Surgical management of pelvic organ prolapse in women (Review)

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TABLE OF CONTENTS

[Intervention Review]

Surgical management of pelvic organ prolapse in women

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ABSTRACT

Background

Pelvic organ prolapse may occur in up to 50% of parous women. A variety of urinary, bowel and sexual symptoms may be associated with the prolapse.

Objectives

To determine the effects of the many different surgeries used in the management of pelvic organ prolapse.

Search methods

We searched the Cochrane Incontinence Group Specialised Register *(*9 February 2009*)* and reference lists of relevant articles. We also contacted researchers in the field.

Selection criteria

Randomised or quasi-randomised controlled trials that included surgical operations for pelvic organ prolapse.

Data collection and analysis

Trials were assessed and data extracted independently by two review authors. Six investigators were contacted for additional information with five responding.

Main results

Forty randomised controlled trials were identified evaluating 3773 women. Abdominal sacral colpopexy was better than vaginal sacrospinous colpopexy in terms of a lower rate of recurrent vault prolapse (RR 0.23, 95% CI 0.07 to 0.77) and less dyspareunia (RR 0.39, 95% CI 0.18 to 0.86). However there was no statistically significant difference in re-operation rates for prolapse (RR 0.46, 95% CI 0.19 to 1.11). The vaginal sacrospinous colpopexy was quicker and cheaper to perform and women had an earlier return to activities of daily living. The three trials contributing to this analysis were clinically heterogeneous.

For anterior vaginal wall prolapse, standard anterior repair was associated with more recurrent cystoceles than when supplemented with a polyglactin mesh inlay (RR 1.39, 95% CI 1.02 to 1.90) or porcine dermis mesh inlay (RR 2.72, 95% CI 1.20 to 6.14); but data on morbidity and other clinical outcomes were lacking. Standard anterior repair was associated with more anterior compartment failures

on examination than for polypropylene mesh repair as an overlay (RR 2.14, 95% CI 1.23 to 3.74) or armed transobturator mesh (RR 3.55, 95% CI 2.29 to 5.51). Data relating to polypropylene mesh overlay were extracted from conference abstracts without any peer reviewed manuscripts available and should be interpreted with caution. No differences in subjective outcomes, quality of life data, de novo dyspareunia, stress incontinence, re-operation rates for prolapse or incontinence were identified. Blood loss with transobturator meshes was significantly higher than for native tissue anterior repair. Mesh erosions were reported in 10% (30/293) of anterior repairs with polypropylene mesh.

For posterior vaginal wall prolapse, the vaginal approach was associated with a lower rate of recurrent rectocele or enterocele, or both, than the transanal approach (RR 0.24, 95% CI 0.09 to 0.64); although there was a higher blood loss and post-operative narcotic use. No data exist on efficacy or otherwise of polypropylene mesh in the posterior vaginal compartment.

Meta-analysis on the impact of continence surgery at the time of prolapse surgery was performed with data from seven studies. Continence surgery at the time of prolapse surgery in continent women did not significantly reduce the rate of post-operative stress urinary incontinence (RR 1.39, 95% CI 0.53 to 3.70; random-effects model).

Authors' conclusions

Abdominal sacral colpopexy was associated with a lower rate of recurrent vault prolapse and dyspareunia than with vaginal sacrospinous colpopexy. These benefits must be balanced against a longer operating time, longer time to return to activities of daily living and increased cost of the abdominal approach. The use of mesh or graft inlays at the time of anterior vaginal wall repair reduces the risk of recurrent anterior wall prolapse, on examination. Posterior vaginal wall repair may be better than transanal repair in the management of rectoceles in terms of recurrence of prolapse. The value of the addition of a continence procedure to a prolapse repair operation in women who are dry before operation remains to be assessed. Adequately powered randomised controlled clinical trials are urgently needed on a wide variety of issues and particularly need to include women's perceptions of prolapse symptoms.

PLAIN LANGUAGE SUMMARY

Surgical management of pelvic organ prolapse in women

Pelvic organs, such as the uterus, bladder or bowel, may protrude into the vagina due to weakness in the tissues that normally support them. The symptoms that they cause vary depending on the type of prolapse and include bladder, bowel and sexual problems, pain and a prolapse sensation. The types of repair surgery vary depending on the type of prolapse and associated symptoms. The impact of pelvic organ prolapse surgery on bowel, bladder and sexual function can be unpredictable and may make symptoms worse or result in new symptoms, such as leakage of urine or problems with intercourse.

The review found 40 trials amongst 3773 women with a variety of types of prolapse. The trials showed that abdominal sacral colpopexy may be better than vaginal sacrospinous colpopexy for uterine or vaginal vault prolapse. Limited evidence suggests that vaginal surgery may be better than transanal surgery for posterior vaginal wall prolapse. The use of grafts (biological or synthetic) reduces the risk of recurrent anterior wall prolapse, determined on examination. Evidence of benefit to the woman, including symptoms and quality of life improvement, is lacking for the use of grafts over native tissue repairs. However, there was not enough evidence on most types of common prolapse surgery nor about the use of mesh or grafts in vaginal prolapse surgery.

BACKGROUND

Pelvic organ prolapse is common and is seen in 50% of parous women (Beck 1991). The annual aggregated rate of associated surgery is in the range of 10 to 30 per 10,000 women (Brubaker 2002).

Description of the condition

Pelvic organ prolapse is the descent of one or more of the pelvic organs (uterus, vagina, bladder or bowel). The different types of prolapse include:

- upper vaginal prolapse i.e. uterus, vaginal vault (after

hysterectomy when the top of the vagina drops down);

- anterior vaginal wall prolapse i.e. cystocele (bladder descends), urethrocele (urethra descends), paravaginal defect (pelvic fascia defect);
- posterior vaginal wall prolapse i.e. enterocele (small bowel descends), rectocele (rectum descends), perineal deficiency.

A woman can present with prolapse of one or more of these sites. The aetiology of pelvic organ prolapse is complex and multi-factorial. Possible risk factors include pregnancy, childbirth, congenital or acquired connective tissue abnormalities, denervation or weakness of the pelvic floor, ageing, hysterectomy, menopause and factors associated with chronically raised intra-abdominal pressure (Bump 1998; Gill 1998; MacLennan 2000).

Women with prolapse commonly have a variety of pelvic floor symptoms only some of which are directly related to the prolapse. Generalised symptoms of prolapse include pelvic heaviness; bulge, lump or protrusion coming down from the vagina; a dragging sensation in the vagina or backache. Symptoms of bladder, bowel or sexual dysfunction are frequently present. For example, women may need to reduce the prolapse by using their fingers to push the prolapse up to aid urinary voiding or defecation. These symptoms may be directly related to the prolapsed organ, for example poor urinary stream when a cystocele is present or obstructed defecation when a rectocele is present. They may also be independent of the prolapse, for example symptoms of overactive bladder when a cystocele is present.

The term de novo stress urinary incontinence is used to describe stress incontinence that develops following surgical correction of the prolapse, amongst women who were continent prior to surgery. De novo stress urinary incontinence is clearly disappointing to women and was one of the outcome measures considered in this review. Occult stress incontinence is the term used to describe stress urinary incontinence which is demonstrable only when the prolapse is reduced, in otherwise continent women.

Treatment of prolapse depends on the severity of the prolapse, its symptoms, the woman's general health, and surgeon preference and capabilities. Options available for treatment are conservative, mechanical or surgical interventions.

Generally, conservative or mechanical treatments are considered for women with a mild degree of prolapse, for those who wish to have more children, the frail or those women unwilling to undergo surgery. Conservative and mechanical interventions have been considered in separate Cochrane reviews (Adams 2004; Hagen 2006). There was no good evidence to guide management in either of these reviews.

Description of the intervention

The current review considers all surgical procedures for women with pelvic organ prolapse. The aims of surgery include:

- the restoration of normal vaginal anatomy;
- the restoration or maintenance of normal bladder function;
- the restoration or maintenance of normal bowel function;
- the restoration or maintenance of normal sexual function.

A wide variety of abdominal and vaginal surgical techniques are available for the treatment of prolapse (see Appendix 1). The most common procedures are anterior repair (colporrhaphy) for anterior vaginal wall prolapse and posterior repair (colporrhaphy) for posterior vaginal wall prolapse. Together, these account for over 90% of all prolapse operations. Two main approaches can be used.

- Vaginal approaches include vaginal hysterectomy, anterior or posterior vaginal wall repair (colporrhaphy), McCall culdoplasty, Manchester repair (amputation of the cervix with uterus suspension to the cardinal ligaments), prespinous and sacrospinous colpopexy, enterocele ligation, paravaginal repair, Le Fortes procedure and perineal reconstruction.
- Abdominal approaches include hysterectomy, sacral colpopexy, paravaginal repair, vault suspending and uterosacral ligament plication, enterocele ligation and posterior vaginal wall repair; abdominal surgery can be performed through an open incision or with laparoscopy requiring small incisions.

A combination of some of these procedures may be employed in the surgical correction of prolapse because more than one type of prolapse may occur.

In addition to the variety of prolapse operations, the surgeon must choose whether to use absorbable sutures such as polyglycolic acid based materials (for example polyglactin), delayed-absorption sutures such as polydioxanone or non-absorbable sutures such as polypropylene. Furthermore, some techniques require the routine use of grafts or mesh, for example sacral colpopexy where different materials can be used to bridge the gap between the vaginal cuff and the hollow of the sacrum; whereas for others, grafts are optional. Graft material can be synthetic (for example polypropylene or polyglactin mesh) or biological. Biological grafts can be further divided into autologous (for example fascia), alloplastic (for example porcine dermis) or homologous (for example cadaveric fascia lata).

The choice of operation depends on a number of factors, which include the nature, site and severity of the prolapse; whether there are additional symptoms affecting urinary, bowel or sexual function; the general health of the woman and surgeon preference and capability. Concomitant procedures to treat or prevent urinary incontinence are also often performed at the same time.

To aid the assessment of the success of surgery, clear pre and post-operative site-specific vaginal grading and details of the operative intervention should be recorded in the reports.

Why it is important to do this review

The wide variety of surgical treatments available for prolapse indicates the lack of consensus as to the optimal treatment. Guidelines have been published using the available literature but are based on

studies of mixed type and quality (Carey 2001). Provided that sufficient numbers of trials of adequate quality have been conducted, the most reliable evidence is likely to come from the consideration of randomised controlled trials, and this is the basis for the review. The aim is to help identify optimal practice and to highlight where there is a need for further research.

OBJECTIVES

To determine the effects of surgery in the management of pelvic organ prolapse including bladder and bowel symptoms and problems with sexual function.

The following comparisons were made.

1. One type of upper vaginal prolapse (uterine and vaginal vault) repair versus another

Including open or laparoscopic abdominal sacral colpopexy, vaginal sacrospinous colpopexy, vaginal or abdominal hysterectomy, high levator myorrhaphy, uterosacral ligament vault suspension, vaginal Mayo McCall repair.

2. One type of anterior vaginal wall prolapse repair versus another

Including anterior vaginal wall repair (anterior colporrhaphy) with or without graft reinforcement, abdominal paravaginal repair.

3. One type of posterior vaginal wall prolapse repair versus another

Including posterior vaginal wall repair (posterior colporrhaphy) with or without graft reinforcement, transanal repair, abdominal posterior repair.

4. Any type of surgical prolapse repair versus conservative treatment

5. Any type of surgical prolapse repair versus mechanical devices

6. Prolapse repair without continence surgery versus prolapse repair with any continence surgery

Incontinent or continent women or women with potential stress urinary incontinence (for example detected on reduction of prolapse prior to surgery) treated with formal continence surgery at the time of prolapse surgery, versus being left untreated.

7. No graft versus use of graft (synthetic mesh or biological)

8. One type of graft (synthetic mesh or biological) versus another type of graft

9. One type of suture versus another type of suture

METHODS

Criteria for considering studies for this review

Types of studies

Randomised controlled trials (RCT) or quasi-randomised controlled clinical trials (CCT) in which at least one arm was a surgical intervention for pelvic organ prolapse.

Types of participants

Adult women seeking treatment for symptomatic pelvic organ prolapse. Both primary and recurrent prolapse were considered. Pelvic organ prolapse includes:

- upper vaginal prolapse (uterine or vaginal vault);
- anterior vaginal wall prolapse (cystocele, urethrocele, paravaginal defect);
- posterior vaginal wall prolapse (enterocele, rectocele, perineal deficiency).

Types of interventions

Trials including any type of abdominal or vaginal surgery for pelvic organ prolapse in at least one trial group. Comparison interventions included no treatment, conservative management, a mechanical device, or an alternative approach to surgery. Concomitant operations to treat or prevent urinary incontinence were also evaluated.

Types of outcome measures

Primary outcomes

Women's observations related to prolapse

- Perceived cure or improvement in prolapse symptoms
- Acceptability of procedure or satisfaction with outcome (e.g. Patient Global Impression of Improvement (PGI-I))
- Prolapse-specific quality of life questionnaires (e.g. Prolapse - Quality of Life (P-QOL), Sheffield Prolapse Symptoms Questionnaire)

Secondary outcomes

Clinicians' observations related to prolapse

Site-specific grading of prolapse, reported as rate of recurrence, for example:

- Baden-Walker half-way system (Baden 1972);
- International Continence Society Pelvic Organ Prolapse Quantification System (POP-Q) classification (Bump 1996a).

Quality of life

- Other condition-specific quality of life questionnaire: related to urinary incontinence (e.g. BFLUTS, IIQ, ICI-SF); sexual function (e.g. PISQ, ICIQ-FLUTSsex); bowel function (e.g. Faecal Incontinence Quality of Life Scale, Wexner score)
- Generic quality of life or health status measures (e.g. Short-Form 36) (Ware 1992)
- Psychological outcome measures (e.g. Hospital Anxiety and Depression Scale (HADS)) (Zigmond 1983)

Measures of associated symptoms (objective or subjective)

- Bladder symptoms, including symptomatic and occult incontinence
- Bowel symptoms
- Sexual problems

Surgical outcome measures

- Operating time
- Further pelvic organ prolapse surgery
- Further continence surgery

Complications

- Blood loss
- Need for transfusion
- Infection including mesh or graft infection
- Adverse effects (e.g. return to theatre, damage to surrounding viscera, mesh or graft erosion, graft rejection)
- Other adverse effects

Economic measures

For example catheter days, inpatient days, days to return to activities of daily living

- Use of resources
- Costs of interventions or resources
- Resource implications of effects of treatment
- Formal economic evaluations

Search methods for identification of studies

Electronic searches

This review has drawn on the search strategy developed for the Cochrane Incontinence Review Group. Relevant trials were identified from the Group's Specialised Register of controlled trials which is described, along with the Review Group search strategy, under the Group's details in *The Cochrane Library* (For more details please see the 'Specialized Register' section of the Group's module in The Cochrane Library). The Register contains trials identified from the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, CINAHL and handsearching of journals and conference proceedings. The Incontinence Group Specialised Register was searched (most recently February 2009) using the Group's own keyword system (all searches were of the keyword field of Reference Manager 9.5 N, ISI ResearchSoft). The search terms used were:
({design.cct*} OR {design.rct*})
AND
({topic.prolapse*})
AND
({intvent.surg*})
The trials in the Incontinence Group Specialised Register are also contained in CENTRAL.

Searching other resources

We searched the reference lists of relevant articles and contacted researchers in the field.
We did not impose any language or other limits on any of the searches.

Data collection and analysis

Selection of studies

Titles and, if available, abstracts of all possibly eligible studies were assessed by two review authors for their methodological quality (method of randomisation and adequacy of concealment of the randomisation process) and relevance to the review objectives. Full reports of each study likely to be eligible were then independently assessed by at least two review authors using the Cochrane Incontinence Group's assessment criteria. Authors agreed on whether or not to include the study according to the inclusion criteria for the review.

Studies were excluded if they were not randomised or quasi-randomised trials of surgery for women with pelvic organ prolapse. Excluded studies are listed with the reasons for their exclusion in the table Characteristics of excluded studies.

Data extraction and management

Data extraction was undertaken independently by at least two review authors and comparisons made to ensure accuracy. Discrepancies were resolved by discussion or by referral to a third party. Where trial data were not reported adequately, attempts were made to acquire the necessary information from the trialists.

Data synthesis

Included trial data were processed as described in the Cochrane Handbook for Systematic Reviews of Interventions (Higgins 2009). Meta-analyses were undertaken to synthesise trial data, when appropriate. The method of meta-analysis depended on the nature of the outcomes. For categorical outcomes we related the numbers reporting an outcome to the numbers at risk in each group in order to derive a relative risk (RR). For continuous variables we used means and standard deviations to derive a mean difference (MD). As a general rule, a fixed-effect model was used for calculations of summary estimates and their 95% confidence intervals (CI).

Subgroup analysis and investigation of heterogeneity

Trials were only combined if the interventions were similar enough based on clinical criteria. When important heterogeneity was suspected from visual inspection of the results, the Chi^2 test for heterogeneity (at 10%) or the I^2 statistic (Higgins 2003) was determined looking for further differences between the trials. When concern about heterogeneity persisted, a random-effects model was to be used.

Trials were separately identified and combined if they addressed other objectives of the review related to the prevention or treatment of urinary incontinence or to the use of a mesh or graft.

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies; Characteristics of ongoing studies.

Results of the search

Full reports of 59 potentially eligible studies were assessed. For this update, 23 new eligible studies were assessed and 18 new trials were included (Al-Nazer 2007; Ali 2006; Allahdin 2008; Borstad 2008; Braun 2007; Constantini 2007; Constantini 2008; de Tayrac 2008; Dietz 2008; Guerette 2006; Lim 2007; Natale 2007; Natale 2009; Nguyen 2008; Nieminen 2008; Pantazis 2008; Schierlitz 2007; Sivaslioglu 2008). Three previously included studies were updated (Brubaker 2008; Meschia 2007; Roovers 2004). Four ongoing trials were identified (Freeman 2007; Glazener 2009; Tincello 2004; Verleyen 2004): one of these trials (Freeman 2007) has been reported in an interim abstract as Pantazis 2008.

Included studies

In total, 40 randomised controlled trials on the surgical management of pelvic organ prolapse were identified. These were conducted in 12 countries (Italy, USA, Australia, the UK, the Netherlands, Taiwon, Finland, Belgium, Chile, Egypt, France and Singapore). The trials involved a total of 3954 women, all of whom received a surgical intervention.

Five trials (Ali 2006; Borstad 2008; Jeng 2005; Pantazis 2008; Schierlitz 2007) reported median follow up of less than one year and only three trials reported outcomes at greater than five years (Colombo 1997; Colombo 2000; Roovers 2004).

Given the diverse nature of pelvic organ prolapse, to allow a meaningful analysis of the data the review was divided into sections related to the site of the prolapse.

1. Upper vagina including cervix, uterus and vault.
2. Anterior vaginal wall.
3. Posterior vaginal wall.

Further comparisons were made according to the use of mesh or not, and to continence issues.

1. One type of upper vaginal prolapse (uterine and vaginal vault) repair versus another (Comparison 1)

Fifteen trials compared the management of upper vaginal prolapse (Benson 1996; Braun 2007; Brubaker 2008; Constantini 2007; Constantini 2008; Culligan 2005; de Tayrac 2008; Dietz 2008; Jeng 2005; Lo 1998; Maher 2004; Meschia 2004a; Natale 2007; Pantazis 2008; Roovers 2004). Three previously included trials (Brubaker 2008; Meschia 2004a; Roovers 2004) have been updated with data from new publications.

Abdominal sacral colpopexy versus vaginal sacrospinous colpopexy

Three trials addressed this comparison (Benson 1996; Lo 1998; Maher 2004). Benson's trial reported data for 80 of 101 randomised women with uterovaginal or vault prolapse; the women with uterovaginal prolapse all underwent hysterectomy (Benson 1996). Lo's trial reported follow up of 118 of 138 continent women who had at least Stage 3 prolapse; some underwent anterior or posterior repairs or abdominal or vaginal hysterectomy in addition to the repair of the prolapse that was actually being compared in the trial (Lo 1998). Maher's trial included 89 women with post-hysterectomy vaginal vault prolapse (Maher 2004). In the Benson and Maher trials, the abdominal group underwent sacral colpopexy with procedures such as colposuspension, paravaginal repair or a vaginally performed posterior vaginal wall repair, as required. In the vaginal arm of Benson's trial, a bilateral vaginal sacrospinous colpopexy was performed, which was in contrast to a unilateral sacrospinous colpopexy in Maher's trial. In Lo's trial this was not specified but Nichols' method was referenced. Thus, clinical heterogeneity was evident as some women in two of the trials (Benson 1996; Lo 1998) underwent hysterectomy in addition to a prolapse procedure.

Women with stress urinary incontinence were treated with a needle suspension in the vaginal arm of Benson's trial (n = 20) and a colposuspension in the abdominal arm (n = 14) (Benson 1996). Women with stress urinary incontinence or occult incontinence (n = 14, n = 15 in the abdominal and vaginal arms, respectively) received an abdominal colposuspension in both arms of Maher's trial (Maher 2004). In that trial, 27 women had symptoms of overactive bladder at baseline (n = 13, n = 14 respectively). Simple costs were calculated by Benson and Maher, incorporating length of stay and operating theatre cost. Formal cost effectiveness was not reported in either study. However, there was significant variation in the outcome measures (Benson and Lo had incomplete site-specific prolapse reporting; Maher and Lo failed to report time to recurrent prolapse; in Lo optimal surgical cure of prolapse was considered to be Stage 2 prolapse or less). These factors contributed to heterogeneity. Despite these caveats, all three trials were considered to be similar enough for certain outcomes to be combined in a meta-analysis.

Abdominal sacral colpopexy and abdominal hysterectomy versus Mayo McCall and vaginal hysterectomy

One trial compared abdominal sacral colpopexy to the vaginal Mayo-McCall technique in the correction of severe (POP-Q Stage 3-4) central compartment prolapse (Braun 2007). Patients in group A (n = 47) underwent total abdominal hysterectomy (TAH) with or without bilateral salpingo-oophorectomy (BSO) and sacral colpopexy using synthetic combined absorbable and non-absorbable (Vypro) mesh, while patients in group B (n = 47) underwent vaginal hysterectomy (VH) plus anterior and posterior colporrhaphy plus the Mayo McCall procedure using delayed absorbable (PDS) sutures. Mean follow-up time was 33 months (range 20 to 41) for both groups and no concomitant procedures were performed (Braun 2007).

Uterine suspension (preservation) versus vaginal hysterectomy

Abdominal uterine preservation versus vaginal hysterectomy and repair

One trial evaluated only women with uterine prolapse who underwent sacrohysteropexy (with uterine preservation) in the abdominal group (n = 41) and vaginal hysterectomy and vaginal repair with the vault being fixed to the uterosacral cardinal ligament complex in the vaginal group (n = 41) (Roovers 2004). Roovers' trial was analysed as a separate subcategory in the analyses as the vaginal arm did not include a sacrospinous colpopexy and the abdominal group included uterine preservation. In an update, published only as an abstract, the authors presented long-term (eight years) follow up of this prospective randomised trial comparing abdominal sacrohysteropexy and vaginal hysterectomy with anterior or posterior repair, or both, in women with Stage 2 or greater uterine prolapse (POP-Q). Seventy-four of the original 84 patients were alive and able to be contacted for the follow up. Sixty (71%) women completed questionnaires and 31 (37%) were examined (Roovers 2004).

Vaginal sacrospinous uterine suspension versus vaginal hysterectomy

Two trials addressed this comparison.

One trial published as an abstract (Dietz 2008) compared vaginal sacrospinous uterine suspension (with uterine preservation) (n = 31) compared with vaginal hysterectomy (n = 34) with both patient and clinician-reported prolapse outcomes. Dietz used the POP-Q system to determine failure, as Stage 2 or greater. One other trial examined sexual function outcomes after vaginal sacrospinous uterine suspension (with uterine preservation) compared with vaginal hysterectomy (Jeng 2005) but no prolapse or incontinence outcomes were reported.

Hysterectomy with high levator myorrhaphy (HLM) versus hysterectomy with uterosacral vaginal vault suspension (UVVS)

One trial (Natale 2007) compared two procedures for suspension of the vaginal vault: HLM (n = 116) and UVVS (n = 113) in women with Stage 2 vault prolapse in addition to an anterior

vaginal wall prolapse. All women underwent a concomitant vaginal hysterectomy and anterior repair with polypropylene mesh. Demographic parameters and previous prolapse surgeries did not differ between the two groups (Natale 2007). Data were derived from an abstract (ICS 2007) and further information was obtained from the authors.

Open abdominal sacral colpopexy versus laparoscopic sacral colpopexy

One trial reported (in abstract form) a pilot RCT comparing open (n = 15) and laparoscopic (n = 15) sacral colpopexy in the treatment of POP-Q Stage 2 vault prolapse (Pantazis 2008). Women who were medically unfit for sacral colpopexy or those requiring concomitant pelvic surgery were excluded. No CONSORT statement, intention-to-treat analysis or blinding status of the assessors was provided and continuous data were reported without standard deviations. Demographic details were similar in both groups (Pantazis 2008).

Vaginal sacrospinous colpopexy versus posterior intravaginal slingplasty (PIVS) (infracoccygeal sacropexy)

Two trials compared vaginal sacrospinous colpopexy with PIVS using multi-filament polypropylene tape for uterine or vault prolapse (de Tayrac 2008; Meschia 2004a), one of which was added in the update. de Tayrac 2008 and colleagues conducted a multicentre study comparing multi-filament PIVS (Tyco, France) with sacrospinous suspension for the management of symptomatic Stage 2 or greater uterine or vaginal vault prolapse. Unfortunately, due to withdrawal of the multi-filament polypropylene tape from the market, recruitment stopped prematurely after randomisation of 21 women in the mesh group and 24 in the sacrospinous group. Meschia et al compared 33 women receiving the PIVS and 33 women who underwent the sacrospinous colpopexy for uterine or vault prolapse (Meschia 2004a). This report was an update of the trial that was previously included using unpublished data obtained from the authors.

Prolapse repair without continence surgery versus prolapse repair with any continence surgery (also Comparison 6)

Two trials (Brubaker 2008; Constantini 2008) evaluated the efficacy of adding continence surgery (Burch colposuspension) to abdominal sacral colpopexy. Two-year data were available for the Brubaker trial (Brubaker 2008). As the primary focus of these papers was continence outcomes they were evaluated in section 6 on prolapse and continence surgery.

One type of graft versus another type of graft in sacral colpopexy (also Comparison 8)

One double-blind RCT compared a cadaveric fascia lata graft (Tutoplast) (n = 46) with polypropylene mesh (Trelex) (n = 54) in abdominal sacral colpopexy for post-hysterectomy vaginal vault prolapse (Culligan 2005). Amongst these groups, 41% and 44% respectively had undergone previous prolapse or incontinence surgery. A tension-free vaginal tape operation was performed for stress urinary incontinence, abdominal paravaginal repair for paravaginal support defects and rectocele repair as required. The methodology stated that bladder, bowel, sexual function and quality of life were assessed by questionnaires but these results have not yet been published. The post-operative evaluation was performed by a nurse specialist who was blinded to treatment allocation. This study was analysed in a separate subcategory as women in both arms received a graft or mesh.

2. One type of anterior vaginal wall prolapse repair versus another (Comparison 2)

Nineteen trials included various surgical procedures for treating anterior vaginal wall prolapse with or without stress urinary incontinence (Al-Nazer 2007; Ali 2006; Bump 1996; Cervigni 2005; Colombo 1996; Colombo 1997; Colombo 2000; De Ridder 2004; Gandhi 2005; Guerette 2006; Lim 2007; Meschia 2004; Meschia 2007; Natale 2009; Nguyen 2008; Nieminen 2008; Sand 2001; Sivaslioglu 2008; Weber 2001) and one was updated with two-year data (Meschia 2007).

Due to clinical heterogeneity in stage of prolapse, types of operations, and whether women with previous surgery, urinary incontinence or occult incontinence had been included, only some trials could be combined for meta-analysis:

- Sand 2001 with Weber 2001;
- Bump 1996 with Colombo 1997; and
- Al-Nazer 2007 with Ali 2006; Lim 2007; Nguyen 2008; Nieminen 2008 and Sivaslioglu 2008.

Anterior vaginal wall prolapse repair without continence surgery versus prolapse repair with any continence surgery (also Comparison 6)

Five trials addressed this comparison (Bump 1996; Colombo 1996; Colombo 1997; Colombo 2000; Meschia 2004).

Anterior vaginal wall repair alone versus anterior repair with pubo-urethral ligament plication

One trial (Colombo 1996) enrolled only continent women with cystocele Stage 2 or more. None of the women had pre-operative detrusor overactivity. The trialists studied the prevention of de novo stress urinary incontinence after cystopexy with (n = 50) or without (n = 52) pubo-urethral ligament plication.

Anterior vaginal wall repair with urethrovesical plication versus anterior repair with bladder neck needle suspension

Two trials (Bump 1996; Colombo 1997) were considered to be sufficiently similar to allow the data to be combined in meta-analysis (Colombo 1997, see above, compared cystopexy with pubo-urethral ligament plication versus Pereyra bladder neck needle suspension) .

In one trial (Bump 1996) women were all continent but had bladder neck hypermobility in addition to Stage 3 or 4 prolapse (POP-Q, as recommended by the International Continence Society (ICS)). All women had an anterior vaginal wall repair for anterior vaginal wall prolapse ICS Stage 3 or 4. The trialists compared the effects of bladder neck needle suspension (n = 14) with plication of the urethrovesical junction endopelvic fascia (n = 15) on post-operative development of stress incontinence. They analysed 29 women; 10 out of 15 in the fascia plication group and 10 out of 14 in the needle suspension group had potential stress incontinence (defined as a mean pressure transmission ratio of less than 90% for the proximal three-quarters of the urethra or a positive stress test during barrier testing).

In a second trial, Colombo 1997 enrolled women with cystocele Stage 2 or more and either occult (n = 73) or symptomatic (n = 36) urinary incontinence (Colombo 1997). None of the women had pre-operative detrusor overactivity. The trialists compared cystopexy with posterior pubo-urethral ligament plication (n = 55) versus cystopexy plus Pereyra bladder neck suspension (n = 54).

Anterior vaginal wall repair versus Burch colposuspension

In this trial from Italy, women were studied who had primary Stage 2 or 3 cystocele and concomitant urodynamic urinary stress incontinence (Colombo 2000). None of the women had pre-operative detrusor overactivity. The 68 women were randomised to receive either Burch colposuspension (n = 35) or anterior vaginal wall repair (n = 33).

Prolapse repair and urethrovesical endopelvic fascia plication versus prolapse repair and tension-free vaginal tape (TVT)

In another Italian trial, women with severe genital prolapse and occult stress urinary incontinence were enrolled (Meschia 2004). None of the women had pre-operative detrusor overactivity. The women were randomised to receive either urethrovesical endopelvic fascia repair (n = 25) or TVT (n = 25) in addition to vaginal hysterectomy and prolapse repair. Most also had a posterior repair (23 out of 25, and 20 out of 25 respectively).

No graft (synthetic or biological) versus use of graft (also Comparison 7)

Fourteen trials incorporated mesh in one or both arms of the comparison (Al-Nazer 2007; Ali 2006; Cervigni 2005; De Ridder 2004; Gandhi 2005; Guerette 2006; Lim 2007; Meschia 2007; Natale 2009; Nguyen 2008; Nieminen 2008; Sand 2001; Sivaslioglu 2008; Weber 2001). Five of the trials excluded women who were incontinent at baseline or needed a concomitant continence procedure such as suburethral tape, colposuspension, sling or needle suspension (Cervigni 2005; Natale 2009; Nieminen 2008; Sivaslioglu 2008; Weber 2001). One trial included women with stress urinary incontinence (SUI) undergoing suburethral tapes only (Nguyen 2008).

