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Surgery for women with posterior compartment prolapse (Review)

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[Intervention Review]

Surgery for women with posterior compartment prolapse

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ABSTRACT

Background

Posterior vaginal wall prolapse (also known as 'posterior compartment prolapse') can cause a sensation of bulge in the vagina along with symptoms of obstructed defecation and sexual dysfunction. Interventions for prevention and conservative management include lifestyle measures, pelvic floor muscle training, and pessary use. We conducted this review to assess the surgical management of posterior vaginal wall prolapse.

Objectives

To evaluate the safety and effectiveness of any surgical intervention compared with another surgical intervention for management of posterior vaginal wall prolapse.

Search methods

We searched the Cochrane Incontinence Group Specialised Register of controlled trials, which contains trials identified from the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, ClinicalTrials.gov, and the World Health Organization International Clinical Trials Registry Platform (WHO ICTRP) (searched April 2017). We also searched the reference lists of relevant articles, and we contacted researchers in the field.

Selection criteria

We included randomised controlled trials (RCTs) comparing different types of surgery for posterior vaginal wall prolapse.

Data collection and analysis

We used Cochrane methods. Our primary outcomes were subjective awareness of prolapse, repeat surgery for any prolapse, and objectively determined recurrent posterior wall prolapse.

Main results

We identified 10 RCTs evaluating 1099 women. Evidence quality ranged from very low to moderate. The main limitations of evidence quality were risk of bias (associated mainly with performance, detection, and attrition biases) and imprecision (associated with small overall sample sizes and low event rates).

Transanal repair versus transvaginal repair (four RCTs; n = 191; six months' to four years' follow-up)

Awareness of prolapse is probably more common after the transanal approach (risk ratio (RR) 2.78, 95% confidence interval (CI) 1.00 to 7.70; 2 RCTs; n = 87; I^2 = 0%; low-quality evidence). If 10% of women are aware of prolapse after transvaginal repair, between 10% and 79% are likely to be aware after transanal repair.

Repeat surgery for any prolapse: Evidence is insufficient to show whether there were any differences between groups (RR 2.42, 95% CI 0.75 to 7.88; 1 RCT; n = 57; low-quality evidence).

Recurrent posterior vaginal wall prolapse is probably more likely after transanal repair (RR 4.12, 95% CI 1.56 to 10.88; 2 RCTs; n = 87; I^2 = 35%; moderate-quality evidence). If 10% of women have recurrent prolapse on examination after transvaginal repair, between 16% and 100% are likely to have recurrent prolapse after transanal repair.

Postoperative obstructed defecation is probably more likely with transanal repair (RR 1.67, 95% CI 1.00 to 2.79; 3 RCTs; n = 113; I^2 = 10%; low-quality evidence).

Postoperative dyspareunia: Evidence is insufficient to show whether there were any differences between groups (RR 0.32, 95% CI 0.09 to 1.15; 2 RCTs; n = 80; I^2 = 5%; moderate-quality evidence).

Postoperative complications: Trials have provided no conclusive evidence of any differences between groups (RR 3.57, 95% CI 0.94 to 13.54; 3 RCTs; n = 135; I^2 = 37%; low-quality evidence). If 2% of women have complications after transvaginal repair, then between 2% and 21% are likely to have complications after transanal repair.

Evidence shows no clear differences between groups in *operating time* (in minutes) (mean difference (MD) 1.49, 95% CI -11.83 to 8.84; 3 RCTs; n = 137; I^2 = 90%; very low-quality evidence).

Biological graft versus native tissue repair

Evidence is insufficient to show whether there were any differences between groups in rates of *awareness of prolapse* (RR 1.09, 95% CI 0.45 to 2.62; 2 RCTs; n = 181; I^2 = 13%; moderate-quality evidence) or r*epeat surgery for any prolapse* (RR 0.60, 95% CI 0.18 to 1.97; 2 RCTs; n = 271; I^2 = 0%; moderate-quality evidence). Trials have provided no conclusive evidence of a difference in rates of r*ecurrent posterior vaginal wall prolapse* (RR 0.55, 95% CI 0.30 to 1.01; 3 RCTs; n = 377; I^2 = 6%; moderate-quality evidence); if 13% of women have recurrent prolapse on examination after native tissue repair, between 4% and 13% are likely to have recurrent prolapse after biological graft. Evidence is insufficient to show whether there were any differences between groups in rates of *postoperative obstructed defecation* (RR 0.96, 95% CI 0.50 to 1.86; 2 RCTs; n = 172; I^2 = 42%; moderate-quality evidence) or *postoperative dyspareunia* (RR 1.27, 95% CI 0.26 to 6.25; 2 RCTs; n = 152; I^2 = 74%; low-quality evidence). *Postoperative complications* were more common with biological repair (RR 1.82, 95% CI 1.22 to 2.72; 3 RCTs; n = 448; I^2 = 0%; low-quality evidence).

Other comparisons

Single RCTs compared site-specific vaginal repair versus midline fascial plication (n = 74), absorbable graft versus native tissue repair (n = 132), synthetic graft versus native tissue repair (n = 191), and levator ani plication versus midline fascial plication (n = 52). Data were scanty, and evidence was insufficient to show any conclusions about the relative effectiveness or safety of any of these interventions. The *mesh exposure rate* in the synthetic group compared with the native tissue group was 7%.

Authors' conclusions

Transvaginal repair may be more effective than transanal repair for posterior wall prolapse in preventing recurrence of prolapse, in the light of both objective and subjective measures. However, data on adverse effects were scanty. Evidence was insufficient to permit any conclusions about the relative effectiveness or safety of other types of surgery. Evidence does not support the utilisation of any mesh or graft materials at the time of posterior vaginal repair. Withdrawal of some commercial transvaginal mesh kits from the market may limit the generalisability of our findings.

PLAIN LANGUAGE SUMMARY

Surgical management of pelvic organ prolapse in women

Review question

Which surgical interventions for posterior vaginal wall prolapse have the best outcomes, and what are the complications of each intervention?

Background

Posterior vaginal wall prolapse is descent of the rectum or small bowel, causing the back wall of the vagina to bulge into the vagina. This condition can be treated conservatively with pelvic floor muscle training or vaginal pessaries, or it can be managed surgically. Several

different operations are currently performed to manage prolapse of the posterior vaginal wall. This review aims to compare these different operations in terms of their effectiveness and safety. Surgery for prolapse of the posterior vaginal wall can be done through the back passage or through the vagina. Different vaginal techniques aim to restore the strong fascial layer at the midline along the whole length of the posterior vaginal wall (midline fascial plication), or to identify and repair specific defects in this strong fascial layer (site-specific repair). Those who perform repairs can use a woman's own native tissue alone or can add a graft. The graft can be absorbable, biological, or synthetic.

Study characteristics

This review identified 10 randomised controlled trials including 1099 women with posterior vaginal wall prolapse. Four trials compared transanal repairs with transvaginal repairs. One study compared site-specific repair with midline fascial plication - two different techniques for transvaginal native tissue repair. One trial compared absorbable graft and native tissue vaginal repair. Four trials compared biological graft with native tissue, and one trial compared synthetic graft with native tissue. The evidence is current to April 2017.

Key results

Repair through the vagina may be more effective than repair through the back passage for posterior vaginal wall prolapse. However, data on adverse effects are scanty. Evidence was insufficient to permit conclusions about the relative effectiveness or safety of other types of surgery. Evidence does not support using mesh or biological grafts at the time of posterior vaginal repair. Withdrawal of some commercial transvaginal mesh kits from the market may limit the generalisability of our findings.

Quality of the evidence

Evidence quality ranged from very low to moderate. The main limitations in evidence quality were risk of bias (associated mainly with performance, detection, and attrition biases) and imprecision (associated with small overall sample sizes and low event rates).

SUMMARY OF FINDINGS

Summary of findings for the main comparison. Transanal repair versus transvaginal repair

Transanal repair versus transvaginal repair for women with posterior vaginal wall prolapse

Patient or population: women with posterior vaginal wall prolapse

Setting: hospital operating theatre

Intervention: transanal repair
Control: transvaginal repair

Outcomes (follow-up time)	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence (GRADE)
	Risk with transvaginal repair	Risk with transanal repair			
Awareness of prolapse (subjective failure) (12-25 months)	103 per 1000	285 per 1000 (103 to 790)	RR 2.78 (1.00 to 7.70)	87 (2 RCTs)	⊕⊕⊖⊖ LOW[a,b]
Repeat surgery for any prolapse (25 months)	125 per 1000	303 per 1000 (94 to 985)	RR 2.42 (0.75 to 7.88)	57 (1 RCT)	⊕⊕⊖⊖ LOW[a,c]
Recurrent posterior vaginal wall prolapse (objective failure) (12-25 months)	103 per 1000	423 per 1000 (160 to 1000)	RR 4.12 (1.56 to 10.88)	87 (2 RCTs)	⊕⊕⊖⊖ MODERATE[a]
Postoperative obstructed defecation (6-25 months)	254 per 1000	424 per 1000 (254 to 709)	RR 1.67 (1.00 to 2.79)	113 (3 RCTs)	⊕⊕⊖⊖ LOW[a,b]
Postoperative dyspareunia (12-25 months)	194 per 1000	62 per 1000 (17 to 224)	RR 0.32 (0.09 to 1.15)	80 (2 RCTs)	⊕⊕⊖⊖ LOW[a,c]
Postoperative complications (6-25 months)	16 per 1000	56 per 1000 (15 to 212)	RR 3.57 (0.94 to 13.54)	135 (3 RCTs)	⊕⊕⊕⊖ LOW[a,b]
Operating time (12-50 months)	Mean operating time in control groups	MD 1.49 minutes lower in the transanal group (11.83 lower to 8.84 higher)	-	137 (3 RCTs)	⊕⊕⊖⊖ VERY LOW[d,e,f]

	ranged from 32 to 74 minutes.				

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the mean risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

CI: confidence interval; RCT: randomised controlled trial; RR: risk ratio.

GRADE Working Group grades of evidence.
High quality: We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate quality: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low quality: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.
Very low quality: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.

[a]Downgraded one level owing to serious risk of bias; one study at high risk of performance and detection bias, second study at unclear risk of bias in several domains.
[b]Downgraded one level owing to serious imprecision; findings compatible with benefit in transvaginal group or with no difference between groups.
[c]Downgraded one level owing to serious imprecision; single trial and/or very few events.
[d]Downgraded one level owing to serious risk of bias, two of three studies at high risk of performance and detection bias.
[e]Downgraded one level owing to inconsistency as $I^2 = 90\%$.
[f]Downgraded one level owing to serious imprecision; findings compatible with benefit in either group or with no difference between groups.

Summary of findings 2. Biological graft versus native tissue repair for posterior vaginal wall prolapse

Biological graft versus native tissue repair for posterior vaginal wall prolapse

Patient or population: women with posterior vaginal wall prolapse

Setting: hospital operating theatre
Control: native tissue fascial
Comparison: biological graft

Outcomes (follow-up time)	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence (GRADE)
	Risk with native tissue	Risk with biological graft			
Awareness of prolapse (subjective failure) (16-24 months)	87 per 1000	95 per 1000 (39 to 222)	RR 1.09 (0.45 to 2.62)	181 (2 RCTs)	⊕⊕⊕⊖ MODERATE[a]
Repeat surgery for any prolapse	50 per 1000	30 per 1000 (9 to 98)	RR 0.60 (0.18 to 1.97)	271 (2 RCTs)	⊕⊕⊖⊖ LOW[a,b]

(24 months)					
Recurrent posterior vaginal wall prolapse (objective failure) (16-24 months)	130 per 1000	72 per 1000 (39 to 132)	RR 0.55 (0.30 to 1.01)	377 (3 RCTs)	⊕⊕⊖⊖ LOW[b,c]
Postoperative obstructed defecation (16-24 months)	171 per 1000	164 per 1000 (85 to 318)	RR 0.96 (0.50 to 1.86)	172 (2 RCTs)	⊕⊕⊕⊖ MODERATE[a]
Postoperative dyspareunia (16-24 months)	133 per 1000	169 per 1000 (35 to 833)	RR 1.26 (0.59 to 2.68)	152 (2 RCTs)	⊕⊕⊕⊖ LOW[a,d]
Postoperative complications (including wound infection) (16-24 months)	118 per 1000	215 per 1000 (144 to 321)	RR 1.82 (1.22 to 2.72)	448 (3 RCTs)	⊕⊕⊕⊖ MODERATE[b]
Operating time (24 months)	Mean operating time in the control group was 169 minutes.	MD 19 minutes lower in the biological graft group (range 49.93 minutes lower to 11.93 minutes higher)	-	68 (1 RCTs)	⊕⊕⊖⊖ LOW[e]

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the mean risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

CI: confidence interval; RCT: randomised controlled trial; RR: risk ratio.

GRADE Working Group grades of evidence.
High quality: We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate quality: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low quality: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.
Very low quality: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.

[a]Downgraded one level owing to serious imprecision; findings compatible with benefit in either group or with no difference between groups.
[b]Downgraded one level owing to serious risk of bias due to high attrition rates in one study.
[c]Downgraded one level owing to serious imprecision; findings compatible with benefit in biological graft group or with no difference between groups.
[d]Downgraded one level owing to serious inconsistency: $I^2 = 74\%$.
[e]Downgraded one level owing to serious imprecision, with wide confidence intervals. Findings compatible with benefit in either group or with no effect.

BACKGROUND

Pelvic organ prolapse is common and is seen on examination in 40% to 60% of parous women (Handa 2004; Hendrix 2002). The annual aggregated rate of associated surgery in the United States is in the range of 10 to 30 per 10,000 women (Brubaker 2002). Pelvic organ prolapse is the descent of one or more of the pelvic organs (uterus, vagina, bladder, or bowel). Types of prolapse include:

1. upper vaginal prolapse (i.e. uterus, vaginal vault (after hysterectomy when the top of the vagina drops down));
2. anterior vaginal wall prolapse (i.e. cystocele (bladder descends), urethrocele (urethra descends), paravaginal defect (pelvic fascia defect)); and
3. posterior vaginal wall prolapse (i.e. enterocele (small bowel descends), rectocele (rectum descends), perineal deficiency).

A woman can present with prolapse at one or more of these sites. Posterior vaginal wall prolapse can cause the sensation of bulge in the vagina and can also cause symptoms of obstructed defecation, sometimes requiring splinting or digitation to facilitate bowel emptying. As with prolapse in other compartments of the vagina, posterior wall prolapse can cause sexual dysfunction. Prevention and conservative management of posterior wall prolapse is consistent with all types of vaginal prolapse and involves lifestyle measures, pelvic floor muscle training, and pessary use. The topic of this systematic review and meta-analysis is the surgical management of posterior vaginal wall prolapse.

Description of the condition

Posterior wall prolapse is usually caused by prolapse of the rectum into the vagina (rectocele), but it can also be caused by prolapse of the small bowel into the vagina (enterocele).

The aetiology of pelvic organ prolapse (POP) is complex and multi-factorial. Known 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; and backache. Symptoms of bladder, bowel, or sexual dysfunction are frequently present. For example, women may need to use their fingers to reduce the prolapse to aid defecation. These symptoms may be directly related to the prolapsed organ, for example, obstructed defecation when a rectocele is present. They may also be independent of the prolapse, for example, faecal urgency when a rectocele is present.

Description of the intervention

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

Generally, conservative or mechanical treatments are considered for women with a mild degree of prolapse, those who wish to have more children, frail women, and women unwilling to undergo surgery. Conservative and mechanical interventions have been considered in separate Cochrane reviews (Adams 2004; Hagen 2011). These reviews provided no good evidence to guide management. The current review considers all surgical procedures for women with posterior vaginal wall prolapse.

Surgical management of posterior wall prolapse can be transvaginal or transanal. Different techniques can be used transvaginally, and repairs can utilise native tissue and biological or synthetic graft materials. Appendix 1 describes the various surgical techniques that are available.

Over the past five years and following significant litigation regarding outcomes of prolapse surgery after use of transvaginal polypropylene mesh, many of the products evaluated in this review have been voluntarily removed from the market (Prolift - Gynecare/Ethicon, Somerville, NJ, USA; Perigee - American Medical Systems, Minnetonka, MN, USA; Avaulta - Bard, Covington, LA, USA), or companies have excluded transvaginal utilisation of the mesh product (Gynemesh PS - Gynecare/Ethicon). When reading this review, one must be mindful that the data presented include some products that are no longer available for use.

To aid assessment of surgery, clinicians should record clear preoperative and postoperative site-specific vaginal grading, details of the operative intervention, and impact of the surgery on functional aspects of bladder, bowel, and sexual function.

How the intervention might work

Aims of surgery include:

1. restoration of normal vaginal anatomy;
2. restoration or maintenance of normal bowel function; and
3. restoration or maintenance of normal sexual function.

Why it is important to do this review

Surgical management of posterior vaginal wall prolapse remains non-standardised. The wide variety of surgical treatments available for prolapse indicates lack of consensus as to optimal treatment. Provided that sufficient numbers of trials of adequate quality have been conducted, the most reliable evidence is likely to come from randomised controlled trials, which serve as the basis for this review. The aim of this review is to identify optimal practice while highlighting topics requiring further research.

OBJECTIVES

To evaluate the safety and effectiveness of any surgical intervention compared with another intervention for management of posterior vaginal wall prolapse.

METHODS

Criteria for considering studies for this review

Types of studies

We included published and unpublished randomised controlled trials (RCTs) in which investigators compared any surgery for posterior vaginal wall prolapse against any other surgery for posterior vaginal wall prolapse. We excluded quasi-randomised studies (e.g. studies with evidence of inadequate sequence generation such as alternate days, patient numbers) as they are

associated with high risk of bias. As this is a systematic review of surgical interventions, we excluded cross-over studies, as the design is not valid in this context. Review inclusion criteria require that trials provide follow-up for at least six months.

Types of participants

Eligible studies included adult women seeking treatment for symptomatic posterior vaginal wall prolapse - primary or recurrent.

Types of interventions

Eligible studies compared different types of surgery for posterior vaginal wall prolapse by looking at the following.

1. Differences in route.
   a. Transanal.
   b. Transvaginal.
2. Differences in type of repair.
   a. Any surgical technique to repair posterior vaginal wall prolapse compared with any other surgical technique to repair posterior vaginal wall prolapse.

Types of outcome measures

Primary outcomes

1. Awareness of prolapse: any affirmative response to questions related to awareness of prolapse or vaginal bulge (subjective failure)

2. Repeat surgery for any prolapse

3. Recurrent posterior vaginal wall prolapse, defined as any stage 2 or greater prolapse (Pelvic Organ Prolapse Quantification (POP-Q): Ap or Bp assessed to be prolapsed to 1cm above the hymen or lower (more distal)(objective failure)

- Ap is a point on the posterior vaginal wall 3 cm from the vaginal entrance, range -3 to +3 cm
- Bp is approximately at the midpoint of the posterior vaginal wall, range -3 to +10 cm
- C describes the vaginal apex, ranging from -10 to non-determined limit
- Ba is approximately at the midpoint of the anterior vaginal wall, range -3 to +10 cm

Secondary outcomes

4. Bowel function

4.1 Postoperative obstructed defecation

4.2 Postoperative anal incontinence

4.3 Postoperative constipation

5. Sexual function

5.1 De novo dyspareunia

5.2 Postoperative dyspareunia

5.3 No improvement in dyspareunia

6. Prolapse outcomes (POP-Q scores present nine measurements of the vagina to quantify and describe vaginal prolapse). For simplicity, we have reported four of these basic measurements

6.1 Mean postoperative change in Ap

6.2 Mean postoperative change in Bp

6.3 Mean postoperative change C

6.4 Mean postoperative change in Ba

7. Quality of life (QOL) and satisfaction

7.1 Postoperative Pelvic Floor Impact Questionnaire (PFIQ)-7

7.2 Postoperative Pelvic Floor Distress Inventory (PFDI)-20

7.3 Postoperative pelvic Organ Prolapse Symptom Score (POP-SS)

7.4 Postoperative Pelvic organ prolapse/urinary Incontinence Sexual Questionnaire (PISQ)-12

8. Adverse events

8.1 Mesh exposure

8.2 Reoperation for mesh exposure

8.3 Intraoperative complications including bowel injury and haemorrhage

8.4 Postoperative complications including wound infection

9. Perioperative outcomes - continuous

9.1 Estimated blood loss (EBL; mL)

9.2 Operation time (minutes)

9.3 Length of stay (days)

9.4 Postoperative narcotic use (mg equivalent of morphine)

10. Perioperative outcomes - dichotomous

10.1 Persistent postoperative pain

10.2 Discharge from hospital within 48 hours

10.3 Blood transfusion

11. Investigations

11.1 Defecogram: mean postoperative rectocele size (cm)

11.2 Anal manometry: postoperative mean maximum anal resting pressure (MARP) (mmHg)

Search methods for identification of studies

We did not impose any language or other limits on any of the searches detailed below.