Two trials compared traditional anterior vaginal wall repair with anterior vaginal wall repair supplemented by the use of absorbable mesh inlay (polyglactin mesh, Vicryl) for cystocele (Sand 2001; Weber 2001). These two trials were considered similar enough to be combined in a meta-analysis. To enable meaningful comparison between these trials, the standard and ultralateral anterior vaginal wall repair groups in Weber's trial (Weber 2001) were combined to mimic Sand's groups (Sand 2001) when comparing anterior vaginal wall repair with and without polyglactin mesh inlay.

Six trials compared anterior colporrhaphy to a variety of non-absorbable synthetic mesh repair techniques (Al-Nazer 2007; Ali 2006; Lim 2007; Nguyen 2008; Nieminen 2008; Sivaslioglu 2008).

Anterior vaginal wall repair versus anterior vaginal wall repair with synthetic absorbable mesh

- Anterior vaginal wall repair versus anterior vaginal wall repair with polyglactin mesh (Vicryl) inlay

Sand randomly allocated women with cystocele, to or beyond the introitus, to anterior vaginal wall repair alone (n = 70) or anterior vaginal wall repair and polyglactin mesh inlay (n = 73) (Sand 2001). The surgery was for primary cystocele in 85% of cases. Concomitant surgery was performed as required and included vaginal hysterectomy, vaginal sacrospinous colpopexy, posterior vaginal wall repair (n = 67 /70 and 65 /73) and continence surgery. The women who underwent posterior vaginal wall repair and were assigned to the polyglactin mesh inlay for the cystocele also had their posterior vaginal wall repair augmented with polyglactin mesh.

- Ultralateral anterior vaginal wall repair versus anterior vaginal wall repair with polyglactin mesh (Vicryl) inlay

Weber evaluated the efficacy of standard anterior vaginal wall repair (n = 33), ultralateral anterior vaginal wall repair (n = 24) and standard anterior vaginal wall repair plus polyglactin mesh inlay (n = 26) in women who underwent surgery for anterior vaginal wall prolapse (Weber 2001). Other concomitant prolapse surgery was performed as required but women who required a continence operation were excluded. However, no data for continence outcomes were provided.

Anterior vaginal wall repair (anterior colporrhaphy) versus repair with synthetic non-absorbable mesh

Six trials compared anterior colporrhaphy to a variety of synthetic non-absorbable mesh repair techniques and were considered similar enough to combine in various meta-analyses (Al-Nazer 2007; Ali 2006; Lim 2007; Nguyen 2008; Nieminen 2008; Sivaslioglu 2008).

Al-Nazer et al compared anterior colporrhaphy (n = 20) and vaginal repair with mesh (n = 20) in women with anterior vaginal wall prolapse. Patients with Stage 2 or more vaginal prolapse were included although the inclusion criteria did not distinguish between the various vaginal compartments and exclusion criteria were not given. Self-styled armless soft polypropylene (Gynemesh) mesh was utilised in the mesh group and results at one year were reported (Al-Nazer 2007).

Ali and colleagues evaluated the anterior colporrhaphy with (n = 54) and without (n = 54) a tension-free polypropylene (Gynemesh PS) mesh in patients with Grade 3 or 4 cystourethrocele (Baden-Walker halfway system). Failure was defined as Grade 2 or worse anterior vaginal wall prolapse. Six-month results were presented (Ali 2006).

Lim and colleagues compared traditional anterior and posterior fascial plication using polydioxanone sutures (n = 60) to anterior and posterior Gynemesh PS overlay (n = 62) in the management of women with Grade 2 or more POP-Q cystocele or rectoceles, or both, with no apical prolapse to the introitus. No exclusion criteria were listed and one-year review data were extracted from an abstract, with the authors declining to make full results available (Lim 2007).

Nguyen and colleagues reported on anterior colporrhaphy (n = 38 women, 2/0 PDS sutures for plication) and anterior colporrhaphy plus polypropylene mesh kit repair (n = 38, Perigee, American Medical Systems) at one year with a full published paper and two-year abstract (Nguyen 2008). One patient in the mesh group withdrew. Adequate randomisation and patient allocation concealment were described, with assessors of outcome blinded to allocation. The CONSORT statement was included and outcomes were recorded on an intention-to-treat basis.

Nieminen 2008 and colleagues compared anterior colporrhaphy alone and anterior colporrhaphy plus a self-styled mono-filament mesh (Parietene light, Sofradim, France) in post-menopausal women with symptomatic anterior compartment prolapse at the hymen or beyond. The data were reported in two full-text publications, at one and two years. There were two inconsistencies between the data reported at one year and two years (Nieminen 2008). The reduction in mesh exposures from 17% at one year to 8% at two years is difficult to explain. Furthermore, the percentage of patients having undergone previous prolapse surgery at one year was 27% in the anterior colporrhaphy group and 18% in the mesh group, while the two year report quoted 20% and 14% respectively.

Sivaslioglu 2008 and colleagues evaluated a site-specific polyglactin 910 repair (n = 45) and self-styled four-armed polypropylene (Parietene, Sofradim) mesh (n = 45) in "women having primary cystocele". One-year outcomes were reported. Those with SUI, rectocele or enterocele were excluded. The management of concomitant apical prolapse was not specified in either group and assessment was performed by non-blinded reviewers. There were some variations between the studies in the performance of anterior colporrhaphy:

- suture types (where reported) were PDS sutures (Lim 2007; Nguyen 2008), multifilament 0 or 2/0 (Nieminen 2008) and site-specific polyglactin 910 repair (Sivaslioglu 2008);
- mesh types were mesh overlay Gynemesh PS (Al-Nazer 2007; Ali 2006; Lim 2007), armed transobturator meshes (Nguyen 2008; Nieminen 2008; Sivaslioglu 2008) and anterior colporrhapy plus polypropylene mesh repair (Ali 2006; Nguyen 2008; Nieminen 2008).

Anterior vaginal wall repair versus anterior vaginal wall repair with biological grafts

Three trials compared anterior vaginal wall repair with anterior vaginal wall repair with biological graft overlays (Gandhi 2005; Guerette 2006; Meschia 2007).

- Anterior vaginal wall repair versus anterior vaginal wall repair with cadaveric fascial lata (Tutoplast)

Gandhi et al compared anterior colporrhaphy without (n = 78) and with cadaveric fascial lata (Tutoplast 2 x 4 cm) (n = 76) for primary or recurrent anterior vaginal wall prolapse Stage 2 or more (Gandhi 2005). Standardised concomitant surgery included vaginal hysterectomy and McCall sutures for uterine prolapse and sacrospinous colpopexy for vault prolapse. For SUI a Cooper's ligament sling was initially used, later suburethral slings were performed. Success rates for stress incontinence were not published.

- Anterior vaginal wall repair versus anterior vaginal wall repair with porcine dermis inlay (Pelvicol)

Meschia 2007 reported outcomes of anterior colporrhaphy (fascial plication) without (n = 91) and with porcine dermis inlay (Pelvicol) (n = 85) for primary anterior vaginal wall prolapse Stage 2 or more (Meschia 2007). Concomitant surgery was standardised and included vaginal hysterectomy with culdoplasty for uterine prolapse, posterior repair for posterior compartment defects and suburethral slings for SUI as required.

- Anterior vaginal wall repair versus anterior wall repair with bovine pericardium collagen

Guerette and colleagues reported, in abstract form, a multi-centre RCT comparing anterior colporrhaphy (n = 46) with anterior colporrhaphy plus bovine pericardium collagen matrix graft reinforcement (n = 44). No CONSORT statement or inclusion and exclusion criteria were available. POP-Q findings and complications were reported at 12 months without QoL or functional data (Guerette 2006).

One type of graft (synthetic mesh or biological) versus another type of graft in anterior vaginal wall prolapse repair (also Comparison 8)

Anterior vaginal wall repair comparing different types of mesh or grafts with each other

Three trials addressed this comparison (Cervigni 2005; De Ridder 2004; Natale 2009) comparing synthetic absorbable (De Ridder 2004) or non-absorbable (Cervigni 2005; Natale 2009) mesh with repairs using biological grafts.

Cervigni 2005 compared Prolene Soft (mono-filament polypropylene mesh, n = 36) with porcine dermis (Pelvicol, n = 36) for women with recurrent cystocele, with a mean follow up of eight months.

De Ridder 2004 and colleagues (in a conference abstract only) performed a four-defect cystocele repair and reinforced the repair with porcine dermis (Pelvicol) (n = 65) or polyglactin mesh (Vicryl) (n = 69) for primary or recurrent Stage 3 anterior vaginal wall prolapse. Concomitant surgery included vaginal hysterectomy and posterior repair (De Ridder 2004).

Natale 2009 and colleagues prospectively compared self-styled ('armed') polypropylene mesh (Gynemesh PS) (n = 96) with similarly styled porcine biological graft Pelvicol (n = 94) in the management of symptomatic Stage 2 or greater anterior vaginal wall prolapse. Women did not require an anti-incontinence procedure and patients with diabetes mellitus or collagen disease were excluded. Two-year results were reported.

3. One type posterior vaginal wall prolapse repair versus another (Comparison 3)

Four trials included women with posterior vaginal wall prolapse (Kahn 1999; Nieminen 2004; Paraiso 2006; Sand 2001).

Two trials (Kahn 1999; Nieminen 2004) compared vaginal and transanal approaches for the management of rectoceles. In addition, another trial provided data for women with rectoceles undergoing posterior repair with and without mesh (Sand 2001). A fourth trial compared rectocele repair using traditional posterior colporrhaphy (n = 28), site-specific repair (n = 27) and site-specific repair augmented with a porcine small intestine submucosa graft inlay (Fortagen, Organogenesis) (n = 26) (Paraiso 2006).

The trials involving transanal repair were only published as abstracts for scientific meetings but the authors provided additional data. Each trial had slightly different inclusion criteria. Kahn included women who had symptoms of prolapse or impaired rectal evacuation with incomplete emptying on isotope defecography and normal compliance on anorectal manometry (Kahn 1999). Nieminen included women with symptomatic rectoceles not responding to conservative treatment (Nieminen 2004). Importantly, women with compromised anal sphincter function and other symptomatic genital prolapse were excluded. In both trials the vaginal repair was performed by gynaecologists and the transanal repair by colorectal surgeons. In Kahn's trial the posterior vaginal wall repair was performed using levator plication and in Nieminen's trial the rectovaginal fascia was plicated. The trials were considered to be similar enough to be combined in a meta-analysis.

The Paraiso trial was funded from an unrestricted research grant from Organogenesis (Paraiso 2006). The trialists included women with posterior wall prolapse, although women could have prolapse at other vaginal sites or urinary incontinence. They excluded women who required other colorectal surgery or had a pork allergy. Outcomes were independently assessed by nurse assessors blinded to treatment allocation and using prolapse quantification and validated prolapse, bowel, bladder and sexual function questionnaires.

In the fourth trial (Sand 2001) the women were included if they had a central cystocele, with or without urinary incontinence, for which they required an anterior repair. The majority of the women were also having a posterior repair for rectocele (132 out of 143, 92%). The women allocated to the mesh augmentation arm for their anterior repair also had their posterior repair augmented with mesh; recurrence rates of rectocele were reported separately. However, no clinical outcomes relating to urinary, bowel or sexual function were reported .

4. Any type of surgical prolapse repair versus conservative treatment

There were no trials which compared surgery with either conservative treatment.

5. Any type of surgical prolapse repair versus mechanical devices

There were no trials which compared mechanical devices.

6. Prolapse repair without continence surgery versus prolapse repair with any continence surgery

Twelve trials included only continent women or reported outcomes separately for a continent subsample (Brubaker 2008; Bump 1996; Cervigni 2005; Colombo 1996; Colombo 1997; Constantini 2007; Lo 1998; Maher 2004; Meschia 2004; Natale 2009; Schierlitz 2007; Sivaslioglu 2008). Occult urinary incontinence is diagnosed in women with prolapse and without symptoms of stress urinary incontinence (SIUI) who have demonstrable SUI when the prolapse is reduced. Two trials included women with occult SUI and provided data separately for their urinary outcomes (Meschia 2004; Schierlitz 2007). One trial included as a

single group both continent women and those with 'potential' incontinence (the term 'potential' was interpreted as occult) (Bump 1996).
Two trials provided data for women who were incontinent at baseline but were randomised to receive prolapse surgery with and without continence surgery (TVT, Borstad 2008; colposuspension, Constantini 2008).

Continent women in upper vaginal prolapse trials

Five trials provided data for this comparison (Brubaker 2008; Constantini 2007; Lo 1998; Maher 2004; Schierlitz 2007).
Although Lo did not report the total number of women who developed new urinary incontinence after surgery, he did report how many women required subsequent surgery for incontinence (Lo 1998).
In another trial, Maher performed additional Burch colposuspensions for all women with urodynamically proven or occult SUI in women randomly allocated to abdominal sacral colpopexy (n = 14) or vaginal sacrospinous colpopexy (n = 15) for vaginal vault prolapse (Maher 2004). Women undergoing concomitant colposuspension were stratified to ensure equal representation in the groups. Occult SUI at baseline was detected in 5 out of 14 women (11% of 46 in whole arm) of the abdominal group and 6 out of 15 (13% of 43) of the vaginal group; urinary outcomes were not available separately according to this baseline diagnosis. However, data were provided about the occurrence of new urinary incontinence in women previously continent (n = 22 and n = 24 respectively) and new overactive bladder symptoms in women previously unaffected by urgency, detrusor overactivity or overactive bladder syndrome (n = 33 and n = 29).
Three studies determined the effect of including or excluding continence surgery in women undergoing standardised prolapse surgery who had a variable assessment of stress continence status including: stress continent on a MESA scoring system (although 19.1% had symptoms of SUI and 39% had a positive stress test in Brubaker 2008); no stress incontinence (Constantini 2007); and stress continent but with a positive stress test with or without prolapse reduced (Schierlitz 2007).

Continent women in anterior vaginal wall prolapse trials

Seven trials provided data for this comparison (Bump 1996; Cervigni 2005; Colombo 1996; Colombo 1997; Meschia 2004; Natale 2009; Sivaslioglu 2008).
In one Italian trial in women with anterior prolapse, all the women were continent but a continence procedure was only performed in one arm (pubo-urethral ligament plication in addition to a standard colporrhaphy) (Colombo 1996).
In another Italian trial, all the women were continent but demonstrated to have occult SUI on pre-operative prolapse reduction (Meschia 2004).
Another trial included a mixed sample of women with and without incontinence (Colombo 1997). However, data were presented separately, allowing assessment of prolapse surgery on urinary outcomes in the 73 continent women with occult incontinence.
In Bump's trial, 20 out of 29 women (10 out of 15 in the fascia plication group and 10 out of 14 in the needle colposuspension group) had urodynamically defined potential stress incontinence (defined as a mean pressure transmission ratio of less than 90% for the proximal three-quarters of the urethra or a positive stress test during barrier testing) (Bump 1996). However, all the women were symptomatically continent and both arms included a continence procedure. Data from this trial were aggregated with those from Colombo 1997.
In two trials of two different types of mesh [mono-filament polypropylene and porcine dermis (Pelvicol, Bard) (Cervigni 2005; Natale 2009), women who required a concomitant anti-incontinence procedure were excluded. Cervigni 2005 reported pre and post-operative overactive bladder rates but not post-operative continence rates, while Natale 2009 reported on both.
In one further trial, comparing polyglactin with polypropylene mesh, women with SUI were excluded (Sivaslioglu 2008).

Incontinent women in prolapse surgery trials

Two trials provided data for this comparison (Borstad 2008; Constantini 2008).
Borstad 2008 randomly allocated women with pelvic organ prolapse and SUI to unspecified prolapse surgery without TVT (group A, n = 94) and with TVT (group B, n = 87). At three months, women in group A with persisting SUI were able to undergo TVT and 53/94 did so. Pre-operatively, group B had a significantly lower severity of stress urinary leakage on stress testing.
In another trial, Constantini 2008 and colleagues reported a four-year evaluation of sacral colpopexy with or without colposuspension in women with pelvic organ prolapse and urinary incontinence. All the women had SUI, mixed urinary incontinence (MUI) or were stress continent but had urethral leakage at urodynamic determinations with the prolapse reduced (occult UI). Amongst the 47 women evaluated, 24 presented with uterovaginal prolapse, 13 with vault prolapse and two with cystocele and rectocele but it was not clear which women had each type of incontinence. The assessors were blinded.

7. No graft versus use of graft (synthetic mesh or biological graft) in anterior or posterior prolapse surgery

Thirteen trials compared standard (no graft or mesh) vaginal prolapse repairs with those which included mesh or graft material: porcine small intestine submucosa graft inlay (Fortagen)

- polyglactin mesh (absorbable synthetic Vicryl) (Allahdin 2008; Sand 2001; Weber 2001),
- porcine dermis graft (biological, Pelvicol) (Meschia 2007),

- porcine small intestine submucosa graft inlay (Fortagen) (Paraiso 2006)
- cadaveric fascia lata graft (biological, Tutoplast) Gandhi 2005,
- bovine pericardium collagen matrix graft reinforcement (biological) (Guerette 2006),
- mono-filament polypropylene mesh (non-absorbable synthetic) (Al-Nazer 2007; Ali 2006; Lim 2007; Nguyen 2008; Nieminen 2008; Sivaslioglu 2008).

In three trials some data were available separately for women who underwent a posterior vaginal wall repair (Lim 2007; Paraiso 2006; Sand 2001).
The data from three trials included women with anterior and posterior compartment prolapse who were undergoing anterior and posterior mesh repair with polypropylene (Lim 2007) and polyglactin (Allahdin 2008; Sand 2001), respectively.
In the trials from Allahdin 2008 and Lim 2007, outcomes were not differentiated for anterior and posterior pelvic organ prolapse (POP).

8. One type of graft (synthetic mesh or biological graft) versus another type of graft

Three trials compared two different types of material overlay in women having anterior repairs:
- mono-filament polypropylene mesh (Prolene Soft, Gynecare) with porcine dermis graft (Pelvicol, Bard) (Cervigni 2005),
- mono-filament polypropylene mesh (Gynemesh) and Pelvicol (Natale 2009),
- porcine dermis graft (Pelvicol) with polyglactin mesh (Vicryl) (De Ridder 2004).

One trial used different materials as inlays for sacral colpopexy in both arms, in women with vault prolapse:
- cadaveric fascia lata graft (Tutoplast) versus polypropylene mesh (Trelex) (Culligan 2005).

9. One type of suture versus another type of suture

One small trial (Allahdin 2008) compared two different suture types in women having anterior or posterior vaginal wall surgery, or both. Six-month and two-year outcomes were reported.
Full details of the included trials are given in the 'Characteristics of included studies' table.

Excluded studies

Overall 17 studies were excluded from the review, six during this update (Barber 2006; Biller 2008; Carramao 2008a; Glavind 2007; Meschia 2007a; Segal 2007). Full details are given in the 'Characteristics of excluded studies' table.

Risk of bias in included studies

Allocation

Sufficient detail was provided in 21 trials to confirm that secure concealment of the randomisation process was used, for example allocation by a remote person or computer (Al-Nazer 2007; Ali 2006; Allahdin 2008; Benson 1996; Brubaker 2008; Bump 1996; Constantini 2008; Culligan 2005; Gandhi 2005; Maher 2004; Meschia 2004; Meschia 2004a; Meschia 2007; Natale 2009; Nguyen 2008; Nieminen 2008; Paraiso 2006; Roovers 2004; Schierlitz 2007; Sivaslioglu 2008; Weber 2001). However, in one of these trials four women received the opposite treatment to their randomised allocation (mesh instead of fascia) and were subsequently analysed in the mesh group thus compromising the randomisation process; an intention-to-treat analysis was not used (Culligan 2005). Of the remainder, eight trials stated that they used computer generated number lists but it was unclear whether the allocation was concealed before assignment; another gave no details of the randomisation process (Jeng 2005). The last trial stated that a computer generated but open number list was used and it was, therefore, classified as a quasi-randomised trial (Colombo 2000).

Blinding

Women and surgeons could not be blinded to the procedure when different surgical routes were compared (Benson 1996; Braun 2007; Colombo 2000; Meschia 2004a; Roovers 2004). Blinding of patients and the post-operative reviewer were performed in five trials (Allahdin 2008; Brubaker 2008; Culligan 2005; Nguyen 2008; Paraiso 2006). Outcome assessments were conducted by non-surgeons in 10 trials (Allahdin 2008; Benson 1996; Constantini 2008; Culligan 2005; Maher 2004; Meschia 2007; Natale 2009; Paraiso 2006; Roovers 2004; Weber 2001).

Incomplete outcome data

Loss to follow up was a variable problem, ranging from zero (Allahdin 2008; Colombo 1997; Jeng 2005; Kahn 1999; Meschia 2004; Meschia 2004a) to 24% (26 out of 109) (Weber 2001). Weber also reported a statistically significant higher loss to follow up in one arm of the trial (ultralateral anterior vaginal wall repair).

Other potential sources of bias

CONSORT statements were reported by eight trials (Brubaker 2008; Constantini 2008; Dietz 2008; Nguyen 2008; Nieminen 2008; Paraiso 2006; Roovers 2004; Sivaslioglu 2008). In 10 trials, data were analysed on an intention-to-treat basis (Allahdin 2008; Brubaker 2008; Jeng 2005; Maher 2004; Meschia 2007; Nguyen 2008; Paraiso 2006; Roovers 2004; Weber 2001).

Baseline descriptive characteristics were reported in all trials and were equally distributed except in three trials: Sand 2001 reported that previous hysterectomy was more common in the mesh overlay group; Kahn (Kahn 1999) reported a difference in menopausal status and previous hysterectomies between the groups; and women in the vaginal sacrospinous colpopexy arm in Meschia's trial were significantly older (Meschia 2004a). Pre-operative prolapse status was reported in all trials but one (De Ridder 2004), but equal distribution and severity of prolapse between groups was not specifically reported in seven trials (Ali 2006; Benson 1996; Bump 1996; Meschia 2004; Pantazis 2008; Sand 2001; Schierlitz 2007). One trial included 7% of women with Stage 1 anterior vaginal wall prolapse pre-operatively (at time of inclusion), which would also have been classified as a post-operative success (Weber 2001).
Length of follow up was less than one year in five trials (Ali 2006; Jeng 2005; Natale 2007; Pantazis 2008; Schierlitz 2007) and greater than five years in another four trials (Colombo 1997; Colombo 2000; Lo 1998; Roovers 2004) with all other trialists reporting results between one and five years.

Effects of interventions

Fifteen studies evaluated surgeries for upper vaginal prolapse (uterine or vault) (Benson 1996; Braun 2007 Brubaker 2008; Constantini 2007; Constantini 2008; Culligan 2005; de Tayrac 2008; Dietz 2008; Jeng 2005; Lo 1998; Maher 2004; Meschia 2004a; Natale 2007; Pantazis 2008; Roovers 2004). Seven of these are new included trials (Braun 2007; Constantini 2007; Constantini 2008; de Tayrac 2008; Dietz 2008; Natale 2007; Pantazis 2008) and three are updates of previously included trials (Brubaker 2008; Meschia 2004a; Roovers 2004). All trials provided data regarding the outcome of prolapse surgery except Jeng 2005. All the trials with mesh used non-absorbable, permanent mesh except one trial in which an absorbable mesh was compared with a non-absorbable mesh (Culligan 2005).

1. One type of upper vaginal prolapse (uterine and vaginal vault) repair versus another (Comparison 1)

Abdominal sacral colpopexy versus vaginal sacrospinous colpopexy

Three trials were considered to be similar enough to address the comparison of abdominal sacral colpopexy and vaginal sacrospinous colpopexy (Benson 1996; Lo 1998; Maher 2004).
There was no statistically significant difference between the abdominal and vaginal approach in the number of women reporting prolapse symptoms, although there were more reports of subjective failure in the vaginal group (subjective failure after abdominal surgery 9/84 versus 18/85; RR 0.53, 95% CI 0.25 to 1.09; Analysis 1.1.1) (Benson 1996; Maher 2004). The limited evidence was not sufficient to detect a statistically significant difference between the abdominal and vaginal approach for patient satisfaction (RR 0.82, 95% CI 0.32 to 2.06; Analysis 1.2.1) (Maher 2004).
Abdominal sacral colpopexy was better than vaginal sacrospinous colpopexy in terms of:

- the number of women failing to improve to Stage 2 or better (3 out of 52 versus 13 out of 66; RR 0.29, 95% CI 0.09 to 0.97; Analysis 1.5.2) (Lo 1998);
- a lower rate of recurrent vault prolapse (3 out of 84 versus 13 out of 85; RR 0.23, 95% CI 0.07 to 0.77; Analysis 1.6.1) (Benson 1996; Maher 2004);
- less post-operative stress urinary incontinence (14 out of 47 versus 28 out of 81; RR 0.55, 95% CI 0.32 to 0.95; Analysis 1.15.1) (Benson 1996; Maher 2004);
- less post-operative dyspareunia (7 out of 45 versus 22 out of 61; RR 0.39, 95% CI 0.18 to 0.86; Analysis 1.27) (Benson 1996; Lo 1998; Maher 2004).

However, caution should be exercised when evaluating these data due to significant variation in the methodology of the three trials as detailed in the 'Description of studies' above.
There were no statistically significant differences in objective failure at any site (any pelvic organ prolapse RR 0.77, 95% CI 0.39 to 1.53; Analysis 1.5.1) (Maher 2004) or reoperation rates for SUI (RR 0.6, 95% CI 0.21 to 1.73; Analysis 1.40) (Benson 1996; Lo 1998; Maher 2004).
Although data were available for bowel outcomes (Analysis 1.24; Analysis 1.23; Analysis 1.26) and adverse events (Analysis 1.32), they were too few to provide sufficiently precise estimates to identify or rule out clinically important differences.
The lower reoperation rate for prolapse after abdominal surgery did not reach statistical significance (6 out of 84 versus 14 out of 85; RR 1.46, 95% CI 0.19 to 1.11; Analysis 1.39.1) (Benson 1996; Maher 2004).
The results for intra-operative blood loss were inconsistent in two studies, with a mean difference of 298 ml less blood loss in the abdominal group in Lo's study (Lo 1998) and 33 ml more blood loss in Maher's trial (Maher 2004) (Analysis 1.30.1). The Benson did not report blood loss but the post-operative change in haemoglobin was not statistically different (Benson 1996).
Women treated abdominally took significantly longer to present with recurrent prolapse (months to recurrence WMD -10.90, 95% CI -17.12 to -4.68; Analysis 1.38.1) in one trial (Benson 1996).
On the other hand, the abdominal sacral colpopexy was associated with a longer operating time (WMD 21 minutes, 95% CI 12 to 30; Analysis 1.33.1) (Benson 1996; Lo 1998; Maher 2004), longer time to recover (WMD 8.3 days, 95% CI 3.9 to 12.7; Analysis 1.35.1) (Maher 2004) and was more expensive (WMD US$1334, 95% CI 1027 to 1641; Analysis 1.37.1) (Benson 1996; Maher 2004) than the vaginal approach.

Sacral colpopexy and abdominal hysterectomy versus vaginal Mayo McCall culdoplasty and vaginal hysterectomy

One small trial (Braun 2007) compared 47 women who underwent total abdominal hysterectomy (TAH) and sacral colpopexy using synthetic combined absorbable and non-absorbable (Vypro) mesh with 47 women who underwent vaginal hysterectomy (VH) plus anterior and posterior colporrhaphy plus the Mayo McCall procedure using delayed absorbable (PDS) sutures. Anatomical failure rates at 33-months mean follow up were none in the sacral colpopexy group and 2/24 in the Mayo-McCall group (one with vault prolapse and one with anterior prolapse which required further intervention), although a quantitative definition for success or failure was not provided (Analysis 1.5.3). The mean operating time, length of hospitalisation and rates of complications were higher in the sacral colpopexy group but, in the absence of statistical analysis to support these results, one cannot comment on their significance.

Uterine suspension (preservation) versus vaginal hysterectomy

Three trials addressed this comparison (Dietz 2008; Jeng 2005; Roovers 2004). These trials could not be combined as the non-hysterectomy groups were too different (had clinical heterogeneity) and Jeng supplied no anatomical outcomes.

Abdominal uterine preservation versus vaginal hysterectomy and repair

One trial (Roovers 2004) compared abdominal sacral hysteropexy with uterine preservation versus vaginal hysterectomy and repair with vault fixation to the uterosacral-cardinal ligament complex. Although more women had subjective prolapse symptoms at one year after abdominal surgery (RR 3.2, 95% CI 1.29 to 7.92; Analysis 1.1.2), there was no statistically significant difference in the prolapse domain of the urinary distress inventory (UDI) (mean difference 4.1, 95% CI -5.4 to 13.6) nor the score for urinary incontinence (mean difference 6, 95% CI -2 to 14). However, at one year after surgery the vaginal group reported significantly better (lower) scores on the discomfort /pain domain (7.1, 95% CI 1.1 to 13.2), overactive bladder domain (8.7, 95% CI 0.5 to 16.9) and the obstructive micturition domain (10.3, 95% CI 0.6 to 20.1) as compared to the abdominal group.

More women in the abdominal group required repeat prolapse repair (RR 9.00, 95% CI 1.19 to 67.85; Analysis 1.39.2). In the first year after surgery five women (13%) in the abdominal group had a reoperation for recurrent cystocele and four women (10.5%) for recurrent uterine prolapse, whereas in the vaginal group only one patient required surgery for vaginal vault prolapse. The operating time was less for the abdominal group (MD -10 minutes, 95% CI -12 to -8; Analysis 1.33.2) possibly reflecting the less invasive nature of the abdominal procedure in this trial (the uterus was preserved in the abdominal group as opposed to removed in the vaginal group).

Long-term follow up

At the eight-year follow up in one trial (Roovers 2004), the higher number of women reporting prolapse symptoms at one year was not reproduced: 87% in the vaginal group versus 68% in the abdominal group reported that prolapse symptoms had improved compared to before primary surgery (RR 2.60, 95%CI 1.02 to 6.65; Analysis 1.1.3). There was also no statistically significant difference in the prolapse reoperation rate: 11/42 (26%) patients of the abdominal group and 6/42 (14%) of the vaginal group required further prolapse or incontinence surgery (RR 1.83, 95% CI 0.75 to 4.50; Analysis 1.41.2). IIQ scores and POP-Q scores were similar for both groups. Defecation symptoms had more adverse effects on quality of life in the abdominal group than in the vaginal group. The difference in the constipation obstruction domain of the Defecation Distress Inventory (DDI) was statistically significant. Eight (19%) of the 42 patients in the vaginal group and 18 (43%) of the patients in the abdominal group (P = 0.03) visited a physician after primary surgery because of pelvic floor symptoms (Analysis 1.3) (Roovers 2004).

Vaginal sacrospinous uterine suspension versus vaginal hysterectomy

In another trial (Jeng 2005), vaginal sacrospinous uterine hysteropexy (suspension) with uterine preservation was compared with vaginal hysterectomy. There were few reports of dyspareunia in either group (Analysis 1.27.3) but there were more adverse symptoms in the sacrospinous suspension arm, mostly due to buttock pain (RR 4.23, 97% 1.25 to 14.25; Analysis 1.32.6) (Jeng 2005).

In a third, small trial Dietz 2008 reported on vaginal sacrospinous uterine hysteropexy as compared to vaginal hysterectomy. At one year, the higher rate of apical compartment recurrence in the hysteropexy group 7/34 (21%) was not statistically different from that in the hysterectomy group (1/33 (3%); RR 0.16, 95% CI 0.02 to1.20; Analysis 1.6.4). The rates of cystocele and rectocele recurrence were not significantly different between the groups. Four women (12%) underwent further prolapse surgery in the hysteropexy group as compared to two (6%) in the hysterectomy group (Analysis 1.39). Women undergoing the sacrospinous hysteropexy had a median hospital stay that was one day shorter than in the hysterectomy group (3 versus 4, P = 0.03), and the mean number of days to return to work was 23 days earlier (95% CI 9 to 37; Analysis 1.36.1) than in the hysterectomy group. No differences were reported in domain scores on quality of life and urogenital symptoms between the two procedures one year after the surgery.

Hysterectomy with high levator myorrhaphy (HLM) versus hysterectomy with uterosacral vaginal vault suspension (UVVS)

One trial (Natale 2007) compared two vaginal vault procedures, HLM (n = 116) and UVVS (n = 113), in patients with Stage 2 or more uterine prolapse. All women underwent vaginal hysterectomy and anterior repair with concomitant mono-filament polypropylene mesh.

There were no data on the subjective reporting of prolapse symptoms by the women.

At follow up, apical (Analysis 1.6.5), anterior (Analysis 1.9) and posterior (Analysis 1.12) compartment recurrence rates were similar in both groups. The mean total vaginal length was significantly shorter (7.9 cm after HLM versus 8.91 cm after UVVS, P = 0.04). Urinary symptoms (Analysis 1.15; Analysis 1.17; Analysis 1.18; Analysis 1.20; Analysis 1.16; Analysis 1.21), bowel symptoms (Analysis 1.25), sexual function (Analysis 1.27; Analysis 1.28) and urodynamic parameters did not differ between groups post-operatively. Post-operative unilateral ureteric angulation leading to hydronephrosis was identified in 9/113 patients in the UVVS group and required further surgical intervention for removal of sutures (Analysis 1.32.8). Mesh erosion rates were comparable between the two groups.

Open abdominal sacral colpopexy versus laparoscopic sacral colpopexy

A single pilot trial (Pantazis 2008) compared open (n = 15) and laparoscopic (n = 15) sacral colpopexy in the treatment of POP-Q Stage 2 vault prolapse. The trial was a feasibility study and was too small to enable conclusions to be drawn. The median patient Global Impression of Improvement (one to seven score, one being best improvement and seven being worst deterioration) was one in both groups. At 12 weeks, the elevation of the vaginal vault above the hymen (point C) was similar in the two groups (open 6 cm, laparoscopic 6.2 cm; P = 0.71). RRs and CIs could not be calculated as standard deviations were not given. There were no serious adverse events in either group (Analysis 1.32.9).

Vaginal sacrospinous colpopexy versus posterior intravaginal slingplasty (PIVS) also termed infracoccygeal sacropexy

Two trials (de Tayrac 2008; Meschia 2004a) compared vaginal sacrospinous colpopexy with posterior intravaginal slingplasty (PIVS) using multi-filament polypropylene tape in women having uterine or vault suspension. They were considered similar enough to combine in a meta-analysis. The combined trials had too few data to identify differences in most of the outcomes reported, including:

- satisfaction (Analysis 1.2.2),
- objective recurrences at the upper vagina following the PIVS and sacrospinous colpopexy (Analysis 1.6.2),
- anterior compartment prolapse (Analysis 1.10.1),
- posterior compartment prolapse (Analysis 1.13.1),
- the rate of postoperative SUI (Analysis 1.15.2),
- urge incontinence (Analysis 1.17.2),
- constipation (Analysis 1.24.2).
- adverse events (Analysis 1.32.3),
- hospital stay (Analysis 1.34.3),

On the other hand, with the posterior intravaginal slingplasty operation the mean operating time was shorter (MD 8 minutes, 95% CI 4 to 11; Analysis 1.33.3) and blood loss less (MD 70 ml, 95% CI 56 to 84; Analysis 1.30.3) (Meschia 2004a).

Prolapse repair without continence surgery versus prolapse repair with any continence surgery (see Comparison 6)

Two trials (Brubaker 2008; Constantini 2008) evaluated the efficacy of adding continence surgery to sacral colpopexy. As these papers' primary focus was continence outcomes they were evaluated in the section on prolapse and continence surgery (Comparison 6 below). However, regarding their prolapse and other outcomes:

- women were more satisfied after surgery with additional colposuspension, in one trial (Analysis 1.4) (Constantini 2008);
- the vault was higher (better) and the vaginal length longer after additional colposuspension (Analysis 1.7; Analysis 1.8);
- the anterior wall of the vagina was higher (better) in women who had the additional colposuspension (Analysis 1.11) but the results were conflicting with regard to the position of the posterior wall (Analysis 1.14): in one trial (Brubaker 2008) the posterior wall was higher (better) in the sacral colpopexy alone arm while in the other (Constantini 2008) the posterior wall was higher in the group who had the additional colposuspension;
- There were too few women having repeat prolapse surgery to draw conclusions (Analysis 1.39.6).

One type of graft versus another type of graft in sacral colpopexy (also Comparison 8)

One trial (Culligan 2005) compared the abdominal sacral colpopexy using either absorbable cadaveric fascia lata graft (Tutuplast) or non-absorbable (permanent) mono-filament polypropylene mesh (Trelex). There were no recurrences of vaginal vault prolapse in either group, but the objective failure rate for recurrence at any other vaginal site was significantly worse (14/44 (32%) in the fascial graft group versus 4/45 (9%) in the mesh group; RR 3.58, 95% CI 1.28 to 10.03; Analysis 1.5.4). There were no vaginal erosions in the 46 women in the fascial graft group but two out of 54 women had mesh erosion in the non-absorbable mesh group. No data on bladder, bowel or sexual function were provided.

2. One type of anterior vaginal wall prolapse repair versus another (Comparison 2)

Nineteen trials included various surgical procedures for treating anterior vaginal wall prolapse with or without SUI (Al-Nazer 2007; Ali 2006; Bump 1996; Cervigni 2005; Colombo 1996; Colombo 1997; Colombo 2000; De Ridder 2004; Gandhi 2005; Guerette 2006;Lim 2007; Meschia 2007; Meschia 2004; Natale 2009; Nguyen 2008; Nieminen 2008; Sand 2001; Sivaslioglu 2008; Weber 2001)

Combination of data was possible for seven sets of trials:

- two were comparable in terms of type of population (women with prolapse only) and types of operation (anterior repair with and without mesh) (Sand 2001; Weber 2001);
- another two were comparable in terms of types of operation (endopelvic fascia plication versus needle suspension) (Bump 1996; Colombo 1997);
- six trials assessed anterior colporrhaphy versus polypropylene mesh (Al-Nazer 2007; Ali 2006; Lim 2007; Nguyen 2008; Nieminen 2008; Sivaslioglu 2008).

The last six trials were further divided in order to assess (a) anterior colporrhaphy alone versus inlay or armed mesh and (b) anterior colporrhaphy alone versus mesh with and without anterior colporrhaphy.

- Three trials assessed anterior colporrhaphy alone versus polypropylene Gynemesh inlays (Al-Nazer 2007; Ali 2006; Lim 2007).
- Three assessed anterior colporrhaphy alone versus armed transobturator polypropylene meshes (Nguyen 2008; Nieminen 2008, Sivaslioglu 2008).
- Two assessed anterior colporrhaphy alone versus polypropylene mesh alone (Al-Nazer 2007; Sivaslioglu 2008).
- Four trials assessed anterior colporrhaphy alone versus anterior colporrhaphy plus polypropylene mesh (Ali 2006; Lim 2007; Nguyen 2008; Nieminen 2008).

Anterior vaginal wall repair versus abdominal paravaginal repair

No trials were identified.

Anterior vaginal wall repair alone versus anterior vaginal wall repair with graft or mesh reinforcement (for midline cystocele defects) (see also Comparison 7 below)

These results have been divided into two to reflect the different qualities of types of biological grafts and synthetic meshes.

Anterior vaginal wall repair versus anterior vaginal wall repair with biological graft reinforcement (for midline cystocele defects)

One trial (Meschia 2007) compared anterior colporrhaphy without and with porcine dermis overlay (Pelvicol). The trial demonstrated that at one-year follow up the objective failure rate of the anterior compartment was higher (20/103, 19%) in the anterior colporrhaphy alone group as compared to the porcine dermis group (7/98, 7%) (Meschia 2007). There were no differences between groups in blood loss, inpatient days, change in haemoglobin, postoperative voiding dysfunction and dyspareunia; but all had wide CIs. There was one porcine dermis graft rejection requiring surgical removal. The two-year update of this trial (from an abstract) confirmed that women in the mesh group had a better anatomical outcome at point Ba (failure rate 11/98 (11%) in women with Pelvicol augmentation versus 24/103 (23%) without; RR 2.08, 95% CI 1.08 to 4.01; Analysis 2.6.9) (Meschia 2007).

Another trial (Gandhi 2005) compared anterior colporrhaphy without or with Tutoplast (solvent dehydrated cadaveric fascia lata). At 13 months the objective and subjective failure rates of the anterior compartment were not statistically significantly different: 23/78 and 16/76 (RR 1.4, 95% CI 0.8 to 2.44; Analysis 2.6.10) and 6/57 and 6/55 (RR 0.96, 95% CI 0.33 to 2.81; Analysis 2.1.1) respectively (Gandhi 2005). Apart from urinary voiding function there were no other bladder, bowel or sexual function outcomes reported.

Finally, in a further trial (Guerette 2006) the anterior colporrhaphy group and anterior colporrhaphy with bovine pericardium collagen matrix graft reinforcement group were reported to be similar in terms of mean point Aa and Ba at one-year follow up. The presented data were not suitable for analysis as no standard deviations were reported and we await full publication (Guerette 2006).

The nature of the different biological grafts used in these trials (Gandhi 2005; Guerette 2006; Meschia 2007) were considered to be too dissimilar to combine results in a meta-analysis.

Anterior vaginal wall repair alone versus anterior vaginal wall repair with synthetic mesh reinforcement (for midline cystocele defects)

Absorbable synthetic mesh

Data from two small trials suggested that traditional anterior repair may be followed by higher objective failure rates than after polyglactin mesh reinforcement of anterior repair (RR 1.48, 95% CI 1.07 to 2.04; Analysis 2.6.3) (Sand 2001; Weber 2001) but data on reoperation rates were not given and complication rates were similar. Weber et al did not find significant differences in cure rates for cystocele between the standard cystocele repair (30%), ultralateral repair (46%) and standard plus polyglactin mesh inlay (42%) at mean follow up of 24 months, but the trial was only powered to detect a 30% difference between the groups (Weber 2001).

Non-absorbable synthetic mesh

Data from three trials (Al-Nazer 2007; Ali 2006; Lim 2007) demonstrated that anterior vaginal repair utilising polypropylene mesh inlay was superior in reducing anterior compartment recurrences on objective assessment compared to native tissue anterior colporrhaphy (RR 2.14, 95% CI 1.23 to 3.74; Analysis 2.6.1).

Transobturator armed polypropylene meshes, both self styled (Nieminen 2008; Sivaslioglu 2008) and commercial kits (Nguyen 2008), had a lower rate of anterior compartment prolapse on examination as compared to anterior colporrhaphy alone (RR 3.55, 95% CI 2.29 to 5.51; Analysis 2.6.14).

Data from two trials (Al-Nazer 2007; Sivaslioglu 2008) demonstrated that polypropylene mesh repair without a concomitant anterior colporrhaphy was superior to anterior colporrhaphy alone in reducing anterior compartment prolapse (RR 3.66, 95% CI 1.45 to 9.26; Analysis 2.6.15).

Polypropylene mesh repair with a concomitant anterior colporrhaphy was also better than anterior colporrhaphy alone (RR 2.85, 95% CI 1.97 to 4.12; Analysis 2.6.15) (Ali 2006; Lim 2007; Nguyen 2008; Nieminen 2008).

The trials were too small to draw conclusions about other outcomes. Only one trial reported a subjective success rate, the difference was not statistically significant (Analysis 2.1.5) (Nieminen 2008). In two trials further prolapse surgery was reported in only two women after anterior colporrhaphy and in one after a polypropylene mesh procedure (Analysis 2.26.2). One small trial was unable to demonstrate whether or not there was a difference in quality of life between the two groups using: P-QOL (WMD 1.3, 95% CI -1.2 to 3.8; Analysis 2.4), PFIQ-7 (WMD 9, 95% CI -4 to 22; Analysis 2.16) and PFDI-20 (WMD 11, 95% CI -3 to 25; Analysis 2.8) (Nguyen 2008). Further continence surgery was performed in 7/134 women following anterior colporrhaphy and 5/141 after polypropylene mesh procedure (Analysis 2.27.1), reported in two trials.

These data need to be interpreted with caution as variations in concomitant surgeries existed.

In two trials which compared transobturator meshes with anterior colporrhaphy blood loss was significantly higher in the transobturator mesh group, measured as blood loss (Analysis 2.19.1) (Nieminen 2008) or change in haemoglobin (Analysis 2.20.2) (Nguyen 2008).

There were no significant differences in the rates of de novo dyspareunia (RR 0.90, 95% CI 0.25 to 3.23; Analysis 2.18.6) (Nguyen 2008, Sivaslioglu 2008) and de novo stress urinary incontinence (RR 0.87, 95% CI 0.43 to 1.76; Analysis 2.9.1) (Sivaslioglu 2008; Nieminen 2008) for women undergoing anterior colporrhaphy versus transobturator mesh; there was significant heterogeneity.

Mesh erosions were reported in 10.3% (30/292) of women who had a polypropylene mesh (Figure 1) (Analysis 2.22.1).

One type of graft (synthetic mesh or biological graft inlays) versus another type of graft (for midline cystocele defects) (see also Comparison 8 below)

Three trials evaluated different mesh inlays:

- prolene soft versus Pelvicol (Cervigni 2005);
- polyglactin versus Pelvicol (De Ridder 2004); and
- armed polypropylene mesh versus Pelvicol (Natale 2009).

Due to the nature of the different types of mesh used in the trials and different inclusion criteria in Cervigni 2005 and Natale 2009, we considered the trials too dissimilar to combine them in a meta-analysis.

The first trial (Cervigni 2005) was too small to demonstrate significant differences in any outcomes: objective failure rates, calculated for Grade 2 in the Baden-Walker half-way-system, were 14/36 versus 12/36 (RR 1.17, 95% CI 0.63 to 2.16; Analysis 2.6.12); dyspareunia occurred in 11/36 (30%) and 5/36 (14%) (RR 2.2, 95% CI 0.85 to 5.69; Analysis 2.18.2); mesh erosions occurred in 3/36 and 1/36 (RR 3.00, 95% CI 0.33 to 27.5; Analysis 9.4.1); and post-operative voiding dysfunction rates were 9/36 versus 5/36 (RR 1.80, 95% CI 0.67 to 4.85; Analysis 2.12.2) (Cervigni 2005).

De Ridder 2004 compared two types of absorbable mesh: polyglactin (Vicryl) inlay versus porcine dermis (Pelvicol). The objective failure rate at 25-months follow up was significantly worse in the Vicryl group: 19/62 (31%) compared with 6/63 (9.5%) with Pelvicol (RR 3.22, 95% CI 1.38 to 7.52; Analysis 2.6.11) (De Ridder 2004). Further prolapse surgery had to be performed in 3/63 versus 9/62 women, respectively (RR 3.05, 95% CI 0.87 to 10.73; Analysis 2.26.1) (De Ridder 2004).

In a third trial, Natale 2009 compared polypropylene mesh (Gynemesh) with porcine dermis (Pelvicol). At two years, significantly fewer women had anterior vaginal wall recurrence: 28% (27/96) of the mesh group compared to 44% (41/94) of the porcine graft group (RR 0.64, 95% CI 0.43 to 0.96; Analysis 2.6.13). De novo SUI was seen in two women following the polypropylene mesh and in one after the porcine dermis graft (Analysis 2.9:2), and similar numbers of women reported dyspareunia (10 versus 12; Analysis 2.18.3). The difference in post-operative urgency urinary incontinence (more in the Pelvicol group despite less urinary frequency) did not reach statistical significance (Analysis 2.10.7). Comparing post-operative data in the two groups, the authors reported a better impact of surgery on sexuality with porcine than with polypropylene mesh (P = 0.03) but data were not provided (Natale 2009).

Other comparisons for anterior vaginal wall prolapse

Five other trials were identified which compared different operations for anterior vaginal wall prolapse or different continence procedures for women with urinary incontinence or occult urinary incontinence as well as anterior vaginal wall prolapse (Bump 1996; Colombo 1996; Colombo 1997; Colombo 2000; Meschia 2004).

One small trial (Colombo 2000) comparing anterior repair with Burch colposuspension showed statistically significant lower rates of cystocele recurrence (RR 0.09, 95% CI 0.01 to 0.64; Analysis 2.6.5) but higher rates of persisting urinary incontinence (RR 3.39, 95% CI 1.40 to 8.22; Analysis 2.8.3). However, this was not

reflected in differences in reoperation rates for either prolapse or incontinence (Analysis 2.26.3; Analysis 2.27.2) (Colombo 2000). Another small trial (Meschia 2004) reported that more women were incontinent after endopelvic fascia plication than after TVT supplementing prolapse surgery (RR 9, 95% CI 1.23 to 65.85; Analysis 2.9.6) but the data were too few to comment on the effect on prolapse or other clinical outcomes. However, operating time was 19 minutes shorter for the operation without the TVT (WMD -19 minutes, 95% CI -29 to -9; Analysis 2.24.2) (Meschia 2004).

3. One type of posterior vaginal wall prolapse repair versus another (Comparison 3)

Two small trials compared vaginal and transanal approaches to the management of rectoceles (Kahn 1999; Nieminen 2004) and two others examined posterior repair with and without mesh reinforcement (Paraiso 2006; Sand 2001). The most recent of these trials compared three techniques to correct posterior vaginal compartment prolapse (Paraiso 2006).

Posterior vaginal wall repair versus a transanal repair

Many of the important outcome parameters were not reported thus limiting the data available and the ability to perform meta-analyses. The results for posterior vaginal wall repair were better than for transanal repair in terms of subjective (RR 0.36, 95% CI 0.13 to 1; Comparison 03.01.01) (Kahn 1999; Nieminen 2004) and objective (RR 0.24, 95% CI 0.09 to 0.64; Analysis 3.2.3) (Kahn 1999; Nieminen 2004) failure rates (persistence of rectocele or enterocele, or both). Analysing women with rectocele alone showed that recurrent rectocele occurred in 2 out of 39 in the vaginal group and 7 out of 48 following the transanal repair, a difference that did not reach statistical significance (RR 0.32, 95% CI 0.07 to 1.34; Analysis 3.2.1) (Nieminen 2004). Post-operative enterocele was, however, significantly less common following the vaginal surgery as compared to the transanal group (RR 0.23, 95% CI 0.07 to 0.83; Analysis 3.2.2) (Kahn 1999; Nieminen 2004).
Post-operative hospital stay was longer after vaginal surgery than after transanal surgery in one trial (mean difference (MD) 1 day, 95% CI 0.47 to 1.53; Analysis 3.15.1) (Kahn 1999) despite a shorter operating time (MD -7 minutes, 95% CI -12 to -2) (Kahn 1999). The operating times in the other trial (Nieminen 2004) were the same for both groups (35 minutes). When data for operating times were combined (WMD -3.6 minutes; Analysis 3.14.1), there was significant heterogeneity (P = 0.07, I^2 = 69%) and the difference was not significant if a random-effects model was used (95% CI -10.4 to 3.3 minutes). The vaginal approach was associated with a significantly higher blood loss (79 ml, 95% CI 40 to 119; Analysis 3.8.1) (Kahn 1999; Nieminen 2004) and post-operative narcotic use (Analysis 3.11.1) (Kahn 1999) compared to the transanal approach.
Nieminen reported that the mean depth of rectocele on post-operative defecography was 4.13 cm in the transanal group and this was significantly larger than the 2.73 cm in the vaginal group (WMD -1.43, 95% CI -2.86 to 0, P = 0.05; data not shown). Post-operative difficulties in bowel evacuation were seen in 9 out of 31 in the vaginal group as compared to 14 out of 34 in the transanal group, a difference that was not significantly different (RR 0.73, 95% CI 0.37 to 1.42; Analysis 3.5.1) (Kahn 1999; Nieminen 2004). No significant differences were seen in the rate of incontinence to flatus or faeces post-operatively between the groups, nor in rates of post-operative dyspareunia, but the trials were too small for these data to be reliable. There were differences between the trials for the outcome post-operative complications: in one trial four women had a haematoma and one needed a blood transfusion, in the vaginal arm (Kahn 1999); whereas in the other, one woman had a wound infection after transanal operation (Nieminen 2004) (Analysis 3.12.1).

Posterior vaginal wall repair versus an abdominal posterior repair

No trials were identified.

Posterior vaginal wall prolapse: a traditional posterior repair versus posterior repair with graft reinforcement

One trial compared posterior repair with and without mesh reinforcement (Sand 2001). Rectocele recurrence appeared equally with and without polyglactin (Vicryl) mesh augmentation (7 out of 67 versus 6 out of 65) but the CIs were wide (RR 1.13, 95% CI 0.40 to 3.19; Analysis 3.2.4) (Sand 2001). No trial reported mesh erosion.
Another trial compared posterior colporrhaphy, site-specific repair and site-specific repair augmented with porcine small intestine submucosa graft inlay for repairing rectoceles (Paraiso 2006). There was no statistical difference in objective failure between posterior colporrhaphy and site-specific repair (RR 0.64, 95%CI 0.20 to 2.03; Analysis 3.2.5) (Paraiso 2006). There was a lower objective failure rate at one year following the posterior colporrhaphy as compared to porcine graft inlay (RR 0.31, 95% CI 0.11 to 0.84; Analysis 3.2.6) (Paraiso 2006). However, there were no differences in subjective report of prolapse symptoms (Analysis 3.1.2; Analysis 3.1.3). Rates of post-operative dyspareunia were similar between posterior colporrhaphy and site-specific repair (RR 1.65, 95%CI 0.71 to 3.81; Analysis 3.7.2) (Paraiso 2006) and between posterior colporrhaphy and porcine graft groups (RR 2.85, 95% CI 0.91 to 8.96; Analysis 3.7.3) (Paraiso 2006). There were no significant differences between the groups in operating time (Analysis 3.14), change in haematocrit, post-operative complications (Analysis 3.12), duration of hospital stay, post-operative bowel and sexual function or reoperation rate for prolapse recurrence (Analysis 3.16). The nature of the different grafts utilised in the Sand and Paraiso studies did not allow for meta-analysis.

For posterior vaginal wall prolapse: one type of graft (synthetic mesh or biological graft inlays) versus another type of graft

No trials were identified.

4. Any type of surgical prolapse repair versus conservative treatment (Comparison 4)

No trials addressed this comparison.

5. Any type of surgical prolapse repair versus mechanical devices (Comparison 5)

No trials addressed this comparison.

6. Prolapse repair without continence surgery versus prolapse repair with any continence surgery (Comparison 6)

Continent women or those with potential stress urinary incontinence (SUI) (for example detected on reduction of prolapse prior to surgery) treated with formal continence surgery at the time of prolapse surgery versus being left untreated

The effects of surgical management of pelvic organ prolapse on urinary symptoms were addressed in 11 trials which included data for women without urinary incontinence at baseline (Brubaker 2008; Bump 1996; Cervigni 2005; Colombo 1996; Colombo 1997; Constantini 2007; Lo 1998; Maher 2004; Meschia 2004; Natale 2009; Schierlitz 2007). One of these trials (Brubaker 2008) was updated with newly published information (Visco 2008). Because there was considerable statistical and clinical heterogeneity, some of the outcomes have been presented using a random-effects model.

There was significant statistical and clinical heterogeneity when the data from all the trials were combined. The use of a random-effects model in two outcomes showed that the overall effect of the addition of any continence surgery to prolapse surgery was not statistically significant in reducing urinary incontinence, whether using patient-reported outcomes (RR 1.39, 95% CI 0.53 to 3.70; Analysis 6.2.1) or objective measures (RR 1.99, 95% CI 0.87 to 3.16; Analysis 6.1.1). The data for similar trials were combined according to the continence operations performed (see below).

The trials involved several different operations and different populations. Some single trials were too small to demonstrate differences in new urinary symptom outcomes between the two arms, in terms of new SUI (Analysis 6.2; Analysis 6.3), persistent or new urgency, detrusor activity or overactive bladder (Analysis 6.7), post-operative voiding dysfunction (Analysis 6.9) or the need for subsequent incontinence surgery (Analysis 6.10). However, some individual trials which used concomitant continence procedures demonstrated less incontinence in the groups with the extra procedure.

- One small trial showed a higher rate of new SUI after pubo-urethral ligament plication than after Pereyra needle suspension although in only the one outcome, objectively demonstrated SUI (RR 2.06, 95% CI 1.05 to 4.06; Analysis 6.3.1) (Colombo 1997).
- In another trial (Brubaker 2008) more women (who were continent at baseline) became incontinent at 3 months in the group who did not have Burch colposuspension in addition to abdominal sacral colpopexy (RR 1.57, 95% CI 1.13 to 2.19; Analysis 6.2.1) (Brubaker 2008). The additional operation resulted in higher blood loss (MD -73 gms, 95% CI -115 to -31; Analysis 1.30.5) (Brubaker 2008) and a longer operating time (-20 minutes, 95% CI -33 to -7; Analysis 1.33.5) (Brubaker 2008). At two years, the subjective stress incontinence rate was higher in the group without Burch colposuspension (63/149 (42%) versus 33/143 (27%); RR 1.83, 95% CI 1.29 to 2.61; Analysis 6.1.3) (Brubaker 2008). Visco 2008 described in more detail the outcomes of stress continent women with a positive stress test after undergoing two forms of prolapse reduction, but none of the techniques used to demonstrate occult urinary incontinence were able to predict which women would become incontinent or not, with or without concomitant continence surgery.
- Two small trials (Meschia 2004; Schierlitz 2007) included continent women with occult SUI. More women were incontinent after endopelvic fascia plication than when TVT was used as a continence procedure to supplement prolapse surgery: in respect to both subjective SUI (35% versus 4%; RR 8.66, 95% CI 2.12 to 35.41; Analysis 6.2.6) and objective SUI (RR 5.5, 95% CI 1.36 to 22.32; Analysis 6.3.2). However, subsequent continence surgery was too infrequent to allow possible differences to be identified (or ruled out) confidently (Analysis 6.10.2).

Three trials did not demonstrate a beneficial effect of including continence surgery at the time of prolapse surgery (Analysis 6.1.1) (Bump 1996; Colombo 1997; Constantini 2007).

Three separate meta-analyses were able to be performed.

Seven trials described the rate of objective SUI in all continent women undergoing prolapse surgery with and without continence surgery (Brubaker 2008; Bump 1996; Colombo 1996; Colombo 1997; Constantini 2007; Meschia 2004; Schierlitz 2007). Continence procedures employed included: pubo-urethral ligament plication (Colombo 1996); needle suspension (Bump 1996; Colombo 1997); colposuspension (Brubaker 2008; Constantini 2007) and suburethral tape (Meschia 2004; Schierlitz 2007). The trials demonstrated that the addition of continence surgery at the time of prolapse surgery did not significantly reduce the risk of SUI post-operatively (random-effects model RR 1.66, 95% CI 0.87 to 3.16; Analysis 6.1.1). However, the removal of one small trial (Constantini 2007), which reported counter-intuitively that

more women were incontinent after colposuspension, did result in significantly less incontinence in the group that had concomitant continence surgery (RR 2.01, 95% CI 1.26 to 3.18; Analysis 6.1). Six trials described the rate of woman-reported de novo SUI after prolapse surgery without continence surgery and prolapse surgery with continence surgery (Brubaker 2008; Bump 1996; Colombo 1996; Constantini 2007; Meschia 2004; Schierlitz 2007). The studies demonstrated that while fewer women had de novo stress incontinence when continence surgery was performed at the same time as the prolapse surgery (fixed-effect model RR 1.52, 95% CI 1.13 to 2.04) this did not reach statistical significance when a random-effects model was used, because of significant heterogeneity (RR 1.39, 95% CI 0.53 to 3.70; Analysis 6.2.1). Even the removal of the one small trial (Constantini 2007), which reported counter-intuitively that more women were incontinent after colposuspension, did not result in a statistically significant difference (RR 1.93, 95% CI 0.84 to 4.45). However, in the two small trials which used TVT as the continence operation the women who had the TVT were clearly less likely to be wet (RR 8.66, 95% CI 2.12 to 35.41; Analysis 6.1.6).

Four trials described the rate of de novo SUI after prolapse surgery without continence surgery and prolapse surgery with continence surgery in a subgroup who had occult SUI pre-operatively (Brubaker 2008; Bump 1996; Meschia 2004; Schierlitz 2007). The meta-analysis demonstrated a significantly higher rate of post-operative SUI in women who did not receive continence surgery (34/93 (37%) versus 15/94 (16%) with a continence procedure) at the time of prolapse surgery (RR 2.42, 95% CI 1.44 to 4.09; Analysis 6.5). There was significant heterogeneity and the difference was not significant when a random-effects model was used.

Two trials reported the rate of de novo SUI after sacral colpopexy without continence surgery and sacral colpopexy with continence surgery in a subgroup of women without symptoms of stress incontinence and a negative stress test pre-operatively. Brubaker 2008 demonstrated that fewer women were incontinent when including colposuspension at the time of sacral colpopexy in continent women, while Constantini 2007 reported that there was more de novo stress incontinence if colposuspension was performed at the time of sacral colpopexy in continent women (which is counter-intuitive as it is known that colposuspension is an effective operation for urinary incontinence (Lapitan 2009). When combined in meta-analysis, continent women who had a concomitant colposuspension at the time of sacral colpopexy and those that did not had similar rates of de novo SUI (RR 0.55, 95% CI 0.03 to 8.81; Analysis 6.1.3) (Brubaker 2008, Constantini 2007).

In contrast, there was no clear effect on new urgency, detrusor overactivity or overactive bladder symptoms in women who had concomitant continence surgery (Analysis 6.7).

Overall, after prolapse surgery 187/1280 women (15%) reported new subjective SUI in 12 trials (Brubaker 2008; Bump 1996; Colombo 1996; Colombo 1997; de Tayrac 2008; Maher 2004; Meschia 2004; Natale 2007; Natale 2009; Nieminen 2008; Schierlitz 2007; Sivaslioglu 2008) (Analysis 6.2). New overactive bladder symptoms were noted in 103/854 (12%) women in nine trials (Brubaker 2008; Bump 1996; Cervigni 2005; Colombo 1996; Colombo 1997; de Tayrac 2008; Maher 2004; Meschia 2004; Natale 2007) and new voiding dysfunction was reported in 56/476 (12%) women in six trials (Bump 1996; Colombo 1996; Colombo 1997; de Tayrac 2008; Maher 2004; Natale 2007).

Urinary incontinence treated with formal continence surgery at the time of prolapse surgery versus being left untreated

Two other trials investigated the benefit of adding a continence procedure for women undergoing prolapse surgery who did have incontinence at baseline (TVT: Borstad 2008; colposuspension: Constantini 2008).

A single small study (Borstad 2008) evaluated unspecified prolapse surgery with and without TVT in women with pelvic organ prolapse and SUI. At three months objective SUI was seen in 67/94 (71%) of those without TVT and 4/87 (5%) in the TVT group (Analysis 6.1.4). Three months after the surgery, 53 of the 94 who underwent prolapse surgery without TVT underwent a subsequent TVT (Analysis 6.10) (Borstad 2008).

In another small study (Constantini 2008) there were no statistically significant differences in urinary outcomes between women who had a concomitant colposuspension or not (Analysis 6.1.5).

7. No graft versus use of graft (synthetic mesh or biological graft) in anterior or posterior prolapse surgery, or both (Comparison 7)

Thirteen trials included a mesh or graft in one arm of the trial.

No mesh versus biological graft

Four trials used biological graft inlays for anterior or posterior repairs (Gandhi 2005; Guerette 2006; Meschia 2007; Paraiso 2006).

There were no statistically significant differences in prolapse symptoms in any of these trials, however the confidence intervals were wide. (Analysis 7.1).

Two of the trials compared anterior vaginal wall repair without and with porcine dermis graft (Pelvicol) (Meschia 2007) and without and with cadaveric fascia lata (Tutoplast) (Gandhi 2005). While there were fewer women with objective recurrence of prolapse in the graft inlay arms of the trials, this did not reach statistical significance in either trial (Analysis 7.5). There were too few data reported for the other outcomes to provide reliable estimates.