Electronic searches

We searched the Cochrane Incontinence Group Specialised Register of controlled trials, which contains trials identified from

the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, ClinicalTrials.gov, and the World Health Organization International Clinical Trials Registry Platform (WHO ICTRP) (searched April 2017) (Appendix 1). We handsearched conference proceedings for the International Urogynecology Society (IUGA) and the International Continence Society (ICS) for podium presentations up until June 2016. We searched the reference lists of relevant articles and contacted researchers in the field.

Searching other resources

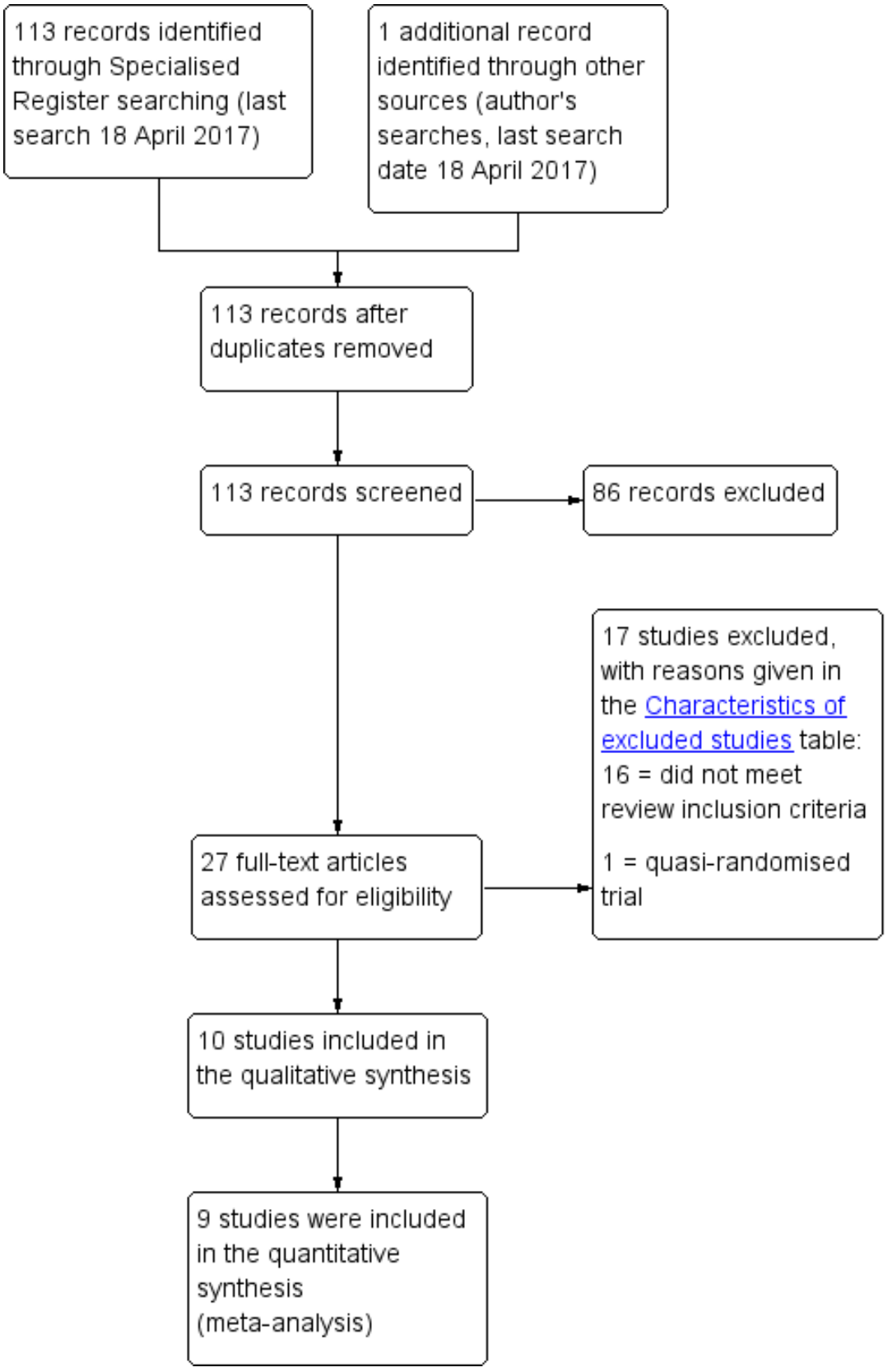
We handsearched conference proceedings for the International Urogynecology Society (IUGA) and the International Continence Society (ICS) for podium presentations from 2012 to June 2016. We searched the reference lists of relevant articles and contacted researchers in the field.

Data collection and analysis

Selection of studies

Two review authors assessed the titles and, if available, abstracts of all possibly eligible studies for compliance with the inclusion criteria for this review. At least two review authors then independently assessed full-text reports for each study likely to be eligible. We have listed excluded studies along with reasons for their exclusion in the Characteristics of excluded studies table. We have presented the selection process in a PRISMA flow chart (Figure 1).

Figure 1. PRISMA study flow diagram.



Data extraction and management

At least two review authors extracted data and performed comparisons to ensure accuracy. We resolved discrepancies by discussion or by consultation with a third party. When trial data were not reported adequately, we attempted to acquire the necessary information from the trialist.

Assessment of risk of bias in included studies

Two review authors independently assessed included studies for risk of bias using the Cochrane risk of bias assessment tool (Higgins 2011b) to evaluate selection (random sequence generation and allocation concealment); performance (blinding of participants and personnel); detection (blinding of outcome assessors); attrition (incomplete outcome data); reporting (selective reporting); and other biases. We resolved disagreements by discussion or by consultation with a third review author. We will describe all judgements fully and will present our conclusions in the risk of bias table that we will incorporate into our interpretation of review findings by performing sensitivity analyses (see below).

We considered that robust methods of sequence generation and allocation concealment would prevent bias related to differing surgical skills, even when studies were not stratified by surgeon.

We considered that all our primary outcomes were at risk of detection and/or performance bias unless both personnel and outcome assessors were clearly blinded, as even repeat surgery may be influenced by knowledge of which type of surgery was conducted initially.

We rated studies with over 15% loss to follow-up as having high risk of attrition bias.

We rated studies that reported outcomes according to a published protocol as having low risk of selection bias. Among trials for which a published protocol was not available, we rated those that reported at least one of our primary outcomes as having unclear risk of bias and those that did not report any of our primary outcomes as having high risk.

Measures of treatment effect

For dichotomous data, we used numbers of events in control and intervention groups of each study to calculate Mantel-Haenszel risk ratios (RRs). For continuous data, if all studies reported exactly the same outcomes, we calculated mean differences (MDs) between treatment groups. If investigators reported similar outcomes on different scales, we calculated standardised mean differences (SMDs). We presented 95% confidence intervals (CIs) for all outcomes. We compared the magnitude and direction of effect reported by studies with how they are presented in the review, while accounting for legitimate differences.

Unit of analysis issues

All analyses were per woman randomised.

Dealing with missing data

We analysed the data on an intention-to-treat basis as far as possible and attempted to obtain missing data from the original trialists. When these were unobtainable, we analysed only available data.

Assessment of heterogeneity

We considered whether clinical and methodological characteristics of included studies were sufficiently similar for meta-analysis to provide a clinically meaningful summary. We assessed statistical heterogeneity by using the I^2 measure. We considered I^2 greater than 50% to indicate substantial heterogeneity (Higgins 2011; Higgins 2003).

Assessment of reporting biases

In view of the difficulty of detecting and correcting for publication bias and other reporting biases, review authors aimed to minimise their potential impact by ensuring a comprehensive search for eligible studies and by staying alert for duplication of data. If we included more than 10 studies in a single analysis, we planned to construct a funnel plot to assess reporting bias.

Data synthesis

If studies were sufficiently similar, we combined data using a fixed-effect model in Review Manager software (Revman 2014) for the following comparisons.

1. Transanal versus vaginal.
2. Site-specific versus midline fascial plication.
3. Absorbable graft versus native tissue.
4. Biological graft versus native tissue.
5. Synthetic graft versus native tissue.
6. Levator ani plication versus native tissue repair.

Subgroup analysis and investigation of heterogeneity

If we detected substantial heterogeneity, we explored possible explanations by conducting sensitivity analyses. We took any statistical heterogeneity into account when interpreting results, especially if we noted any variation in the direction of effect.

We combined trials only if interventions were similar enough in terms of clinical criteria. When we suspected important heterogeneity through visual inspection of results, we used the Chi^2 test for heterogeneity (at 10%) or the I^2 statistic to look for further differences between trials (Higgins 2003). When concern about heterogeneity persisted, we used a random-effects model.

We identified trials separately and combined if they addressed other secondary objectives of the review related to prevention or treatment of complications or evaluation of urinary, bowel, or sexual function.

Sensitivity analysis

We conducted sensitivity analyses for the primary outcomes to determine whether our conclusions were robust to arbitrary decisions made regarding eligibility and analysis. These analyses included consideration of whether review conclusions would have differed if:

1. we had restricted eligibility to studies at low risk of bias (defined as low risk of selection bias and not as high risk of bias in any domain);
2. we had adopted a random-effects model; or
3. the summary effect measure used had been odds ratio rather than risk ratio.

Overall quality of the body of evidence: 'Summary of findings' table

We prepared a 'Summary of findings' table using GRADEproGDT 2015 and Cochrane methods. This table evaluates the overall quality of the body of evidence for the main review outcomes (awareness of prolapse, repeat surgery for prolapse, recurrent posterior vaginal wall prolapse) and for additional clinically relevant outcomes (postoperative obstructed defecation, postoperative dyspareunia, postoperative complications, estimated blood loss, and operating time) for the main review comparison (transanal repair vs transvaginal repair).

We prepared an additional 'Summary of findings' table for another important comparison (biological graft vs native tissue), which evaluates the main review outcomes (awareness of prolapse, repeat surgery for prolapse, recurrent posterior vaginal wall prolapse) and additional clinically relevant outcomes (postoperative obstructed defecation, postoperative dyspareunia, postoperative complications, and estimated blood loss).

We considered other comparisons clinically less important, and although we assessed the quality of evidence by using GRADE methods, we did not construct 'Summary of findings' tables for these comparisons. In particular, all synthetic meshes used in the included studies have been withdrawn from the commercial market, decreasing the clinical significance of these outcomes.

We assessed the quality of evidence using GRADE criteria: risk of bias, consistency of effect, imprecision, indirectness, and publication bias. Two review authors worked independently to provide judgements about evidence quality (high, moderate, low, or very low) and resolved disagreements by discussion. We justified, documented, and incorporated judgements into reporting of results for each outcome.

RESULTS

Description of studies

Results of the search

We screened 113 abstracts and excluded 86 of them. We screened 27 full texts and included 10 studies (Farid 2010; Glazener 2017; Kahn 1999; Nieminen 2004; Paraiso 2006; Park 2014 Abstract; Sand 2001; Sung 2012; Vijaya 2011 Abstract; Wei 2015). We excluded 17 studies and found no studies that are ongoing or are awaiting classification.

We provided full details of the included trials in the Characteristics of included studies table.

We presented the flow of literature through the assessment process in a PRISMA flow chart (Figure 1).

Included studies

Study design and setting

We included 10 RCTs from five countries (Egypt, Finland, UK, USA, and China). All studies used a parallel design.

Participants

The 10 trials randomised a total of 1099 women, all of whom received a surgical intervention. Studies reported mean participant age of between 54 and 65 (Farid 2010; Glazener 2017; Kahn 1999; Nieminen 2004; Paraiso 2006; Sand 2001; Sung 2012; Vijaya 2011 Abstract), except Farid 2010, which reported mean age of 48 years. Wei 2015 reported age ranges of 26 to 71 years for the transvaginal group and 30 to 69 years for the transanal group. Six trials reported mean parity of 2 to 3 (Farid 2010; Glazener 2017; Kahn 1999; Nieminen 2004; Paraiso 2006; Sand 2001), and Farid 2010 reported mean parity of 4.4.

Interventions

Included trials compared the following interventions.

1. Transanal versus transvaginal repair. Four trials made this comparison and randomised 191 women (Farid 2010; Kahn 1999; Nieminen 2004; Wei 2015). All four trials included women with posterior vaginal wall prolapse who had symptoms of prolapse or obstructed defecation, or both. We have provided the description of techniques used in theses studies in Appendix 2.
2. Site-specific repair versus midline fascial plication. One trial made this comparison and randomised 74 women with stage 2 or greater posterior vaginal wall prolapse (Paraiso 2006). We have described these two techniques in Appendix 2.
3. Absorbable graft versus native tissue. One trial made this comparison in 132 women with rectocele (Sand 2001). Investigators used polyglactin 910 knitted mesh (Ethicon, Somerville, New Jersey, and Cincinnati, Ohio, USA). For women randomly assigned to the absorbable mesh group, researchers placed mesh just cephalad to the deep transverse perineal muscles during posterior vaginal wall repair.
4. Biological graft versus native tissue. Four studies made this comparison in 420 women (Glazener 2017; Paraiso 2006; Park 2014 Abstract; Sung 2012).
    a. Glazener 2017 was a large trial that randomised 735 women to fascial or graft anterior, posterior, or both repairs. A total of 191 randomised women underwent a posterior repair only and are included in this review. Inclusion criteria required that women must be booked for anterior, posterior, or both repairs. Biological graft materials were porcine acellular collagen matrix, porcine small intestine submucosa, or bovine dermal grafts. Study personnel inserted the graft below the fascial layer if possible and secured it with peripheral sutures.
    b. Paraiso 2006 included women with stage 2 or greater posterior vaginal wall prolapse and randomised them to receive native tissue plus augmentation with porcine subintestinal submucosal graft or native tissue alone. Investigators secured the graft superiorly to the posterior vaginal fibromuscularis and epithelium with 2.0 delayed absorbable polydioxanone sutures. Laterally, they attached the mesh to the levator ani fascia with interrupted 2.0 braided polyester sutures. In cases for which concomitant uterosacral vaginal vault suspension or iliococcygeus fascial suspension was performed, they secured the graft to the perineal body by using 2.0 polyglycolic acid suture.
    c. Park 2014 Abstract randomised 109 women with symptomatic grade 2 or greater prolapse undergoing laparoscopic sacrocolpopexy to native tissue repair augmented with porcine biograft or native tissue repair alone.

   d. Sung 2012 included women with grade 2 or greater posterior wall prolapse with defecatory or prolapse symptoms and randomised participants to native tissue repair plus augmentation with porcine subintestinal submucosal graft or native tissue repair alone. Investigators trimmed the graft to appropriate size and secured it over the native tissue repair, suturing it laterally to the levator ani fascia using interrupted 2.0 polyglycolic acid sutures bilaterally. They secured the graft superiorly to the rectovaginal connective tissue and inferiorly to the perineal body using 2.0 polyglycolic acid sutures.

5. Synthetic graft versus native tissue. One trial made this comparison in 191 women with rectocele (Glazener 2017). In this trial, investigators used non-absorbable type 1 monofilament macroporous polypropylene mesh. Weight of the mesh ranged from 19 g/m^2 to 44 g/m^2 and hybrid (coated mesh) was allowed. Researchers inserted the mesh below the fascial layer if possible and secured it with peripheral sutures.
6. Levator ani plication versus midline fascial plication. One trial made this comparison in 52 women but did not report on any of our primary or secondary outcomes (Vijaya 2011 Abstract); thus we were unable to include trial data in our meta-analysis.

Follow-up

Two trials reported median follow-up of less than one year (Farid 2010; Vijaya 2011 Abstract); five reported median follow-up of 12 months (Nieminen 2004; Paraiso 2006; Sand 2001; Sung 2012; Wei 2015); three reported median follow-up of 24 months (Glazener 2017; Kahn 1999; Park 2014 Abstract); and no trials reported outcomes at greater than five years.

Outcomes

Eight studies reported data in a form suitable for analysis for at least one of the primary outcomes.

1. Four reported awareness of prolapse (Kahn 1999; Nieminen 2004; Paraiso 2006; Sung 2012).
2. Three reported reoperation for any prolapse (Glazener 2017; Kahn 1999; Paraiso 2006).
3. Six reported recurrent posterior wall prolapse (Glazener 2017; Kahn 1999; Nieminen 2004; Paraiso 2006; Sand 2001; Sung 2012).
4. Seven reported adverse events as an outcome (Farid 2010; Glazener 2017; Kahn 1999; Nieminen 2004; Paraiso 2006; Park 2014 Abstract; Sung 2012).

The primary outcome in Glazener 2017 - the largest included trial - was patient-reported prolapse symptoms based on POP-SS.

Excluded studies

Overall we excluded 17 studies from this review. We have provided full details in the Characteristics of excluded studies table.

Risk of bias in included studies

We have summarised review authors' assessments of risk of bias across included studies in Figure 2 and Figure 3.

Figure 2. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

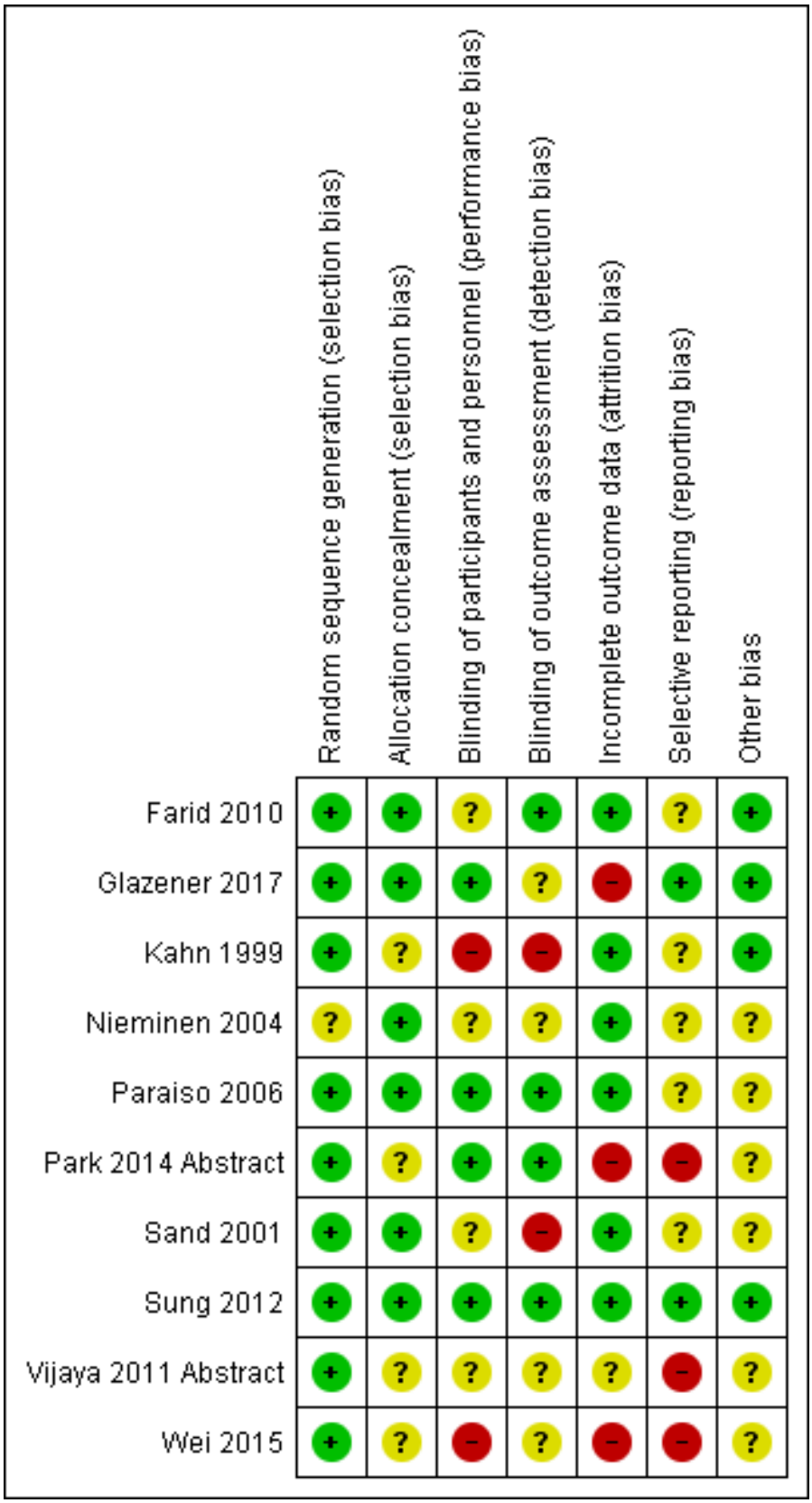
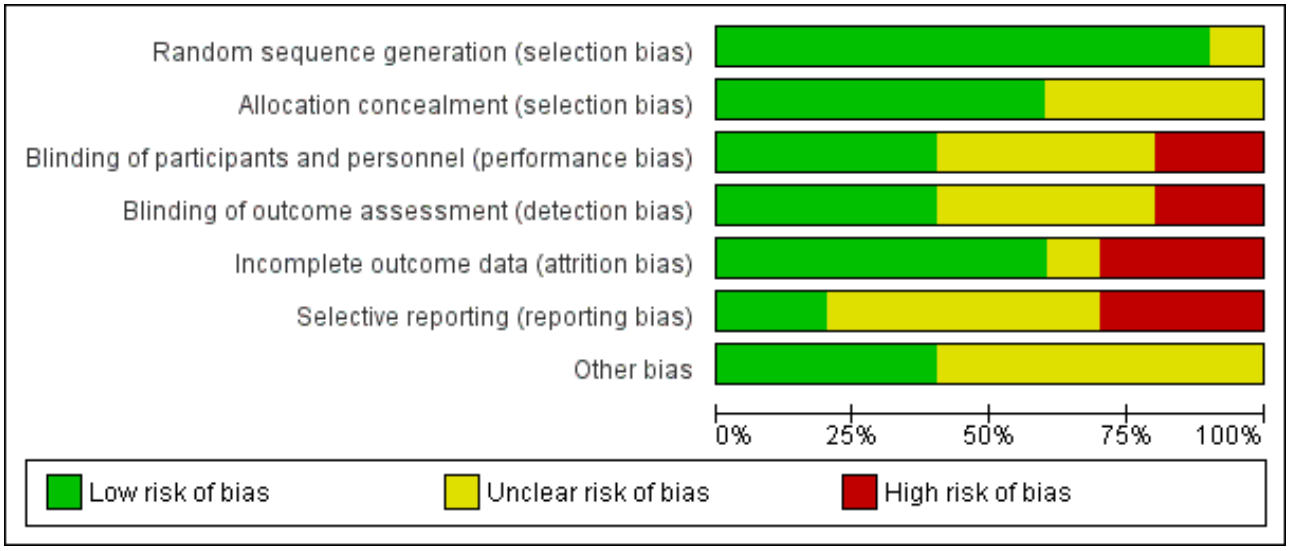


Figure 3. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.