Combining the data from the three trials which provided this outcome using a biological graft, the difference in recurrence rate at any site did not reach statistical significance (RR 1.16, 95% CI 0.81 to 1.66; Analysis 7.7.2). As the results showed statistically significant heterogeneity which could not be explained, we used the more conservative random effects model (RR 1.05, 95% CI

0.41 to 2.67; analysis not shown). The Paraiso trial showed a statistically significant result favouring no mesh (Paraiso 2006).

No mesh versus synthetic mesh reinforcement

Absorbable synthetic mesh (polydioxanone (Vicryl) inlay

Three trials evaluated the effects of using absorbable polyglactin (Vicryl) mesh inlay to augment prolapse repairs (Allahdin 2008; Sand 2001; Weber 2001). The data from two trials were aggregated in a meta-analysis; two non-mesh arms from one trial (traditional anterior vaginal wall repair and ultralateral anterior vaginal wall repair) were also aggregated for comparison with the mesh arm in one of the trials (Weber 2001). Standard colporrhaphy was associated with a significantly higher recurrence rate of cystocele compared with augmentation with polyglactin mesh inlay (RR 1.39, 95% CI 1.02 to 1.90; Analysis 7.5.1) (Sand 2001; Weber 2001). One vaginal polyglactin mesh erosion was reported from two trials (Sand 2001; Weber 2001) and two women needed removal of some mesh in the other (Allahdin 2008). Rectocele recurrence appeared equally common with and without polyglactin mesh augmentation in another trial but the CIs were wide (RR 1.13, 95% CI 0.40 to 3.19; Analysis 7.6.1) (Sand 2001). Other outcomes were inconclusive due to small numbers. Two women required removal of some mesh material in one trial (Allahdin 2008).

However, combining recurrence rates at any site, more women had recurrence of prolapse with no mesh (70/161, 43%) compared with an absorbable mesh inlay (35/131, 27%) (RR 1.42, 95% CI 1.04 to 1.92; Analysis 7.7.1).

Non-absorbable synthetic mesh reinforcement (inlay, armed inlay or mesh kit)

Six trials compared anterior repair to a variety of synthetic non-absorbable mesh repair techniques and were considered similar enough to combine in various meta-analyses (Al-Nazer 2007; Ali 2006; Lim 2007; Nguyen 2008; Nieminen 2008; Sivaslioglu 2008).

The following trials were similar enough to combine in various combinations using meta-analysis.

- Anterior colporrhaphy versus any polypropylene mesh (Al-Nazer 2007; Ali 2006; Lim 2007; Nguyen 2008; Nieminen 2008; Sivaslioglu 2008).
- Anterior colporrhaphy versus polypropylene Gynemesh overlay (Al-Nazer 2007; Ali 2006; Lim 2007).
- Anterior colporrhaphy versus armed transobturator polypropylene meshes (Nguyen 2008; Nieminen 2008; Sivaslioglu 2008).
- Anterior colporrhaphy versus polypropylene mesh alone (Al-Nazer 2007; Sivaslioglu 2008).
- Anterior colporrhaphy versus anterior colporrhaphy plus polypropylene mesh (Ali 2006; Lim 2007; Nguyen 2008; Nieminen 2008).

Women in the no-mesh group had significantly higher recurrence rates than those who received any non-absorbable polypropylene mesh (RR 2.96, 95% CI 2.10 to 4.17; Analysis 7.7.3), regardless of the type of operation (inlay, self-styled armed mesh or mesh kit with or without anterior colporrhaphy).

- Data from three trials (Al-Nazer 2007; Ali 2006; Lim 2007) demonstrated that anterior vaginal repair utilising polypropylene mesh inlay was superior in reducing anterior compartment recurrences on objective assessment compared to native tissue anterior colporrhaphy (RR 2.14, 95% CI 1.23 to 3.74; Analysis 2.6.1).

- Transobturator armed polypropylene meshes, either self-styled (Nieminen 2008; Sivaslioglu 2008) or commercial kits (Nguyen 2008), had a lower rate of anterior compartment prolapse on examination as compared to anterior colporrhaphy alone (RR 3.55, 95% CI 2.29 to 5.51; Analysis 2.6.14).

- Data from two trials (Al-Nazer 2007; Sivaslioglu 2008) demonstrated that polypropylene mesh repair without a concomitant anterior colporrhaphy was superior to anterior colporrhaphy alone in reducing anterior compartment prolapse (RR 3.66, 95% CI 1.45 to 9.26; Analysis 2.6.15).

- Polypropylene mesh repair with a concomitant anterior colporrhaphy was also better than anterior colporrhaphy alone (RR 2.85, 95% CI 1.97 to 4.12; Analysis 2.6.15) (Ali 2006; Lim 2007; Nguyen 2008; Nieminen 2008).

No mesh versus any mesh

Meta-analysis of no mesh versus all types of mesh showed:

- when the results from six trials (Allahdin 2008; Gandhi 2005; Lim 2007; Meschia 2007; Nieminen 2008; Paraiso 2006) comparing no mesh with mesh are combined there was no statistically significant difference in the number of women who reported prolapse symptoms (RR 1.18, 95% CI 0.92 to 1.50; Analysis 7.1), although
- the results from twelve trials (Al-Nazer 2007; Allahdin 2008; Ali 2006; Gandhi 2005; Meschia 2007Lim 2007; Nguyen 2008; Nieminen 2008; Paraiso 2006; Sand 2001; Sivaslioglu 2008; Weber 2001) combined found more women had objective failure with no mesh (RR 1.79, 95% CI 1.48 to 2.17; Analysis 7.7).

This was mostly due to fewer objective recurrences in the group receiving non-absorbable synthetic mesh.

In total, 33/495 (7%) of women had a mesh erosion, although the incidence was higher in those receiving non-absorbable polypropylene mesh (30/292, 10%) (Table 1).

8. One type of graft (synthetic mesh or biological graft) versus another type of graft (Comparison 8)

Three small trials in women having anterior repair compared two types of overlay:

- non-absorbable polypropylene (Prolene Soft) mesh versus absorbable porcine dermis graft (Pelvicol) (Cervigni 2005);
- non-absorbable armed monofilament polypropylene (Gynemesh) versus absorbable porcine dermis graft (Pelvicol) (Natale 2009);
- absorbable porcine dermis graft (Pelvicol) versus absorbable polyglactin mesh (Vicryl) (De Ridder 2004).

Only one trial measured prolapse symptoms reported by women (Cervigni 2005): there was no statistically significant difference between the groups, albeit with wide confidence intervals.
In the De Ridder trial (De Ridder 2004) fewer women had objective recurrence of prolapse when porcine dermis was used rather than polyglactin to reinforce an anterior repair (RR 3.22, 95% CI 1.38 to 7.52; Analysis 8.2.1), although this trial was small. In the Natale trial (Natale 2009) armed polypropylene mesh proved better than armed Pelvicol inlay regarding objective success (RR 0.64, 95% CI 0.43 to 0.96; Analysis 8.2.2) but women had more daytime urinary frequency (RR 4.24, 95% CI 1.83 to 9.84; Analysis 8.5.1).
The trials were too small to demonstrate other statistically significant differences and the confidence intervals were wide.

9. One type of suture versus another type of suture (Comparison 9)

One trial addressed this comparison (Allahdin 2008). The study was too small to draw reliable conclusions.

DISCUSSION

This is one of three reviews of interventions for pelvic organ prolapse and it should be viewed in that context (Adams 2004; Hagen 2006). In the other two reviews, no randomised trials evaluating mechanical devices or pessaries (Adams 2004) and limited trials on conservative, physical or lifestyle interventions (Hagen 2006) were identified.

Forty randomised controlled trials were identified on the surgical management of pelvic organ prolapse. These were conducted in 12 countries (Italy, USA, Australia, the UK, the Netherlands, Taiwon, Finland, Belgium, Chile, Egypt, France and Singapore). The trials involved a total of 3954 women, all of whom received a surgical intervention.

Amongst the 40 trials that addressed surgical management of pelvic organ prolapse, the quality of the trials was variable. All trials reported an objective evaluation of the specific pelvic floor defect that was repaired but full vaginal site-specific outcomes were available for only 12 trials (Brubaker 2008; Cervigni 2005; Colombo 1996; Colombo 1997; Colombo 2000; Constantini 2008; Maher 2004; Meschia 2004a; Natale 2009; Nguyen 2008; Sivaslioglu 2008; Weber 2001). All but five trials (Ali 2006; Allahdin 2008; Jeng 2005; Pantazis 2008; Schierlitz 2007) reported median follow up of greater than one year, only three trials reported outcomes at greater than five years (Colombo 1997; Colombo 2000; Roovers 2004).

Generally, the impact of surgery on associated pelvic floor symptoms including bladder, bowel and sexual function; quality of life; cost and patient satisfaction were poorly reported. Validated pelvic floor questionnaires were reported in seven trials (Brubaker 2008; Constantini 2008; de Tayrac 2008; Maher 2004; Nguyen 2008; Roovers 2004; Sivaslioglu 2008), cost issues by two trialists (Benson 1996; Maher 2004) and impact of surgery on quality of life and patient satisfaction in two trials (Brubaker 2008; Maher 2004). These deficiencies generally reflect the difficulties associated with prolapse surgery. One of the principal aims of prolapse surgery is to correct the vaginal protrusion and any associated pelvic floor dysfunction, but the anatomical correction itself is likely to impact upon bladder, bowel and sexual function in unpredictable ways. Until recently, standardised history, validated pelvic organ prolapse and specific quality of life questionnaires or other outcome assessment tools were not available.

It was disappointing that few trials were found which evaluated conservative, physical, lifestyle or mechanical means of prolapse treatment (Adams 2004; Hagen 2006) and none which compared these interventions with surgery.

Summary of main results

Upper vaginal prolapse (Comparison 1)

The abdominal sacral colpopexy was associated with a lower rate of recurrent vault prolapse (Benson 1996; Maher 2004), reduced grade of residual prolapse (Lo 1998), greater length of time taken to recurrence of prolapse (Benson 1996) and less dyspareunia (Benson 1996; Lo 1998; Maher 2004) as compared to vaginal sacrospinous colpopexy. The data were too few to reliably assess possible differences in satisfaction, bowel outcomes or adverse effects. However, the abdominal sacral colpopexy was associated with a longer operating time (Benson 1996; Lo 1998; Maher 2004), a longer time for recovery (Maher 2004) and it was more expensive (Benson 1996; Maher 2004) than the vaginal approach. The finding of less post-operative stress urinary incontinence after the abdominal approach must be viewed with caution due to the different continence procedures performed in the two trials (as described in the Methodology section). Althoguh there was a lower reoperation rate in the abdominal group, this did not reach statistical significance (Benson 1996; Maher 2004). Culligan 2005 reported that there were no recurrent vault prolapses using either abdominal sacral colpopexy with mono-filament polypropylene

mesh or sacral colpopexy using cadaveric fascia lata graft inlay (Tutoplast). There was less recurrence of prolapse at any other vaginal site at one year of follow up when mesh was used.

In a fifth trial, more women needed repeat prolapse surgery after abdominal sacral hysteropexy (without hysterectomy) and fewer women had pain, overactive bladder symptoms or obstructive micturition symptoms after vaginal surgery which included hysterectomy (Roovers 2004). At an eight-year review, more women saw their primary physician for pelvic floor problems in the abdominal group as compared to the vaginal group. Non-statistically significant higher rates of prolapse symptoms and reoperation were seen after the sacral hysteropexy as compared to the vaginal group (Roovers 2004). A further trial in which women in one arm had uterine preservation reported few relevant outcomes (Jeng 2005). However, the clinical relevance of these trials, which compared different approaches and uterine preservation in one arm and hysterectomy in the other, is debatable.

Two small studies (de Tayrac 2008; Meschia 2004a) were unable to demonstrate a difference in anatomical or functional outcomes between vaginal sacrospinous colpopexy and posterior intravaginal slingplasty. The posterior intravaginal sling was quicker to perform and showed reduced blood loss. It was associated with a 9% rate of mesh complications (Meschia 2004a). However, due to a high reported rate of adverse effects with the multi-filament polypropylene mesh used (Baessler 2005), the posterior intravaginal sling kit has now been withdrawn from the market and recruitment in the second trial stopped prematurely.

Anterior vaginal wall prolapse (Comparison 2)

There is increasing information available on the repair of the anterior vaginal compartment. Most new studies investigated anterior compartment operations.

There was some evidence from two small trials that absorbable polyglactin mesh (Vicryl) might reduce objective prolapse recurrence compared with anterior repair alone (Sand 2001; Weber 2001). A single randomised controlled trial demonstrated that porcine dermis augmentation of the anterior vaginal wall might be beneficial in reducing recurrent anterior vaginal wall prolapse (Meschia 2007). Cadaveric fascia lata (Tutoplast) augmentation of anterior vaginal wall was not beneficial in reducing recurrent anterior vaginal wall prolapse (Gandhi 2005). Three further RCTs compared biological grafts with various mesh augmentations. In a single RCT (De Ridder 2004) it was demonstrated that porcine dermis reduces recurrent anterior vaginal wall prolapse compared to polyglactin augmentation. Armed porcine dermis overlays resulted in a non-statistically significant higher failure rate compared with armed monofilament polypropylene mesh overlay in women with recurrent symptomatic cystocele (Natale 2009). In women with primary cystocele, simple porcine dermis and polypropylene overlays proved similar regarding success rates (Cervigni 2005). It is pertinent, however, that of these four types of mesh or grafts only polypropylene was non-absorbable. These four studies evaluated five interventions, anterior colporrhaphy and four different grafts, and primary and secondary cystoceles which resulted in considerable variation, making a meta-analysis inappropriate. Also, the heterogenicity of the grafts used made the comparison of complications impossible. There was a lack of information on functional (subjective) outcomes.

In one trial concerning women who had stress urinary incontinence as well as pelvic organ prolapse, Burch colposuspension was subjectively better at curing the incontinence and anterior repair was better for the prolapse (Colombo 2000). The trial was too small to judge whether this affected subsequent reoperation rates or the effect on other aspects of bladder, bowel or sexual function.

Six new studies demonstrated that the polypropylene mesh anterior repair was superior to native tissue anterior colporrhaphy, on objective evaluation, in reducing the risk of anterior compartment prolapse. No study was able to demonstrate a difference between the repairs in terms of subjective success, quality of life outcomes and reoperation rates for prolapse or incontinence. The dyspareunia rates were similar between the two groups and two of the three studies using transobturator meshes reported a significantly higher blood loss following the mesh intervention. Overall, 10.2% women in the polypropylene groups had mesh erosions. Three of the studies evaluating polypropylene mesh overlay (Al-Nazer 2007; Ali 2006; Lim 2007) were only available in abstract form and the findings should be interpreted with an awareness of this limitation.

Prior to mesh use becoming the standard repair in the anterior compartment, it would be important to see the improved anatomical outcomes being accompanied by superior patient-determined outcomes that would offset the morbidity associated with the 10% rate of mesh erosions and higher blood loss of the transobturator meshes.

Posterior vaginal wall prolapse (Comparison 3)

Posterior vaginal wall repair performed better than the transanal repair of rectocele in terms of a significantly lower recurrence rate of posterior vaginal wall prolapse in two trials, despite a higher blood loss and greater use of pain relief (Kahn 1999; Nieminen 2004). However, the data were too few to comment on clinical outcomes such as flatus or faecal incontinence, or dyspareunia. More women had difficulties in bowel evacuation after transanal operation but this did not reach statistical significance. In total, five serious adverse effects were reported amongst the 87 women in these two trials.

The trials evaluating mesh augmentation of posterior repair were too small to address this question reliably (Paraiso 2006; Sand 2001) although no woman reported mesh erosion (Sand 2001). In one single well-conducted study, the posterior colporrhaphy was demonstrated to have a lower failure rate as compared to the site-

specific repair with porcine small intestine submucosa graft for rectoceles. There were no significant other differences between the posterior colporrhaphy, site-specific repair or site-specific repair augmented with porcine small intestine submucosa in terms of peri-operative and post-operative morbidity, functional outcomes, quality of life and bowel and sexual function (Paraiso 2006).

Prolapse surgery and potential urinary symptoms (Comparison 6)

Eleven trials provided information about changes to urinary function in women who did not have urinary symptoms before operation. While significant heterogeneity existed between the studies the following meta-analysis was possible.

- Meta-analysis of seven studies demonstrated that the addition of continence surgery to prolapse surgery did not significantly reduced the rate of post-operative stress urinary incontinence. Due to significant variation in inclusions and surgeries performed it is difficult to be more precise. However, in the largest trial, involving over 300 women, colposuspension did reduce the proportion of women with incontinence by half (RR 1.57, 95% CI 1.13 to 2.19; Analysis 6.1). In two small trials which used TVT as the continence operation, the women who had the TVT were less likely to be wet (RR 8.66, 95% CI 2.12 to 35.41; Analysis 6.1.6) but the confidence intervals were wide.
- Meta-analysis of five studies demonstrated that the addition of continence surgery to prolapse surgery in women with pre-operative urodynamic occult stress urinary incontinence did not result in a lower rate of post-operative stress urinary incontinence.
- In stress continent women without occult stress urinary incontinence who were undergoing sacral colpopexy, the addition of colposuspension significantly reduced the rate of post-operative stress incontinence in a single study.

Overall, after prolapse surgery 187 of 1280 women (15%) reported new subjective stress urinary incontinence.

Prolapse surgery and mesh augmentation (Comparison 7 and 8)

The use of mesh to augment repair surgery has been successful in other fields such as groin hernia repair (Scott 2004). Particular issues related to its use in vaginal repair are concern about the effects on bowel, bladder and sexual function and the possibility of mesh erosion or infection. Therefore, evidence of an improved anatomical cure of prolapse in the anterior compartment using polypropylene mesh is not sufficient reason to advocate its use. Obviously improved subjective and quality of life outcomes with reduced reoperating rates are required prior to advocating the routine use of permanent mesh in the anterior compartment.

In the upper or apical compartment, the use of mesh at open sacral colpopexy as compared to vaginal sacrospinous colpopexy significantly improves outcomes but with increased morbidity and cost. A small RCT demonstrated that the peri-operative morbidity was similar between the open and laparoscopic approaches, except for reduced blood loss in the laparoscopic procedure. Visco et al suggested that the mesh erosion or infection rate was increased four-fold when mesh was introduced vaginally as compared to the abdominal route in the management of pelvic organ prolapse (Visco 2001).

There is no evidence to suggest that the addition of any graft material at the posterior compartment repair resulted in improved outcomes.

Thus the evidence is not sufficient to support the use of permanent meshes or grafts at the time of vaginal apical or posterior compartment repair surgery except in the context of randomised controlled clinical trials. These trials must be adequately powered to evaluate the anatomic and functional outcomes and possible adverse events.

Overall completeness and applicability of evidence

It was disappointing that few trials were found which evaluated conservative, physical, lifestyle or mechanical means of prolapse treatment (Adams 2004; Hagen 2006), and none which compared these interventions with surgery (Objectives 11, 12 and 13).

Loss to follow up (dropout) ranged from 0% to 26%, and there was differential dropout from one arm in one trial. A description of the baseline characteristics of the groups showed that they were comparable in all trials except three. In one trial, 7% of women only had Stage 1 prolapse before operation, which would generally be regarded as a success if recorded post-operatively.

The majority of trials reported follow up of between one and five years; it was less than one year in six trials and greater than five years in another four. However, the average time to failure of prolapse surgery requiring repeat operation is 12 years, suggesting that long-term follow up is required to fully assess new prolapse surgery techniques.

The majority of the trials failed to distinguish between women having primary or subsequent procedures. It is likely that the outcomes would be different in these two groups, not least because women having secondary surgery might have worse prolapse symptoms before agreeing to a further operation.

Quality of the evidence

Amongst the 38 trials that addressed surgical management of pelvic organ prolapse, the quality of the trials was variable. All trials reported an objective evaluation of the specific pelvic floor defect that was repaired, but full vaginal site-specific outcomes were available for only 12 trials (Brubaker 2008; Cervigni 2005; Colombo 1996; Colombo 1997; Colombo 2000; Constantini 2008; Maher

2004; Natale 2009; Nguyen 2008; Sivaslioglu 2008; Weber 2001; Meschia 2004a). All but four trials (Ali 2006; Jeng 2005; Pantazis 2008; Schierlitz 2007) reported median follow up of greater than one year but only three trials reported outcomes at greater than five years (Colombo 1997; Colombo 2000; Roovers 2004).
Generally the impact of surgery on associated pelvic floor symptoms including bladder, bowel and sexual function, quality of life, cost and patient satisfaction were poorly reported. Validated pelvic floor questionnaires were reported in seven trials (Brubaker 2008; Constantini 2008; de Tayrac 2008; Maher 2004; Nguyen 2008; Roovers 2004; Sivaslioglu 2008), cost issues by two trialists (Benson 1996; Maher 2004) and impact of surgery on quality of life and patient satisfaction in two trials (Brubaker 2008; Maher 2004). These deficiencies generally reflect the difficulties associated with prolapse surgery. One of the principal aims of prolapse surgery is to correct the vaginal protrusion and any associated pelvic floor dysfunction, but the anatomical correction itself is likely to impact upon bladder, bowel and sexual function in unpredictable ways. Until recently neither standardised history and validated pelvic organ prolapse nor specific quality of life questionnaires or other outcome assessment tools were available.
Only 21 out of 38 trials provided evidence of secure methods of allocation to randomised groups, and one trial which used an open number list was classed as quasi-randomised. In one trial four women were incorrectly analysed in the group opposite to their allocation, as they received the alternative treatment. It is difficult to blind the women and the surgeons to their allocation or actual surgery received, but outcome assessors were blinded in five trials.

AUTHORS' CONCLUSIONS

Implications for practice

The data from randomised trials are currently insufficient to guide practice.

The following conclusions from the review relate to the four areas of surgical management of pelvic organ prolapse where at least two randomised controlled trials have been completed.

- Abdominal sacral colpopexy was associated with a lower rate of recurrent vault prolapse and less dyspareunia than the vaginal sacrospinous colpopexy. The abdominal sacral colpopexy had a longer operating time, longer recovery time and higher cost than the vaginal surgery. Data on the subjective success rate, patient satisfaction and impact of the surgery on quality of life were too few for reliable conclusions.

- The evidence suggested that the use of an absorbable polyglactin mesh overlay, absorbable porcine dermis or polypropylene mesh at the time of anterior vaginal wall repair may reduce the risk of recurrent cystocele on examination, but improved outcomes including patient satisfaction, quality of life and reduced operations for recurrences have not yet been demonstrated.

- The limited evidence suggested that posterior vaginal wall repair may have a better anatomical success rate than transanal repair in the management of posterior vaginal wall prolapse but the clinical effects are uncertain. There was not enough evidence about whether to use graft materials in the posterior compartment.

- Concomitant continence surgery at the time of prolapse surgery in continent women did not reduce the rate of post-operative or de novo stress urinary incontinence. However, in women with occult stress urinary incontinence before operation, the rate of de novo stress urinary incontinence may be reduced if they undergo continence surgery at the time of prolapse surgery. Approximately 20% of women will be prevented from developing de novo stress incontinence post-prolapse surgery if continence surgery is performed on all women who have occult stress incontinence pre-operatively, but 80% will have an unnecessary procedure. Futher evaluation of these issues is required and the benefit needs to be balanced against possible differences in costs and adverse effects. It is likely that the conclusions will differ in different healthcare systems and that women will vary in their own priorities and attitudes.

There was generally a lack of information on the impact of the surgery on quality of life and cost issues.

Implications for research

None of the objectives pre-stated in the protocol for this review have been satisfactorily addressed, and all would benefit from testing in further good quality randomised controlled trials.

More broadly, further evidence on the surgical management of pelvic organ prolapse should include, but not be limited to, the following.

- Upper vaginal prolapse: vaginal surgery (e.g. vaginal hysterectomy, cervical amputation, uterosacral ligament plication, posterior intravaginal slingplasty or sacrospinous colpopexy); abdominal surgery (e.g. open or laparoscopic sacral colpopexy, abdominal hysterectomy); laparoscopic pelvic floor repair; and the use of mesh or grafts.

- Anterior vaginal wall prolapse: vaginal surgery (e.g. anterior vaginal wall repair, vaginal paravaginal repair); open or laparoscopic abdominal surgery (e.g. paravaginal repair); and the use of mesh or grafts.

- Posterior vaginal wall prolapse: vaginal surgery (e.g. midline posterior vaginal wall repair, fascial repairs); the abdominal or laparoscopic approach to rectoceles; and the use of mesh or grafts.

- The place for concomitant continence surgery alongside prolapse surgery.
- Evaluation of different types of sutures, mesh and grafts.

Other trials relating to pelvic organ prolapse should include comparisons with conservative treatment including, but not limited to, pelvic floor exercises, lifestyle changes and mechanical devices (pessaries).

The challenge in prolapse surgery is that while the prolapse itself may cause difficulties with bladder, bowel and sexual function, surgical correction may also affect these functions in unpredictable ways. Therefore, all trials need to include patient-reported and clinician-observed outcomes; and the direct interaction with bladder, bowel and sexual function must be measured. The impact of interventions should also be assessed by utilising validated pelvic floor and quality of life questionnaires, morbidity and cost analyses. Ideally long-term outcomes should be reported, at least at two and five years after surgery.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Al-Nazer 2007

Methods	Single centre RCT for stage 2 POP-q prolapse PC generated randomisation 1 year follow up No CONSORT statement Blinding not stated
Participants	40 randomised Inclusion criteria: stage 2 POPQ prolapse Exclusion criteria: nil
Interventions	A (n=20): anterior colporrhaphy AC B (n=20): self-styled armless soft polypropylene (Gynemesh) mesh without AC
Outcomes	Objective failure not defined: Gp A 7/20 Gp B 1/20 At 12 months overall improvement in functional outcomes was reported but without specific figures or P values
Notes	

Ali 2006

Methods	Single centre RCT Inclusion grade 3 or 4 cystourethrocele (BW halfway system) No exclusion No power Randomisation and concealment, blinding NS 6/12 follow up
Participants	No CONSORT N=108 Inclusion: women with grade 3 or 4 cystourethrocele (BW halfway system) There were no significant differences between the groups regarding pre-operative storage symptoms, urodynamics and degree of prolapse
Interventions	A (54): anterior colporrhaphy alone B (54): anterior colporrhaphy with tension-free polypropylene (Gynemesh PS) overlay
Outcomes	Failure was defined as grade 2 or worse anterior wall prolapse Objective failure at 6 months: A 5/43; B 3/46 (P>0.5) Blood loss: A 50.3±89 ml; B 64.5±70.4 Mesh erosion: A 0, B 3/46
Notes	

Allahdin 2008

Methods	Single centre RCT comparing vaginal fascial repair with or without polyglactin mesh and with polydioxanone or polyglactin sutures, 2x2 factorial design PC randomisation, "secure" remote concealment Blinded patients, ward staff and follow-up assessor Follow up 3 months with exam, 6 months with non-validated questionnaire, 2 years with validated questionnaire
Participants	73 randomised, 7 ineligible after randomisation, 66 in trial Lost to follow up: 8 at 3 and 4 at 6 months, 12 at 2 years Inclusion: grade 2 or more prolapse (unclear examination technique), anterior and/or posterior prolapse Concomitant procedures: vaginal hysterectomy 14; cervical amputation (Manchester) 18; TVT 13
Interventions	A (32): repair with polyglactin mesh overlay B (34): repair without mesh C (33): repair of fascia with polydioxanone sutures D (33): repair of fascia with polyglactin sutures
Outcomes	At 6 months: 6/58 (10%) with residual stage 2 anterior vaginal wall prolapse (A 2/32, B 4/32, C 4/33, D 2/33) Questionnaire mean prolapse symptom score (POP-SS, 0-28) (mean, SD, n): At 6 months: A 4.4(4.8) 29, B 4.3(5.4)33, C 5.1(5.1)29, D 3.6(5.0)33; At 2 years: A 4.3(4.2)25, B 4.3(6.3)29, C 5.5(6.3)26, D 3.2(4.2)28 No. of women with residual prolapse symptoms at 6 months: A 24/29, B 24/33, C 25/29 and D 23/33; at 2 years: A 19/25, B 21/29, C 21/26, D 19/28 Questionnaire mean prolapse QoL score (0-10) (mean, SD, n): At 6 months: A 1.6(2.9)28, B 1.5(2.8) 33, C 2.0(3.1)28, D 1.2(2.5)33; At 2 years: A 1.5(3.0)23, B 1.8(3.5)29, C 2.5(4.1)24, D 0.9(2.1)28 No. of women with quality of life still affected by prolapse: At 6 months: A 10/28, B 13/33, C 11/28 and D 12/33 women; At 2 years: A 9/23, B 8/29, C 9/24, D 8/28 Number of women with urinary incontinence at 2 years: A 18/22, B 16/27, C 16/23, D 18/26 Urinary symptoms (ICI score 0-21): At 2 years: A 4.2(3.9)25, B 4.6(5.5)29, C 5.5(5.9)26, D 3.5(3.3)28 Dyspareunia at 2 years: A 3/9, B 3/12, C 2/11, D 4/10 Death: A 2/32, B 0/34, C 1/33, D 1/33 Repeat prolapse surgery: A 2/32, B 4/34, C 3/33, D 3/33 Notes of all non-responders at 2 years obtained for follow up
Notes	No Consort or power calculation as it was a feasibility study, no separate objective assessment in groups, validated prolapse symptom and urinary symptom questionnaires The authors randomised 66 women with grade 2 or more prolapse to receive anterior and/or posterior vaginal surgery with or without polyglactin mesh overlay and with polydioxanone or with polyglactin sutures for the repair of the pubocervical and rectovaginal fascia. At three months follow up with examination 6/58 women had stage 2 anterior vaginal prolapse without a significant difference between groups. At six months FU a postal questionnaire was completed by 62 women and at 2 years by 54 women. There were no differences between groups with prolapse symptoms The study is limited due to no power calculation, no objective report of prolapse examination separately in groups

Risk of bias

Item	Authors' judgement	Description

Allahdin 2008 (*Continued*)

Allocation concealment?	Yes	Secure method of concealment of randomisation (remote computer allocation)

Benson 1996

Methods	Single centre RCT for uterine or vault prolapse Number table held by nonsurgical co-author Follow up A+B 2.5 years
Participants	101 randomised 13 withdrawals (10 did not want surgery, 3 in A wanted vaginal surgery) 88 analysed 8 lost to follow up Inclusion: cervix to or beyond hymen, vaginal vault inversion >50% length and anterior wall to or beyond introitus Exclusion: uterus >12 weeks, adnexal mass, short vagina, central cystocele, >2 abdominal surgeries, obesity, prior inflammatory bowel or pelvic disease
Interventions	A (40): abdominal group: sacral colpopexy (mesh not specified), paravaginal repair, Halban, posterior vaginal wall repair with colposuspension or sling for stress urinary incontinence, non standardised continence surgery B (48): vaginal group: bilateral sacrospinous colpopexy, vaginal paravaginal repair, McCall culdoplasty, needle suspension or sling; permanent sutures
Outcomes	Optimal: asymptomatic vaginal apex > levator plate: no vaginal tissue beyond the hymen A: 22/38, B: 12/42 Satisfactory: asymptomatic for prolapse and prolapse improved from preoperative: Symptomatic: prolapse apex descent >50% of its length or vaginal tissue beyond hymen Incontinence A: 10/38, B: 16/42 Dyspareunia A: 0/15, B: 15/26 Peri-operative outcome: Febrile: A 8% /38, B 4% /42 Hospital stay: A 5.4, B 5.1 days Incontinence: A 23% /38, B 44% /42 Cost: Hospital charge: A US$8048, B US$6537 Further prolapse surgery: A 6, B 14 Further continence surgery: A 1, B 5
Notes	After interim analysis study ceased early. Satisfactory randomisation 63% vaginal group underwent continence surgery as compared to 40% abdominal group: 21% slings vaginal group as compared to 5% abdominal group suggesting unequal randomisation. Women with a cystocele to the introitus postoperatively were considered to have optimal outcome when this was also part of inclusion criteria. Objective outcome not reported No stratification No blinding Standardised surgery, but continence surgery not standardised

Benson 1996 (*Continued*)

	No intention to treat No CONSORT statement No validated questionnaires No quality of life measures.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Borstad 2008

Methods	RCT comparing prolapse surgery with TVT and prolapse surgery with delayed TVT at 3 months for women with POP and SUI No CONSORT statement Power calculation: 70 in each arm No data on type of randomisation, allocation concealment or blinding strategy Intention-to-treat analysis: yes
Participants	Inclusion criteria: pelvic organ prolapse and stress urinary incontinence Exclusion criteria not specified Randomised 194 (A 99; B 95) Lost to follow up A 5; B 8 Analysed A 94; B 87
Interventions	A (94): unspecified prolapse surgery without TVT (53 women underwent TVT at 3 months following initial surgery) B (87): unspecified prolapse surgery plus TVT
Outcomes	Objective SUI: A 67/94; B 4/87 at 3 months New incontinence operation at 3 months: A 53/94; 0/87
Notes	Pre-operatively group A had greater severity of urine loss on pad test (mean 67 g range 2-270) than group B (mean 35 g range 0-200) P=0.003

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Randomised

Braun 2007

Methods	Single centre RCT comparing abdominal and vaginal routs for surgically treating central compartment prolapse No CONSORT statement No power calculation No intention-to-treat analysis No data on type of randomisation, blinding strategy or allocation concealment No definition of cure or failure Follow up 33 months (20-41) both arms Prolapse assessment: POP-Q
Participants	Inclusion: POPQ stage 3-4 prolapse Exclusion: not specified Randomised: 47 Analysed: 47
Interventions	A (23): TAH ± BSO + abdominal (open) sacral colpopexy B (24): vaginal hysterectomy + anterior & posterior colporrhaphy + Mayo McCall stitch Materials used: A: vypro mesh (combined absorbable - non-absorbable); prolene (non-absorbable) sutures to both sacrum and vagina B: delayed absorbable (PDS) sutures
Outcomes	Mean operating time: Gp A: 140 min (100-240); Gp B: 90 min (50-130) Mean days in hospital: Gp A: 3.8; Gp B: 2 Objective failure: A: 0/23; B: 2/24 (1 anterior and 1 vault) Further prolapse surgery: A: 0/23; B: 1/24 Total complication rate: A: 3/23 (13%); B: 0/24 Specific complications: A: haematoma 1/23, mesh erosion: 1/23, incisional hernia: 1/23
Notes	A quantitative definition for success or failure is not provided. The mean operating time, length of hospitalisation and rates of complications were higher in the sacral colpopexy group but in the absence of statistical comparisons to support these results, one cannot comment on their significance.

Brubaker 2008

Methods	RCT (computer generated block stratification for surgeon and paravaginal repair), sealed envelopes opened at time of surgery after anaesthetic was administered) 7 Site: multicentre study in USA Follow up: 3 months (data at 1 year for 231 women) 2 year data interviewers and examiners blinded imputation of 2-yr outcome data (those reoperated included outcome related to worse of score prior to 2nd intervention or after subsequent intervention)
Participants	322 women. CONSORT statement Inclusion criteria: POPQ stage 2-4 prolapse (Aa must be -1 or worse) and stress continent based on responses of 'never' or 'rarely' to 6 of the 9 SUI questions of MESA. Despite these criteria, preoperatively 19.2% participants had SUI defined by PFDI, 10% had bothersome stress urinary incontinence (PFDI questionnaire) and 39% had a positive stress test with or without prolapse reduction prior to intervention. From table 2 of the 3 month data it appears these participants were equally distributed between the groups. Exclusion criteria: Immobile urethrovesical junction, pregnancy, anticipated move away after surgery Groups were comparable at baseline on age, race, ethnic group, marital status, education, parity, method

	of delivery, distribution of women with positive stress test, OAB, prior hysterectomy continence and prolapse surgery Surgeons were unaware of urodynamic findings including urodynamic stress incontinence or occult stress incontinence with or without the prolapse reduced
Interventions	A (157): abdominal sacral colpopexy with Burch colposuspension B (165): abdominal sacral colpopexy without Burch colposuspension (control group) Compliance: women treated according to randomised groups: A, 154/157; B, 164/165 concomitant surgery paravaginal repair A 31/157 20% Gp B 34/165 20.6% hysterectomy GP A 29%: Gp B 28% standardised surgery for colposuspension: not standardised paravaginal repair or sacral colpopexy (17% biological grafts, 43% Mersilene and 39% polypropylene and minimal use of PFTE (Gore-tex) (6%) While surgery was standardised for colposuspension neither the paravaginal repair nor sacral colpopexy was standardised with variation in use of suture type and graft materials: 17% biological grafts, 43% Mersilene 39% polypropylene 6% Gore-tex. No data on further performed surgeries is provided in the publication
Outcomes	**At 3 months**: SUI composite end point defined as any of the following present: 1. Symptoms, as defined by a "yes" response to any of three questions in the PFDI stress incontinence subscale assessing leakage with coughing, sneezing, or laughing; physical exercise; and lifting or bending over 2. Stress incontinence during a standardized stress test at maximum bladder capacity or 300 mL, whichever was less 3. Any treatment for stress incontinence after the study surgery Composite SUI outcome at 3 months: A, 35/156; B, 67/164; 1 year: A, 42/155; B, 42/155; 24 months: A,47/147, B,70/155 Composite OAB outcome at 3 months: A, 50/156; B, 59/164; 12 months: A, 51/155, B, 66/161; 24 months: A, 47/147, B, 69/155 Urge urinary incontinence at 3 months: A, 10/143; B, 18/151; 12 months: A, 9/155, B, 17/158; 24 months: A, 10/147, B, 19/155 Operation time (N, mean min, SD): A, 157, 190 (55); B, 165, 170 (60) Blood loss (N, mean ml, SD): A, 157, 265 (242); B, 165, 192 (125) Cumulative adverse effects at 24 months: A, 56/153; B, 64/158 Serious adverse effects: A, 7/157; B, 5/165 **At 2 years**: Two year results were reported on Group A (n = 157) and B (n = 165) SUI symptoms (PFDI+ve): A 38/147, B 63/155 +ve cough stress test: A 11/116, B 9/134 Further surgery for SUI: A 19/147, B 31/155 Bothersome SUI: A 17/147, B 39/155 Bothersome UI: A 10/47, B 19/155 POPQ Outcomes, mean (SD): point C (cervix): A -8.0±1.5, B -8.2± 1.3 Ba (anterior): A -2.2±0.9, B -1.8±1.1 Bp (posterior): A -2.0±0.9, B -2.3±0,8 stage 0 24/117, 23/132; stage 1 43/117, 51/132; stage 2 46/117, 57/132; stage 3 4/117, 1/132
Notes	Study terminated after 322 women had been randomised because of significant differences in UI outcomes Results not reported separately according to whether concomitant hysterectomy performed Women remained in allocated groups for analysis (ITT) but analysis based on end-point data actually

Brubaker 2008 (*Continued*)

	available Further data were made available in a new report depending upon status of occult stress incontinence (Visco 2008). The prolapse reduction during preoperative stress testing was performed with 5 different methods (swab, manual, speculum, pessary or forceps) with each women undergoing two types of prolapse reduction. Data from all prolapse reductions (2 for each patient) were reported as a total at 3 months only. Visco concluded that none of the techniques to demonstrate occult urinary incontinence were able to predict which women would become incontinent or not with or without concomitant continence surgery, although women who did have occult incontinence were more likely to be incontinent afterwards regardless of randomised allocation. Data from all prolapse reductions (two for each patient) were reported as a total and in analysing the post intervention continence status of women who did and did not have occult stress incontinence pre-operatively a decision was made to half the reported total numbers for the analysis Stress continence at baseline was defined based on responses of 'never' or 'rarely' to six of the nine SUI questions on the MESA questionnaire (medical, epidemiological and social aspects of aging questionnaire) . Preoperatively 19% of the participants had SUI defined by the PFDI (Pelvic Floor Distress Inventory) , 10% had bothersome stress urinary incontinence according to the PFDI and 39% had a positive stress test with or without prolapse reduction prior to surgery Different and complicated definitions were used to categorise stress continence prior to and after the interventions making it more difficult to be classified as stress continent post interventions than prior to the intervention (see included studies tables). 39% classified as stress continent prior to surgery would have been classified as stress incontinent using the post-intervention definition The use of imputation in the two year results is to be applauded by the authors. The process utilised ensures that in women undergoing further continence surgery that the continence status prior to the second intervention or after the surgical intervention outcomes, whichever is worse, is included in the final outcome data

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Bump 1996

Methods	Dual centre RCT: needle suspension or plication of urethrovesical junction endopelvic fascia for cystocele and potential stress incontinence Computer generated randomisation, blocks of 4 to 6 Follow up A+B 2.9 years
Participants	32 women Withdrawals: 0 Inclusion: stage 3 or 4 anterior vaginal wall prolapse and bladder neck hypermobility Lost to follow up: 4
Interventions	A (14): needle suspension according to Muzsnai with non-absorbable sutures B (15): plication of urethrovesical junction endopelvic fascia according to Hurt with non-absorbable suture

Bump 1996 (*Continued*)

Outcomes	Definition of cure: no stress urinary incontinence, no overactive bladder symptoms, no voiding dysfunction Postoperative urodynamic stress incontinence that was not present preoperatively: A 2/14, B 1/15 New overactive bladder symptoms: A 2/14, B 1/15 Describes site specific pelvic organ prolapse
Notes	No blinding No stratification No intention to treat No CONSORT Potential stress incontinence was identified in 20/29 preoperatively The definition of potential stress urinary incontinence included a positive barrier test or pressure transmission ratio of <90% for proximal 3/4 of the urethra Validated questionnaires.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Cervigni 2005

Methods	Single centre RCT (computer generated, concealment unclear): Prolene Soft vs Pelvicol for anterior vaginal wall prolapse Mean follow up: A 8.1, B 8.8 months
Participants	82 enrolled: A 40, B 42 analysed: A 36 B 36 Inclusion: symptomatic cystocele stage II or more Exclusion: need for concomitant anti-incontinence procedures; previous pelvic floor surgery
Interventions	A (40): tension-free cystocele repair and high levator myorrhaphy (not described in detail), Prolene soft overlay (non-absorbable mesh) B (42): as above with Pelvicol overlay (absorbable mesh) Concomitant surgery: vaginal hysterectomy (58%/77%)
Outcomes	Recurrent cystocele grade II or more (Baden-Walker): A 14/36, B 12/36 Subjective failure: A 3/36 B 1/36 Adverse effects: mesh erosion: A 3/36, B 1/36; postoperative pelvic or suprapubic pain: A 12/36, B 3/36 Total adverse effects: A 15/36, B 4/36 Total OAB: A 9/36, B 13/36 De novo OAB: A 1/19, B 2/18 De novo dyspareunia: A 31% 11/36, B 14% 5/36 Constipation: A 7/36, B 5/36 Voiding dysfunction: A 9/36, B 5/36 Urodynamic voiding dysfunction: A 3/36, B 3/36

Cervigni 2005 (*Continued*)

Notes	Abstract and further information supplied by authors Not all women were symptomatic for prolapse though inclusion criteria state symptomatic cystocele according to symptoms table Conclusion on voiding function seems unfounded Statistical significance considered at p=0.001 is unusual If statistical significance is considered at 5%, de novo dyspareunia and constipation is significantly higher in the Prolene Soft group

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Colombo 1996

Methods	Single centre RCT (computer generated, unclear if allocation concealed) Cystopexy or cystopexy and pubourethral ligament plication for cystocele Follow up: A 2.6 years, B 2.9 years
Participants	107 randomised Lost to follow up: 4, 1 died 102 analysed Inclusion: cystocele grade 2 or more Exclusion: positive stress test with or without prolapse reduced, overactive bladder symptoms, MUCP <30, previous incontinence surgery
Interventions	A (52): Cystopexy alone: interrupted non-absorbable sutures of fascia B (50): Cystopexy and pubourethral ligament plication according to Hurt with absorbable suture McCall culdoplasty and posterior repair in all women
Outcomes	Objective cure of cystocele less than grade 2: A: 50/52, B: 48/50 Reduction in voiding symptoms: Successful prevention stress urinary incontinence: A: 48/52, B 46/50 Dyspareunia: A 2/24, B 13/23 New postoperative overactive bladder symptoms Voiding dysfunction Days in hospital
Notes	No blinding No intention to treat Power calculation post hoc No CONSORT No validated symptom or QOL questionnaire Informed consent not required before randomisation Surgery standardised Who reviewed outcomes was unclear.

Colombo 1996 (*Continued*)

Risk of bias		
Item	**Authors' judgement**	**Description**
Allocation concealment?	Unclear	B - Unclear

Colombo 1997

Methods	Single centre RCT (computer generated, allocation concealment unclear) Follow up: A 6.3 years, B 6.7 years
Participants	109 randomised 109 analysed for 5 years postoperatively 9 died 3-7 years postoperatively Inclusion: positive stress test with or without prolapse reduced, cystourethrocele > grade 2 Exclusion: negative stress test, overactive bladder symptoms, MUCP <30, previous incontinence surgery
Interventions	A (55): Cystopexy with interrupted non-absorbable sutures of fascia pubourethral ligament plication with absorbable sutures B (54): Pereyra with non-absorbable sutures McCall culdoplasty and posterior colporrhaphy in all women
Outcomes	Objective cure of cystocele less than grade 2: A 55/55, B 52/54 Subjective cure SUI: A 43/55, B 48/54 Objective cure SUI: A 24/55, B 37/54 Objective cure of occult SUI: A 20/40, B 25/43 New post-operative overactive bladder symptoms, voiding dysfunction, days in hospital
Notes	No blinding No intention to treat Power calculation performed post hoc No CONSORT No validated symptom or quality of life measures Informed consent not required before randomisation Surgery standardised Who reviewed outcomes unclear.

Risk of bias		
Item	**Authors' judgement**	**Description**
Allocation concealment?	Unclear	B - Unclear

Colombo 2000

Methods	Single centre RCT (computer generated open number list) Burch or anterior repair for pelvic organ prolapse and stress urinary incontinence PC-open list Follow up: A 14.2, B 13.9 years
Participants	71 randomised Lost to follow up: 3 (A 2, B 1) 68 analysed Inclusion: USI, cystocele >2 or 3, swab test >30% Exclusion: detrusor overactivity, previous pelvic floor surgery, high risk for abdominal operation
Interventions	A (35): Burch group: total abdominal hysterectomy and vault to uterosacral ligament, Moschcowitz, Burch with 3-4 Ethibond B (33): anterior colporrhaphy: vaginal hysterectomy, Pouch of Douglas obliteration and anchoring of vaginal cuff to uterosacral ligament, catgut plication
Outcomes	Definition of cure: no subjective stress urinary incontinence, or no positive stress test Objective cure cystocele: A 23/35, B 32/33 Subjective cure stress urinary incontinence: A 30/35, B 17/32 Objective cure stress urinary incontinence: A 26/35, B 14/32 Overactive bladder symptoms, voiding, dyspareunia Total vaginal length: A 7.9 cm, B 4.7 cm
Notes	No blinding No intention to treat No CONSORT No stratification No power calculation No validated symptom or QOL questionnaire Surgery standardised.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	No	C - Inadequate

Constantini 2007

Methods	Single centre RCT Randomisation not stated Allocation concealment not stated Blinding of outcome assessors not stated No CONSORT
Participants	6 women Inclusion: continent women (women with negative stress test before and after prolapse reduction, no preoperative symptoms of urinary incontinence, negative symptom questionnaire and no leakage during urodynamics) with 'severe' uterovaginal and vault prolapse (not clearly defined)

Constantini 2007 (*Continued*)

	Exclusion: N/S 66 randomised 66 analysed
Interventions	A (32): sacral colpopexy (open) B (34): sacral colpopexy + Burch (open) concomitant surgeries: abdominal hysterectomy
Outcomes	Length of F/U: A 38±19 mo (range 15-71); B 42±18 mo (range 12-74) Overall de novo incontinence: A 3/32 (9%); B 12/34 (35%) p< 0.05 De novo stress incontinence: A 1/32 (3%); B 9/34 (27%)
Notes	Primary continence assessments were based on a non-defined stress test, and symptoms from the UDI questionnaire. Urinary incontinence was clinically classified "on the basis of the ICS definition and graded on the Ingelman Sunderberg scale". Pre-operative UDI scores were given but no postoperative UDI scores were available

Constantini 2008

Methods	Single site RCT Blinded assessors Intention to treat NS Power calculation adequate Sample size 47
Participants	CONSORT statement: yes Inclusion: women age 18-75, POP>St. 2 (BW and POPQ), urinary incontinence defined by ICS Exclusion: uterine fibroids, uterine/cervical malignancy, active PID, allergy to synthetic graft/suture materials, pregnancy/lactation, significant illnesses, inability to provide informed consent or comply with study protocol 47 randomised A 23; B 24 No loss to follow up Distribution of POP between groups not clear: 24 uterovaginal, 13 vault, 8 cystocele and 2 cystocele and rectocele
Interventions	A (23): sacral colpopexy 17, sacral hysteropexy 6, no colposuspension B (24): sacral colpopexy + Burch 14, sacral hysteropexy + Burch 10 Pre-operatively incontinence defined by urodynamics: 13 USI, 30 mixed, 4 occult (incontinence with coughing or Valsalva manoeuvre with the prolapse reduced). Distribution of patients with prolapse and incontinence pre-operatively between the groups is unclear
Outcomes	Primary incontinence outcome: combination of bladder diary, number of pads and stress test without clear definition: A 9/23, B 13/24 (P=0.46) Secondary outcomes included quality of life (IIQ and UDI) VAS and subjective symptoms Median pads/day (range): A pre 1 (0-5) post 0 (0-3); B pre 1 (0-5) post 1 (0-3) Median IIQ score(range): A pre18 (1-53) post 2 (0-17); B pre 16 (3-33) post 2 (0-11) (P=0.33) Median UDI score (range): A pre 16 (0-45) post 3 (0-10); B 16 pre (6-45) post 3 (0-10) (P=0.77) Median VAS* satisfaction score (range): A 9 (3-10); B 8 (4-10) POP was a primary outcome without clear definition failure: no differences were detected in anatomical outcome (POP-Q measurements given in paper for 7 POP-Q measurements)

Constantini 2008 (*Continued*)

Notes	The authors' conclusion that colposuspension at time of sacral colpopexy has little positive benefit seems valid. There are methodological problems with this paper, including lack of clear and equal distribution of prolapse grading and incontinence between the groups pre-operatively, inconsistency of pre and post-operative incontinence classifications (urodynamics pre-operatively and symptoms post-operatively) and lack of definition of success of prolapse grading and data relating to peri-operative parameters and complications.

Culligan 2005

Methods	Single centre RCT (computed generated, blocked, opaque envelopes, double blind) Fascia lata versus polypropylene mesh for sacral colpopexy Follow up: 1 year
Participants	100 randomised Lost to follow up: 11 (A 2, B 9) Inclusion: post-hysterectomy vault prolapse Groups comparable at baseline on age, weight, height, parity, incontinence severity, POP-Q measurements, prolapse stage, previous prolapse or incontinence surgery (A 19/46, B 24/54) Randomised group compared with women who declined randomisation (101 women), no statistically significant differences found
Interventions	A (46): abdominal sacral colpopexy with cadaveric fascia lata graft (Tutoplast) attached with Goretex to anterior and posterior vaginal wall and to S1-S2, covered with peritoneum B (54): abdominal sacral colpopexy as above, using polypropylene mesh (Trelex) Concomitant surgery: TVT, paravaginal and rectocele repair; conditions not defined
Outcomes	Definition of failure: POP-Q stage 2 or greater at any site: A 14/44, B 4/45 Recurrent vault prolapse at point C: A 0/44, B 0/45 Blood loss N, mean ml (SD): A 46, 265 (261), B 54, 47 (148) Operating time N, mean min (SD): A 46, 233 (7), B 54, 227 (63) Ileus: A 0/46, B 2/54 Adverse effects: fever: A 2/46, B 2/54; wound breakdown: A 5/46, B 8/54; graft erosion: A 0/46, B 2/54 Total adverse effects: A 7/46, B 12/54
Notes	4 women randomised to fascia (A) actually received mesh (B) and were analysed in the mesh group, therefore NOT true ITT. One single blinded examiner No ITT Only mean values of POPQ given for sites apart from point C No analysis of questionnaires, bladder, bowel and sexual function

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

De Ridder 2004

Methods	RCT (unclear randomisation and concealment) Pelvicol versus Vicryl for stage III cystocele repair Follow up: 25/26 months
Participants	134 included A 65, B 69 Inclusion: stage III cystocele
Interventions	A (65): Raz 4 defect cystocele repair reinforced with porcine dermis overlay (Pelvicol) B (69): as above, reinforced with Vicryl Concomitant surgery: vaginal hysterectomy and rectocele repair
Outcomes	Primary outcome: recurrence of cystocele stage II: A 6/63, B 19/62 (p=.002) Number having repeat prolapse surgery: A 3/63, B 9/62 No differences in questionnaires
Notes	Abstract, limited information though requested No subjective outcome, no analysis of bladder, bowel and sexual function

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

de Tayrac 2008

Methods	Mulicentre RCT comparing Infracoccygeal sacropexy and sacrospinous suspension for uterine or vaginal vault prolapse No CONSORT statement Power calculation: yes, 77 required in each arm. Recruitment stopped after change in mesh material (multifilament mesh replaced by monofilament) No intention-to-treat analysis No data on type of randomisation, blinding strategy or allocation concealment No definition of cure or failure Mean follow up 16.8 months (range 1.5 - 32) both arms Prolapse assessment: POP-Q Validated questionnaires: PFDI, PFIQ, PISQ-12, French version
Participants	Inclusion: symptomatic uterine or vaginal vault prolapse (stage 2 or higher) Exclusion: isolated cystocele, stage 1 prolapse, rectal prolapse, and intestinal inflammatory disease 49 randomised 4 lost to follow up 45 analysed
Interventions	A (21): infracoccygeal sacropexy (multifilament Polypropylene tape, posterior IVS) B (24): sacrospinous suspension Concomitant surgery: cystocele repair, posterior repair, hysterectomy, suburethral tape. Types of repair and indications for repair were not described

de Tayrac 2008 (*Continued*)

Outcomes	Primary outcome measure: post-operative day 1 pain assessed by a VAS Secondary outcome measures: peri-operative data, quality of life, anatomical results and erosion rates Anatomical failure (not defined): A 1/21 (4.8%); B 0/24; p=0.94 Post-op uterine/vault prolapse (stage>1): A 1/21 (4.8%); B 0/24; p=0.94 Post-op cystocele (stage>1): A 1/21 (4.8%); B 6/24 (25%); p=0.14 Post-op rectocele (stage>1): A 0/21; B 1/24 (4.2%); p=0.94 Further prolapse surgery: A 2/21 (9.5%); B 2/24 (8.3%) Day 1 post-op pain (VAS 0 to 10, 0=no pain): A 1.3+/-1.6; B 3.2+/-2.7; p=0.01 Operating time mean (min): A 13.2+/-5.2; B 20.0+/-8.1; p=0.002 Days in hospital mean: A 4.9+/-1.8; B 3.9+/-1.2; p=0.06 Patients' satisfaction: A 18/21 (86%); B 19/24 (79%)
Notes	Power calculations were unusually based on the parameter of day 1 pain scores and necessitated 77 women in each group While the pain on day 1 VAS was significantly greater (p=0.01) in the sacrospinous group, no differences were seen on days 0, 2 or at follow up PISQ-12, PFDI and PFIQ scores were not significantly different between groups but absolute values were not given for the latter two The authors concluded the posterior IVS was equivalent to the sacrospinous suspension with a decreased rate of post-operative pain and cystocele recurrence. The higher recurrent cystocele rate was non-statistically significant and difficult to evaluate given the lack of documentation of anterior compartment surgery. The conclusion regarding decreased pain is also misleading as it only relates to day 1 scores and not supported by data on days 0, 2 and post-operative follow up

Dietz 2008

Methods	RCT 1 yr review Inclusion: stage 2 or greater uterine prolapse CONSORT Not blinded, no power calculation Randomisation and concealment not stated Concomitant surgery anterior and posterior repair, TVT if required
Participants	71 randomised Gp A 34 Gp B 37 Withdrew 3 2 Surgery 31 35 Lost to follow up 0 2 Analysed 31 33 the article results quote 34 SS hysteropexy group Groups were comparable at baseline
Interventions	A (31) vaginal hysterectomy B (34) vaginal sacrospinous hysteropexy with uterine preservation
Outcomes	POPQ stage 2 or greater objective failure: apical (vault / uterine) A 1/31, B 7/34 Ba (anterior, cystocele) A 20/31, B 17/34 Bp (posterior, rectocele) A 9/31, B 6/34

Dietz 2008 (*Continued*)

	hospital stay A 4 days, B 3 days (P=0.03) further prolapse surgery A 2/31, B 4/34 days to return to activities of daily life A 33±21, B 34±13 days to return to work A 66±34, B 43±21. No differences were reported in domain scores on quality of life and urogenital symptoms UDQ and IIQ between the two procedures one year after the surgery. Functional outcomes and quality of life did not differ between the procedures.
Notes	The authors concluded that more recurrent apical prolapses were found after the sacrospinous hysteropexy as compared to vaginal hysterectomy at one year

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Randomised

Gandhi 2005

Methods	Single centre RCT (computer generated, opaque envelopes, adequate concealment) Anterior colporrhaphy with and without fascia lata for primary or recurrent anterior vaginal wall prolapse
Participants	162 signed consent form 154 randomised A 76, B 78 Loss to follow up 2 in B but in results 78 and 77 analysed Inclusion: anterior vaginal wall prolapse to hymen or beyond on straining; >18 years of age; willing to comply with return visits Concomitant surgery: vaginal hysterectomy in 49%/47%; sacrospinous fixation in 43%/42% (all cases with vaginal vault prolapse to midvagina or beyond); posterior repair in 99%/94%, Coopers' ligament sling in 67%/55%, midurethral sling 13%/10% Enterocele: A 75%, B 73% Baseline voiding dysfunction (slow stream): A 48/68, B 42/65
Interventions	A (76): "ultralateral" midline plication of anterior endopelvic connective tissue using Vicryl buttress sutures (as described by Weber 2001), plus additional cadaveric fascia lata patch (Tutoplast) anchored at the lateral limits of the colporrhaphy B (78) as above without allograft
Outcomes	Definition of failure: recurrent stage II cystocele: A 16/76; B 23/78 Subjective failure (vaginal bulging): A 6/55, B 6/57 (note: the denominator is different to objective outcome) Postoperative voiding dysfunction: A 21/72, B 28/76 Persistent voiding dysfunction: A 19/53, B 22/52 De novo voiding dysfunction: A 3/19, B 6/24
Notes	Unclear patient numbers (disparity with loss to follow up) Questionnaires not used in all patients.

Gandhi 2005 (*Continued*)

Risk of bias		
Item	**Authors' judgement**	**Description**
Allocation concealment?	Yes	A - Adequate

Guerette 2006

Methods	Multicentre RCT 12 month follow up No CONSORT, or blinding statement No inclusion or exclusion criteria
Participants	no dropouts (loss to review)
Interventions	A (n=46): anterior colporrhaphy B (n=44): anterior colporrhaphy with bovine pericardium collagen matrix graft reinforcement
Outcomes	Results reported as P values without numbers making data input impossible Mean overall POP-Q stage for both the AC and GR groups were the same (0.878) Mean point C values at 12 months: A -7.5, B -7.3 (P=0.646). Differences in points Aa and Ba were not statistically different (Aa: P=0.096, Ba: 0.294) healing abnormalities were reported to be similar in both groups without numbers being available
Notes	No consort statement or inclusion and exclusion criteria or QoL or functional data are available for review.

Jeng 2005

Methods	RCT (unclear randomisation and concealment) Total vaginal hysterectomy versus transvaginal sacrospinous uterine suspension Follow up: 6 months
Participants	158 women Dropouts: 0 Inclusion: age <50 years; Grade 2-3 uterine or cervical prolapse; sexually active Exclusion: previous anterior or posterior vaginal wall repair, or oophorectomy Groups comparable at baseline on age, parity, height, weight, partners' health status, sexual functioning
Interventions	A (80): transvaginal sacrospinous uterine suspension (without hysterectomy) B (78): total vaginal hysterectomy All operations done by one surgeon
Outcomes	Adverse effects: UTI: A, 1/80; B, 2/78 Buttock pain: A, 12/80; B, 0/78 Acute urinary retention: A, 0/80; B, 1/78 Dyspareunia after surgery: A, 4/80; B, 4/78

Jeng 2005 (*Continued*)

	Vaginal dryness after surgery: A, 4/80; B, 4/78 Time to resumption of intercourse (mean weeks, range): A, 8 (4-16 weeks); B, 8 (5-16) Sexual functioning: no differences bewteen the groups after surgery (P>0.05)
Notes	No prolapse or incontinence outcomes reported (study was aimed at evaluation of sexual functioning)

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Kahn 1999

Methods	Single centre RCT (number table randomisation, concealment unclear) Follow up: 25 months (8-37) A+B
Participants	63 randomised Withdrawal: 4 (A 2, B 2) Excluded: 2 (one no rectocele surgery because posterior vaginal wall cyst, one did not get the surgery performed) Inclusion: symptomatic rectocele or sense of impaired rectal emptying with >15% trapping on isotope defecography
Interventions	A (24): posterior colporrhaphy with levator plication, enterocele repair, hysterectomy, anterior repair as required B (33): transanal repair by single colorectal surgeon, circular muscle plicated longitudinally, permanent suture
Outcomes	Objective cure of recto/enterocele: A: 21/24, B: 23/33 Change in POP-Q (Ap or Bp) score: A: 1 stage, B: 0 Improved or cured obstructed defecation A: 12/20, B: 14/24 Need for vaginal digitation
Notes	No blinding No stratification No CONSORT Who reviewed outcomes unclear No validated symptom or QoL questionnaires.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Lim 2007

Methods	Single centre RCT CONSORT no Randomisation N/S Allocation concealment N/S Blinding N/S 12 months follow up
Participants	Inclusion criteria: grade 2 or more POP-Q cystocele and rectoceles with no apical prolapse to the introitus Exclusion criteria: N/S Randomised: 122 (A: 60, B: 62) Lost to follow up: A: 0, B 0 Analysed: A 60, B 62
Interventions	A (60): traditional anterior and posterior fascial plication using polydioxanone sutures B (62): anterior and posterior repair with Gynemesh PS augmentation
Outcomes	Definition of cure: less than stage 2 prolapse at all sites Objective failure stage 2 or greater POP-Q at any site: A 34%, B 17.5% P=0.027 Subjective failure (not satisfied with surgery, VAS <80): A 17%, B 12% Dyspareunia A 46% B 46% De novo dyspareunia A 21%, B 18% Mesh erosion: A 0, B 6.5%
Notes	Data was extracted from Abstract with the authors declining to make full results available. Further evaluation from the full peer reviewed article is required.