Allocation

Random sequence generation was adequate in all trials, so risk of selection bias was low in all 10 trials. Sufficient detail was provided in five of 10 RCTs, which adequately described the randomisation process and confirmed that the randomisation process was securely concealed, for example, allocation by a remote person or sealed envelopes (Farid 2010; Glazener 2017; Nieminen 2004; Paraiso 2006; Sand 2001; Sung 2012).

In the other four trials, it is unclear whether allocation was concealed before assignment (Kahn 1999; Nieminen 2004; Vijaya 2011 Abstract; Wei 2015).

Blinding

Four trials blinded patients (Glazener 2017; Paraiso 2006; Park 2014 Abstract; Sung 2012), meaning that they had low performance bias. Two trials had high risk of performance bias (Kahn 1999; Wei 2015), and reporting was unclear in the remaining four studies. Reviewers remained blinded in four trials (Farid 2010; Paraiso 2006; Park 2014 Abstract; Sung 2012), meaning that risk of detection bias was low. Two trials had high risk of detection bias (Kahn 1999; Sand 2001), and reporting was unclear in the remaining four trials.

Incomplete outcome data

Loss to follow-up was a variable problem, ranging from zero in Kahn 1999, Nieminen 2004, and Paraiso 2006, to 28% in Park 2014 Abstract at 24 months. Farid 2010 had a 2% attrition rate at six months, Sand 2001 and Sung 2012 had a 12% attrition rate at 12 months, Wei 2015 had a 16% attrition rate at 50 months, and Glazener 2017 had a 20% attrition rate at 24 months. Vijaya 2011 Abstract did not state an attrition rate. Therefore, we assessed risk of attrition as low in nine trials and as unclear in Vijaya 2011 Abstract.

Selective reporting

Seven of the 10 trials reported on at least one primary outcome. We identified trial protocols for two trials (Glazener 2017; Sung 2012), which we rated as having low risk of reporting bias because they reported on all intended primary outcomes and did not switch outcomes. Three studies did not report any of the primary outcomes, and we rated them as having high risk of selection bias, as we could not find the trial protocols (Park 2014 Abstract; Vijaya 2011 Abstract; Wei 2015). We rated the five trials that reported on primary outcomes but did not have accessible protocols as having unclear risk of reporting bias (Farid 2010; Kahn 1999; Nieminen 2004; Paraiso 2006; Sand 2001).

Other potential sources of bias

We found no other potential sources of bias.

Effects of interventions

See: **Summary of findings for the main comparison** Transanal repair versus transvaginal repair; **Summary of findings 2** Biological graft versus native tissue repair for posterior vaginal wall prolapse

1. Transanal versus transvaginal

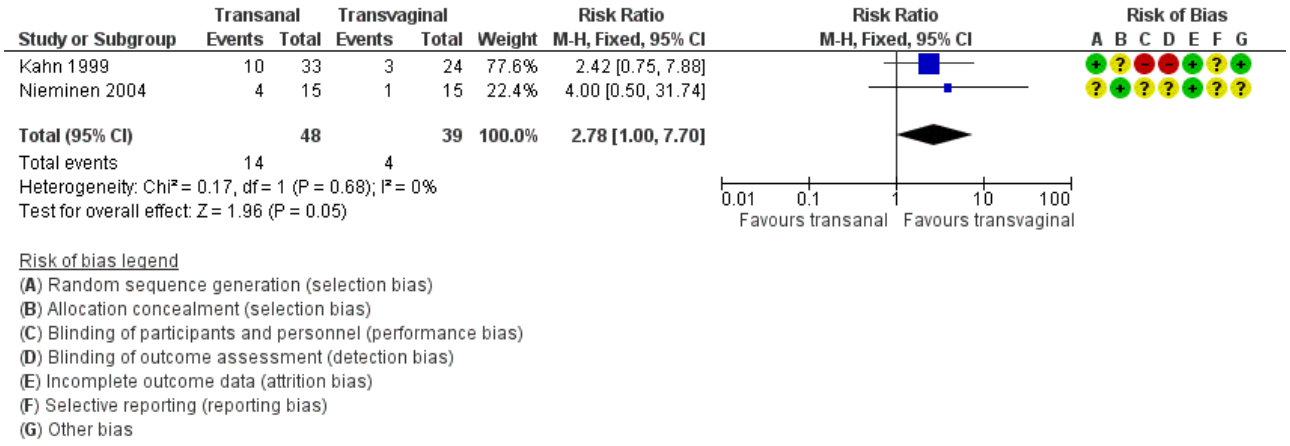
Four trials reported on this comparison (Farid 2010; Kahn 1999; Nieminen 2004; Wei 2015).

Primary outcomes

1.1 Awareness of prolapse

Awareness of prolapse may be more common after transanal repair (risk ratio (RR) 2.78, 95% confidence interval (CI) 1.00 to 7.70; 2 RCTs; n = 87; I^2 = 0%; low-quality evidence; Analysis 1.1; Figure 4). This suggests that if 10% of women are aware of prolapse after transvaginal repair, between 10% and 79% are likely to be aware after transanal repair.

Figure 4. Forest plot of comparison: 1 Transanal versus transvaginal, outcome: 1.1 Awareness of prolapse (subjective failure).

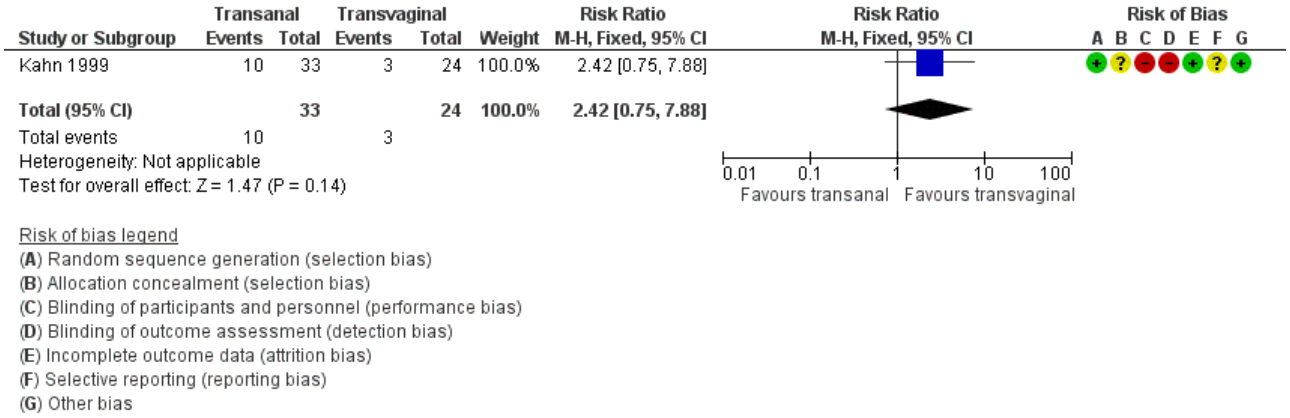


A sensitivity analysis using odds ratios instead of risk ratios showed benefit for the transvaginal group with higher rates of prolapse awareness in the transanal group (Peto OR 3.05, 95% CI 1.08 to 8.60; I^2 = 0%; Mantel Haenszel OR 3.52, 95% CI 1.05 to 11.78).

1.2 Repeat surgery for prolapse

Evidence was insufficient to show whether there was any difference between transanal and transvaginal groups (RR 2.42, 95% CI 0.75 to 7.88; 1 RCT; n = 57; low-quality evidence; Analysis 1.2; Figure 5).

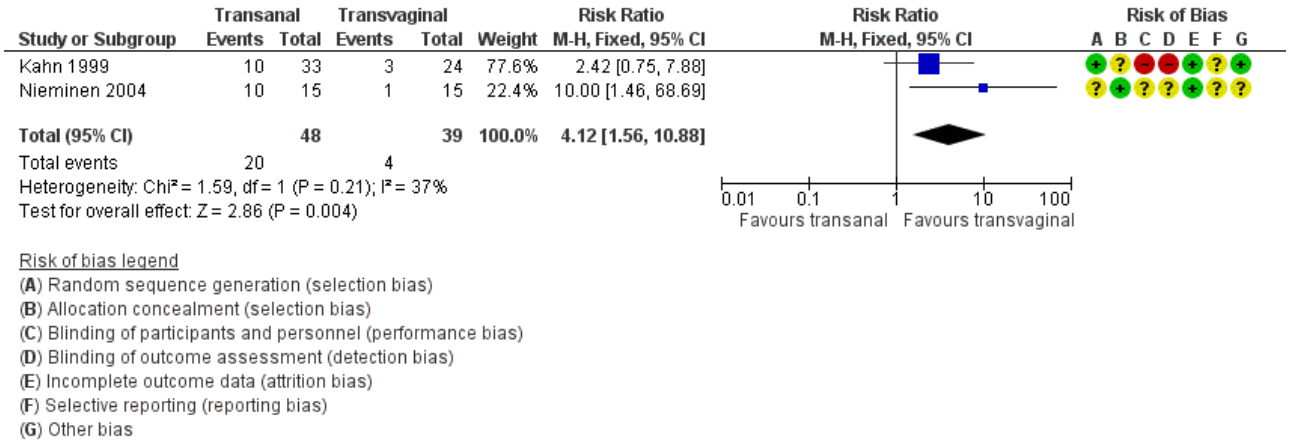
Figure 5. Forest plot of comparison: 1 Transanal versus transvaginal, outcome: 1.2 Repeat surgery for any prolapse.



1.3 Recurrent posterior vaginal wall prolapse

After one to two years' follow-up, recurrent posterior wall prolapse was more likely after transanal repair (RR 4.12, 95% CI 1.56 to 10.88; 2 RCTs; n = 87; I^2 = 35%; moderate-quality evidence; Analysis 1.3; Figure 6). This suggests that if 10% of women have recurrent prolapse on examination after transvaginal repair, between 16% and 100% are likely to have recurrent prolapse after transanal repair.

Figure 6. Forest plot of comparison: 1 Transanal versus transvaginal, outcome: 1.3 Recurrent posterior vaginal wall prolapse (objective failure).



Secondary outcomes

1.4 Bowel function

1.4.1 Postoperative obstructive defecation

Data show possibly more women with postoperative obstructed defecation in the transanal group (RR 1.66, 95% CI 1.00 to 2.79; 3 RCTs; n = 113; I^2 = 10%; low-quality evidence; Analysis 1.4). Our findings suggest that if 25% of women undergoing transvaginal repair have postoperative obstructed defecation, between 25% and 71% undergoing transanal repair will have postoperative obstructed defecation.

1.4.2 Postoperative anal incontinence

Two studies reported no cases of de novo postoperative anal incontinence (Farid 2010; Nieminen 2004).

1.4.3 Postoperative constipation

Evidence was insufficient to show whether there was any difference in rates of postoperative constipation between transanal and transvaginal groups (RR 2.00, 95% CI 0.92 to 4.34; 1 RCT; n = 48; Analysis 1.4).

1.5 Sexual function

1.5.1 De novo dyspareunia

Evidence was insufficient to show whether there was any difference between groups, because two studies reporting this outcome described only a single occurrence of de novo dyspareunia, which occurred in the transanal group (RR 3.00, 95% CI 0.13 to 68.26; 2 RCTs; n = 78; Analysis 1.5) (Farid 2010; Nieminen 2004).

1.5.2 Postoperative dyspareunia

Trials provided no evidence of a significant difference between the two groups in rates of postoperative dyspareunia (RR 0.32, 95% CI 0.09 to 1.15; 2 RCTs; n = 80; I^2 = 5%; moderate-quality evidence). If 19% of women have postoperative dyspareunia after a transvaginal repair, between 2% and 22% are likely to do so after transanal repair (Analysis 1.5).

1.5.3 No improvement in sexual function

Women were more likely to have no improvement in sexual function after a transanal repair than after a transvaginal repair (RR 1.44, 95% CI 1.04 to 1.99; 2 RCTs; n = 49; I^2 = 0%; low-quality evidence; Analysis 1.5).

1.6 Prolapse outcomes

1.6.1 Mean postoperative Ap

The postoperativeAp value was better in the transvaginal group (mean difference (MD) 1.44 cm, 95% CI 0.81 to 2.07; 1 RCT; n = 30; Analysis 1.6).

1.6.2 Mean postoperative Bp

Trials provided no data for this outcome.

1.6.3 Mean postoperative C

Trials provided no data for this outcome.

1.6.4 Mean postoperative Ba

Trials provided no data for this outcome.

1.7 Quality of life and satisfaction measures

Trials provided no data for these outcomes.

1.8 Adverse events

1.8.1 Mesh exposure

Trials provided no data for this outcome.

1.8.2 Repeat surgery for mesh exposure

Trials reported no data for this outcome.

1.8.3 Intraoperative complications including bowel injury and haemorrhage

Two trials reported no intraoperative complications (Farid 2010; Nieminen 2004; n = 80).

1.8.4 Postoperative complications

Trials provided no conclusive evidence of a difference between transanal and transvaginal groups (RR 3.57, 95% CI 0.94 to 13.54; 3 RCTs; n = 135; I^2 = 37%; low-quality evidence; Analysis 1.7).

1.9 Perioperative outcomes - dichotomous

1.9.1 Persistent postoperative pain

Evidence was insufficient to show whether there was a difference in persistent postoperative pain between the two groups (RR 0.12, 95% CI 0.02 to 0.94; 1 RCT; n = 57; Analysis 1.8).

1.9.2 Discharge from hospital within 48 hours

Evidence was insufficient to show whether there was a difference in the number of women discharged from hospital within 24 hours (RR 0.85, 95% CI 0.59 to 1.22; 1 RCT; n = 30).

1.9.3 Blood transfusion

Trials provided no data for this outcome.

1.10 Perioperative outcomes - continuous

1.10.1 Estimated blood loss

Mean estimated blood loss was less in the transanal group than in the transvaginal group (MD -79.38 mL, 95% CI -119.08 to -39.69; 2 RCTs; n = 87; moderate-quality evidence; Analysis 1.9).

1.10.2 Operating time

Evidence was insufficient to show whether there was a difference between groups in operating time (MD -0.20 minutes, 95% CI -3.49 to 3.10; 3 RCTs; n = 137; moderate-quality evidence; Analysis 1.10).

1.10.3 Postoperative narcotic use

Evidence was insufficient to show whether there was a difference in narcotic use between the two groups (MD -29.00, 95% CI -5.12 to 10.98; 1 RCT; n = 57; mg equivalent of morphine).

1.10.4 Length of stay in hospital

Length of stay was shorter in the transanal group in the only study that reported this outcome (MD 1 day, 95% CI 0.47 to 1.53; 1 RCT; n = 57).

1.11 Investigations

1.11.1 Defecogram: mean postoperative rectocele size

Evidence was insufficient to show whether there was a difference between groups in mean postoperative rectocele size (MD 0.62 cm, 95% CI -0.64 to 1.89; 3 RCTs; n = 107).

1.11.2 Anal manometry: postoperative MARP

Evidence was insufficient to show whether there was any difference in MARP between transanal and transvaginal groups (MD 2.93 mmHg, 95% CI -5.12 to 10.98; 3 RCTs; n = 107).

2. Site-specific repair versus midline fascial plication

A single trial reported outcomes for this comparison (Paraiso 2006).

Primary outcomes

2.1 Awareness of prolapse

Evidence was insufficient to show whether there was any difference between groups in rates of awareness of prolapse (RR 0.86, 95% CI 0.25 to 2.88; 1 RCT; n = 60; low-quality evidence; Analysis 2.1).

2.2 Repeat surgery for prolapse

Evidence was insufficient to show whether there was any difference between groups (RR 1.78, 95% CI 0.17 to 18.78; 1 RCT; n = 70; low-quality evidence; Analysis 2.2).

2.3 Recurrent posterior vaginal wall prolapse

Evidence was insufficient to show whether there was any difference between groups (RR 1.56, 95% CI 0.49 to 4.91; 1 RCT; n = 55; low-quality evidence; Analysis 2.3).

Secondary outcomes

2.4 Bowel function

2.4.1 Postoperative obstructive defecation

Evidence was insufficient to show whether there was any difference between groups (RR 1.11, 95% CI 0.53 to 2.31; 1 RCT; n = 56; low-quality evidence; Analysis 2.4).

2.4.2 Postoperative anal incontinence

Trials provided no data for this outcome.

2.4.3 Postoperative constipation

Trials provided no data for this outcome.

2.5 Sexual function

2.5.1 De novo dyspareunia

Trials provided no data for this outcome.

2.5.2 Postoperative dyspareunia

Evidence was insufficient to show whether there was any difference between groups (RR 1.07, 95% CI 0.28 to 4.06; 1 RCT; n = 34; low-quality evidence; Analysis 2.5).

2.5.3 No improvement in sexual function

Trials provided no data for this outcome.

2.6 Prolapse outcomes

Trials provided no data for these outcomes.

2.7 Quality of life and satisfaction measures

2.7.1 PFIQ-7 scores

Evidence was insufficient to show whether there was a difference between groups in PFIQ-7 scores (MD 0 points, 95% CI -21.9 to 21.9; 1 RCT; n = 32; Analysis 2.6).

2.7.2 PFDI-20 scores

Evidence was insufficient to show whether there was a difference between groups in PFDI-20 scores (MD 9 points, 95% CI -18.21 to 36.21; 1 RCT; n = 32; Analysis 2.6).

2.7.3 PISQ-12

Evidence was insufficient to show whether there was a difference between groups in PISQ-12 scores (MD 0 points, 95% CI -2.77 to 2.77; 1 RCT; n = 32; Analysis 2.6).

2.7.4 POP-SS

Trials provided no data for this outcome.

2.8 Adverse events

2.8.1 Mesh exposure

Trials provided no data for this outcome.

2.8.2 Repeat surgery for mesh exposure

Trials provided no data for this outcome.

2.8.3 Intraoperative complications including bowel injury and haemorrhage

Evidence was insufficient to show whether there was any difference between groups (RR 5.0, 95% CI 0.25 to 100.7; 1 RCT; n = 74; Analysis 2.7).

2.8.4 Postoperative complications

Evidence was insufficient to show whether there was a difference between groups in rates of postoperative complications (RR 1.38, 95% CI 0.87 to 2.17; 1 RCT; n = 74; Analysis 2.7).

2.9 Perioperative outcomes - dichotomous

2.9.1 Persistent postoperative pain

Trials provided no data for this outcome.

2.9.2 Discharge from hospital within 48 hours

Trials provided no data for this outcome.

2.9.3 Blood transfusion

Evidence was insufficient to show whether there was a difference between groups in blood transfusion rates (RR 0.14, 95% CI 0.01 to 2.67; 1 RCT; n = 74; Analysis 2.8).

2.10 Perioperative outcomes - continuous

2.10.1 Estimated blood loss

Trials provided no data for this outcome.

2.10.2 Operating time

Evidence was insufficient to show whether there was a difference in operating time between groups (MD 1 minute, 95% CI -30.22 to 32.22; 1 RCT; n = 74; Analysis 2.9).

2.10.3 Postoperative narcotic use

Trials provided no data for this outcome.

2.10.4 Length of stay in hospital

Trials provided no data for this outcome.

2.11 Investigations

2.11.1 Defecogram: mean postoperative rectocele size

Trials provided no data for this outcome.

2.11.2 Anal manometry: postoperative MARP

Trials provided no data for this outcome.

3. Absorbable graft versus native tissue

A single study reported outcomes for this comparison (Sand 2001).

Primary outcomes

3.1 Awareness of prolapse

Trials provided no data for this outcome.

3.2 Repeat surgery for prolapse

Trials provided no data for this outcome.

3.3 Recurrent posterior vaginal wall prolapse (objective failure)

Evidence was insufficient to show whether there was any difference between groups in rates of objective failure (RR 0.88, 95% CI 0.31 to 2.49; 1 RCT; n = 104; low-quality evidence; Analysis 3.1).

Secondary outcomes

3.4 Bowel function

Trials provided no data for these outcomes.

3.5 Sexual function

Trials provided no data for these outcomes.

3.6 Prolapse outcomes

Trials provided no data for these outcomes.

3.7 Quality of life and satisfaction measures

Trials provided no data for these outcomes.

3.8 Adverse events

Trials provided no data for these outcomes.

3.9 Perioperative outcomes - dichotomous

Trials provided no data for these outcomes.

3.10 Perioperative outcomes - continuous

Trials provided no data for these outcomes.

3.11 Investigations

Trials provided no data for these outcomes.

4. Biological graft versus native tissue

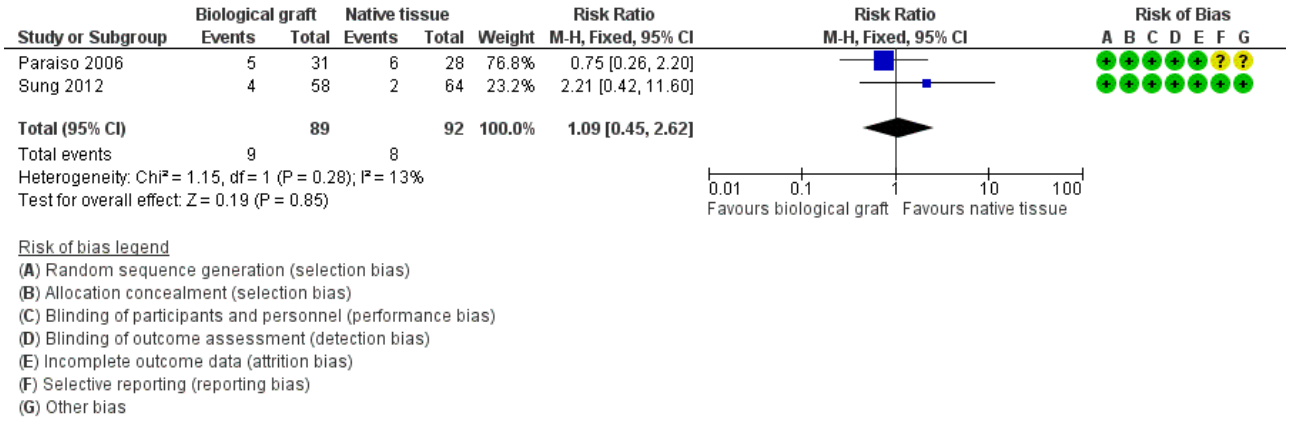
Four trials reported outcomes for this comparison (Glazener 2017; Paraiso 2006; Park 2014 Abstract; Sung 2012).

Primary outcomes

4.1 Awareness of prolapse

Evidence was insufficient to show whether there was any difference between groups in rates of awareness of prolapse (RR 1.09, 95% CI 0.45 to 2.62; 2 RCTs; n = 181; I^2 = 13%; moderate-quality evidence; Analysis 4.1; Figure 7).

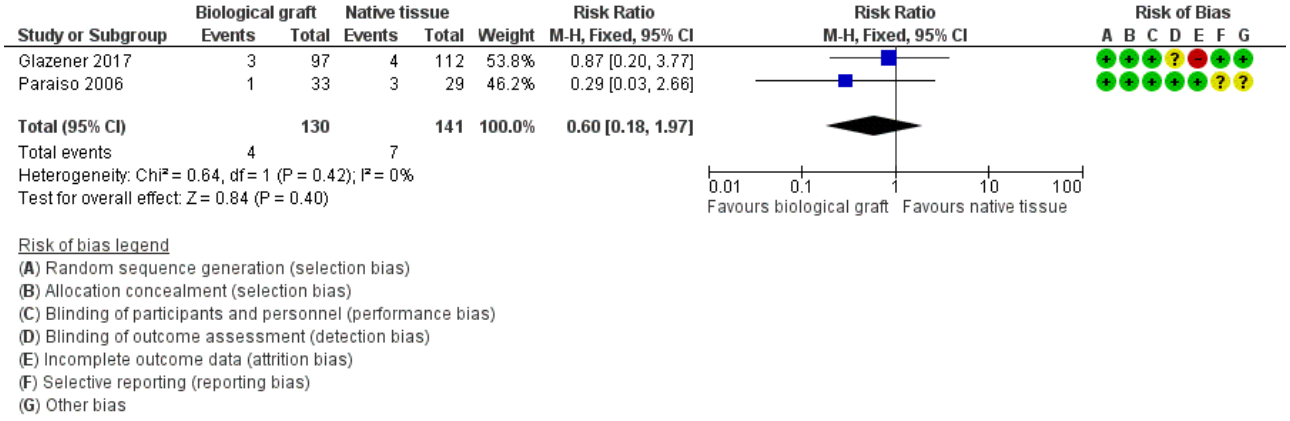
Figure 7. Forest plot of comparison: 4 Biological graft versus native tissue, outcome: 4.1 Awareness of prolapse (subjective failure).



4.2 Repeat surgery for prolapse

Evidence was insufficient to show whether there was any difference between groups in rates of repeat surgery for prolapse (RR 0.60, 95% CI 0.18 to 1.97; 2 RCTs; n = 271; I^2 = 0%; low-quality evidence; Analysis 4.2; Figure 8).

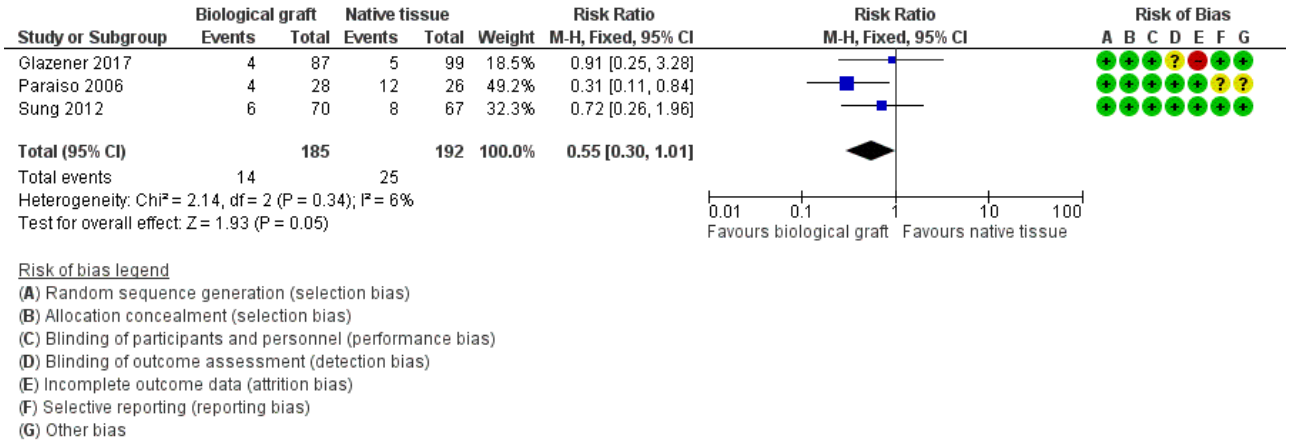
Figure 8. Forest plot of comparison: 4 Biological graft versus native tissue, outcome: 4.2 Repeat surgery for any prolapse.



4.3 Recurrent posterior vaginal wall prolapse (objective failure)

Trials provided no conclusive evidence of a difference between groups in rates of objective failure (RR 0.55, 95% CI 0.30 to 1.01; 3 RCTs; n = 377; I^2 = 6%; low-quality evidence; Analysis 4.3; Figure 9). If 13% of women have recurrent prolapse on examination after native tissue repair, between 4% and 13% are likely to have recurrent prolapse after biological graft. Limiting the analysis to studies at low risk of bias suggested benefit for the biological graft group (RR 0.47, 95% CI 0.24 to 0.94; 2 RCTs; n = 191; I^2 = 26%).

Figure 9. Forest plot of comparison: 4 Biological graft versus native tissue, outcome: 4.3 Objective failure (prolapse).



Secondary outcomes

4.4 Bowel function

4.4.1 Postoperative obstructed defecation

Evidence was insufficient to show whether there was any difference between groups in rates of postoperative obstructive defecation (RR 0.96, 95% CI 0.50 to 1.86; 2 RCTs; n = 172; I^2 = 42%; moderate-quality evidence; Analysis 4.4).

4.4.2 Postoperative anal incontinence

Trials provided no data for this outcome.

4.4.3 Postoperative constipation

Trials provided no data for this outcome.

4.5 Sexual function

4.5.1 De novo dyspareunia

Trials provided no data for this outcome.

4.5.2 Postoperative dyspareunia

Evidence was insufficient to show whether there was any difference between groups (RR 1.27, 95% CI 0.26 to 6.25; 2 RCTs; n = 152; I^2 = 74%; low-quality evidence; Analysis 4.5).

4.5.3 No improvement in sexual function

Trials provided no data for this outcome.

4.6 Prolapse outcomes

4.6.1 Mean postoperative Ap

Trials provided no data for this outcome.

4.6.2 Mean postoperative Bp

Evidence was insufficient to show whether there was a difference between groups in postoperative Bp values (MD 0.1 cm, 95% CI -0.31 to 0.51; 1 RCT; n = 182; Analysis 4.6).

4.6.3 Mean postoperative C

Evidence was insufficient to show whether there was a difference between groups in postoperative C values (MD -0.1 cm, 95% CI -0.62 to 0.42; 1 RCT; n = 183; Analysis 4.6).

4.6.4 Mean postoperative Ba

Evidence was insufficient to show whether there was a difference between groups in postoperative Ba values (MD 0 cm, 95% CI -0.43 to 0.43; 1 RCT; n = 183; Analysis 4.6).

4.7 Quality of life and satisfaction measures

4.7.1 PFIQ-7

Evidence was insufficient to show whether there was a difference between groups in postoperative PFIQ-7 scores (MD -11 points, 95% CI -28.67 to 6.67; 1 RCT; n = 28; Analysis 4.7).

4.7.2 PFDI-20

Evidence was insufficient to show whether there was a difference between groups in PFDI-20 values (MD -12 points, 95% CI -35.26 to 11.26; 1 RCT; n = 30; Analysis 4.7).

4.7.3 PISQ

Evidence was insufficient to show whether there was a difference between groups in PISQ scores (MD 1 point, 95% CI -1.28 to 3.28; 1 RCT; n = 74; Analysis 4.7).

4.7.4 POP-SS

Evidence was insufficient to show whether there was a difference between groups in POP-SS scores (MD-0.5 points, 95% CI -2.16 to 1.16; 1 RCT; n = 209; Analysis 4.7).

4.8 Adverse events

4.8.1 Mesh exposure

Evidence was insufficient to show whether there was any difference between groups in mesh exposure rates (RR 5.0, 95% CI 0.9 to 28.07; 2 RCTs; n = 329; Analysis 4.8).

4.8.2 Repeat surgery for mesh exposure

Trials provided no data for this outcome.

4.8.3 Intraoperative complications including bowel injury and haemorrhage

Evidence was insufficient to show whether there was any difference between biological graft and native tissue groups (RR 1.66, 95% CI 0.29 to 9.55; 2 RCTs; n = 228; Analysis 4.8).

4.8.4 Postoperative complications

Trials reported more postoperative complications in the biological graft group than in the native tissue group (RR 1.82, 95% CI 1.22 to 2.72; 3 RCTs; n = 448; high-quality evidence).

4.9 Perioperative outcomes - dichotomous

4.9.1 Persistent postoperative pain

Trials provided no data for this outcome.

4.9.2 Discharge from hospital within 48 hours

Trials provided no data for this outcome.

4.9.3 Blood transfusion

Evidence was insufficient to show whether there was any difference between biological graft and native tissue groups (RR 2.5, 95% CI 0.28 to 22.96; 2 RCTs; n = 228; Analysis 4.9).

4.10 Perioperative outcomes - continuous

4.10.1 Estimated blood loss

Trials provided no data for this outcome.

4.10.2 Operating time

Evidence was insufficient to show whether there was a difference in operating times (MD 19 minutes lower in the biological graft group, 95% CI -49.93 to 11.93; 1 RCT; n = 68; Analysis 4.10).

4.10.3 Postoperative narcotic use

Trials provided no data for this outcome.

4.10.4 Length of stay in hospital

Trials provided no data for this outcome.

4.11 Investigations

Trials provided no data for these outcomes.

5. Synthetic graft versus native tissue

A single study reported on outcomes for this comparison (Glazener 2017).

Primary outcomes

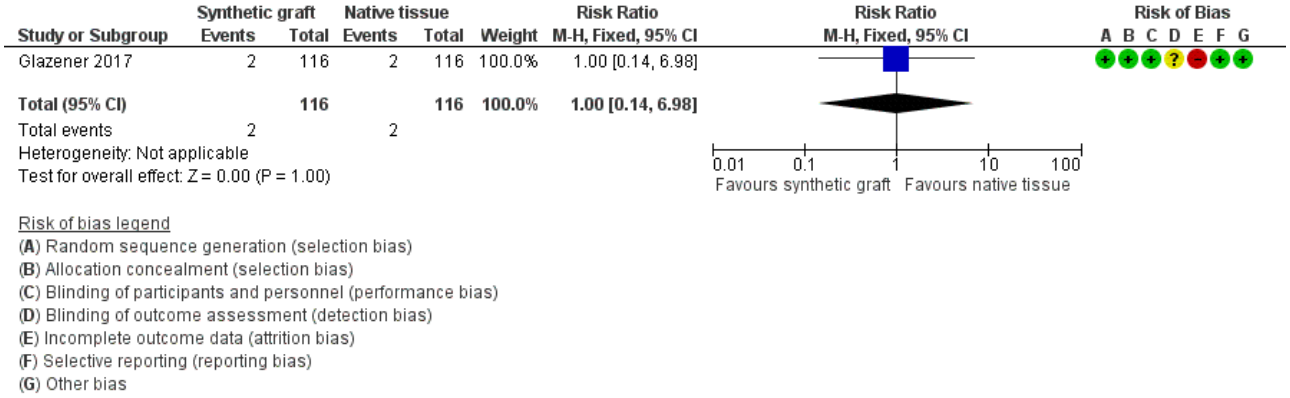
5.1 Awareness of prolapse

Trials provided no data for this outcome.

5.2 Repeat surgery for prolapse

Evidence was insufficient to show whether there was any difference between groups (RR 1.0, 95% CI 0.14 to 6.98; 1 RCT; n = 232; moderate-quality evidence; Analysis 5.1; Figure 10).

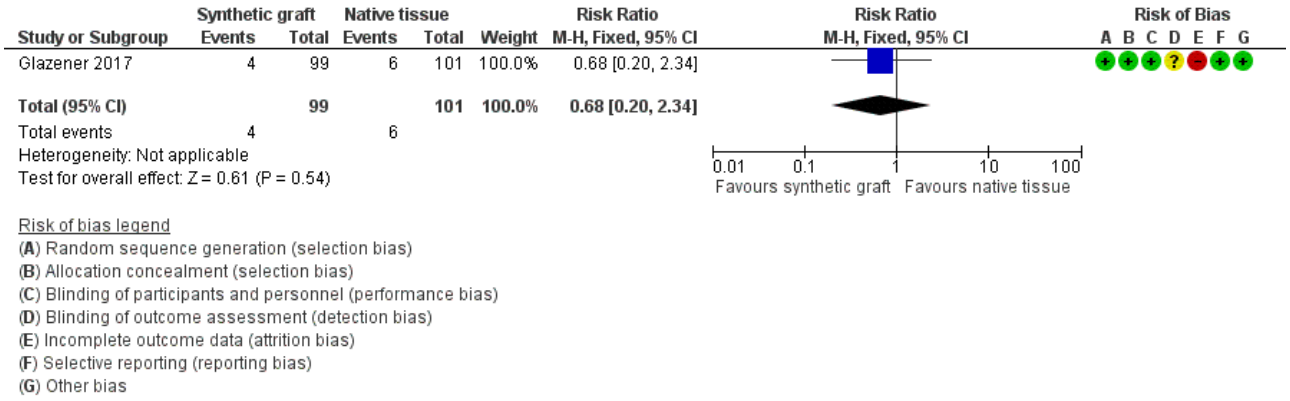
Figure 10. Forest plot of comparison: 5 Synthetic graft versus native tissue, outcome: 5.1 Repeat surgery for any prolapse.



5.3 Recurrent posterior vaginal wall prolapse

Evidence was insufficient to show whether there was any difference between groups in rates of recurrent posterior wall prolapse (RR 0.68, 95% CI 0.2 to 2.34; 1 RCT; n = 200; moderate-quality evidence; Analysis 5.2; Figure 11).

Figure 11. Forest plot of comparison: 5 Synthetic graft versus native tissue, outcome: 5.2 Objective failure (prolapse).



Secondary outcomes

5.4 Bowel function

Trials provided no data for these outcomes.

5.5 Sexual function

Trials provided no data for these outcomes.

5.6 Prolapse outcomes

5.6.1 Mean postoperative Ap

Trials provided no data for this outcome.

5.6.2 Mean postoperative Bp

Evidence was insufficient to show whether there was a difference between groups in Bp values (MD 0.2 cm, 95% CI -0.18 to 0.58; 1 RCT; n = 191; Analysis 5.3).

5.6.3 Mean postoperative C

Evidence was insufficient to show whether there was a difference between groups in C values (MD 0 cm,, 95% CI -0.61 to 0.61; 1 RCT; n = 190; Analysis 5.3).

5.6.4 Mean postoperative Ba

Evidence was insufficient to show whether there was a difference between groups in Ba values (MD -0.1 cm, 95% CI -0.54 to 0.34; 1 RCT; n = 191; Analysis 5.3).

5.7 Quality of life and satisfaction measures

5.7.1 POP-SS

Evidence was insufficient to show whether there was a difference between groups in POPP-SS scores (MD 0.7 points, 95% CI 0.75 to 2.15; 1 RCT; n = 232; Analysis 5.4).

5.8 Adverse events

5.8.1 Mesh exposure

Data show more mesh exposures in the synthetic graft group, with a rate of 7% compared with 0% in the native tissue group (RR 18.7, 95% CI 1.10 to 317.94; 1 RCT; n = 252; Analysis 5.5).

5.8.2 Repeat surgery for mesh exposure

Trials provided no data for this outcome.

5.8.3 Intraoperative complications including bowel injury and haemorrhage

Trials provided no data for this outcome.

5.8.4 Postoperative complications

Evidence was insufficient to show whether there was a difference between groups in rates of postoperative complications (RR 0.39, 95% CI 0.14 to 1.06; 1 RCT; n = 252; Analysis 5.5).

5.9 Perioperative outcomes - dichotomous

5.9.1 Persistent postoperative pain

Trials provided no data for this outcome.

5.9.2 Discharge from hospital within 48 hours

Trials provided no data for this outcome.

5.9.3 Blood transfusion

Evidence was insufficient to show whether there was any difference between synthetic graft and native tissue groups in blood transfusion rates (RR 2.51, 95% 0.28 to 22.96; 1 RCT; n = 228; Analysis 5.6).

5.10 Perioperative outcomes - continuous

Trials provided no data for these outcomes.