Lo 1998

Methods	Single centre RCT (using random number tables) Follow up: 1 to 5.2 years (median 2.1)
Participants	138 randomised, 20 withdrew due to age or not willing to be followed up Inclusion: prolapse at least Grade III (ICS classification) Exclusion: urinary incontinence Past medical history: previous pelvic surgery A: 19, B: 22 Sexually active: A: 11, B: 18
Interventions	A (52): abdominal sacral colpopexy with Mersiline mesh: + 7 posterior repair; + 12 posterior repair and abdominal hysterectomy; + 21 abdominal hysterectomy B (66): vaginal sacrospinous colpopexy with 1-0 nylon: + 20 anterior and posterior repair and vaginal hysterectomy; + 44 anterior and posterior repair Post-operatively, all women had oestrogen treatment
Outcomes	Success defined as ICS grade II or less Objective success rate (all prolapse): A: 49/52, B: 53/66 Operation time (min): A: 157 (SD 35), B: 141 (37) Blood loss (ml): A: 150 (137), B: 448 (258) Hospital stay (days): A: 7.24 (2.07), B: 8.77 (3.8) Prolonged catheter use: A: 0/52, B: 17/66

Lo 1998 (*Continued*)

	Post-operative UTI: A: 2/52, B: 4/66 Dyspareunia: A: 1/11, B: 11/18 (4 of the 11 severe) New urinary incontinence requiring later operation: A: 2/52, B: 1/66 Adverse effects requiring re-operation: A: 4/52, B: 7/66 Adverse effects A: 2 continence operations, 1 retroperitoneal infection and mesh removal, 1 ureteral injury Adverse effects B: 1 continence operation, 1 rectovaginal fistula, 2 vaginal vault strictures, 3 perineal infections
Notes	Groups stated to be comparable at baseline on age, parity, weight and previous pelvic surgery No blinding No CONSORT Who reviewed outcomes unclear No validated symptom or QoL questionnaires.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Maher 2004

Methods	RCT (stratified by SUI) Multicentre, multisurgeon Computer generated randomisation held by nonsurgical co-author Follow up: A: 24 months, B: 22
Participants	95 women Withdrawals: 0 Lost to follow up: 6 (A: 1, B: 5) Inclusion: vault prolapse to introitus Exclusion: prior sacral colpopexy, unfit for general anaesthetic, foreshortened vagina
Interventions	A (46): abdominal group = sacral colpopexy prolene mesh, paravaginal repair, Moschcowitz, posterior vaginal repair and colposuspension for SUI B (43): vaginal group: R sided sacrospinous colpopexy, enterocele and anterior and post repair, colposuspension for SUI, PDS (slowly absorbable sutures) Both groups: colposuspension for occult or potential SUI
Outcomes	Subjective cure (no prolapse symptoms): A: 43/46, B: 39/43 Objective cure (site specific stage 2 or greater failure at any site) : A: 35/46: B: 29/42 Satisfied with surgery: A: 39/46, B: 35/43 Number of women sexually active: A: 19/42, B: 17/37 Dyspareunia: A: 6/19, B: 7/17 Dyspareunia (de novo): A: 2/19, B: 3/17 Preoperative SUI cured: A: 11/14, B: 13/15 De novo SUI postoperatively: A: 2/22, B: 8/24

Maher 2004 (*Continued*)

	Preoperative voiding dysfunction cured A 7/9: B 4/5 Peri-operative outcomes: Blood loss (ml): A: n=47, mean=362 (SD 239), B: 48, 306 (201) Operating time (minutes): A: 47, 106 (37), B: 48, 76 (42) Postoperative complications: A: 1 mesh infection requiring removal, 2 incisional hernia, B: 0 Further prolapse surgery: Further prolapse or continence surgery: A: 4/46, B: 5/43 Cost: (US dollars) A: 4515: B: 3202 Hospital stay (days): A: 47, 5.4 (2.2), B: 48, 4.8 (1.4) Time to return to normal activity: A: 47, 34 (12), B: 48, 25.7 (9.7)
Notes	No blinding Intention to treat Non surgeon follow up No CONSORT Validated symptom and QoL questionnaires.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Meschia 2004

Methods	RCT (sealed envelopes with numbers assigned from a computer generated random number list) Comparing TVT and plication of urethrovesical junction endopelvic fascia in addition to prolapse repair Single centre (Milan, Italy) Follow up (median):A: 26 months (range 15 to 31 months), B: 24 (15 to 31)
Participants	50 women Inclusion: severe symptomatic genital prolapse and occult stress urinary incontinence Exclusion: age >70 years, BMI > 30, diabetes, previous pelvic or continence surgery, symptoms of SUI, detrusor overactivity, cotton-swab test > 30 degrees Age: mean 65 years (SD 8) Parity: 2.2 (0.8) BMI: 25 (3)
Interventions	A (25): prolapse repair and TVT (with prolene tape) B (25): prolapse repair and urethrovesical plication (with 2-0 permanent-braided polyester sutures) All women also had vaginal hysterectomy, McCall culdoplasty and cystocele repair Cystocele (anterior repair) with 2-0 delayed absorbable sutures (polydioxanone) No sacrospinous ligament fixation performed Rectocele repair: A: 20/25, B: 23/25
Outcomes	Subjective prolapse symptoms, failure rate: A: 4/25, B: 8/25 Objective failure (overall): A: 8/25, B: 7/25 Objective failure (anterior): A: 6/25, B: 7/25

Meschia 2004 (*Continued*)

	Objective failure (posterior): A: 3/25, B: 3/25 Objective failure (apex): A: 0/25, B: 3/25 Further prolapse surgery: offered to 2 women but groups not specified Further continence surgery: A: 0/25, B: 3/25 SUI subjective: A: 1/25, B: 9/25 SUI objective: A: 2/25, B: 11/25 OAB de novo (new): A: 3/25, B: 1/25 Voiding dysfunction and recurrent UTIs: A: 3/25, B: 1/25 Adverse effects: A: 2 (bladder perforation, retropubic haematoma), B: 0 Peri-operative outcomes Operation time (minutes): A: 131 (SD 13), B: 112 (21) Blood loss (ml): 188 (77), B: 177 (102) Hb change: A: 1.8 (1.6), B: 1 (1.2) Days in hospital: A: 6.4 (1.5), B: 6.1 (1.5) Time to spontaneous voiding (days): A: 4.4 (1.7), B: 3.8 (2)
Notes	Power calculation provided Groups comparable at baseline.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Meschia 2004a

Methods	RCT (computer generated number table, opaque envelopes) on posterior IVS and sacrospinous fixation for vault prolapse Median follow up: A 19, B 17 months
Participants	66 randomised A 33, B 33 No withdrawals or losses to follow up Inclusion: vault (vaginal cuff) prolapse ICS stage II or more Baseline stress urinary incontinence: A 11/33, B 7/33 Baseline overactive bladder: A 14/33, B 11/33 Baseline voiding dysfunction: A 19/33, B 18/33 Women in Group A were significantly younger than in group B (63 years vs 68 yrs, P<0.05)
Interventions	A (33): infracoccygeal sacropexy (posterior IVS) using multifilament Polypropylene tape B (33): sacrospinous ligament fixation (vaginal sacrospinous colpopexy) Concomitant surgery: anterior (A 64% B 66%) and posterior (70%, 88%) repair, high closure of pouch of Douglas if indicated (36%, 42%)
Outcomes	Primary outcome: recurrence of prolapse at any site (data not provided) Subjective prolapse sensation: A 3/33, B 2/33 VAS prolapse sensation (0-10) N, mean (SD): A 33, 2.4 (3.3), B 33, 1.8 (2.1)

Meschia 2004a (*Continued*)

	Vault prolapse at ICS point C stage II: A 1/33, B 0/33 Anterior vaginal wall prolapse stage II or more: A 9/33, B 11/33 Posterior vaginal wall prolapse stage II or more: A 4/33, B 6/33 Operative time mean min, (SD): A 58 (17), B 69 (17) Blood loss mean ml (SD): A 56 (35), B 126 (21) Days in hospital mean (SD): A 3 (1.1), B 4 (1.7) Complications: Pararectal abscess A: 1/33, B 0/33; Vaginal vault erosion: A 3/33, B 0/33; Buttock pain: A 0/33, B 4/33 Postoperative voiding dysfunction: A 6/33, B 8/33 Stress urinary incontinence: A 5/33, B 5/33 Overactive bladder: A 9/33, B 10/33 Dyspareunia: A 0/33, B 1/33 Constipation: A 3/33, B 2/33 Faecal incontinence: A 1/33, B 1/33
Notes	Abstract and further data from authors No stratification No CONSORT statement No intention to treat No power analysis No validated QoL or pelvic floor questionnaires.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Meschia 2007

Methods	Multicentre RCT (computer generated) on primary surgery anterior vaginal wall prolapse Allocation concealed Power calculation: 90 in each arm required Follow up: 2 years Intention-to-treat analysis: yes, including those women with missing data at two years but with 1 year follow up completed
Participants	206 randomised Lost to follow up 5: A 2 B 3 Inclusion: primary anterior prolapse POP-Q Point Ba -1 (>=stage II) Exclusion: none Baseline stress urinary incontinence: A 22/100, B 18/106 Baseline overactive bladder: A 44/100, B 35/106 Baseline sexually active: A 65/100, B 74/106; with dyspareunia: A 12/65, B 11/74 No differences between the two groups with respect to demographic and clinical characteristics At two years number available for analysis:176 (A 91; B 85) Intention-to-treat analysis: 201 analysed (A 103; B 98)

Meschia 2007 (*Continued*)

Interventions	A (100) interrupted fascial plication Vicryl 00 WITH Pelvicol overlay fixed with PDS suburethrally and uterosacral cardinal ligament distally B (106): surgery as above WITHOUT Pelvicol overlay Concomitant surgery standardised Vaginal hysterectomy McCall culdoplasty, posterior compartment defect fascial plication
Outcomes	Objective (POPQ point Ba -1): A 7/98 (7%) B 20/103 P=0.0019, OR 3.13 CI 1.26-1.78 Subjective symptoms of prolapse: A 9/98 (9%) B 13/103 (13%) VAS prolapse severity: (SD): A 1.5 (1.7), B 1.5 (1.6) Adverse effects: haematoma: A 3/98, B 0/98 Length of stay, mean days (SD): A 4.4 (1.5), B 4.7 (1.3) Blood loss ml (SD): A 151 (112), B 167 (96) Time to voiding mean days (SD): A 3 (3.2), B 3.5 (3) Voiding dysfunction: A 15/98 (15%), B 16/103 (15%) Overactive bladder: A 15/98 (15%), B 18/103 (17%) Stress urinary incontinence: A 10/98 (10%), B 14/103 (13%) Sexually active: A 47, B 48 Dyspareunia: A 7/47 (15%), B 5/48 (10%) At 2 years: primary outcome measure = rate of anterior vaginal prolapse recurrence Anatomic outcomes were defined according to the ICS recommendations Overall subjective failure (both groups): 20/176 (11%) Objective failure (unsatisfactory anatomic outcome point Ba): A 9/85 (11%); B 20/91 (22%); P=0.07 Intention-to-treat analysis (including women with missing data at two years but with 1 year follow-up completed): Objective failure (ITT): A 11/98 (11%); B 24/103 (23%); p=0.04 Graft rejection necessitating removal: A 1/98, B 0/103
Notes	Number of patients approached or declined unclear No CONSORT The authors concluded that the use of Pelvicol implant can improve anatomic outcomes in the anterior vaginal compartment

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Natale 2007

Methods	Single centre RCT on vaginal vault suspension No CONSORT statement, no power calculation, and concealment not mentioned, procedures not described in abstract and in further information obtained from authors PC generated randomisation list Power calculation: 80% power, 110 patients in each study arm to detect a 15% reduction in vaginal vault prolapse. In order to allow for a 10% dropout rate, sought to enrol 120 subjects in each study arm POPQ, urodynamics, Q-tip test PQoL, Wexner score for constipation and PISQ-12
Participants	229 women with apical POP stage 2 or more All completed one-year follow up Demographic parameters and previous prolapse surgeries did not differ between the two groups
Interventions	A: n= 116 high levator myorrhaphy B: n= 113 uterosacral vault suspension Concomitant surgery in all women: vaginal hysterectomy and "tension-free" cystocele repair with polypropylene mesh in all women. Operations performed by three different surgeons
Outcomes	Demographic, urodynamic and prolapse data at baseline similar in groups Apical stage 2 recurrent prolapse in A 6/116 (5%) and B 5/113 (4%); Anterior stage 2 prolapse in A 34/116 (29%) and B 40/113 (35%); Posterior stage 2 prolapse in A 12/116 (10%) and B 11/113 (10%) Mean post-operative total vaginal length in A 7.9 cm and B 9.1 cm; p=0.03 No difference in first desire to void, bladder capacity, pressure at maximum flow, maximum flow. Detrusor overactivity present in A 17/116 (25%) and B 55/113 (49%) De novo symptoms in abstract only (different patient numbers): stress urinary incontinence in A 5 (9%), B 8 (14%) urge incontinence in A 0 and B 7 (12%) urgency in A 2 (3%) and B 5 (9%) Increased daytime frequency in A 3 (5%) and B 9 (16%) nocturia in A 6 (10%) and B 7 (12%) slow stream in A 11 (19%) and B 5 (9%) dyspareunia in 5 (9%) in both groups constipation in A 7 (12%) and B 8 (14%). Complications: angulation of ureter with hydronephrosis in 9 patients (8%) in group B mesh erosion in A 12 (10%) and B 16 (14%); significant improvement in PQOL scores in both groups No differences in symptoms, PISQ-12-scores, Wexner score for constipation, urodynamic data or prolapse degrees between groups
Notes	Natale et al (ICS 2007, abstract) assessed two procedures for suspension of the vaginal vault: High Levator Myorrhaphy (HLM; 58) and Uterosacral Vaginal Vault Suspension (UVVS; 58) in patients with stage 2 prolapse. All women underwent anterior repair with Polypropylene mesh and vaginal hysterectomy concomitantly. Demographic parameters and previous prolapse surgeries did not differ between the two groups At follow up, apical compartment recurrence rate was lower although not significantly in the LM group as compared to the UVVS group (2/58 versus 15/58) but the mean total vaginal length (TVL) was significantly smaller (7.2 versus 8.9 cm). Post-operative detrusor overactivity was less prevalent among patients in the LM arm (17/58 versus 22/58, P=0.05) although figures for bladder function pre-operatively are not given. Post-operative unilateral ureteric

	angulation leading to hydronephrosis was identified in 5/58 patients in the UVVS group and required a further surgical intervention for removal of a suture. Mesh erosion rates were comparable between the two groups. Weaknesses of this study include the lack of exclusion criteria, length of follow up, peri-operative data and a clear definition for success or failure

Natale 2009

Methods	CONSORT statement: No Power calculation: 100 in each arm Type of randomisation: computer generated Blinding strategy: not specified Allocation concealment: not specified Definition of cure: point Ba<−1 (i.e., stage 0 or 1 according to the POP-Q system) Follow up: 24 months Prolapse assessment: POP-Q
Participants	Inclusion: recurrent, symptomatic stage 2 or greater anterior vaginal wall prolapse (point Ba >/= -1) planning to undergo secondary pelvic reconstructive surgery Exclusion: patients needing a concomitant anti-incontinence procedure and patients with diabetes mellitus or collagen disease Randomised: 190 Analysed: 190 Women were comparable at baseline on demographic data, degree of POP, and clinical or urodynamic findings. Previous hysterectomy: A 60/96, B 54/94
Interventions	A (96): cystocele repair with armed monofilament polypropylene mesh (Gynemesh) B (94): cystocele repair with armed porcine dermis graft (Pelvicol) Concomitant surgery: not specified. Prophylactic antibiotic cover All underwent tension-free cystocele repair (TCR) and levator myorrhaphy and vaginal hysterectomy if required The sheets of both the Pelvicol graft and the synthetic mesh were trimmed to an identical rounded shape, with two lateral wings/arms. In each operation, the central, rounded part of the graft was positioned under the urinary bladder in a tension-free fashion, while its arms were inserted deep into the periurethral tissue on both sides towards the pubic bone. A single fixating monocryl 2/0 suture was performed at the base of one wing of the mesh, at the periurethral level
Outcomes	Objective failure: A 27/96; B 41/94; p=0.06 Stress Urinary Incontinence de novo: A 2/96; B 1/94 Increased daytime urinary frequency: A pre 33, post 26/96; B pre 42, post 6/94 Dyspareunia: A pre 20, post 10; B pre 29, post 12; not significant PISQ-12: A: No change between pre-op and post-op scores p=0.31; B: Significant improvement between pre-op and post-op scores p=0.03 P-QoL (post-op scores): B superior to A in social limitations p=0.04 and emotions p=0.02 In both groups significant and equal reduction in slow urinary stream and incomplete bladder emptying following intervention In both groups non-significant but equal reduction in urinary urgency, urge incontinence and nocturia Mesh erosion oversewing: A 6/96; B 0/94

Natale 2009 (*Continued*)

Notes	The trialists concluded that Gynemesh was not statistically significantly superior to porcine graft in the management of anterior compartment prolapse at 2 years. Sexuality and P-QOL was superior in the porcine graft group as compared to the Gynemesh PS

Nguyen 2008

Methods	Single centre RCT on anterior vaginal prolapse CONSORT statement: yes Power calculation: 38 in each arm Type of randomisation: computer generated Blinding strategy: primary surgeon - till the surgery day; patients, research nurse and medical assistant remained blinded Allocation concealment: sealed opaque envelopes Definition of cure: Ant wall POP-Q St. < 2, 'Optimal support' = Aa and Ba at St. 0, 'Satisfactory' = Aa and Ba at St.1 and improved from pre-op staging Follow up: 12 months (full publication) and 24 months (abstract only) Prolapse assessment: POP-Q
Participants	Inclusion: 21 years and older with POP-Q stage 2 or greater anterior prolapse requiring surgical correction Exclusion: pregnancy (present or contemplated), prior repair with graft, systemic infection, compromised immune system, uncontrolled diabetes mellitus, previous pelvic irradiation/cancer, polypropylene allergy, scheduled for concomitant Burch or pubovaginal sling Randomised: 76 Withdrawals: 1 Lost to follow up: 1 Analysed: 76
Interventions	A (38): anterior colporrhaphy (AC) with delayed absorbable (PDS) sutures B (38): AC + polypropylene four armed mesh kit repair (Perigee, American Medical Systems) Concomitant surgery: vaginal hysterectomy, bilateral salpingo-oophorectomy, uterosacral suspension, midurethral tape, site-specific rectocele repair, perineoplasty, Apogee mesh kit repair Concomitant prolapse and suburethral tape surgeries were performed in both groups
Outcomes	Definition of failure: POP-Q stage 2 anterior prolapse. Objective failure: A 20/38 (53%); B 5/38 (14%); p=0.01 Hb change at day 1 post-op (median): A 1.8 (g/dl); Gp B 2.4 (g/dl); p=0.02 Blood transfusion: A1/38, B 1/38 Further prolapse surgery: A 1/38; B 0/38 Further continence surgery: A 1/38; B 0/38 Validated questionnaires: A pre PFDI-20 109±58; post PFDI-20 45±32 B pre PFDI-20 108±45; post PFDI-20 34±31 A pre PFIQ-7 45±32; post PFIQ-20 23±34 B pre PFIQ-7 82±54; post PFIQ-20 14±23 In both groups the change in PFDI and PFIQ scores after surgery is highly significant P=0.001 Mesh erosion: A 0, B 2/38 Definition of dyspareunia: 'usually' or 'always' to item 5 at the PISQ-12

Nguyen 2008 (*Continued*)

	Dyspareunia de novo: A 4/26 (15.4%), B 2/22 (9.1%)
Notes	Data regarding study methodology was obtained from the full published article, follow up at 12 months PFDI - pelvic floor distress quality of life measure PFIQ - pelvic floor incontinence questionnaire (quality of life measure)

Nieminen 2004

Methods	Single centre RCT (nurse took card from envelope with 15 vaginal and 15 transanal cards) Follow up: A 12 months, B 12 months
Participants	30 women Inclusion: symptomatic rectoceles Exclusion: any other prolapse or compromised anal sphincter function 42 eligible women participated 12 excluded due to compromised anal sphincter function 30 analysed No loss to follow up
Interventions	A (15): midline rectovaginal fascia plication Vicryl repair B (15): transanal repair performed by 2 colorectal surgeons Vertical and horizontal Vicryl sutures, enterocele repaired
Outcomes	Improvement symptoms A: 14/15: B 11/15 (P=0.08) Postoperative mean reduction Ap A 2.7: B 1.3 (P=0.01) Depth rectocele defecography Recurrent posterior wall prolapse (rectocele or enterocele): A 1/15, B 10/15 (P=0.01) Continuing need to digitally assist rectal emptying postoperatively A: 1/11, B 4/10 Sexually active: A 12/15, B 11/15 Dyspareunia: A 4/12, B 2/11 Incontinence to flatus: A 4/15, B 3/15 Incontinence to faeces: A 0/15, B 0/15 Peri-operative outcomes: Operating time: A 35 minutes: B 35 minutes Blood loss ml: A 120, B 60 Discharged from hospital in 48 hours: A 13/15: B 11/15.
Notes	Full text as yet unpublished ICS abstract No intention to treat No CONSORT.

Risk of bias

Item	**Authors' judgement**	**Description**
Allocation concealment?	Unclear	B - Unclear

Nieminen 2008

Methods	Muticentre RCT on anterior vaginal prolapse CONSORT statement: yes Power calculation: 101 in each arm Type of randomisation: computer generated Allocation concealment: opaque envelopes Blinding strategy: not specified, but lack of a non-surgical blinded outcome reviewer Definition of cure: less than stage 2 prolapse at Aa or Ba Follow up: 24 months Prolapse assessment: POP-Q
Participants	Inclusion: post-menopausal women with symptomatic anterior vaginal wall prolapse to the hymen or beyond Exclusion: apical defect indicating vaginal fixation or stress urinary incontinence necessitating surgery or the main symptomatic prolapse component was in the posterior vaginal wall. Also patients with gynaecological tumour or malignancy calling for laparotomy or laparoscopy and those with untreated vaginal infection Randomised: 202 Withdrawals: 1 Lost to follow up: 1 Analysed: 200 No significant differences in baseline demographics, prior hysterectomy or prolapse surgeries between the two groups
Interventions	A (96): anterior colporrhaphy (AC) using a 0 or 2/0 multifilament suture B (104): AC + self-tailored (from a 6 x11 cm mesh patch) 4 armed low-weight polypropylene mesh Type of mesh: non-absorbable monofilament polypropylene (Parietene light, Sofradim, France) Sutures for AC: absorbable 0 or 2/0 multifilament suture Concomitant surgery: vaginal hysterectomy, posterior repair, culdoplasty as required, no concomitant continence surgeries were performed
Outcomes	Objective failure: A 39/96; B 12/104 Symptomatic prolapse: A 35/96; B 27/104; p=0.11 Awareness of bulge at 1 year: A 6/93, B 7/107 Awareness of bulge at 2 years: A 17/96; B 5/104; p=0.003 Further prolapse surgery: A 1/96; B 1/104 Further continence surgery: A 6/96; B 5/104 Operating time mean (min): A 58+/-26; B 73+/-26; p<0.001 Blood loss mean (ml): A 114+/-109; B 190+/-23; p=0.004 Stress incontinence de novo: A 9/96; B 15/104 Mesh erosion: A 0, B 8/104 (at 1 year follow up erosion rate was reported as 18/104)
Notes	Nieminen and colleagues compared anterior colporrhaphy alone and anterior colporrhaphy plus a self styled monofilament mesh (Parietene light, Sofradim, France) in postmenopausal women with symptomatic anterior compartment prolapse at the hymen or beyond. Women were excluded if they had an apical defect indicating concomitant vaginal fixation or stress urinary incontinence necessitating surgery or the main symptomatic prolapse component was in the posterior vaginal wall. Also patients with gynecologic tumor or malignancy calling for laparotomy or laparoscopy and those with untreated vaginal infection were excluded Concomitant surgeries including a vaginal hysterectomy and posterior repair were performed as required.

Nieminen 2008 (*Continued*)

	No concomitant continence surgeries were performed In the mesh group a four armed graft was tailored from a 6 x11 cm mesh patch The anterior colporrhaphy was performed using a 0 or 2/0 multifilament suture There were no significant differences in baseline demographics, prior hysterectomy or prolapse surgeries between the two groups At two years, the objective failure rates were significantly higher in those undergoing the anterior colporrhaphy alone (39/96) as compared to the anterior colporrhaphy with the self styled Sofradim Paritene polypropylene mesh (12/104). As pointed out by the authors, there was no difference in subjective awareness of prolapse between the two interventions (AC 35/96; mesh 27/104; p=0.11) although the operating time and blood loss were significantly greater in the AC + mesh group and eighteen patients (17%) in this group developed mesh erosion at one year and at two years the authors interestingly reported eight percent mesh exposures. At one and two years respectively, the number of women aware of bulge in the AC group was 6/93, 17/96 as compared to 7/107, 5/104 in the mesh group, which is highly significant (p= 0.003). De novo Stress Urinary Incontinence occurred in nine (9/96, 9%) from the AC group of which six underwent TVT and in 15 (15/104, 14%) from the AC + mesh group of which four underwent TVT. One subsequent prolapse surgery was required in each group (Cystocele in AC group and apical repair in the AC + mesh group). The weaknesses of the study included the lack of a non-surgical blinded reviewer There were two inconsistencies between the one year and two year data. The reduction in mesh exposures from 17% at one year to 8% at two years is difficult to explain. Furthermore, the percentage of patients having undergone previous prolapse surgery at one year was 27% in the AC group and 18% in the mesh group while the two year report quotes 20% and 14% respectively

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	

Pantazis 2008

Methods	RCT pilot comparing abdominal open and laparoscopic sacral colpopexy CONSORT statement: No Power calculation: No Type of randomisation: Not specified Blinding strategy: Not specified Allocation concealment: No Definition of cure/failure: Not specified. Primary outcome is the level of the vaginal apex (change of point C) Follow up: 12 weeks Prolapse assessment: POP-Q
Participants	Inclusion: symptomatic vault prolapse stage >/= 2 Exclusion: medical unfitness for a sacral colpopexy, and the need for any concomitant pelvic surgery Randomised: 30 Analysed: 30 Demographic characteristics were similar in both groups
Interventions	A (15): abdominal (open) sacral colpopexy B (15): laparoscopic sacral colpopexy No concomitant surgeries in either group

Pantazis 2008 (*Continued*)

Outcomes	Operating time: A 155, B 165 min (p=0.69) Median length of admission A 4.5 days, B 3.0 (p=0.07) Point C elevation mean (cm): A 6.0; B 6.2; (p=0.71) Patient's Global Impression of Improvement (1 to 7 score, 1 being best improvement and 7 being worst deterioration) : A 1; B 1 Hb drop day 2 post-op mean (g/dl): A 2.45; B 1.35; P=0.01, 95%CI 0.304 to 1.882
Notes	No SDs.

Paraiso 2006

Methods	Single centre RCT (computer generated randomisation by sealed envelopes with blinded research nurse) 106 randomised to posterior colporrhaphy (37), site-specific repair (37), site specific repair augmented with porcine small intestine submucosa (32: Fortagen, Organogenesis) study funded unrestricted research grant Organogenesis
Participants	106 women Inclusion: grade II or greater posterior vaginal wall prolapse with or without other prolapse or incontinence or gynaecological procedures Exclusion: concomitant colorectal procedures, allergy to pork
Interventions	A (37): posterior colporrhaphy as per Maher 2-0 Ethibond B (37): site specific repair Cundiff 2-0 Ethibond C (32): as in B with 4x8 cm porcine small intestine submucosa graft inlay (Fortagen)
Outcomes	Objective failure (Bp greater or equal to -2 at 1 year): A: 4/28, B: 6/27, C: 12/26 Subjective (functional) failure (worsening prolapse or colorectal symptoms at 1 year): A: 5/31, B: 4/29, C: 6/28 Operating time mean mins (SD): A: 150 (68), B: 151 (69), C: 169 (62) Estimated blood loss mean (range): A: 150 (50-950), B: 150 (50- 600), C: 200 (50-3500) Length hospital stay median days (range): A: 2 (1-19), B: 2 (1-6), C: 2 (1-6) Intraoperative complications: A: 1/37 (3%), B: 2/37 (5%), C: 2/31 (6%) Postoperative complications: A: 21/37, B: 14/37, C: 16/31 Reoperation for prolapse at 1 year: A: 1/33, B: 2/37, C: 3/29 Dyspareunia: A: 9/20, B: 6/22, C: 3/19 No differences between groups in condition-related quality of life outcomes (PFDI-20, PFIQ-7, PISQ-12)
Notes	Ongoing study: initial full text review after 1 year Intention-to-treat basis Consort statement Independent nurse review Limited sample size.

Risk of bias

Item	Authors' judgement	Description

Paraiso 2006 (*Continued*)

Allocation concealment?	Yes	A - Adequate

Roovers 2004

Methods	RCT (computer generated random number table, allocation concealed) comparing abdominal and vaginal surgery for uterine prolapse Follow up: A 12, B 12 months Multicentre RCT comparing abdominal and vaginal surgery for uterine prolapse CONSORT statement: Yes Power calculation: 38 in each arm Type of randomisation: computer generated random number table, allocation concealed Blinding strategy: participating gynaecologists and study co-ordinator were kept blinded Allocation concealment: sealed envelopes Definition of cure/failure: failure defined as recurrent prolapse stage >/= 2 plus symptoms of pelvic floor dysfunction Follow up (mean): 94 months (range 84 - 120) Prolapse assessment: POP-Q
Participants	82 women Inclusion: uterine prolapse stage 2-4 on POP-Q Exclusion: uterus size > 12 weeks gestation, prior hysterectomy, adnexal mass, previous abdominal pelvic surgeries > 2, body mass index >35, prior inflammatory bowel or pelvic disease, faecal incontinence d/t sphincter defect Offered participation: 124, 3 excluded, 39 refused to participate, 2 withdrew from abdominal group as wanted vaginal surgery Randomised: 82 (41 in each arm) Analysed: 82 At 8 years follow up: 74 of the original 84 patients were alive and able to be contacted. 60/74 (81%) completed questionnaires and 31/74 (42%) were examined
Interventions	A (41): abdominal: sacral colpopexy with preservation of uterus: colposuspension for SUI B (41): vaginal: vaginal hysterectomy with vaginal repair and uterosacral ligament plication: bladder neck needle suspension for SUI Concomitant surgery: anterior colporrhaphy, posterior colporrhaphy, Burch colposuspension, Pereyra or Raz needle bladder neck suspension
Outcomes	Reoperation performed or planned: A 9/41, B 1/41 Urogenital distress inventory: no significant mean differences between A and B in domain score for genital prolapse (mean difference 4.1, 95% CI -5.4 to 13.6) Scores on the UDI for: discomfort/pain domain (mean difference 7.1, 95% CI 1.1 to 13.2); overactive bladder domain (mean difference 8.7, 95% CI 0.5 to 16.9); or obstructed micturition domain (mean difference 10.3, 95% CI 0.6 to 20.1) were significantly higher in A than in B Peri-operative outcomes: operating time: A 97 (SD 3.6) min, B 107 (SD 4.7) min blood loss: A 244 (51.5) ml, B 248 (34.1) ml days in hospital: A 7.7 (0.2) B 7.6 (0.3) Eight year follow up: 74/84 participants alive and contacted, 60 (71%) completed questionnaires, 31 (37%) were examined.