5.11 Investigations

Trials provided no data for these outcomes.

6. Levator ani plication versus midline fascial plication

One trial reported outcomes for this comparison but provided no data suitable for analysis (Vijaya 2011 Abstract).

This small study of 52 women reported superior objective outcomes with fascial plication alone as compared with levator ani plication with midline fascial plication at six months, with mean difference in the preoperative and postoperative Ap scores greater in the fascial plication group. The abstract states that quality of life assessment based on a Prolapse Quality of Life (P-

QOL) questionnaire was significantly improved in both groups, with no differences between groups. Trial authors also reported no differences between groups in sexual function before or after the intervention, and data show that bowel function was improved by the intervention in the fascial repair group but not in the levator plication group, as assessed by the Birmingham Bowel and Urinary Symptoms Questionnaire.

Other analyses

Sensitivity analysis by risk of bias did not substantially change review findings, except for one analysis (Analysis 4.3). As noted above, analysis restricted to studies at lower risk of bias suggested that biological graft may be associated with lower rates of objective failure (recurrent vaginal wall prolapse) than native tissue repair.

Sensitivity analysis using Mantel-Haenszel or Peto odds ratios as the effect estimate did not substantially change review findings, except for one analysis (Analysis 1.1). As noted above, use of odds ratios revealed that transanal repair was associated with higher rates of subjective prolapse than transvaginal repair. This finding did not reach statistical significance when risk ratios were used.

Sensitivity analysis based on a random-effects rather than a fixed-effect model did not substantially change any review findings.

We were unable to conduct our planned assessment of reporting bias, as insufficient studies in any one comparison precluded construction of a funnel plot.

DISCUSSION

Summary of main results

Four trials compared transanal and transvaginal approaches for management of posterior vaginal wall prolapse. Both subjective and objective success appeared to be greater in the transvaginal group. The transvaginal group was probably less likely to have obstructed defecation and was more likely to have improvement in sexual function. Postoperative complications may be less likely after transvaginal surgery, although findings for this outcome were inconclusive. However, intraoperative blood loss was greater in the transvaginal group.

Four trials compared biological graft and native tissue repair and found no clear evidence of a difference between groups for measures of effectiveness. However, postoperative complications were more common with biological repair.

In comparisons of site-specific vaginal repair versus midline fascial plication, absorbable graft versus native tissue repair, synthetic graft versus native tissue repair, and levator ani plication versus midline fascial plication, evidence was insufficient to permit any conclusions about their relative effectiveness or safety.

Overall completeness and applicability of evidence

Generally well-designed randomised controlled trials comparing surgical interventions for posterior vaginal wall prolapse are scarce. Of the four trials comparing transanal repair versus transvaginal repair, investigators in either one or two trials reported each of the primary outcomes. One randomised controlled trial provided data for our primary outcomes for site-specific repair versus midline fascial plication. In the other comparison versus midline fascial plication, one randomised controlled trial provided data for one of our primary outcomes. In the absorbable graft versus native tissue comparison, one randomised controlled trial presented data for one of our primary outcomes. Of the four trials that address biological graft versus native tissue, two to three trials reported each of the primary outcomes. A single trial provided data for two of our primary outcomes for the synthetic graft versus native tissue comparison.

Well-designed randomised controlled trials are needed to examine all of our comparisons. None of the included trials performed cost analysis.

Quality of the evidence

Using GRADEpro software, we assessed risk of bias, imprecision, inconsistency, and indirectness for each of the review comparisons, and we used these assessments to grade the quality of evidence assigned to each outcome, ranging from moderate to very low (see Effects of interventions section). We were unable to assess risk of publication bias owing to lack of data.

The main limitations in evidence quality were serious risk of bias (associated mainly with performance, detection, and attrition biases) and serious imprecision (associated with small overall sample sizes and low event rates).

The quality of evidence related to comparisons of transvaginal versus transanal approach ranged from very low to moderate. The quality of evidence related to comparisons of biological graft versus native tissue ranged from low to moderate.

Potential biases in the review process

Systematic searches of the literature for published and unpublished trials were rigorous, and we do not believe that any publications have been omitted. The large number of secondary outcomes reported in this review increases the potential for spurious positive findings (type 1 error). Therefore in drawing our conclusions, we limited our focus to primary outcomes (awareness of prolapse, repeat surgery for prolapse, recurrent posterior vaginal wall prolapse) and the four most clinically important secondary outcomes (postoperative obstructed defecation, postoperative dyspareunia, postoperative complications, and operating time).

A persistent limitation of meta-analysis of studies of pelvic floor disorders is that many different validated questionnaires are utilised, which makes collation of data challenging.

Agreements and disagreements with other studies or reviews

Another comprehensive meta-analysis of level one evidence for surgical management of posterior vaginal wall prolapse can be found in the 2017 International Consultation on Incontinence (ICI 2017) proceedings. The ICI document concludes that transvaginal repair of posterior wall defects is more successful when midline fascial plication is used with or without levatorplasty than when a site-specific repair technique is used in terms of objective success; however we did not find a significant difference between these two types of repair. The ICI reported a finding of higher rates of dyspareunia with levatorplasty than with midline fascial plication alone.

Our findings are consistent with those provided by the ICI for transanal versus transvaginal repair, and our evidence suggests that the transvaginal approach may be superior to the transanal approach.

Our findings are consistent with the ICI finding that no conclusive evidence shows that biological or synthetic mesh repair is more effective than native tissue repair in the posterior vaginal wall.

AUTHORS' CONCLUSIONS

Implications for practice

Transvaginal repair may be more effective than transanal repair for posterior wall prolapse for preventing recurrence of prolapse when both objective and subjective measures are considered. However, data on adverse effects are scanty. Evidence was insufficient to permit any conclusions about the relative effectiveness or safety of other types of surgery. Evidence does not support utilisation of any mesh or graft materials at the time of posterior vaginal repair. Withdrawal of some commercial transvaginal mesh kits from the market may limit the generalisability of review findings.

Implications for research

Long-term follow-up in current trials will establish whether long-term benefits are derived from transvaginal graft or mesh, provided that adequate follow-up rates can be achieved. Research on graft or mesh products that may be effective, without the complications associated with current meshes, is of paramount importance.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

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

Farid 2010

Methods	Multi-surgeon dual-centre RCT Randomisation: nurse taking card from envelope - blinded Reviewers blinded No significant differences between groups at the beginning 6-Month follow-up
Participants	3 groups of 16 participants December 2002-2005 62 multi-parous with symptomatic rectocele (obstructed defecation) Not described re blinding of participants 48 after exclusions Inclusion criteria: rectocele larger than 2 cm symptomatic for obstructed defecation (1 or more of the following symptoms: need for digital manipulation during defecation, sense of incomplete evacuation, excessive straining, or dyspareunia)

Farid 2010 *(Continued)*

	Exclusion criteria: recurrent rectocele, rectal intussusception, anismus, diabetes, previous anal surgery, systemic steroid treatment, connective tissue disease, slow-transit constipation, compromised anal sphincter function, abnormal thyroid function
Interventions	A (n = 16): transperineal repair (3.0 Vicryl) with levatorplasty (0.0 Vicryl) B (n = 16): transperineal repair alone C (n = 16): transanal approach (2.0 Vicryl) (Delorme procedure)

Outcomes	• Awareness of prolapse
	• Recurrent posterior wall prolapse
	• Bowel function
	  ○ Postoperative obstructed defecation
	  ○ Anal incontinence
	• Sexual function
	  ○ De novo dyspareunia
	  ○ Improvement in dyspareunia
	• Adverse events
	  ○ Intraoperative operation including bowel injury and haemorrhage
	  ○ Wound infection
	• Perioperative outcomes
	• Investigations
	  ○ Defecogram: postoperative rectocele size
	  ○ Anal manometry - mean anal resting pressure (MARP)

Notes	Trial authors conclude that transperineal repair is superior to transanal repair in structural and functional outcomes; Egypt Ethics granted

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated randomisation list
Allocation concealment (selection bias)	Low risk	Sequentially numbered, opaque envelopes
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not stated
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Examiners blinded
Incomplete outcome data (attrition bias) All outcomes	Low risk	All participants accounted for, 1 lost to follow-up (left the country) - not stated in paper the group to which this participant was assigned
Selective reporting (reporting bias)	Unclear risk	Reported on 2 of this review's primary outcomes
Other bias	Low risk	NO COI reported

Farid 2010 *(Continued)*

	Groups similar at the start
	No concomitant procedures

Glazener 2017

Methods	RCT: 2 parallel comparing A:B (mesh trial) A:C (graft trial) 35 centres in UK 65 surgeons Remote Web-based randomisation 2-Year follow-up Modified ITT analysis
Participants	1352 randomised, 320 randomised within posterior repair subgroup n = 1348 Mesh trial (overall not just posterior) A: 111 (430) B: 111 (435) Graft trial A: 93 (367) C: 98 (368) 35 centres Primary anterior or posterior repairs
Interventions	A: native tissue B: synthetic mesh C: biological graft
Outcomes	• Repeat surgery for prolapse • Recurrent posterior vaginal wall prolapse (objective failure) • Prolapse outcomes ○ Mean postop Bp, Ba, C • QOL (POP-SS) - this is the primary outcome in this trial • Adverse events - postoperative complications
Notes	HTA-funded study in UK

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated online programme

Glazener 2017 *(Continued)*

Allocation concealment (selection bias)	Low risk	Sequentially numbered, opaque, sealed envelopes
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Patients were blinded until 12 months unless asked
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Reviewers attempted to remain blinded
Incomplete outcome data (attrition bias) All outcomes	High risk	20% at 2 years. Specific attrition rates for posterior repair groups not given
Selective reporting (reporting bias)	Low risk	Reported on all primary outcomes of this review, protocol available
Other bias	Low risk	Funding declared and no COI Concomitant procedures included anterior and apical repair procedures - same numbers in comparison groups had concomitant procedures

Kahn 1999

Methods	Single-centre RCT (number table randomisation, concealment unclear) Follow-up: 25 months (8-37) A+B 89% followed up
Participants	63 randomised, 57 underwent surgery (2 from each group decided on conservative management, 1 had no prolapse at time of surgery, and 1 delayed surgery past duration of study owing to personal circumstances) Withdrawal: 4 (A 2, B 2) Excluded: 2 (1 no rectocele surgery because posterior vaginal wall cyst, 1 did not have surgery performed) Inclusion: symptomatic rectocele (bulge or impaired defecation with > 15% trapping on isotope defecography), failing conservative treatment
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	• Awareness of prolapse
	• Repeat surgery for prolapse
	• Recurrent posterior vaginal wall prolapse
	• Bowel function
	  ○ Postoperative obstructed defecation
	• Sexual function
	  ○ Postoperative dyspareunia
	• Adverse events
	  ○ Postoperative complications including wound infection
	• Perioperative outcomes - continuous
	• EBL

Kahn 1999 *(Continued)*

- Operating time
- Length of stay
  - Postoperative narcotic use
- Perioperative outcomes - dichotomous
  - Persistent postoperative pain

Notes	Abstract No blinding No stratification No CONSORT Individual who reviewed outcomes unclear No validated symptom or QOL questionnaires USA

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Number table randomisation
Allocation concealment (selection bias)	Unclear risk	Unclear
Blinding of participants and personnel (performance bias) All outcomes	High risk	Patients not blinded
Blinding of outcome assessment (detection bias) All outcomes	High risk	Assessors not blinded
Incomplete outcome data (attrition bias) All outcomes	Low risk	No patients who underwent surgery lost to follow-up - see above
Selective reporting (reporting bias)	Unclear risk	Reported on all primary outcomes of this review, protocol not available
Other bias	Low risk	COI not reported No concomitant procedures

Nieminen 2004

Methods	Single-centre RCT (nurse took card from envelope with 15 vaginal and 15 transanal cards) Blinding - unclear Follow-up: A 12 months, B 12 months Groups similar at the start, so no selection bias No loss to follow-up
Participants	30 women

Nieminen 2004 *(Continued)*

	Inclusion: symptomatic rectocele not responding to conservative treatment Exclusion: any other prolapse or compromised anal sphincter function 42 eligible women participated 12 excluded owing to compromised anal sphincter function 30 analysed
Interventions	A (15): midline rectovaginal fascia plication Vicryl repair, excess mucosa trimmed, no levatorplasty, enterocele repaired, perineorrhaphy B (15): transanal repair performed by 2 colorectal surgeons Vertical and horizontal Vicryl sutures, enterocele repaired, anal mucosa trimmed

Outcomes	• Awareness of prolapse
	• Recurrent posterior wall prolapse
	• Bowel function
	  ○ Postoperative obstructed defecation
	  ○ Postoperative anal incontinence
	• Sexual life:
	  ○ De novo dyspareunia
	  ○ Improvement in dyspareunia
	• Prolapse outcomes
	  ○ Mean value of postoperative Ap
	• Adverse events
	  ○ Intraoperative complications
	  ○ Postoperative complications
	• Perioperative outcomes - continuous
	  ○ EBL
	  ○ Operation time
	• Perioperative outcomes - dichotomous
	  ○ Discharged from hospital within 48 hours
	• Investigations
	  ○ Defecogram: postoperative rectocele size
	  ○ Anal manometry - mean anal resting pressure (MARP)

Notes	Full text Ethics granted January 1998-March 2001 Outcomes not clearly defined or laid out Validated questionnaires not used No intention to treat No CONSORT Finland

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not specifically stated
Allocation concealment (selection bias)	Low risk	Sequentially numbered, opaque, sealed envelopes

Nieminen 2004 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not stated
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not stated
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss to follow-up
Selective reporting (reporting bias)	Unclear risk	Reported on 2 of review's primary outcomes, protocol not found
Other bias	Unclear risk	Groups similar at the start No concomitant procedures

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) June 2002-December 2004 ITT analysis 93% follow-up with mean 17.5 months Assessed at 6 weeks, 6 months, 1 and 2 years
Participants	106 women Inclusion: 21 years and over, stage 2 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	• Awareness of prolapse (subjective failure)
	• Repeat surgery for prolapse
	• Recurrent posterior vaginal wall prolapse (objective failure)
	• Bowel symptoms
	  ◦ Postoperative obstructed defecation
	• Sexual function
	  ◦ Postoperative dyspareunia
	• QOL (PFDI-20, PFIQ-7, PISQ-12)

Paraiso 2006 *(Continued)*

- Adverse events
  - Intraoperative complications
  - Postoperative complications
- Perioperative outcomes
  - Operating time
  - Blood transfusion

Notes	Ongoing study: initial full-text review after 1 year ITT basis CONSORT statement Independent nurse review Limited sample size USA

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated
Allocation concealment (selection bias)	Low risk	Sequentially numbered, opaque, sealed envelopes
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Blinded up to 6 weeks
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Blinded non-surgeon reviewer
Incomplete outcome data (attrition bias) All outcomes	Low risk	At 17.5 months, 33/37 (11% attrition) native tissue, 37/37 (0% attrition) site-specific, 29/32 biological graft (10% attrition)
Selective reporting (reporting bias)	Unclear risk	Reported on all of review's primary outcomes, protocol not found
Other bias	Unclear risk	Declared unrestricted research grant from Organogenesis, whose product was being evaluated. Company had no involvement in designing or running trial. No concomitant procedures

Park 2014 Abstract

Methods	Single-centre RCT Computer-generated randomisation schedule Patients were blinded to examiner (nurse). Two years' follow-up Sample size of 50 per group provides 80% power to detect a 20% difference between groups. ITT analysis

Park 2014 Abstract *(Continued)*

	Groups same at the start Follow-up 6 weeks, 6 months, 12 months, 24 months Completed 2 years' follow-up: Gp A 43/53 (77%); Gp B 38/53 (72%)
Participants	172 eligible 109 randomised (63 excluded) Inclusion: women aged 31 to 77 years with symptomatic prolapse (≥ stage 2) undergoing laparoscopic sacral colpopexy Exclusion: none A: 56 B: 53 Completed analysis in 2 years: Gp A 43 (77%); Gp B 38 (72%)
Interventions	A: Native tissue repair 56 2. Biological graft 53
Outcomes	• Adverse events ○ Mesh exposure
Notes	t-tests and regression analyses used to determine statistical significance USA

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated block, similar groups
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants blinded for 2 years
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Blinded examiner
Incomplete outcome data (attrition bias) All outcomes	High risk	At 2 years, native tissue 43/53 (77%) (23% attrition) Biological graft 38/53 (72%) (28% attrition)
Selective reporting (reporting bias)	High risk	No primary outcomes of this review reported, protocol not found
Other bias	Unclear risk	Not stated

Park 2014 Abstract *(Continued)*

	Trial done in women undergoing a different operation - laparoscopic sacral colpopexy

Sand 2001

Methods	Prospective, randomised, controlled trial Participant selection by computer-generated random number tables 12-Month follow-up
Participants	161 women enrolled in trial Anterior/posterior colporrhaphy with polyglactin 910 mesh (80) Anterior/posterior colporrhaphy without polyglactin 910 mesh (80) (1 woman excluded) 17 lost to follow-up at 52 months Inclusion: cystocele protruding to or beyond the hymenal ring in the standing position while coughing or straining, regardless of other concurrent prolapse. Participants had to be > 18 years old, ambulatory, and willing to comply with return visits. Exclusion: pregnant or contemplating pregnancy in the next 12 months. Had only an anterior enterocele or only a paravaginal defect with no need for central cystocele repair at the time of reconstructive surgery Patients seen at 2, 6, 12, and 52 weeks after surgery
Interventions	Anterior/posterior colporrhaphy with polyglactin 910 mesh (80) Anterior/posterior colporrhaphy without polyglactin 910 mesh (80) (1 woman excluded)
Outcomes	• Recurrent posterior vaginal wall prolapse (objective failure)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated random number tables
Allocation concealment (selection bias)	Low risk	Sequentially numbered, opaque, sealed envelopes
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not stated
Blinding of outcome assessment (detection bias) All outcomes	High risk	Examiner not blinded

Sand 2001 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Low risk	17 lost to follow-up at 52 months (11%). Not stated in study to which groups these were assigned, but it is stated that loss to follow-up was not significantly different between the 2 groups
Selective reporting (reporting bias)	Unclear risk	Reported on 1 of this review's primary outcomes, protocol not found
Other bias	Unclear risk	Not stated Concomitant procedure was anterior vaginal repair; same numbers in both comparison groups had concomitant procedures.

Sung 2012

Methods	Two-site double-blinded randomised controlled trial: Allocation concealment sealed envelopes Randomisation block and stratified site Patients and assessors blinded (patients unblinded 12 months) ITT analysis (1 did not receive graft) 16-Month follow-up
Participants	160 women randomised 137 12-month follow-up anatomical, 133 subjective data January 2004, 5 years Inclusion criteria: women with stage 2 or greater symptomatic rectocele (defined as vaginal bulge, defecatory symptoms, or both) Exclusion criteria: < 18 years, women undergoing concomitant sacrocolpopexy or colorectal procedures, history of porcine allergy, connective tissue disease, pelvic malignancy, pelvic radiation, inability to understand English, or inability or unwillingness to consent or comply with follow-up. All other vaginal prolapse repairs and anti-incontinence procedures included
Interventions	Biological graft vs native tissue repair

Outcomes	• Awareness of prolapse (subjective failure)
	• Objective failure (Ap or Bp - 1 or greater)
	• Bowel function - obstructed defecation
	• Sexual function - postoperative dyspareunia
	• Adverse events
	  ○ Intraoperative complications
	  ○ Postoperative complications
	• Perioperative outcomes
	  ○ Blood transfusion

Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement

Sung 2012 *(Continued)*

Random sequence generation (selection bias)	Low risk	Computer-generated random sequence, groups similar at start
Allocation concealment (selection bias)	Low risk	Sequentially numbered, opaque, sealed envelopes
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Blinded reviewers
Incomplete outcome data (attrition bias) All outcomes	Low risk	At 12 months, 70/80 (13%) in native tissue and 68/80 in graft group (15%)
Selective reporting (reporting bias)	Low risk	Reported on 2 of this review's primary outcomes, protocol found
Other bias	Low risk	No financial conflict of interest; grant funding National Institute of Child and Human Health No concomitant procedures

Vijaya 2011 Abstract

Methods	RCT with block randomisation Allocation concealment, power and consort not stated Before and 6 months postoperatively, anatomical outcome assessed by POP-Q, subjective outcomes by P-QOL, sexual dysfunction by FSFI, and bowel-associated symptoms by BBUSQ-22 16-Month follow-up
Participants	Inclusion: symptomatic posterior wall prolapse Exclusion: concomitant surgery NS
Interventions	A (26): standard posterior colporrhaphy (with plication of the levator ani muscle) B (26): fascial and vaginal plication repair
Outcomes	• Mean difference in preoperative and postoperative Ap
Notes	Very scant raw data United Kingdom

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**

Vijaya 2011 Abstract *(Continued)*

Random sequence generation (selection bias)	Low risk	Block randomisation, groups similar at the start
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not stated
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not stated
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Unclear
Selective reporting (reporting bias)	High risk	Primary outcomes of this review not reported, no protocol found
Other bias	Unclear risk	Not stated No concomitant procedures

Wei 2015

Methods	RCT Random number table No blinding No ITT analysis Unclear how many women were screened to get the 50 included Follow-up 50 months 5 lost to follow-up at 12 months, 8 at 50 months
Participants	50 women Inclusion criteria: women with rectocele with defecatory difficulty, imaging showing rectocele at least 4 cm in depth with at least 6 months conservative treatment first Exlusion criteria: intussusception, puborectalis syndrome, any other obstructive constipation, gastrointestinal motor dysfunction disease, colorectal cancer, constipation caused by psychological or endocrine disorder
Interventions	Transvaginal 25 f/u 12 months: 23; 50 months: 22 Transanal 25 f/u 12 months: 22; 50 months: 20
Outcomes	• Operative time • Mean rectocele postoperative size on defecogram • Postoperative MARP

Wei 2015 *(Continued)*

Notes

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Random number table
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding of participants and personnel (performance bias) All outcomes	High risk	No blinding
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not stated
Incomplete outcome data (attrition bias) All outcomes	High risk	At 50 months, 20/25 (80%) in transanal group, 22/25 (78%) in transvaginal group
Selective reporting (reporting bias)	High risk	Primary outcomes of this review not reported, protocol not found
Other bias	Unclear risk	Not stated No concomitant procedures

BBUSQ: Birmingham Bowel and Urinary Symptoms Questionnaire.
COI: conflict of interest.
EBL: estimated blood loss.
FSFI: Female Sexual Function Index.
HTA: Health Technology Assessment.
ITT: intention-to-treat.
MARP: mean anal resting pressure.
PFDI: Pelvic Floor Distress Inventory.
PFIQ: Pelvic Floor Impact Questionnaire.
PISQ: Pelvic organ prolapse/urinary Incontinence Sexual Questionnaire.
POP-Q: Pelvic Organ Prolapse Quantification (according to ICS).
POP-SS: Pelvic Organ Prolapse Symptom Score.
P-QOL: Prolapse Quality of Life Questionnaire.
QOL: quality of life.
RCT: randomised controlled trial.

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

Study	Reason for exclusion
Allahdin 2008	RCT evaluating the 3 surgical techniques for pelvic organ prolapse surgery. Pelvic organ prolapse data were grouped, and data specific to posterior prolapse were not available.

Study	Reason for exclusion
Boccasanta 2004	RCT on 2 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
Boccasanta 2011	RCT investigating clinical and functional outcomes of the stapled transanal rectal resection in patients with obstructed defecation caused by rectal intussusception and rectocele. Participants with rectal intussusception and rectocele were grouped together, and rectocele data were not explicitly presented.
Dahlgren 2011	RCT comparing use of a porcine skin graft (Pelvicol) vs conventional colporrhaphy in recurrent pelvic organ prolapse surgery. Data regarding participants with cystocele and rectocele were presented together, and information specific to rectocele was not explicitly presented.
Derpapas 2013	Study comparing posterior colpoperineorrhaphy or fascial and vaginal epithelial plication (FEP) of the posterior vaginal wall. Participants were already included in the Vijaya study.
Detollenaere 2013	Study comparing sacrospinous hysteropexy (SH) against vaginal hysterectomy in patients with uterine descent POP-Q stage > 2. Study was not included because patients with anterior and posterior vaginal wall prolapse were grouped together. Posterior prolapse data were not explicitly presented.
Gentile 2014	Study comparing effectiveness and safety of endorectal proctopexy against the STARR procedure in patients with mucosal prolapse or anorectal intussusception (types of rectal prolapse) rather than vaginal prolapse
Glazener 2016	Study looking at clinical effectiveness and cost-effectiveness when comparing surgical methods of vaginal wall prolapse. No data on pelvic organ prolapse were given.
Leanza 2013	Quasi-randomised controlled trial
Lehur 2008	RCT not comparing 2 surgical techniques. Study compared conservative management vs surgical management of rectal mucosal prolapse, which is not the topic of our meta-analysis.
Liu 2016	RCT focusing on treatment of obstructed bowel syndrome associated with rectocele and internal rectal intussusception. The 2 pathologies were not differentiated. Trial concerned 2 different transanal approaches to deal primarily with rectal mucosal prolapse.
Mahmoud 2012	RCT evaluating transanal repair with and without use of a stapler for the procedure. This comparison is not relevant to our meta-analysis.
Noe 2014	RCT comparing pectopexy with sacral colpopexy for correction of vaginal prolapse POP-Q stage 2 or greater. Data for posterior vaginal prolapse were not available as this was grouped broadly with anterior and apical prolapse.
Nygaard 2013	RCT investigating anatomic and symptomatic outcomes of abdominal sacrocolpopexy. Study was not included because patients with anterior and posterior vaginal wall prolapse were grouped together. Data for posterior wall prolapse could not be separated from rest of trial data.
Svabik 2016	RCT investigating 2 surgical procedures for post-hysterectomy vaginal vault prolapse (anterior and posterior Prolift mesh vs sacrospinous colpopexy with anterior and/or posterior native tissue vaginal repair). Apical prolapse covered in separate Cochrane review
Tang 2006	Excluded on the basis of comparing 2 different incision techniques for the posterior vaginal wall rather than 2 different repair techniques

Study	Reason for exclusion
Wang 2010	Study investigating the value of co-treatment with rectal wall repair and procedure for prolapse and haemorrhoids (PPH) for outlet obstruction constipation (OOC) induced by rectocele in woman. This comparison was not relevant to our meta-analysis.

FEP: fascial epithelial plication.
OOC: outlet obstruction constipation.
POP-Q: Pelvic Organ Prolapse Quantification (according to ICS).
PPH: procedure for prolapse and haemorrhoids.
RCT: randomised controlled trial.
STARR: stapled transanal rectal resection.

DATA AND ANALYSES

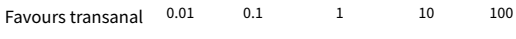
Comparison 1. Transanal versus transvaginal

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Awareness of prolapse (subjective failure)	2	87	Risk Ratio (M-H, Fixed, 95% CI)	2.78 [1.00, 7.70]
2 Repeat surgery for any prolapse	1	57	Risk Ratio (M-H, Fixed, 95% CI)	2.42 [0.75, 7.88]
3 Recurrent posterior vaginal wall prolapse (objective failure)	2	87	Risk Ratio (M-H, Fixed, 95% CI)	4.12 [1.56, 10.88]
4 Bowel function	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
4.1 Postoperative obstructed defecation	3	113	Risk Ratio (M-H, Fixed, 95% CI)	1.67 [1.00, 2.79]
4.2 Postoperative anal incontinence	2	78	Risk Ratio (M-H, Fixed, 95% CI)	0.0 [0.0, 0.0]
4.3 Postoperative constipation	1	48	Risk Ratio (M-H, Fixed, 95% CI)	2.0 [0.92, 4.34]
5 Sexual function	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 De novo dyspareunia	2	78	Risk Ratio (M-H, Fixed, 95% CI)	3.0 [0.13, 68.26]
5.2 Postoperative dyspareunia	2	80	Risk Ratio (M-H, Fixed, 95% CI)	0.32 [0.09, 1.15]
5.3 No improvement in sexual function	2	49	Risk Ratio (M-H, Fixed, 95% CI)	1.44 [1.04, 1.99]
6 Prolapse outcomes	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
6.1 Mean postoperative Ap	1	30	Mean Difference (IV, Fixed, 95% CI)	1.44 [0.81, 2.07]
7 Adverse events	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only

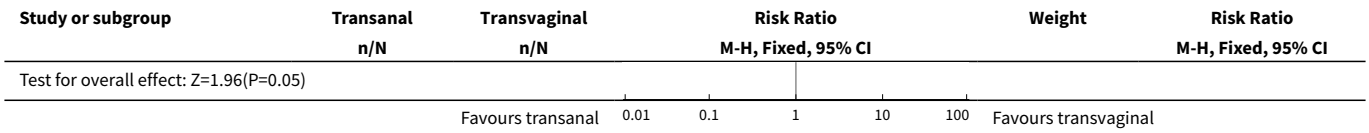
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
7.1 Intraoperative complications including bowel injury and haemorrhage	2	81	Risk Ratio (M-H, Fixed, 95% CI)	0.0 [0.0, 0.0]
7.2 Postoperative complications including wound infection	3	135	Risk Ratio (M-H, Fixed, 95% CI)	3.57 [0.94, 13.54]
8 Perioperative outcomes - dichotomous	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
8.1 Persistent postoperative pain	1	57	Risk Ratio (M-H, Fixed, 95% CI)	0.12 [0.02, 0.94]
8.2 Discharged from hospital within 48 hours	1	30	Risk Ratio (M-H, Fixed, 95% CI)	0.85 [0.59, 1.22]
8.3 Intraoperative complications	2	78	Risk Ratio (M-H, Fixed, 95% CI)	0.0 [0.0, 0.0]
9 Perioperative outcomes - continuous	3		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
9.1 Estimated blood loss	2	87	Mean Difference (IV, Fixed, 95% CI)	-79.38 [-119.08, -39.69]
9.2 Operating time	3	137	Mean Difference (IV, Fixed, 95% CI)	-0.20 [-3.49, 3.10]
9.3 Length of hospital stay	1	57	Mean Difference (IV, Fixed, 95% CI)	-1.0 [-1.53, -0.47]
9.4 Postoperative narcotic use	1	57	Mean Difference (IV, Fixed, 95% CI)	-29.00 [-43.81, -14.19]
10 Investigations	3		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
10.1 Defecogram: mean postoperative rectocele size	3	107	Mean Difference (IV, Fixed, 95% CI)	-0.23 [-0.42, -0.03]
10.2 Anal manometry: postoperative MARP	3	107	Mean Difference (IV, Fixed, 95% CI)	3.05 [-0.56, 6.66]

Analysis 1.1. Comparison 1 Transanal versus transvaginal, Outcome 1 Awareness of prolapse (subjective failure).

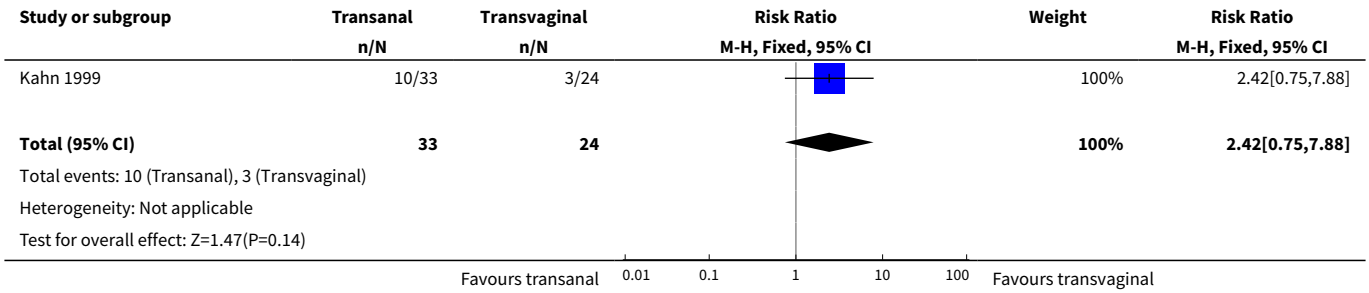
Study or subgroup	Transanal n/N	Transvaginal n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
Kahn 1999	10/33	3/24		77.65%	2.42[0.75,7.88]
Nieminen 2004	4/15	1/15		22.35%	4[0.5,31.74]
Total (95% CI)	**48**	**39**		**100%**	**2.78[1,7.7]**
Total events: 14 (Transanal), 4 (Transvaginal)					
Heterogeneity: Tau^2=0; Chi^2=0.17, df=1(P=0.68); I^2=0%					



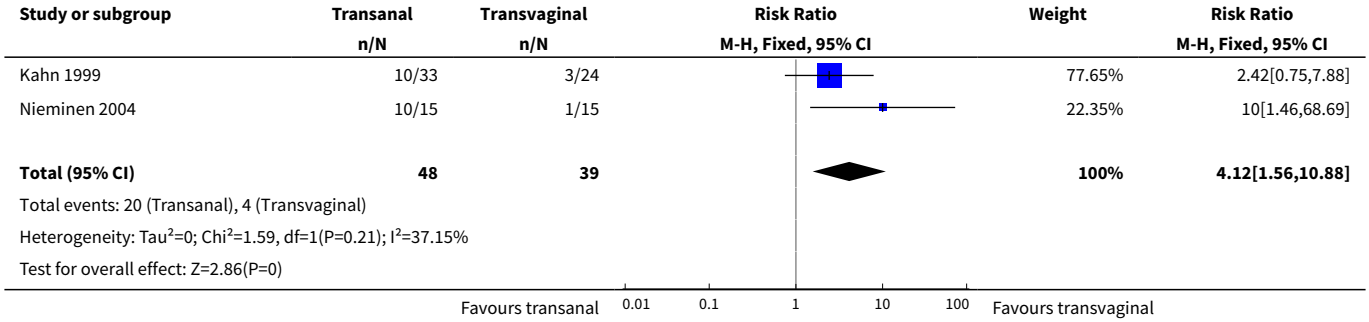
Favours transanal — Favours transvaginal



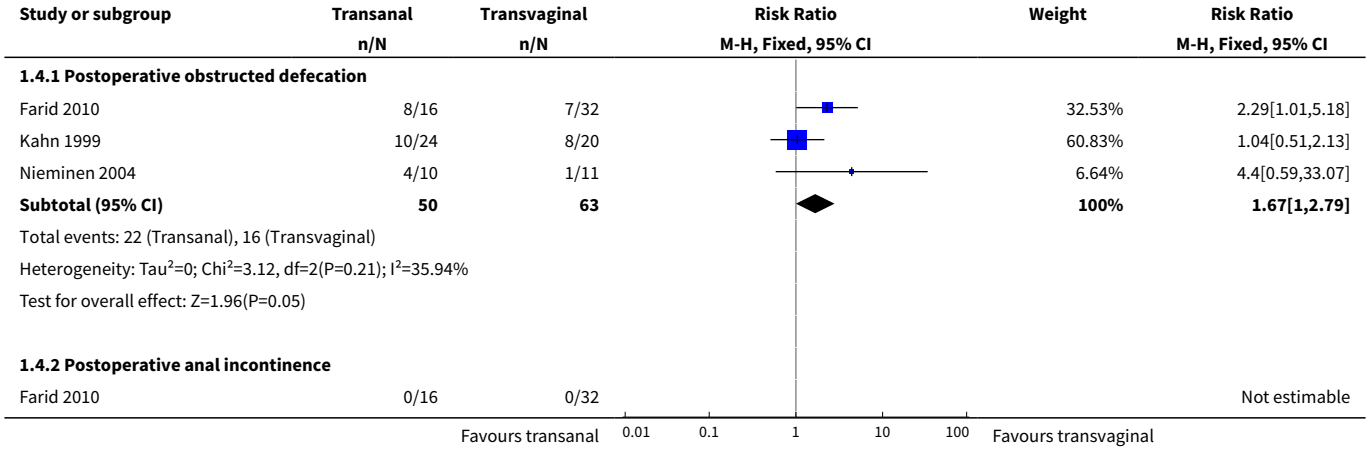
Analysis 1.2. Comparison 1 Transanal versus transvaginal, Outcome 2 Repeat surgery for any prolapse.

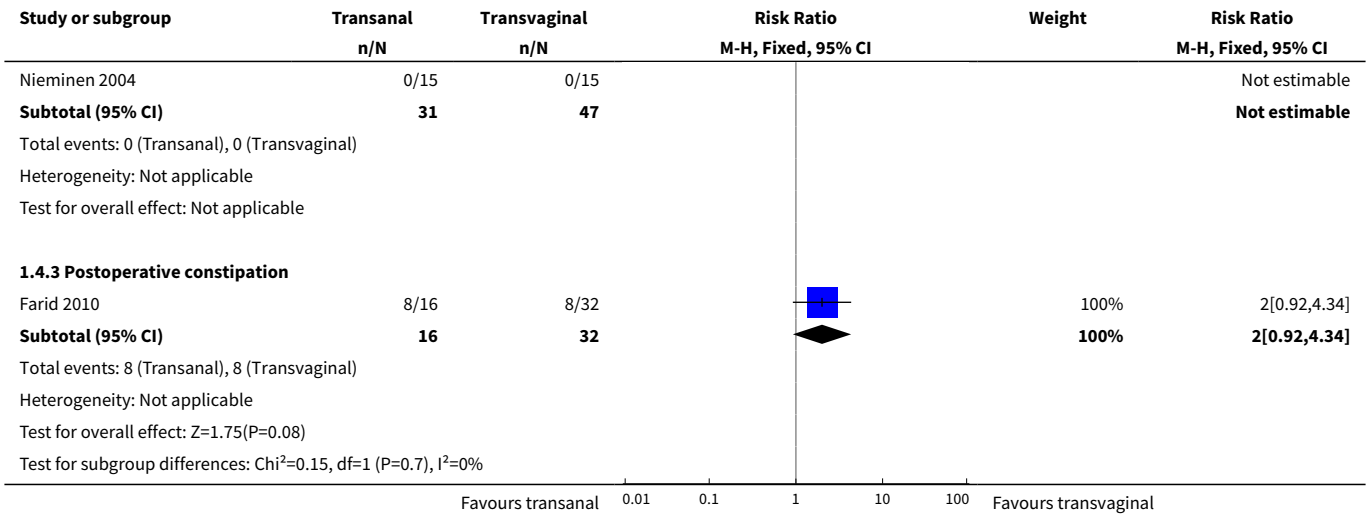


Analysis 1.3. Comparison 1 Transanal versus transvaginal, Outcome 3 Recurrent posterior vaginal wall prolapse (objective failure).

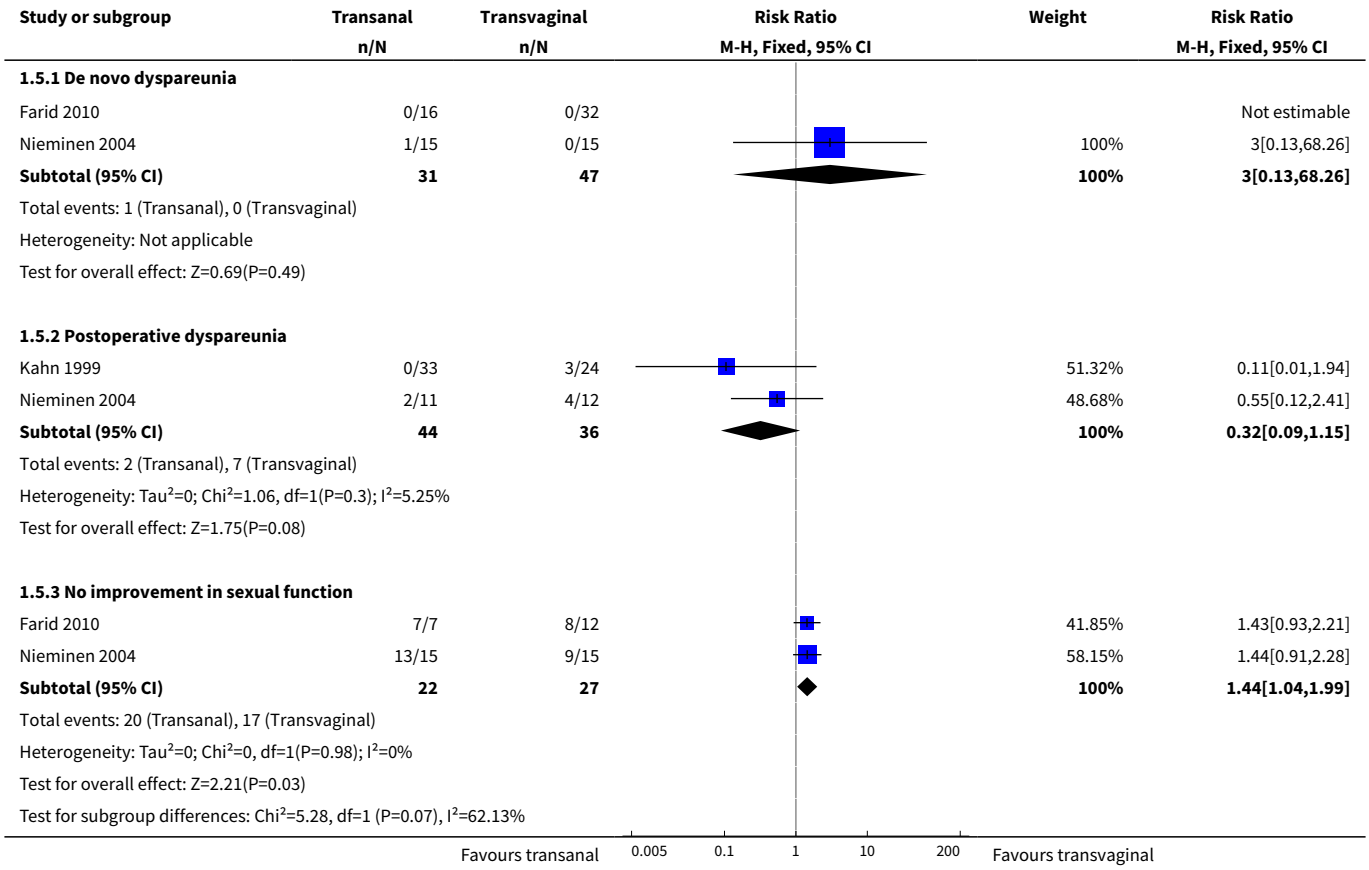


Analysis 1.4. Comparison 1 Transanal versus transvaginal, Outcome 4 Bowel function.