Roovers 2004 (*Continued*)

	No data provided about numbers in each randomised group at follow up therefore denominator is from original randomisation (and has increased to 42 in each group) Women visiting a physician after surgery for pelvic floor symptoms: A 18/42 43%); B 8/42 (19%) P=0.03 Women reporting on improvement in prolapse symptoms post-op: A 29/42 (68%); B 37/42 (87%) P=0.09 Re-operation rate: A 11/42 (26%); B 6/42 (14%) P=0.28 IIQ scores and POP-Q scores were similar for both groups Defecation symptoms had more adverse effect on quality of life in A than B. The difference in the constipation obstruction domain of the DDI was statistically significant
Notes	RCT compared vaginal hysterectomy in vaginal group with uterine preservation in abdominal group No blinding No stratification Intention to treat According to CONSORT Non surgeon review Validated questionnaire: UDI+IIQ No sexual and bowel function outcomes The authors concluded that long term results of this RCT were consistent with short term results and demonstrated that vaginal hysterectomy with anterior and/or posterior colporrhaphy is preferable to abdominal sacral colpopexy with preservation of the uterus, as surgical correction of uterine prolapse We do not agree with these conclusions as there were no statistically significant differences in subjective or anatomical outcomes, reoperation rates or IIQ scores demonstrated. The statistically significant greater number of women visiting a physician with pelvic floor symptoms and recording an adverse effect on quality of life of the constipation / obstruction domain of DDI in the abdominal group as compared to the vaginal group would not be sufficient to support the authors' conclusion

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Sand 2001

Methods	Single centre RCT (computer generated number table) Vaginal repair with or without Vicryl mesh overlay for cystocele and rectocele Follow up: A 12, B 12 months
Participants	143 women Inclusion: cystocele to or beyond hymenal ring on standing Exclusion: less than 18 years of age, pregnancy, contemplating pregnancy within one year, paravaginal defect only, anterior enterocele 161 randomised 1 excluded (anterior enterocele) 17 lost to follow up

Sand 2001 (*Continued*)

Interventions	A (70): no mesh: Vicryl plication of anterior endopelvic fascia B (73): mesh: as above with Vicryl mesh folded underneath trigone and cuff and secured Vicryl to fascia: also added to posterior wall if posterior repair performed Posterior repair performed: A: 67/70, B: 65/73
Outcomes	Cure: POP-Q less than grade 2 Objective cure of cystocele: A 40/70, B 55/73 (P=0.02) Objective failure for rectocele: A 7/67, B 6/65 Mesh erosion: A, 0/70 (not applicable); B, 0/73
Notes	No subjective success No urinary, bowel or sexual function data No peri-operative data No intention to treat analysis No CONSORT No blinding Standardised concomitant surgery Review by surgeon.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Schierlitz 2007

Methods	Multicentre RCT Randomisation concealment NS Intention to treat NS Blinding assessors NS 6 month review
Participants	inclusion: symptomatically continent women with urodynamically demonstrable stress incontinence with or without reduction of prolapse (POP-Q stage 3 or greater) exclusion NS 69 eligible 52 randomised No loss to follow up
Interventions	A (27) non-standardised prolapse surgery without TVT B (25) non-standardised prolapse surgery with TVT No women had bladder neck plications
Outcomes	primary outcome repeat continence surgery A 1/27 B 0/25 Urodynamic stress incontinence A 9/27 B 1/25 Median subjective VAS < 80 (0-100) failure A 95; B 80 p=0.81 no range SD so unable to calculate UDI, IIQ, PISQ questionnaires stated no difference no figures

Schierlitz 2007 (*Continued*)

	I hour pad test stated no difference in figures
Notes	Occult SUI was defined as symptomatically continent women with urodynamically demonstrable stress incontinence with or without reduction of the prolapse (POP-Q Stage 3 or greater) The authors calculated a clinician would have to insert 26 TVT slings unnecessarily to prevent one woman needing a sling post-operatively and concluded routine insertion of a suburethral sling where occult stress urinary incontinence has been demonstrated prior to prolapse repair can not be recommended

Sivaslioglu 2008

Methods	Single centre RCT comparing polypropylene mesh surgery with site-specific surgery in the treatment of cystocoele CONSORT statement: Yes Power calculation: 45 in each arm Type of randomisation: computer generated Blinding strategy: No (assessment was performed by non-blinded reviewers) Allocation concealment: not specified Definition of cure/failure: 'Acceptable cure' defined as cystocele less than -1 cm (stage 1 POP-Q) Follow up: mean 12 months (range 8-16) Prolapse assessment: POP-Q
Participants	Inclusion: primary cystocele Exclusion: stress urinary incontinence, concomitant rectocele or enterocoele or recurrent cystocoele Randomised: 90 (45 to each arm) Analysed: 85 Lost to follow up: 5
Interventions	A (42): site-specific Polyglactin 910 anterior repair B (43): self-styled four armed polypropylene (Parietene, Sofradim, France) mesh, no anterior repair Concomitant surgery not standardised, management of concomitant apical prolapse was not specified in either group
Outcomes	Objective failure (stage 2 or more POP-Q): A 12/42; B 4/43; P<0.05 PQoL score post-op (mean±SD): A 7.5±6.2; B 6.2±5.5 No further prolapse surgery in either group Stress Urinary Incontinence de novo: A 3/42; B 0/43 Dyspareunia de novo: A 0/42; B 2/43 Mesh erosion:A 0/42, B 3/43
Notes	Sivaslioglu and colleagues evaluated a site-specific Polyglactin 910 repair and self-styled four armed polypropylene (Parietene, Sofradim) mesh The management of concomitant apical prolapse was not specified in either group and assessment was performed by non-blinded reviewers. Three patients in the AC group developed de-novo SUI and two in the mesh group developed de-novo dyspareunia. Operating time and blood loss are not described

Weber 2001

Methods	RCT (computer generated random number tables. Sealed envelopes concealed assignment) comparing 3 surgical techniques 3 arms, 1 centre Length of follow up: A+B+C, 23.3 months
Participants	83 women Inclusion: all women undergoing cystocele repair Exclusion: continence surgery i.e. colposuspension or sling 114 randomised 5 withdrawals 26 lost to follow up (A 2:B 15: C 9:) leaving 83 in trial
Interventions	A (33): anterior repair: midline plication without tension 0 PDS B (24): ultralateral: dissection to pubic rami laterally, plication paravaginal with tension 0 PDS interrupted C: (26) anterior repair plus mesh: standard plication midline Vicryl mesh overlay, Vicryl sutures
Outcomes	Objective Aa and Ba less than or at 1 cm from introitus: A 10/33, B 11/24, C 11/26 Remaining data reported related to 83 women as a whole and did not differentiate between groups
Notes	Number and level of surgeons unknown Adequate power Non-standardised concomitant surgery Intention to treat yes No CONSORT No stratification Significant disparity in total numbers in Table 1 and actual numbers with prolapse reported Except for point Aa POP-Q, no individual outcome data reported in the 3 groups

Risk of bias

Item	**Authors' judgement**	**Description**
Allocation concealment?	Yes	A - Adequate

BMI = Body mass index
Hb = Haemoglobin
ICS = International Continence Society
IVS = intravaginal slingplasty
MUCP = Maximum urethral catheter pressure
OAB = Overactive bladder
PDS = Absorbable polydioxanone surgical suture (PDS)
PFDI = Pelvic Floor Distress Inventory
PFIQ = Pelvic Floor Impact Questionnaire
PISQ = Pelvic organ prolapse/urinary Incontinence Sexual Questionnaire
POP = Pelvic organ prolapse
POP-Q = Pelvic organ prolapse quantification (according to ICS)
QoL = Quality of Life
RCT = Randomised controlled trial

SUI = Stress Urinary Incontinence (symptom diagnosis)
TVT = Tension-free vaginal tape
UDI = Urogenital Distress Inventory
UI = Urinary incontinence
UTI = Urinary tract infection
VAS = visual analogue scale

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Aka 2004	Unclear study design (participants having a hysterectomy are divided into 2 groups; not all participants had prolapse). Outcome was markers of tissue trauma (acute phase reactants)
Barber 2006	Barber and colleagues compared two independent population cohorts. Arm one was the pessary group in which women were randomly allocated between two pessary types and arm two that underwent a surgical intervention. As patients were not randomly allocated between the pessary and surgery groups, this paper failed to meet the criteria of being a randomised controlled trial and was excluded
Bergman 1989	RCT on anterior colporrhaphy, Pereyra or Burch colposuspension, no data on pelvic organ prolapse given
Biller 2008	Biller and colleagues evaluated inclusion and exclusion of anal purse string suture to minimise contamination during prolapse surgery. This study was excluded from the review as it failed to evaluate pelvic organ prolapse surgical procedures
Boccasanta 2004	RCT on two transanal stapled techniques for outlet obstruction. Outlet obstruction caused not only by rectoceles but also by descending perineum and intussusception. Prolapse data not explicitly presented
Carramao 2008a	Carramao and colleagues compared vaginal hysterectomy with sacrospinous fixation (14) with hysteropexy and mesh pelvic floor repair (14) in women with stage 3 or more pelvic organ prolapse. Peri-operative data and objective success were recorded at 6 months and was identical between the groups This paper was excluded due to the poor sample size and lack of data regarding functional outcomes, quality of life and complications.
Choe 2000	RCT on mesh versus vaginal wall sling for stress incontinence. Not all women had pelvic organ prolapse before the operation
Colombo 1996b	RCT on Burch colposuspension and paravaginal defect repair for stress incontinence, no report on treatment of associated anterior vaginal wall prolapse
Cruikshank 1999	RCT on three operations for prevention of enterocele. Study does not include treatment of prolapse
Das 2004	RCT on posterior intravaginal sling versus sacrospinous ligament fixation. Poster abstract only, very limited data, no results presented
Debodinance 1993	Comparison of two different procedures for stress incontinence and prolapse but no results on pelvic organ prolapse are reported postoperatively

(*Continued*)

Di Palumbo 2003	RCT non-balanced on stress urinary incontinence and urethrocystocele grade 3-4 (Baden-Walker). Very limited prolapse data supplied (mean grading rather than numbers and percentages, failure rates not presented). No clear definition of success or failure
Glavind 2007	Glavind and colleagues compared 3 hours and 24 hours post-operative catheter removal following pelvic organ prolapse surgery. While this study was very interesting, it was excluded from the review as it failed to evaluate pelvic organ prolapse surgical procedures
Guvenal 2002	Unclear study design (participants divided into 3 groups): vaginal hysterectomy + sacrospinous fixation; abdominal hysterectomy and sacral colpopexy; vaginal hysterectomy alone
Kwon 2002	Poster presentation at ICS 2002. Preliminary data, subgroup of an ongoing RCT on additional transvaginal sling for prevention of recurrent anterior vaginal wall prolapse
Mattos 2004	Unclear study design (participants divided into 2 groups): following vaginal hysterectomy, the vault was repaired with (a), Richter's technique or (b) titanium staples to sacrospinous tendon
Meschia 2007a	Meschia and colleagues reported preliminary data comparing anterior and posterior mesh repair (Perigee and Apogee) without hysterectomy and fascial reconstructive surgery with hysterectomy in women with at least POP-Q stage 3 anterior compartment prolapse and stage 2 uterine descent. The abstract reports on 3 months outcomes with 21 women in the mesh group and 17 in non mesh group Due to the short follow up time, small numbers and the preliminary nature of the study this abstract was excluded and we are awaiting the full data set which the authors were not able to supply at this time
Rane 2004	RCT of 3 different operations (vaginal sacrospinous fixation SSF, posterior intravaginal slingplasty IVS, sacral colpopexy SCP (abdominal or laparoscopic)) but presented MRI findings of anatomical results only. SSF said to increase anatomical distortion relative to the other 2 operations
Segal 2007	Segal and colleagues compared the feasibility of local anesthesia with IV sedation versus general anesthesia in women undergoing vaginal surgery for pelvic organ prolapse. This trial was excluded from the review as it failed to evaluate pelvic organ prolapse surgical procedures

RCT = Randomised Controlled Trial
ICS = International Continence Society

Characteristics of ongoing studies *[ordered by study ID]*

Freeman 2007

Trial name or title	LAS: Sacral colpopexy for vault prolapse trial
Methods	RCT
Participants	Women with post-hysterectomy vault prolapse

Freeman 2007 (*Continued*)

Interventions	Abdominal versus laparoscopic sacral colpopexy
Outcomes	Objective assessment of prolapse (change in POP-Q score) Subjective global impression of improvement (PGI). Ten secondary outcomes including QOL measures and surgical details
Starting date	March 2006 - September 2007
Contact information	Dr Bob Freeman, Derriford Hospital, Plymouth
Notes	Pilot study Funding from local research grant 20 women recruited (aim 30) Now interim report as Pantazis 2008.

Glazener 2009

Trial name or title	PROSPECT (PROlapse Surgery: Pragmatic Evaluaiton and randomised Controlled Trials)
Methods	RCT
Participants	women having prolapse surgery
Interventions	anterior and posterior repair (colporrhaphy) with or without non-absorbable or biological mesh inlay, or mesh kit
Outcomes	Prolapse symptoms (POP-SS); prolapse stage (POP-Q), economic outcomes
Starting date	01 09 2009
Contact information	c.glazener@abdn.ac.uk
Notes	HTA funded study in UK

Tincello 2004

Trial name or title	TVT and Colposuspension
Methods	RCT
Participants	Women with urodynamic stress incontinence and anterior vaginal wall prolapse of at least Stage 2 on POPQ
Interventions	TVT versus Colposuspension with anterior repair
Outcomes	3 day urinary diary, 24 hour pad test, King's Health questionnaire, POPQ assessment Follow up at 3 and 12 months

Tincello 2004 (*Continued*)

Starting date	2004
Contact information	
Notes	

Verleyen 2004

Trial name or title	Porcine dermis versus Vicryl plug in Raz cystocele repair
Methods	
Participants	79 women (76 with concomitant prolapse)
Interventions	RCT, porcine dermis versus Vicryl
Outcomes	UDI, IIQ, urinary urgency, recurrent cystocele
Starting date	2003?
Contact information	Dr P Verleyen, University Hospitals, Gassthuisberg
Notes	Abstract of ongoing study reported ICS/IUGA Paris 2004

TVT = tension-free vaginal tape

DATA AND ANALYSES

Comparison 1. Surgery for upper vaginal (vault or uterine) prolapse

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Number of women with prolapse symptoms (subjective failure)	4		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
1.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	2	169	Risk Ratio (M-H, Fixed, 95% CI)	0.53 [0.25, 1.09]
1.2 abdominal sacro-hysteropexy versus vaginal hysterectomy plus anterior and/or posterior colporrhaphy at 1 year	1	82	Risk Ratio (M-H, Fixed, 95% CI)	3.2 [1.29, 7.92]
1.3 abdominal sacro-hysteropexy versus vaginal hysterectomy plus anterior and/or posterior colporrhaphy at 8 years	1	84	Risk Ratio (M-H, Fixed, 95% CI)	2.6 [1.02, 6.65]
1.4 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1	66	Risk Ratio (M-H, Fixed, 95% CI)	0.67 [0.12, 3.73]
2 Number of women unsatisfied with surgery	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
2.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.2 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3 Number of women who visited a physician after surgery because of pelvic floor symptoms	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
3.1 abdominal sacro-hysteropexy versus vaginal hysterectomy plus anterior and/or posterior colporrhaphy	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4 Patient satisfaction: VAS (0-10) or Global Impression of Improvement (PGI-I) score	2		Std. Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 open sacral-colpopexy versus laparoscpic sacral-colpopexy	1		Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable
4.2 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspensio	1		Std. Mean Difference (IV, Fixed, 95% CI)	Not estimable

5 Number of women with any prolapse (objective failure)	6		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
5.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy (failed)	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.2 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy (not improved)	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.3 abdominal sacral colpopexy vs vaginal McCall	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.4 cadaveric fascia lata (Tutoplast) vs polypropylene (Trelex)	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.5 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5.6 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6 Number of women with recurrent vault/uterine prolapse (objective)	7		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
6.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	2	169	Risk Ratio (M-H, Fixed, 95% CI)	0.23 [0.07, 0.77]
6.2 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Risk Ratio (M-H, Fixed, 95% CI)	0.31 [0.03, 2.91]
6.3 cadavaric fascia lata (Tutoplast) vs polyprolylene (Trelex)	1	89	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.4 hysterectomy versus sacrospinous hystereopexy	1	65	Risk Ratio (M-H, Fixed, 95% CI)	0.16 [0.02, 1.20]
6.5 High levator myorrhaphy vs uterosacral vag vault suspension	1	229	Risk Ratio (M-H, Fixed, 95% CI)	1.17 [0.37, 3.72]
7 Vault distance from hymen (cm) POPQ point C after surgery	2		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
7.1 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspensio	2	358	Mean Difference (IV, Fixed, 95% CI)	0.41 [0.13, 0.69]
8 Total vaginal length (cm) after surgery	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
8.1 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspensio	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
9 Number of women with recurrent cystocele (objective)	4		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only

9.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1	89	Risk Ratio (M-H, Fixed, 95% CI)	0.47 [0.12, 1.75]
9.2 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Risk Ratio (M-H, Fixed, 95% CI)	1.65 [0.83, 3.27]
9.3 High levator myorrhaphy vs uterosacral vag vault suspension	1	229	Risk Ratio (M-H, Fixed, 95% CI)	0.83 [0.57, 1.21]
10 Objective anterior compartment prolapse after surgery	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
10.1 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Risk Ratio (M-H, Fixed, 95% CI)	1.65 [0.83, 3.27]
10.2 hysterectomy versus sacrospinous hysteropexy	1	65	Risk Ratio (M-H, Fixed, 95% CI)	1.29 [0.84, 1.97]
11 Anterior vaginal wall distance from hymen (cm) POPQ point Ba after surgery	2		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
11.1 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspensio	2	296	Mean Difference (IV, Fixed, 95% CI)	0.44 [0.26, 0.63]
12 Number of women with recurrent rectocele (objective)	4		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
12.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1	89	Risk Ratio (M-H, Fixed, 95% CI)	2.49 [0.71, 8.79]
12.2 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Risk Ratio (M-H, Fixed, 95% CI)	1.63 [0.55, 4.88]
12.3 High levator myorrhaphy vs uterosacral vag vault suspension	1	229	Risk Ratio (M-H, Fixed, 95% CI)	1.06 [0.49, 2.31]
13 Objective posterior compartment prolapse after surgery	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
13.1 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Risk Ratio (M-H, Fixed, 95% CI)	1.63 [0.55, 4.88]
13.2 hysterectomy versus sacrospinous hystereopexy	1	65	Risk Ratio (M-H, Fixed, 95% CI)	1.65 [0.66, 4.09]
14 Posterior vaginal wall distance from hymen (cm) POPQ point Bp after surgery	2		Mean Difference (IV, Random, 95% CI)	Subtotals only
14.1 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspensio	2	296	Mean Difference (IV, Random, 95% CI)	0.09 [-0.69, 0.87]
15 Number of women with post-operative stress urinary incontinence	6		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only

15.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	2	155	Risk Ratio (M-H, Fixed, 95% CI)	0.55 [0.32, 0.95]
15.2 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Risk Ratio (M-H, Fixed, 95% CI)	1.33 [0.47, 3.74]
15.3 abdominal sacrocolpopexy alone vs abdominal sacrocolpopexy with Burch colposuspension	1	299	Risk Ratio (M-H, Fixed, 95% CI)	1.85 [1.32, 2.60]
15.4 High levator myorrhaphy vs uterosacral vag vault suspension	1	116	Risk Ratio (M-H, Fixed, 95% CI)	0.57 [0.18, 1.85]
16 Number of women with de novo stress incontinence	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
16.1 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
16.2 high levator myorrhaphy vs uterosacral vag vault suspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
17 Number of women with urgency, detrusor overactivity or overactive bladder	5		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
17.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1	83	Risk Ratio (M-H, Fixed, 95% CI)	1.36 [0.78, 2.38]
17.2 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Risk Ratio (M-H, Fixed, 95% CI)	1.28 [0.67, 2.45]
17.3 abdominal sacrocolpopexy alone vs abdominal sacrocolpopexy with Burch colposuspension	1	304	Risk Ratio (M-H, Fixed, 95% CI)	1.18 [0.87, 1.59]
17.4 high levator myorrhaphy vs uterosacral vag vault suspension	1	229	Risk Ratio (M-H, Fixed, 95% CI)	0.93 [0.65, 1.32]
18 Number of women with de novo (new) urgency, detrusor overactivity or overactive bladder	4		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
18.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
18.2 abdominal sacrocolpopexy alone vs abdominal sacrocolpopexy with Burch colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
18.3 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

18.4 high levator myorrhaphy vs uterosacral vag vault suspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
19 Number of women with persistent voiding dysfunction	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
19.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
20 Number of women with new voiding dysfunction	3		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
20.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
20.2 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
20.3 High levator myorrhaphy vs uterosacral vag vault suspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
21 Number of women with de novo nocturia	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
21.1 High levator myorrhaphy vs uterosacral vag vault suspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
22 Postoperative voiding dysfunction symptoms	2		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
22.1 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Risk Ratio (M-H, Fixed, 95% CI)	1.68 [0.81, 3.50]
23 Number of women with faecal incontinence	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
23.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
23.2 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
24 Number of women with constipation	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
24.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1	89	Risk Ratio (M-H, Fixed, 95% CI)	1.40 [0.64, 3.10]
24.2 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Risk Ratio (M-H, Fixed, 95% CI)	2.10 [0.66, 6.64]
25 Number of women with de novo constipation	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
25.1 High levator myorrhaphy vs uterosacral vag vault suspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

26 Number of women with obstructed defecation	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
26.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
27 Postoperative dyspareunia	6		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
27.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	3	106	Risk Ratio (M-H, Fixed, 95% CI)	0.39 [0.18, 0.86]
27.2 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1	66	Risk Ratio (M-H, Fixed, 95% CI)	3.0 [0.13, 71.07]
27.3 vaginal sacrospinous uterine suspension vs vaginal hysterectomy	1	158	Risk Ratio (M-H, Fixed, 95% CI)	0.98 [0.25, 3.76]
27.4 High levator myorrhaphy vs uterosacral vag vault suspension	1	229	Risk Ratio (M-H, Fixed, 95% CI)	0.83 [0.51, 1.36]
28 Women with de novo (new) postoperative dyspareunia	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
28.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
28.2 High levator myorrhaphy vs uterosacral vag vault suspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
29 Postoperative sexual function score (PISQ-12)	2		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
29.1 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
29.2 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspension	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
30 Blood loss (ml)	6		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
30.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	2		Mean Difference (IV, Fixed, 95% CI)	-156.52 [-212.71, -100.32]
30.2 abdominal sacrohysteropexy with Gore-Tex vs vaginal hysterectomy, vaginal repair, uterosacral ligament plicati	1		Mean Difference (IV, Fixed, 95% CI)	-4.0 [-22.91, 14.91]
30.3 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1		Mean Difference (IV, Fixed, 95% CI)	70.0 [56.07, 83.93]
30.4 cadaveric fascia lata (Tutoplast) vs polypropylene (Trelex)	1		Mean Difference (IV, Fixed, 95% CI)	218.0 [132.87, 303.13]

30.5 abdominal sacrocolpopexy alone vs abdominal sacrocolpopexy with Burch colposuspension	1		Mean Difference (IV, Fixed, 95% CI)	-73.0 [-115.39, -30.61]
31 Postoperative decrease in Hb (gm/dl)	2		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
31.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
31.2 Open sacral-colpopexy versus laparoscpic sacral-colpopexy	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
32 Adverse effects	12		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
32.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	3	287	Risk Ratio (M-H, Fixed, 95% CI)	1.30 [0.63, 2.69]
32.2 abdominal sacrohysteropexy with Gore-Tex vs vaginal hysterectomy, vaginal repair, uterosacral ligament plicati	1	82	Risk Ratio (M-H, Fixed, 95% CI)	1.2 [0.40, 3.62]
32.3 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Risk Ratio (M-H, Fixed, 95% CI)	0.73 [0.29, 1.81]
32.4 cadaveric fascia lata (tutoplast) vs polypropylene (Trelex)	1	100	Risk Ratio (M-H, Fixed, 95% CI)	0.68 [0.29, 1.59]
32.5 abdominal sacrocolpopexy alone vs abdominal sacrocolpopexy with Burch colposuspension	1	322	Risk Ratio (M-H, Fixed, 95% CI)	0.99 [0.59, 1.68]
32.6 vaginal sacrospinous uterine suspension vs vaginal hysterectomy	1	158	Risk Ratio (M-H, Fixed, 95% CI)	4.23 [1.25, 14.25]
32.7 abdominal sacral colpopexy vs vaginal McCall	1	47	Risk Ratio (M-H, Fixed, 95% CI)	7.29 [0.40, 133.82]
32.8 High levator myorrhaphy vs uterosacral vag vault suspension	1	229	Risk Ratio (M-H, Fixed, 95% CI)	0.05 [0.00, 0.87]
32.9 Open sacral-colpopexy versus laparoscpic sacral-colpopexy	1	30	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
33 Operating time (minutes)	9		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
33.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	3	293	Mean Difference (IV, Fixed, 95% CI)	21.04 [12.15, 29.94]
33.2 abdominal sacrohysteropexy with Gore-Tex vs vaginal hysterectomy, vaginal repair, uterosacral ligament plicati	1	82	Mean Difference (IV, Fixed, 95% CI)	-10.0 [-11.81, -8.19]

33.3 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Mean Difference (IV, Fixed, 95% CI)	7.58 [4.04, 11.13]
33.4 cadaveric fascia lata (Tutoplast) vs polypropylene (Trelex)	1	100	Mean Difference (IV, Fixed, 95% CI)	6.0 [-10.92, 22.92]
33.5 abdominal sacrocolpopexy alone vs abdominal sacrocolpopexy with Burch colposuspension	1	322	Mean Difference (IV, Fixed, 95% CI)	-20.0 [-32.56, -7.44]
33.6 Open sacral-colpopexy versus laparoscpic sacral-colpopexy	1	30	Mean Difference (IV, Fixed, 95% CI)	Not estimable
34 Length of stay in hospital (days)	7		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
34.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	3	293	Mean Difference (IV, Fixed, 95% CI)	0.14 [-0.25, 0.53]
34.2 abdominal sacrohysteropexy with Gore-Tex vs vaginal hysterectomy, vaginal repair, uterosacral ligament plicati	1	82	Mean Difference (IV, Fixed, 95% CI)	0.10 [-0.01, 0.21]
34.3 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	2	111	Mean Difference (IV, Fixed, 95% CI)	0.27 [-0.28, 0.82]
34.4 Open sacral-colpopexy versus laparoscpic sacral-colpopexy	1	30	Mean Difference (IV, Fixed, 95% CI)	Not estimable
35 Time to return to normal activity ADL (days)	2		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
35.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
35.2 hysterectomy versus sacrospinous hystereopexy	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
36 Days to return to work	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
36.1 hysterectomy versus sacrospinous hystereopexy	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
37 Cost (US dollars)	2		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
37.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	2	169	Mean Difference (IV, Fixed, 95% CI)	1333.95 [1027.24, 1640.65]
38 Time to recurrence of prolapse (months)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
38.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
39 Women having further prolapse surgery	7		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only

39.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	2	169	Risk Ratio (M-H, Fixed, 95% CI)	0.46 [0.19, 1.11]
39.2 abdominal sacrohysteropexy with Gore-Tex vs vaginal hysterectomy, vaginal repair, uterosacral ligament plicati	1	82	Risk Ratio (M-H, Fixed, 95% CI)	9.0 [1.19, 67.85]
39.3 hysterectomy versus sacrospinous hystereopexy	1	65	Risk Ratio (M-H, Fixed, 95% CI)	0.55 [0.11, 2.79]
39.4 abdominal sacral colpopexy vs vaginal McCall	1	47	Risk Ratio (M-H, Fixed, 95% CI)	0.35 [0.01, 8.11]
39.5 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1	45	Risk Ratio (M-H, Fixed, 95% CI)	0.88 [0.13, 5.68]
39.6 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspension	1	311	Risk Ratio (M-H, Fixed, 95% CI)	2.91 [0.60, 14.17]
40 Women having further continence surgery	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
40.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	3	287	Risk Ratio (M-H, Fixed, 95% CI)	0.60 [0.21, 1.73]
41 Women having further prolapse or continence surgery	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
41.1 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	2	169	Risk Ratio (M-H, Fixed, 95% CI)	0.47 [0.23, 0.97]
41.2 Abdominal sacro-hysteropexy versus vaginal hysterectomy plus anterior and/or posterior colporrhaphy at 8 years	1	84	Risk Ratio (M-H, Fixed, 95% CI)	1.83 [0.75, 4.50]

Comparison 2. One method of anterior prolapse repair versus another surgical method

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Number of women with prolapse symptoms (subjective failure)	8		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
1.1 anterior colporrhaphy vs cadaveric fascia lata (Tutoplast)	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.2 traditional anterior colporraphy vs abdominal Burch colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

1.3 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.4 polypropylene mesh (Prolene soft) vs Pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.5 anterior colporrhaphy vs armed transobturtor mesh	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.6 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.7 fascial plication vs fascial plication with Pelvicol inlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
1.8 armed polypropylene mesh (Gynemesh) vs Pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2 Awareness of bulge	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
2.1 anterior colporrhaphy versus armed transobturator polypropylene mesh	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3 Severity of prolapse symptoms (measured using visual analogue scale)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1 fascial plication vs Pelvicol overlay	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4 Prolapse Quality of Life after surgery	2	160	Std. Mean Difference (IV, Fixed, 95% CI)	0.28 [-0.03, 0.59]
4.1 anterior colporrhaphy versus armed transobturator polypropylene mesh	1	85	Std. Mean Difference (IV, Fixed, 95% CI)	0.22 [-0.21, 0.65]
4.2 anterior colporrhaphy versus armed transobturator polypropylene mesh	1	75	Std. Mean Difference (IV, Fixed, 95% CI)	0.35 [-0.11, 0.80]
5 Number of women with prolapse (objective failure)	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	2	138	Risk Ratio (M-H, Fixed, 95% CI)	0.66 [0.34, 1.27]
5.2 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.88 [0.37, 2.05]
5.3 AC versus polypropylene mesh with AC	0	0	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6 Number of women with anterior prolapse / cystocele (objective failure)	18		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
6.1 anterior colporrhaphy vs polypropylene mesh overlay	3	251	Risk Ratio (M-H, Fixed, 95% CI)	2.14 [1.23, 3.74]
6.2 traditional anterior colporraphy vs ultralateral anterior colporraphy	1	57	Risk Ratio (M-H, Fixed, 95% CI)	1.29 [0.84, 1.98]

6.3 traditional anterior colporraphy vs anterior colporraphy + polyglactin mesh reinforcement	2	202	Risk Ratio (M-H, Fixed, 95% CI)	1.48 [1.07, 2.04]
6.4 ultralateral anterior colporraphy vs anterior colporraphy + polyglactin mesh reinforcement	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.94 [0.57, 1.54]
6.5 traditional anterior colporraphy vs abdominal Burch colposuspension	1	68	Risk Ratio (M-H, Fixed, 95% CI)	0.09 [0.01, 0.64]
6.6 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	2	138	Risk Ratio (M-H, Fixed, 95% CI)	0.55 [0.23, 1.29]
6.7 cystopexy vs cystopexy + pubourethral ligament plication	1	102	Risk Ratio (M-H, Fixed, 95% CI)	0.96 [0.14, 6.57]
6.8 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1	50	Risk Ratio (M-H, Fixed, 95% CI)	1.17 [0.46, 2.98]
6.9 fascial plication vs fascial plication with Pelvicol overlay	1	201	Risk Ratio (M-H, Fixed, 95% CI)	2.08 [1.08, 4.01]
6.10 anterior colporrhaphy vs cadaveric fascia lata (Tutoplast)	1	154	Risk Ratio (M-H, Fixed, 95% CI)	1.40 [0.80, 2.44]
6.11 Vicryl vs Pelvicol	1	125	Risk Ratio (M-H, Fixed, 95% CI)	3.22 [1.38, 7.52]
6.12 polypropylene mesh (Prolene soft) vs Pelvicol	1	72	Risk Ratio (M-H, Fixed, 95% CI)	1.17 [0.63, 2.16]
6.13 armed polypropylene mesh (Gynemesh) vs Pelvicol	1	190	Risk Ratio (M-H, Fixed, 95% CI)	0.64 [0.43, 0.96]
6.14 anterior colporrhaphy versus armed transobturator polypropylene mesh	3	361	Risk Ratio (M-H, Fixed, 95% CI)	3.55 [2.29, 5.51]
6.15 AC verus polypropylene mesh repair without AC	2	125	Risk Ratio (M-H, Fixed, 95% CI)	3.66 [1.45, 9.26]
6.16 AC versus polypropylene mesh plus AC	4	487	Risk Ratio (M-H, Fixed, 95% CI)	2.85 [1.97, 4.12]
7 Number of women with posterior prolapse / rectocele (objective failure)	3		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
7.1 traditional anterior colporraphy vs anterior colporraphy + polyglactin mesh reinforcement	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.2 Gynemesh vs Pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.3 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8 Number of women with postoperative stress urinary incontinence	4		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected

8.1 fascial plication vs fascial plication with Pelvicol overlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.2 anterior colporrhaphy versus armed transobturator polypropylene mesh	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.3 traditional anterior colporraphy vs abdominal Burch colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8.4 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9 Number of women with de novo (new) stress urinary incontinence	7		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
9.1 anterior colporrhaphy versus armed transobturator polypropylene mesh	2	285	Risk Ratio (M-H, Fixed, 95% CI)	0.87 [0.43, 1.76]
9.2 Gynemesh vs Pelvicol	1	190	Risk Ratio (M-H, Fixed, 95% CI)	1.96 [0.18, 21.23]
9.3 cystopexy vs cystopexy + pubourethral ligament plication	1	102	Risk Ratio (M-H, Fixed, 95% CI)	0.96 [0.25, 3.64]
9.4 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	2	102	Risk Ratio (M-H, Fixed, 95% CI)	2.62 [0.63, 10.91]
9.5 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1	50	Risk Ratio (M-H, Fixed, 95% CI)	9.0 [1.23, 65.85]
10 Number of women with urgency, detrusor overactivity or overactive bladder	8		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
10.1 fascial plication vs fascial plication with Pelvicol overlay	1	201	Risk Ratio (M-H, Fixed, 95% CI)	1.14 [0.61, 2.14]
10.2 Prolene soft vs Pelvicol	1	72	Risk Ratio (M-H, Fixed, 95% CI)	0.69 [0.34, 1.41]
10.3 traditional anterior colporraphy vs abdominal Burch colposuspension	1	68	Risk Ratio (M-H, Fixed, 95% CI)	1.06 [0.07, 16.27]
10.4 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	2	138	Risk Ratio (M-H, Fixed, 95% CI)	0.96 [0.20, 4.49]
10.5 cystopexy vs cystopexy + pubourethral ligament plication	1	102	Risk Ratio (M-H, Fixed, 95% CI)	0.96 [0.06, 14.96]
10.6 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.33 [0.04, 2.99]
10.7 armed polypropylene mesh (Gynemesh) vs Pelvicol	1	190	Risk Ratio (M-H, Fixed, 95% CI)	0.56 [0.29, 1.07]

11 De novo overactive bladder symptoms	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
11.1 Prolene soft vs Pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
12 Postoperative voiding dysfunction symptoms	3		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
12.1 fascial plication vs fascial plication with Pelvicol overlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
12.2 prolene soft vs Pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
12.3 anterior colporrhaphy vs cadaveric fascia lata (Tutoplast)	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
13 Urodynamic voiding dysfunction	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
13.1 Prolene soft vs pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
14 Persistent voiding dysfunction	6		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
14.1 anterior colporrhaphy vs cadaveric fascia lata (Tutoplast)	1	105	Risk Ratio (M-H, Fixed, 95% CI)	1.18 [0.73, 1.91]
14.2 traditional anterior colporraphy vs abdominal Burch colposuspension	1	68	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
14.3 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	2	138	Risk Ratio (M-H, Fixed, 95% CI)	1.05 [0.49, 2.26]
14.4 cystopexy vs cystopexy + pubourethral ligament plication	1	102	Risk Ratio (M-H, Fixed, 95% CI)	0.09 [0.00, 1.54]
14.5 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.33 [0.04, 2.99]
15 Time to return to spontaneous voiding (days)	2		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
15.1 fascial plication vs fascial plication with Pelvicol overlay	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
15.2 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
16 Pelvic Floor Incontinence Questionnaire-7 after surgery	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
16.1 anterior colporrhaphy versus armed transobturator polypropylene mesh	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
17 Number of women with worse bowel function / constipation	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
17.1 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
17.2 Prolene soft vs Pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
18 Number of women with dyspareunia	7		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only

18.1 fascial plication vs fascial plication with Pelvicol overlay	1	95	Risk Ratio (M-H, Fixed, 95% CI)	0.70 [0.24, 2.05]
18.2 Prolene Soft vs Pelvicol	1	72	Risk Ratio (M-H, Fixed, 95% CI)	2.2 [0.85, 5.69]
18.3 armed polypropylene mesh (Gynemesh) vs Pelvicol	1	190	Risk Ratio (M-H, Fixed, 95% CI)	0.82 [0.37, 1.80]
18.4 traditional anterior colporraphy vs abdominal Burch colposuspension	1	47	Risk Ratio (M-H, Fixed, 95% CI)	6.78 [1.72, 26.81]
18.5 cystopexy vs cystopexy + pubourethral ligament plication	1	47	Risk Ratio (M-H, Fixed, 95% CI)	0.15 [0.04, 0.58]
18.6 anterior colporrhaphy versus armed transobturator polypropylene mesh	2	133	Risk Ratio (M-H, Fixed, 95% CI)	0.90 [0.25, 3.23]
19 Blood loss (ml)	3		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
19.1 fascial plication vs fascial plication with Pelvicol overlay	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
19.2 anterior colporrhaphy versus armed transobturator polypropylene mesh	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
19.3 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
20 Haemoglobin change	2		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
20.1 anterior colporrhaphy versus armed transobturator polypropylene mesh	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
20.2 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
21 Number of women with postoperative complications	8		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
21.1 fascial plication vs fascial plication with Pelvicol overlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
21.2 traditional anterior colporraphy vs ultralateral anterior colporraphy	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
21.3 traditional anterior colporraphy vs anterior colporraphy + polyglactin mesh reinforcement	2		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
21.4 ultralateral anterior colporraphy vs anterior colporraphy + polyglactin mesh reinforcement	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
21.5 traditional anterior colporraphy vs abdominal Burch colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

21.6 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
21.7 cystopexy vs cystopexy + pubourethral ligament plication	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
21.8 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
21.9 Prolene soft vs Pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
22 Mesh erosion	6		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
22.1 anterior colporrhaphy versus polypropylene mesh	5	571	Risk Ratio (M-H, Fixed, 95% CI)	0.08 [0.02, 0.29]
22.2 armed polypropylene mesh (Gynemesh) vs Pelvicol	1	190	Risk Ratio (M-H, Fixed, 95% CI)	12.73 [0.73, 222.87]
23 Death	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
23.1 traditional anterior colporraphy vs ultralateral anterior colporraphy	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
23.2 traditional anterior colporraphy vs anterior colporraphy + polyglactin mesh reinforcement	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
23.3 ultralateral anterior colporraphy vs anterior colporraphy + polyglactin mesh reinforcement	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
24 Operating time (minutes)	2		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
24.1 anterior colporrhaphy versus armed transobturator polypropylene mesh	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
24.2 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
25 Length of stay in hospital (days)	4		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
25.1 fascial plication vs fascial plication with Pelvicol overlay	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
25.2 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
25.3 cystopexy vs cystopexy + pubourethral ligament plication	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
25.4 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
26 Number of women having further prolapse surgery	7		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
26.1 Vicryl vs Pelvicol	1	125	Risk Ratio (M-H, Fixed, 95% CI)	3.05 [0.87, 10.73]

26.2 anterior colporrhaphy versus armed transobturator polypropylene mesh	2	275	Risk Ratio (M-H, Fixed, 95% CI)	1.72 [0.23, 12.99]
26.3 traditional anterior colporraphy vs abdominal Burch colposuspension	1	68	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
26.4 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	2	138	Risk Ratio (M-H, Fixed, 95% CI)	0.41 [0.06, 2.71]
26.5 cystopexy vs cystopexy + pubourethral ligament plication	1	102	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
27 Number of women having further incontinence surgery	6		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
27.1 anterior colporrhaphy versus armed transobturator polypropylene mesh	2	275	Risk Ratio (M-H, Fixed, 95% CI)	1.45 [0.50, 4.27]
27.2 traditional anterior colporraphy vs abdominal Burch colposuspension	1	68	Risk Ratio (M-H, Fixed, 95% CI)	3.18 [0.35, 29.08]
27.3 cystopexy vs cystopexy + pubourethral ligament plication	1	102	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
27.4 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	1	109	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
27.5 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1	50	Risk Ratio (M-H, Fixed, 95% CI)	7.0 [0.38, 128.87]

Comparison 3. One method of posterior prolapse repair versus another surgical method

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Number of women with prolapse symptoms (subjective failure)	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
1.1 posterior vaginal colporrhaphy vs transanal repair	2	87	Risk Ratio (M-H, Fixed, 95% CI)	0.36 [0.13, 1.00]
1.2 posterior vaginal colporrhaphy vs site specific repair	1	60	Risk Ratio (M-H, Fixed, 95% CI)	1.17 [0.35, 3.93]
1.3 posterior vaginal colporrhaphy vs site specific repair with porcine small intestine graft inlay	1	59	Risk Ratio (M-H, Fixed, 95% CI)	0.75 [0.26, 2.20]

2 Number of women with prolapse (objective failure)	4		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
2.1 posterior vaginal colporrhaphy vs transanal repair (rectocele)	2	87	Risk Ratio (M-H, Fixed, 95% CI)	0.32 [0.07, 1.34]
2.2 posterior vaginal colporrhaphy vs transanal repair (enterocele)	2	87	Risk Ratio (M-H, Fixed, 95% CI)	0.23 [0.07, 0.83]
2.3 posterior vaginal colporrhaphy vs transanal repair (rectocele or enterocele))	2	87	Risk Ratio (M-H, Fixed, 95% CI)	0.24 [0.09, 0.64]
2.4 posterior vaginal colporraphy vs posterior colporraphy with mesh reinforcement for rectocele	1	132	Risk Ratio (M-H, Fixed, 95% CI)	1.13 [0.40, 3.19]
2.5 posterior vaginal colporrhaphy vs site specific repair	1	55	Risk Ratio (M-H, Fixed, 95% CI)	0.64 [0.20, 2.03]
2.6 posterior vaginal colporrhaphy vs site specific repair with porcine small intestine graft inlay	1	54	Risk Ratio (M-H, Fixed, 95% CI)	0.31 [0.11, 0.84]
3 Number of women with faecal incontinence after operation	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
3.1 posterior vaginal colporrhaphy vs transanal repair	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4 Number of women with anal incontinence to flatus after operation	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
4.1 posterior vaginal colporrhaphy vs transanal repair	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5 Number of women with obstructed defecation / constipation after surgery	2		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 posterior vaginal colporrhaphy vs transanal repair	2	65	Risk Ratio (M-H, Fixed, 95% CI)	0.73 [0.37, 1.42]
6 Number of women with sexual function not improved after operation	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6.1 posterior vaginal colporrhaphy vs transanal repair	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7 Number of women with dyspareunia	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
7.1 posterior vaginal colporrhaphy vs transanal repair	2	80	Risk Ratio (M-H, Fixed, 95% CI)	3.13 [0.87, 11.23]

7.2 Posterior colporrhaphy versus site specific repair	1	42	Risk Ratio (M-H, Fixed, 95% CI)	1.65 [0.71, 3.81]
7.3 posterior colporrhaphy vs site specific augmented with porcine small intestine submucosa graft	1	39	Risk Ratio (M-H, Fixed, 95% CI)	2.85 [0.91, 8.96]
8 Blood loss (ml)	2		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
8.1 posterior vaginal colporrhaphy vs transanal repair	2	87	Mean Difference (IV, Fixed, 95% CI)	79.38 [39.69, 119.08]
9 Change in hamatocrit	1	142	Mean Difference (IV, Fixed, 95% CI)	-0.48 [-1.64, 0.68]
9.1 Sub-category	0	0	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.2 posterior colorraphy versus site specific repair	1	74	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.3 posterior colporrhaphy versus site specific with porcine small intestine submocosa graft	1	68	Mean Difference (IV, Fixed, 95% CI)	-1.0 [-2.67, 0.67]
10 Difference in haemoglobin	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
10.1 posterior vaginal colporrhaphy vs transanal repair	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
11 Postoperative narcotic (morphine) use	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
11.1 posterior vaginal colporrhaphy vs transanal repair	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
12 Number of women with postoperative complications	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
12.1 posterior vaginal colporrhaphy vs transanal repair	2	87	Risk Ratio (M-H, Fixed, 95% CI)	3.56 [0.80, 15.74]
12.2 posterior vaginal colporrhaphy vs site specific repair	1	74	Risk Ratio (M-H, Fixed, 95% CI)	1.38 [0.87, 2.17]
12.3 posterior vaginal colporrhaphy vs site specific repair with porcine small intestine graft inlay	1	68	Risk Ratio (M-H, Fixed, 95% CI)	1.02 [0.69, 1.53]
13 Persistent postoperative pain	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
13.1 posterior vaginal colporrhaphy vs transanal repair	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
14 Operating time (minutes)	3		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
14.1 posterior vaginal colporrhaphy vs transanal repair	2	87	Mean Difference (IV, Fixed, 95% CI)	-3.64 [-7.43, 0.15]
14.2 posterior colporrhaphy vs site specific repair	1	74	Mean Difference (IV, Fixed, 95% CI)	-1.0 [-32.22, 30.22]
14.3 posterior colporrhaphy versus site specific and porcine small intestine submucosa graft	1	69	Mean Difference (IV, Fixed, 95% CI)	-19.0 [-49.68, 11.68]

15 Length of stay in hospital (days)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
15.1 posterior vaginal colporrhaphy vs transanal repair	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
16 Number of women having further prolapse surgery	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
16.1 posterior vaginal colporrhaphy vs site specific repair	1	70	Risk Ratio (M-H, Fixed, 95% CI)	0.56 [0.05, 5.90]
16.2 posterior vaginal colporrhaphy vs site specific repair with porcine small intestine graft inlay	1	62	Risk Ratio (M-H, Fixed, 95% CI)	0.29 [0.03, 2.66]

Comparison 6. Prolapse repair and continence surgery

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Post-op objective stress incontinence	9		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
1.1 POP surgery without & with continence Sx	7	664	Risk Ratio (M-H, Random, 95% CI)	1.66 [0.87, 3.16]
1.2 prolapse surgery no TVT versus prolapse surgery with TVT	1	52	Risk Ratio (M-H, Random, 95% CI)	8.33 [1.14, 61.15]
1.3 SC without colposuspension (continent women) versus SC with colposuspension	2	358	Risk Ratio (M-H, Random, 95% CI)	0.55 [0.03, 8.81]
1.4 POP surgery TVT (incontinent women) without & with TVT continence surgery	1	181	Risk Ratio (M-H, Random, 95% CI)	15.50 [5.90, 40.72]
1.5 POP surgery colposuspension (incontinent women) without & with colposuspension continence surgery	1	47	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.39, 1.35]
2 Number of women with de novo (new) stress urinary incontinence (subjective report)	13		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
2.1 Prolapse surgery without continence surgery versus prolapse surgery with ANY continence surgery	6	601	Risk Ratio (M-H, Random, 95% CI)	1.39 [0.53, 3.70]

2.2 cystopexy vs cystopexy + pubourethral ligament plication	1	102	Risk Ratio (M-H, Random, 95% CI)	0.96 [0.25, 3.64]
2.3 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	2	102	Risk Ratio (M-H, Random, 95% CI)	2.02 [0.08, 50.63]
2.4 abdominal sacrocolpopexy alone vs abdominal sacrocolpopexy with Burch colposuspension	2	368	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.04, 7.01]
2.5 prolapse repair versus prolapse repair + TVT	2	102	Risk Ratio (M-H, Random, 95% CI)	8.66 [2.12, 35.41]
2.6 anterior colporrhaphy versus armed transobturator polypropylene mesh	2	285	Risk Ratio (M-H, Random, 95% CI)	1.43 [0.15, 13.64]
2.7 Gynemesh vs Pelvicol	1	190	Risk Ratio (M-H, Random, 95% CI)	1.96 [0.18, 21.23]
2.8 abdominal colpopexy vs vaginal colpopexy	1	46	Risk Ratio (M-H, Random, 95% CI)	0.27 [0.06, 1.15]
2.9 high levator myorrhaphy vs uterosacral vag vault suspension	1	116	Risk Ratio (M-H, Random, 95% CI)	0.29 [0.06, 1.32]
2.10 vaginal sacrospinous colpopexy vs posterior intravaginal slingplasty	1	45	Risk Ratio (M-H, Random, 95% CI)	2.64 [0.11, 61.54]
3 Number of women with de novo (new) stress urinary incontinence (objective diagnosis)	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
3.1 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3.2 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4 De novo SUI in stress continent women with -ve stress test	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
4.1 Subgroup analysis	2		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5 Women with de novo SUI who had occult SUI pre-operatively	4	187	Risk Ratio (M-H, Fixed, 95% CI)	2.42 [1.44, 4.09]
6 Number of women with bothersome SUI from Pelvic Floor Distress Index after surgery	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6.1 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspensio	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.2 Prolapse surgery without TVT versus prolapse surgery with TVT	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

7 Number of women with de novo (new) urgency, detrusor overactivity or overactive bladder	6		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
7.1 abdominal colpopexy vs vaginal colpopexy	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.2 cystopexy vs cystopexy + pubourethral ligament plication	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.3 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.4 Prolene soft vs Pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.5 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.6 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8 Number of women with bothersome urge incontinence from Pelvic Floor Distress Index after surgery	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
8.1 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspension	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9 Long term new voiding dysfunction	5		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
9.1 abdominal colpopexy vs vaginal colpopexy	1	75	Risk Ratio (M-H, Fixed, 95% CI)	1.03 [0.07, 15.82]
9.2 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	2	138	Risk Ratio (M-H, Fixed, 95% CI)	1.05 [0.49, 2.26]
9.3 cystopexy vs cystopexy + pubourethral ligament plication	1	102	Risk Ratio (M-H, Fixed, 95% CI)	0.09 [0.00, 1.54]
9.4 prolapse repair + urethrovesical endopelvic fascia repair vs prolapse repair + TVT	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.33 [0.04, 2.99]
10 Further continence surgery	9		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
10.1 prolapse surgery without continence surgery versus prolapse surgery with continence surgery	3	456	Risk Ratio (M-H, Fixed, 95% CI)	1.97 [1.20, 3.23]

10.2 prolapse surgery (continent women) + no TVT versus prolapse surgery with TVT	2	102	Risk Ratio (M-H, Fixed, 95% CI)	4.85 [0.59, 39.83]
10.3 cystopexy vs cystopexy + pubourethral ligament plication	1	102	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.4 abdominal sacral colpopexy vs vaginal sacrospinous colpopexy	2	207	Risk Ratio (M-H, Fixed, 95% CI)	1.05 [0.28, 3.95]
10.5 prolapse repair + urethrovesical plication vs prolapse repair + needle colposuspension	1	73	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10.6 prolapse surgery (incontinent women) + no TVT versus prolapse surgery with TVT	1	181	Risk Ratio (M-H, Fixed, 95% CI)	99.12 [6.21, 1581.10]
10.7 anterior colporrhaphy versus armed transobturator polypropylene mesh	1	200	Risk Ratio (M-H, Fixed, 95% CI)	1.3 [0.41, 4.12]
11 Incontinence Impact Questionnaire IIQ after surgery	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
11.1 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspension	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
12 Urinary Distress Inventory (UDI) after surgery	2		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
12.1 sacral colpopexy without colposuspension (continent women) versus sacral colpopexy with colposuspensio	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
12.2 sacral colpopexy without colposuspension (incontinent women)versus sacral colpopexy with colposuspensio	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
13 PFIO bladder domain	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
13.1 sacral colpopexy without colposuspension versus sacral colpopexy with colposuspension	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable

Comparison 7. Use of native (no mesh) tissue versus mesh or grafts

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Number of women with prolapse symptoms (subjective failure)	6	777	Risk Ratio (M-H, Fixed, 95% CI)	1.18 [0.92, 1.50]
1.1 anterior and posterior colporrhaphy versus colporrhaphy with Vicryl mesh overlay	1	54	Risk Ratio (M-H, Fixed, 95% CI)	0.95 [0.70, 1.31]
1.2 fascial plication vs fascial plication with Pelvicol overlay	1	201	Risk Ratio (M-H, Fixed, 95% CI)	1.37 [0.62, 3.07]
1.3 anterior colporrhaphy vs cadaveric fascia lata (Tutoplast)	1	112	Risk Ratio (M-H, Fixed, 95% CI)	0.96 [0.33, 2.81]
1.4 posterior colporrhaphy or site specific repair versus site specific repair with porcine intestine graft inlay	1	88	Risk Ratio (M-H, Fixed, 95% CI)	0.7 [0.28, 1.78]
1.5 anterior or posterior repair versus repair with polypropylene mesh overlay	2	322	Risk Ratio (M-H, Fixed, 95% CI)	1.42 [0.97, 2.08]
2 Prolapse symptom score at 1 to 5 years	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
2.1 anterior and posterior colporrhaphy versus colporrhaphy with Vicryl mesh overlay	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3 Quality of life (VAS) for severity of prolapse symptoms	2		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1 fascial plication vs fascial plication with Pelvicol overlay	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
3.2 anterior or posterior repair alone versus repair with polyglactin (Vicryl) mesh inlay	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4 Objective failure all sites	2	188	Risk Ratio (M-H, Fixed, 95% CI)	1.88 [1.03, 3.43]
4.1 anterior and posterior colporrhaphy versus colporrhaphy with Vicryl mesh overlay	1	66	Risk Ratio (M-H, Fixed, 95% CI)	1.88 [0.37, 9.58]
4.2 anterior and posterior colporrhaphy versus colporrhaphy with polypropylene mesh overlay	1	122	Risk Ratio (M-H, Fixed, 95% CI)	1.88 [0.99, 3.58]
5 Number of women with anterior prolapse / cystocele (objective failure)	4		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 traditional or ultralateral anterior colporraphy vs anterior colporraphy + polyglactin mesh reinforcement	2	226	Risk Ratio (M-H, Fixed, 95% CI)	1.39 [1.02, 1.90]

5.2 fascial plication vs fascial plication with Pelvicol overlay	1	176	Risk Ratio (M-H, Fixed, 95% CI)	2.08 [1.00, 4.30]
5.3 anterior colporrhaphy vs cadaveric fascia lata (Tutoplast)	1	154	Risk Ratio (M-H, Fixed, 95% CI)	1.40 [0.80, 2.44]
6 Number of women with posterior prolapse / rectocele (objective failure)	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6.1 traditional anterior colporraphy vs anterior colporraphy + polyglactin mesh reinforcement	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6.2 posterior colporrhaphy or site specific repair versus site specific repair with porcine intestine graft inlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7 Objective failure, any site, no mesh versus any mesh	12	1315	Risk Ratio (M-H, Fixed, 95% CI)	1.79 [1.48, 2.17]
7.1 No mesh versus any absorbable synthetic mesh	3	292	Risk Ratio (M-H, Fixed, 95% CI)	1.42 [1.04, 1.92]
7.2 No mesh versus any biological mesh	3	411	Risk Ratio (M-H, Fixed, 95% CI)	1.16 [0.81, 1.66]
7.3 No mesh versus any non-absorbable polypropylene mesh	6	612	Risk Ratio (M-H, Fixed, 95% CI)	2.96 [2.10, 4.17]
8 Number of women having repeat prolapse surgery	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
8.1 anterior or posterior repair alone versus repair with polyglactin (Vicryl) mesh inlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9 Number of women with postoperative urinary incontinence	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
9.1 fascial plication vs fascial plication with Pelvicol overlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9.2 anterior or posterior repair alone versus repair with polyglactin (Vicryl) mesh inlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
10 Number of women with urgency, detrusor overactivity or overactive bladder	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
10.1 fascial plication vs fascial plication with Pelvicol overlay	1	201	Risk Ratio (M-H, Fixed, 95% CI)	1.14 [0.61, 2.14]
11 Postoperative voiding dysfunction symptoms	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
11.1 fascial plication vs fascial plication with Pelvicol overlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
11.2 anterior colporrhaphy vs cadaveric fascia lata (Tutoplast)	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
12 Persistent voiding dysfunction	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
12.1 anterior colporrhaphy vs cadaveric fascia lata (Tutoplast)	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

13 Number of women with dyspareunia	4		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
13.1 fascial plication vs fascial plication with Pelvicol overlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
13.2 posterior colporrhaphy or site specific repair versus site specific repair with porcine intestine graft inlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
13.3 anterior and posterior colporrhaphy versus Anterior and posterior polypropylene Mesh overlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
13.4 anterior or posterior repair alone versus repair with polyglactin (Vicryl) mesh inlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
14 De novo dyspareunia	4	398	Risk Ratio (M-H, Fixed, 95% CI)	1.18 [0.75, 1.84]
14.1 anterior and posterior colporrhaphy versus Anterior and posterior polypropylene Mesh overlay	1	122	Risk Ratio (M-H, Fixed, 95% CI)	1.22 [0.59, 2.51]
14.2 native tissue repair vs mesh repair	4	276	Risk Ratio (M-H, Fixed, 95% CI)	1.15 [0.65, 2.04]
15 Number of women with postoperative complications	4		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
15.1 fascial plication vs fascial plication with Pelvicol overlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
15.2 traditional or ultralateral anterior colporraphy vs anterior colporraphy + polyglactin mesh reinforcement	2		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
15.3 posterior colporrhaphy or site specific repair versus site specific repair with porcine intestine graft inlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
16 Death	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
16.1 traditional or ultralateral anterior colporraphy vs anterior colporraphy + polyglactin mesh reinforcement	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
16.2 anterior or posterior repair alone versus repair with polyglactin (Vicryl) mesh inlay	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
17 Length of stay in hospital (days)	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
17.1 fascial plication vs fascial plication with Pelvicol overlay	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable

Comparison 8. One type of mesh or graft versus another type of mesh or graft

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Number of women with prolapse symptoms (subjective failure)	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
1.1 Prolene soft vs Pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2 Number of women with anterior prolapse / cystocele (objective failure)	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
2.1 Vicryl vs Pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2.2 Monofilament Polypropylene Mesh versus Porcine Dermis Graft	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3 Number of women having further prolapse surgery	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
3.1 Vicryl vs Pelvicol	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3.2 Monofilament Polypropylene Mesh versus Porcine Dermis Graft	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4 Stress urinary incontinence de novo	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
4.1 Monofilament Polypropylene Mesh versus Porcine Dermis Graft	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
5 Increased daytime urinary frequency post-op	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
5.1 Monofilament Polypropylene Mesh versus Porcine Dermis Graft	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
6 Dyspareunia post-op	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
6.1 Monofilament Polypropylene Mesh versus Porcine Dermis Graft	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7 Vaginal mesh erosion	2		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
7.1 Monofilament Polypropylene Mesh (Prolene soft) versus Porcine Dermis Graft	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
7.2 armed polypropylene mesh versus porcine dermis graft	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8 Hospital stay (days)	1	190	Mean Difference (IV, Fixed, 95% CI)	-0.40 [-0.90, 0.10]
8.1 Monofilament Polypropylene Mesh versus Porcine Dermis Graft	1	190	Mean Difference (IV, Fixed, 95% CI)	-0.40 [-0.90, 0.10]

Comparison 9. One suture type versus another type of suture

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Number of women with prolapse symptoms up to 1 year (subjective failure)	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
1.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
2 Number of women with prolapse symptoms at 1 to 5 years (subjective failure)	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
2.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3 Prolapse symptom score up to 1 year	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
3.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
4 Prolapse symptom score at 1 to 5 years	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
4.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
5 Quality of life score due to prolapse (VAS) up to 1 year	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
5.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
6 Quality of life score due to prolapse (VAS) at 1 to 5 years	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
6.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable
7 Objective failure all sites	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
7.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
8 Number of women with urinary incontinence at 1 to 5 years	1		Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
8.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1		Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
9 ICI Urinary symptom score at 1 to 5 years	1		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
9.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1		Mean Difference (IV, Fixed, 95% CI)	Not estimable

10 Number of women with dyspareunia at 1 to 5 years	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
10.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
11 Death	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
11.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
12 Number of women having repeat prolapse surgery	1	Risk Ratio (M-H, Fixed, 95% CI)	Totals not selected
12.1 Polydioxanone (PDS) suture versus polyglactin (Vicryl) suture	1	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable

ADDITIONAL TABLES

Table 1. Mesh erosion

	Number with erosion	Total number of women
Polyglactin (Vicryl, absorbable synthetic)		
Allahdin 2008	2	32
Sand 2001	0	73
Biological (porcine, Pelvicol)		
Meschia 2007	1	98
Non-absorable synthetic polypropylene		
Ali 2006	3	46
Lim 2007	4	62
Nguyen 2008	2	37
Nieminen 2008	18	104
Sivaslioglu 2008	3	43

WHAT'S NEW

Last assessed as up-to-date: 16 November 2009.

Date	Event	Description
6 July 2010	Amended	Minor errors corrected, subtotals for blood loss switched off due to heterogeneity

HISTORY

Protocol first published: Issue 1, 2003

Review first published: Issue 4, 2004

Date	Event	Description
14 April 2010	Amended	changed citation, added conflicts
17 November 2009	New citation required but conclusions have not changed	Full reports of 59 potentially eligible studies were assessed; for this update, 23 new eligible studies were assessed (Al-Nazer 2007a; Ali 2006a; Allahdin 2008; Barber 2006; Biller 2008; Borstad 2008; Braun 2007a; Carramao 2008a; Constantini 2008; de Tayrac 2008; Dietz 2008a; Glavind 2007; Guerette 2006a; Lim 2007a; Meschia 2007a; Natale 2007; Natale 2009; Nguyen 2008; Nieminen 2008; Pantazis 2008a; Schierlitz 2007a; Segal 2007; Sivaslioglu 2008). Overall, 17 studies were excluded from the review, six during this update (Barber 2006; Biller 2008; Carramao 2008a; Glavind 2007; Meschia 2007a; Segal 2007): full details are given in the Characteristics of Excluded Studies In this the second update, 18 new trials were added (Al-Nazer 2007; Ali 2006; Allahdin 2008; Borstad 2008; Braun 2007a; Constantini 2007; Constantini 2008; de Tayrac 2008; Dietz 2008a; Guerette 2006; Lim 2007; Natale 2007; Natale 2009; Nguyen 2008; Nieminen 2008; Pantazis 2008; Schierlitz 2007; Sivaslioglu 2008) and three previously included studies were updated (Brubaker 2008; Meschia 2007; Roovers 2004)
9 February 2009	New search has been performed	new search feb 2009
10 October 2008	Amended	Converted to new review format.
17 April 2007	New citation required and conclusions have changed	Substantive Update Issue 3 2007. 22 RCTs (8 new included trials). The findings are still insufficient to pro-

(*Continued*)

		vide robust evidence to support current and new practice (such as whether to perform a concurrent continence operation, or to use mesh or grafts)

CONTRIBUTIONS OF AUTHORS

All review authors contributed to writing the protocol. Four authors (C Maher, C Glazener, B Feiner, K Baessler) assessed the relevance and eligibility of studies for inclusion in the review. They then assessed the quality of included studies; four (C Maher, K Baessler, C Glazener and B Feiner) independently extracted data from trial reports, interpreted the results and contributed to the writing of the draft version of the review.

DECLARATIONS OF INTEREST

The lead review author, Christopher Maher, is an author of one of the included trials (Maher 2004). Charis Glazener is co author on the Allahdin trial and Chief Investigator on Prospect ongoing trial

INDEX TERMS

Medical Subject Headings (MeSH)

Gynecologic Surgical Procedures [methods]; Pelvic Organ Prolapse [*surgery]; Randomized Controlled Trials as Topic; Rectal Prolapse [surgery]; Recurrence [prevention & control]; Surgical Mesh; Suture Techniques; Urinary Bladder Diseases [surgery]; Urinary Incontinence [surgery]; Uterine Prolapse [surgery]

MeSH check words

Female; Humans