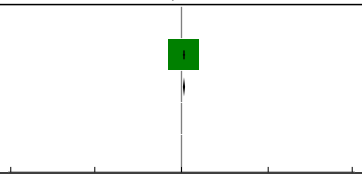


Analysis 1.5. Comparison 1 Transanal versus transvaginal, Outcome 5 Sexual function.



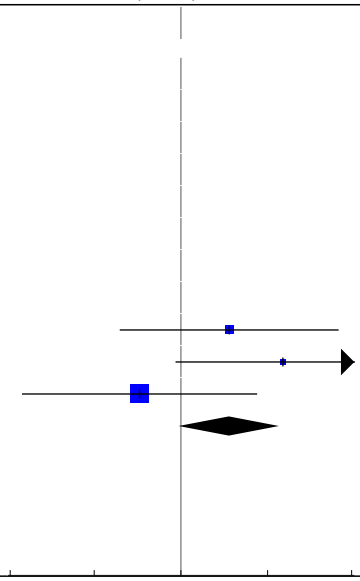
Analysis 1.6. Comparison 1 Transanal versus transvaginal, Outcome 6 Prolapse outcomes.

Study or subgroup	Transanal N	Transanal Mean(SD)	Transvaginal N	Transvaginal Mean(SD)	Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
1.6.1 Mean postoperative Ap							
Nieminen 2004	15	-1.4 (1.1)	15	-2.8 (0.6)		100%	1.44[0.81,2.07]
Subtotal ***	**15**		**15**			**100%**	**1.44[0.81,2.07]**
Heterogeneity: Not applicable							
Test for overall effect: Z=4.45(P<0.0001)							



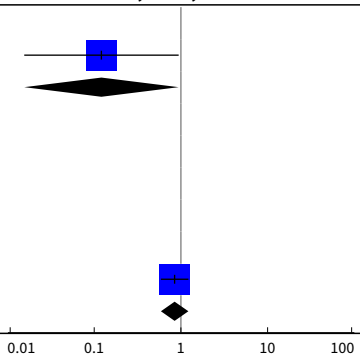
Analysis 1.7. Comparison 1 Transanal versus transvaginal, Outcome 7 Adverse events.

Study or subgroup	Transanal n/N	Transvaginal n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
1.7.1 Intraoperative complications including bowel injury and haemorrhage					
Farid 2010	0/19	0/32			Not estimable
Nieminen 2004	0/15	0/15			Not estimable
Subtotal (95% CI)	**34**	**47**			**Not estimable**
Total events: 0 (Transanal), 0 (Transvaginal)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
1.7.2 Postoperative complications including wound infection					
Farid 2010	3/32	0/16		25.54%	3.61[0.2,65.86]
Kahn 1999	5/24	0/33		16.4%	14.96[0.87,258.27]
Nieminen 2004	0/15	1/15		58.06%	0.33[0.01,7.58]
Subtotal (95% CI)	**71**	**64**		**100%**	**3.57[0.94,13.54]**
Total events: 8 (Transanal), 1 (Transvaginal)					
Heterogeneity: $Tau^2=0$; $Chi^2=3.18$, df=2(P=0.2); $I^2=37.18\%$					
Test for overall effect: Z=1.87(P=0.06)					
Test for subgroup differences: Not applicable					



Analysis 1.8. Comparison 1 Transanal versus transvaginal, Outcome 8 Perioperative outcomes - dichotomous.

Study or subgroup	Transanal n/N	Transvaginal n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
1.8.1 Persistent postoperative pain					
Kahn 1999	1/33	6/24		100%	0.12[0.02,0.94]
Subtotal (95% CI)	**33**	**24**		**100%**	**0.12[0.02,0.94]**
Total events: 1 (Transanal), 6 (Transvaginal)					
Heterogeneity: Not applicable					
Test for overall effect: Z=2.02(P=0.04)					
1.8.2 Discharged from hospital within 48 hours					
Nieminen 2004	11/15	13/15		100%	0.85[0.59,1.22]
Subtotal (95% CI)	**15**	**15**		**100%**	**0.85[0.59,1.22]**



Study or subgroup	Transanal n/N	Transvaginal n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
Total events: 11 (Transanal), 13 (Transvaginal)					
Heterogeneity: Not applicable					
Test for overall effect: Z=0.9(P=0.37)					
1.8.3 Intraoperative complications					
Farid 2010	0/16	0/32			Not estimable
Nieminen 2004	0/15	0/15			Not estimable
Subtotal (95% CI)	**31**	**47**			**Not estimable**
Total events: 0 (Transanal), 0 (Transvaginal)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Test for subgroup differences: Chi^2=3.34, df=1 (P=0.07), I^2=70.09%					

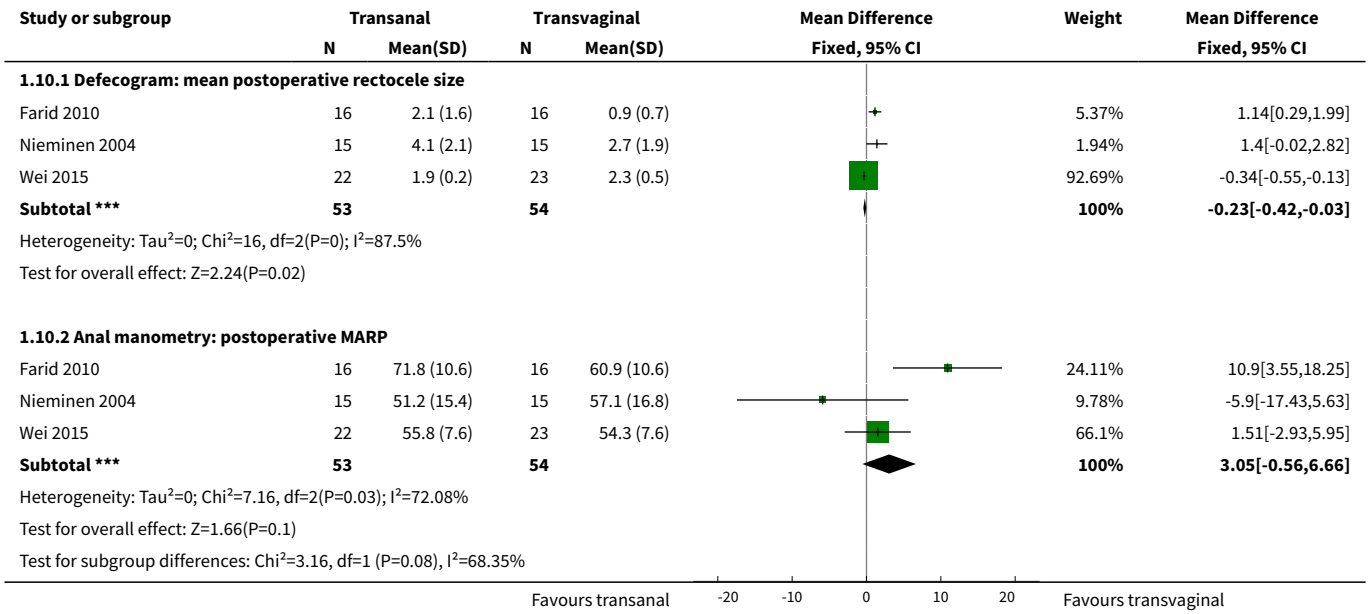
Favours transanal 0.01 0.1 1 10 100 Favours transvaginal

Analysis 1.9. Comparison 1 Transanal versus transvaginal, Outcome 9 Perioperative outcomes - continuous.

Study or subgroup	Transanal N	Transanal Mean(SD)	Transvaginal N	Transvaginal Mean(SD)	Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
1.9.1 Estimated blood loss							
Kahn 1999	33	40 (5)	24	153 (164)		36.57%	-113[-178.63,-47.37]
Nieminen 2004	15	60 (40)	15	120 (90)		63.43%	-60[-109.84,-10.16]
Subtotal ***	**48**		**39**			**100%**	**-79.38[-119.08,-39.69]**
Heterogeneity: Tau^2=0; Chi^2=1.59, df=1(P=0.21); I^2=37.06%							
Test for overall effect: Z=3.92(P<0.0001)							
1.9.2 Operating time							
Kahn 1999	33	39 (10)	24	32 (10)		39.26%	7[1.74,12.26]
Nieminen 2004	15	35 (6)	15	35 (9)		36.22%	0[-5.47,5.47]
Wei 2015	25	62 (12)	25	74 (12)		24.52%	-12[-18.65,-5.35]
Subtotal ***	**73**		**64**			**100%**	**-0.2[-3.49,3.1]**
Heterogeneity: Tau^2=0; Chi^2=19.29, df=2(P<0.0001); I^2=89.63%							
Test for overall effect: Z=0.12(P=0.91)							
1.9.3 Length of hospital stay							
Kahn 1999	33	3 (1)	24	4 (1)		100%	-1[-1.53,-0.47]
Subtotal ***	**33**		**24**			**100%**	**-1[-1.53,-0.47]**
Heterogeneity: Not applicable							
Test for overall effect: Z=3.73(P=0)							
1.9.4 Postoperative narcotic use							
Kahn 1999	33	32 (27)	24	61 (29)		100%	-29[-43.81,-14.19]
Subtotal ***	**33**		**24**			**100%**	**-29[-43.81,-14.19]**
Heterogeneity: Tau^2=0; Chi^2=0, df=0(P<0.0001); I^2=100%							
Test for overall effect: Z=3.84(P=0)							
Test for subgroup differences: Chi^2=28.92, df=1 (P<0.0001), I^2=89.63%							

Favours transanal -200 -100 0 100 200 Favours transvaginal

Analysis 1.10. Comparison 1 Transanal versus transvaginal, Outcome 10 Investigations.



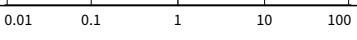
Comparison 2. Site-specific repair versus midline fascial plication

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Awareness of prolapse (subjective failure)	1	60	Risk Ratio (M-H, Fixed, 95% CI)	0.86 [0.25, 2.88]
2 Repeat surgery for any prolapse	1	70	Risk Ratio (M-H, Fixed, 95% CI)	1.78 [0.17, 18.78]
3 Objective failure (prolapse)	1	55	Risk Ratio (M-H, Fixed, 95% CI)	1.56 [0.49, 4.91]
4 Bowel function	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
4.1 Postoperative obstructed defecation	1	56	Risk Ratio (M-H, Fixed, 95% CI)	1.11 [0.53, 2.31]
5 Sexual function	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 Postoperative dyspareunia	1	34	Risk Ratio (M-H, Fixed, 95% CI)	1.07 [0.28, 4.06]
6 Quality of life and satisfaction	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
6.1 PFIQ-7 score	1	32	Mean Difference (IV, Fixed, 95% CI)	0.0 [-21.90, 21.90]
6.2 PISQ-12	1	74	Mean Difference (IV, Fixed, 95% CI)	0.0 [-2.77, 2.77]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.3 PFDI-20 score	1	32	Mean Difference (IV, Fixed, 95% CI)	9.0 [-18.21, 36.21]
7 Adverse events	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
7.1 Intraoperative complications including bowel injury and haemorrhage	1	74	Risk Ratio (M-H, Fixed, 95% CI)	5.0 [0.25, 100.72]
7.2 Postoperative complications including wound infection	1	74	Risk Ratio (M-H, Fixed, 95% CI)	1.38 [0.87, 2.17]
8 Perioperative outcomes - dichotomous	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
8.1 Blood transfusion	1	74	Risk Ratio (M-H, Fixed, 95% CI)	0.14 [0.01, 2.67]
9 Perioperative outcomes - continuous	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
9.1 Operating time	1	74	Mean Difference (IV, Fixed, 95% CI)	1.0 [-30.22, 32.22]

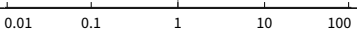
Analysis 2.1. Comparison 2 Site-specific repair versus midline fascial plication, Outcome 1 Awareness of prolapse (subjective failure).

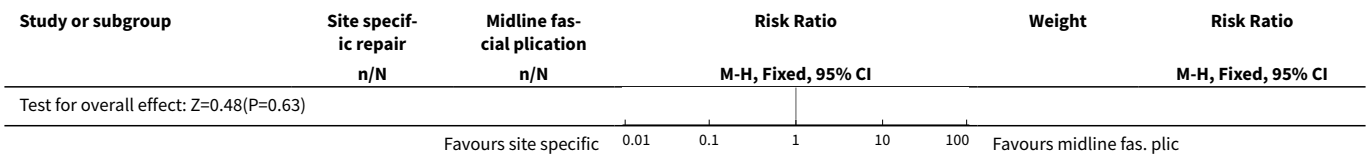
Study or subgroup	Site specific repair n/N	Midline fascial plication n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
Paraiso 2006	4/29	5/31		100%	0.86[0.25,2.88]
Total (95% CI)	**29**	**31**		**100%**	**0.86[0.25,2.88]**
Total events: 4 (Site specific repair), 5 (Midline fascial plication)					
Heterogeneity: Tau^2=0; Chi^2=0, df=0(P<0.0001); I^2=100%					
Test for overall effect: Z=0.25(P=0.8)					



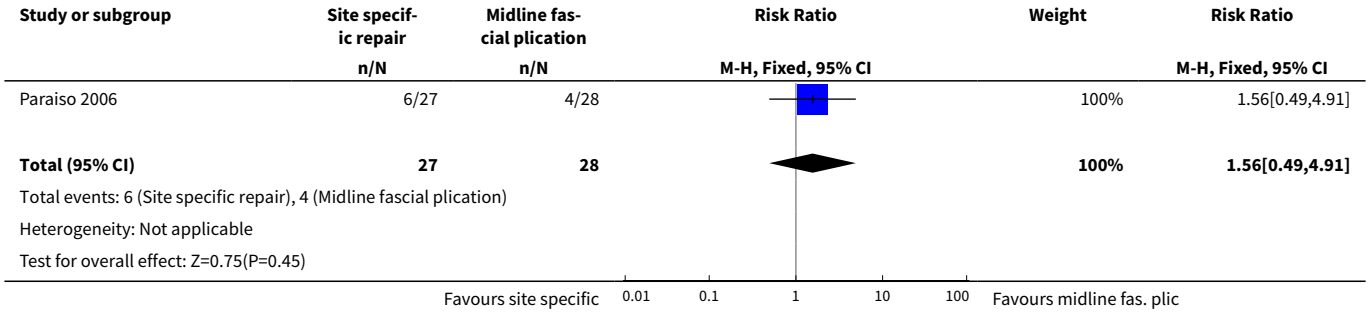
Analysis 2.2. Comparison 2 Site-specific repair versus midline fascial plication, Outcome 2 Repeat surgery for any prolapse.

Study or subgroup	Site specific repair n/N	Midline fascial plication n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
Paraiso 2006	2/37	1/33		100%	1.78[0.17,18.78]
Total (95% CI)	**37**	**33**		**100%**	**1.78[0.17,18.78]**
Total events: 2 (Site specific repair), 1 (Midline fascial plication)					
Heterogeneity: Not applicable					

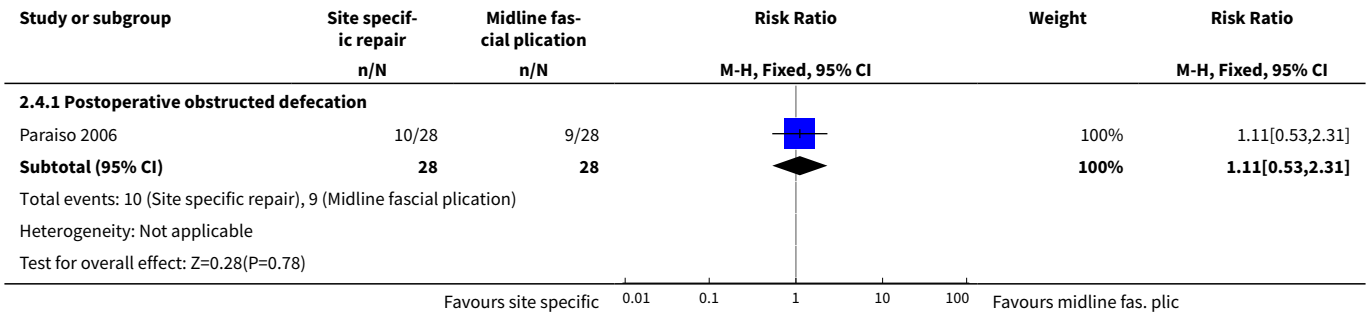




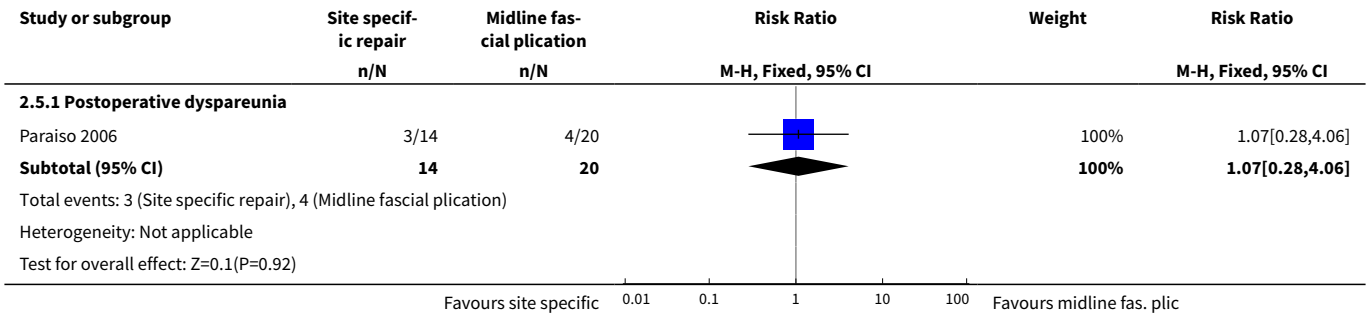
Analysis 2.3. Comparison 2 Site-specific repair versus midline fascial plication, Outcome 3 Objective failure (prolapse).



Analysis 2.4. Comparison 2 Site-specific repair versus midline fascial plication, Outcome 4 Bowel function.

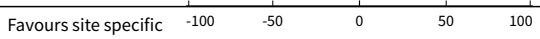


Analysis 2.5. Comparison 2 Site-specific repair versus midline fascial plication, Outcome 5 Sexual function.



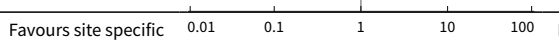
Analysis 2.6. Comparison 2 Site-specific repair versus midline fascial plication, Outcome 6 Quality of life and satisfaction.

Study or subgroup	Site specific repair N	Site specific repair Mean(SD)	Midline fascial plication N	Midline fascial plication Mean(SD)	Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
2.6.1 PFIQ-7 score							
Paraiso 2006	17	16 (31)	15	16 (32)		100%	0[-21.9,21.9]
Subtotal ***	**17**		**15**			**100%**	**0[-21.9,21.9]**
Heterogeneity: Not applicable							
Test for overall effect: Not applicable							
2.6.2 PISQ-12							
Paraiso 2006	37	36 (7)	37	36 (5)		100%	0[-2.77,2.77]
Subtotal ***	**37**		**37**			**100%**	**0[-2.77,2.77]**
Heterogeneity: Not applicable							
Test for overall effect: Not applicable							
2.6.3 PFDI-20 score							
Paraiso 2006	17	53 (46)	15	44 (32)		100%	9[-18.21,36.21]
Subtotal ***	**17**		**15**			**100%**	**9[-18.21,36.21]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.65(P=0.52)							
Test for subgroup differences: Chi^2=0.42, df=1 (P=0.81), I^2=0%							

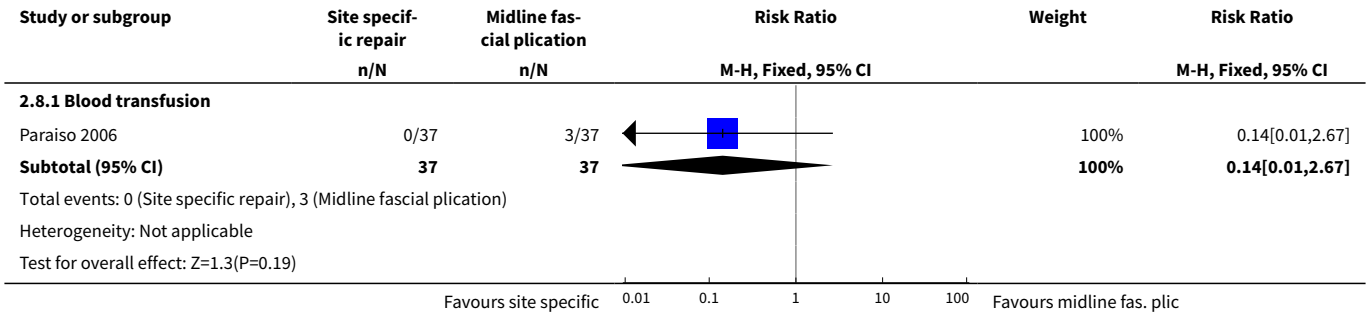


Analysis 2.7. Comparison 2 Site-specific repair versus midline fascial plication, Outcome 7 Adverse events.

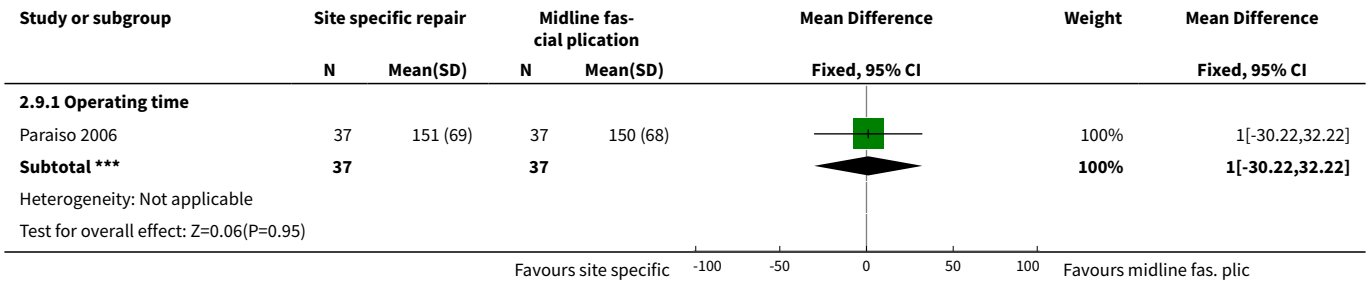
Study or subgroup	Site specific repair n/N	Midline fascial plication n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
2.7.1 Intraoperative complications including bowel injury and haemorrhage					
Paraiso 2006	2/37	0/37		100%	5[0.25,100.72]
Subtotal (95% CI)	**37**	**37**		**100%**	**5[0.25,100.72]**
Total events: 2 (Site specific repair), 0 (Midline fascial plication)					
Heterogeneity: Not applicable					
Test for overall effect: Z=1.05(P=0.29)					
2.7.2 Postoperative complications including wound infection					
Paraiso 2006	22/37	16/37		100%	1.38[0.87,2.17]
Subtotal (95% CI)	**37**	**37**		**100%**	**1.38[0.87,2.17]**
Total events: 22 (Site specific repair), 16 (Midline fascial plication)					
Heterogeneity: Not applicable					
Test for overall effect: Z=1.37(P=0.17)					
Test for subgroup differences: Chi^2=0.69, df=1 (P=0.4), I^2=0%					



Analysis 2.8. Comparison 2 Site-specific repair versus midline fascial plication, Outcome 8 Perioperative outcomes - dichotomous.



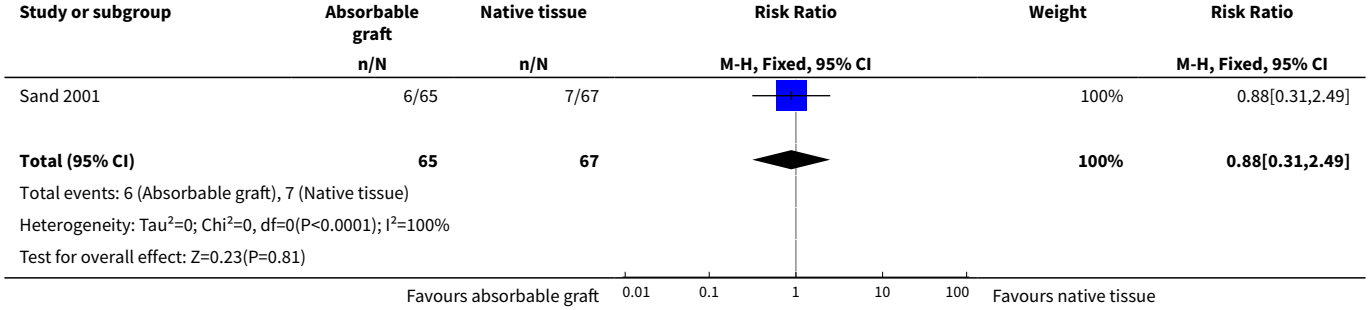
Analysis 2.9. Comparison 2 Site-specific repair versus midline fascial plication, Outcome 9 Perioperative outcomes - continuous.



Comparison 3. Absorbable graft versus native tissue

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Objective failure (prolapse)	1	132	Risk Ratio (M-H, Fixed, 95% CI)	0.88 [0.31, 2.49]

Analysis 3.1. Comparison 3 Absorbable graft versus native tissue, Outcome 1 Objective failure (prolapse).

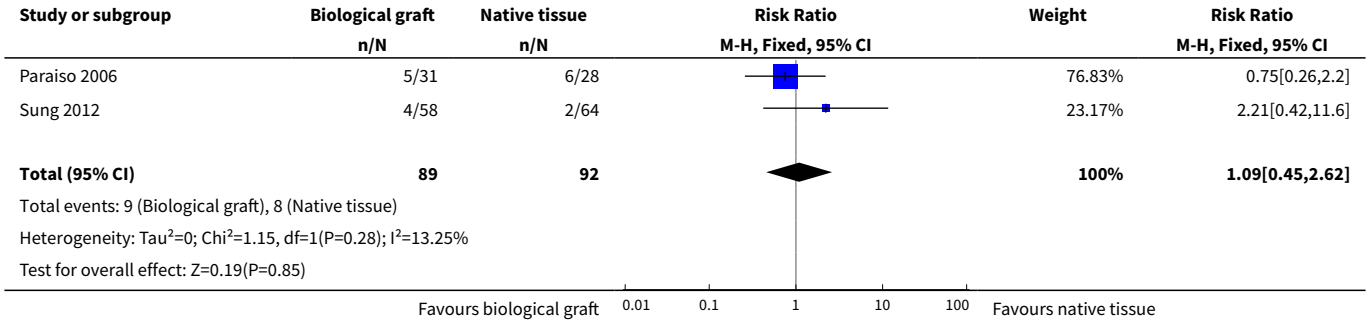


Comparison 4. Biological graft versus native tissue

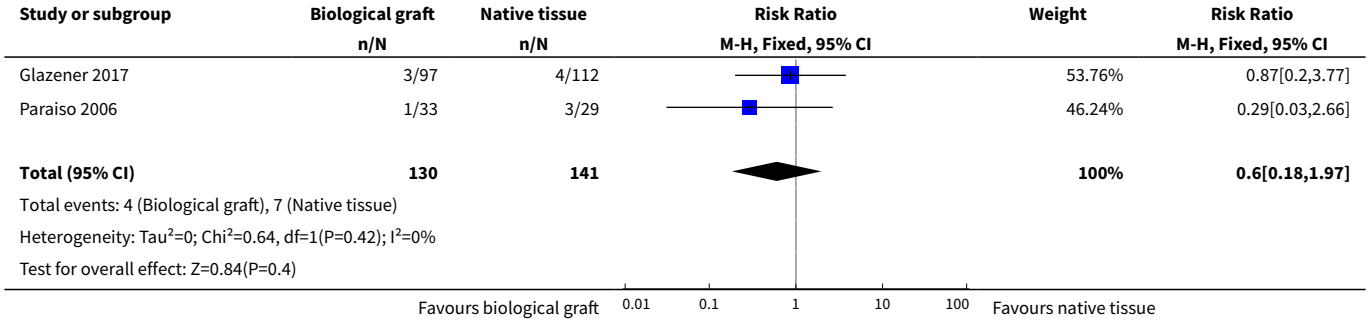
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Awareness of prolapse (subjective failure)	2	181	Risk Ratio (M-H, Fixed, 95% CI)	1.09 [0.45, 2.62]
2 Repeat surgery for any prolapse	2	271	Risk Ratio (M-H, Fixed, 95% CI)	0.60 [0.18, 1.97]
3 Objective failure (prolapse)	3	377	Risk Ratio (M-H, Fixed, 95% CI)	0.55 [0.30, 1.01]
4 Bowel function	2		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
4.1 Postoperative obstructed defecation	2	172	Risk Ratio (M-H, Fixed, 95% CI)	0.96 [0.50, 1.86]
5 Sexual function	2		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 Postoperative dyspareunia	2	152	Risk Ratio (M-H, Fixed, 95% CI)	1.26 [0.59, 2.68]
6 Prolapse outcomes	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
6.1 Mean postoperative Bp	1	182	Mean Difference (IV, Fixed, 95% CI)	-0.10 [-0.51, 0.31]
6.2 Mean postoperative C	1	183	Mean Difference (IV, Fixed, 95% CI)	0.10 [-0.42, 0.62]
6.3 Mean postoperative Ba	1	183	Mean Difference (IV, Fixed, 95% CI)	0.0 [-0.43, 0.43]
7 Quality of life and satisfaction	2		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
7.1 PFIQ-7 score	1	28	Mean Difference (IV, Fixed, 95% CI)	11.0 [-6.67, 28.67]
7.2 PFDI-20 score	1	28	Mean Difference (IV, Fixed, 95% CI)	12.0 [-12.17, 36.17]
7.3 PISQ-12	1	74	Mean Difference (IV, Fixed, 95% CI)	-1.0 [-3.28, 1.28]
7.4 POP-SS	1	209	Mean Difference (IV, Fixed, 95% CI)	0.5 [-1.16, 2.16]
8 Adverse events	4		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
8.1 Mesh exposure	2	329	Risk Ratio (M-H, Fixed, 95% CI)	5.03 [0.90, 28.07]
8.2 Intraoperative complications including bowel injury and haemorrhage	2	228	Risk Ratio (M-H, Fixed, 95% CI)	1.66 [0.29, 9.55]
8.3 Postoperative complications including wound infection	3	448	Risk Ratio (M-H, Fixed, 95% CI)	1.82 [1.22, 2.72]
9 Perioperative outcomes - dichotomous	2		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
9.1 Blood transfusion	2	228	Risk Ratio (M-H, Fixed, 95% CI)	2.51 [0.28, 22.96]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
10 Perioperative outcomes - continuous	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
10.1 Operating time	1	68	Mean Difference (IV, Fixed, 95% CI)	-19.0 [-49.93, 11.93]

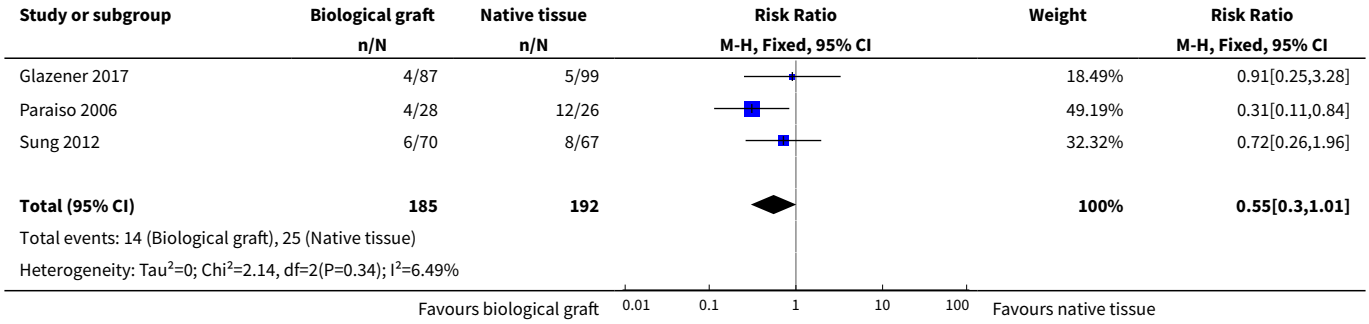
Analysis 4.1. Comparison 4 Biological graft versus native tissue, Outcome 1 Awareness of prolapse (subjective failure).

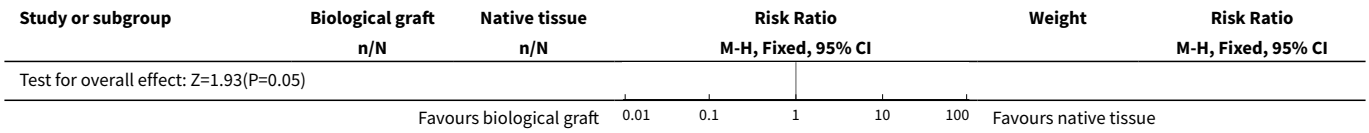


Analysis 4.2. Comparison 4 Biological graft versus native tissue, Outcome 2 Repeat surgery for any prolapse.

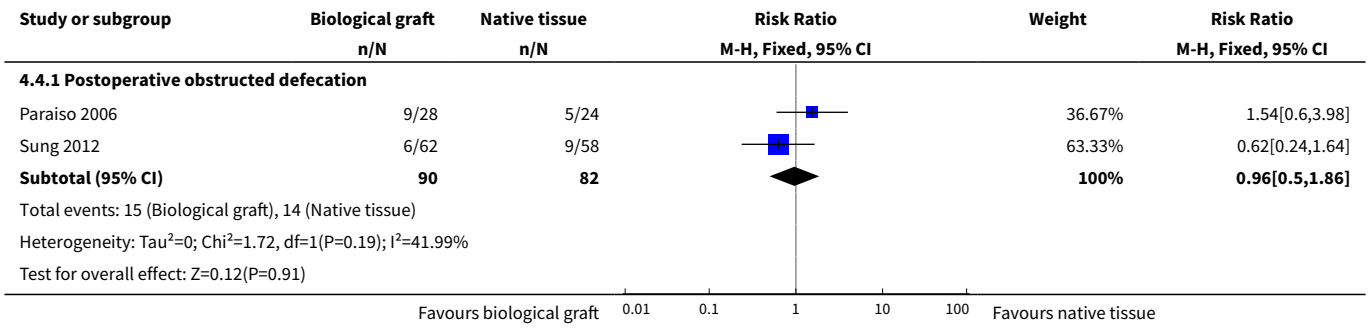


Analysis 4.3. Comparison 4 Biological graft versus native tissue, Outcome 3 Objective failure (prolapse).

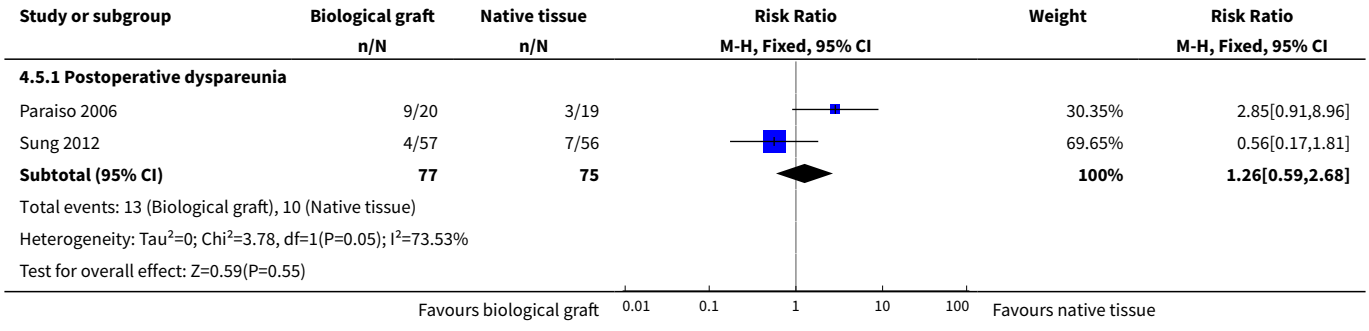




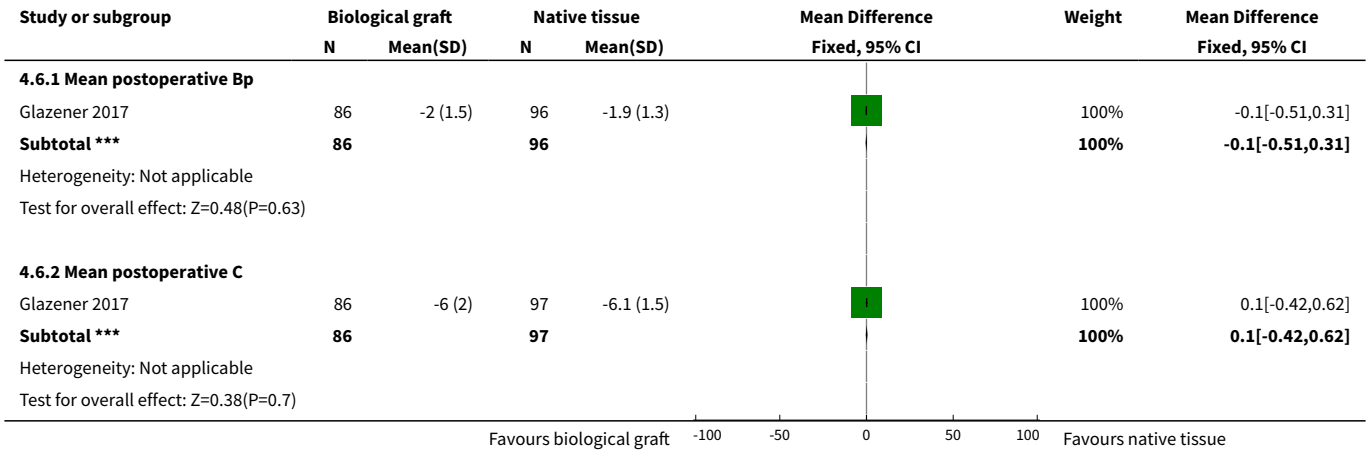
Analysis 4.4. Comparison 4 Biological graft versus native tissue, Outcome 4 Bowel function.

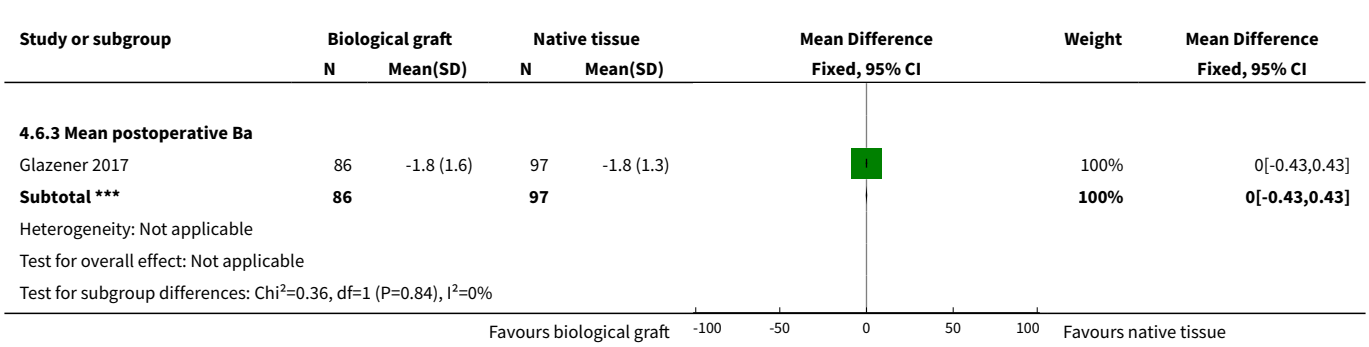


Analysis 4.5. Comparison 4 Biological graft versus native tissue, Outcome 5 Sexual function.

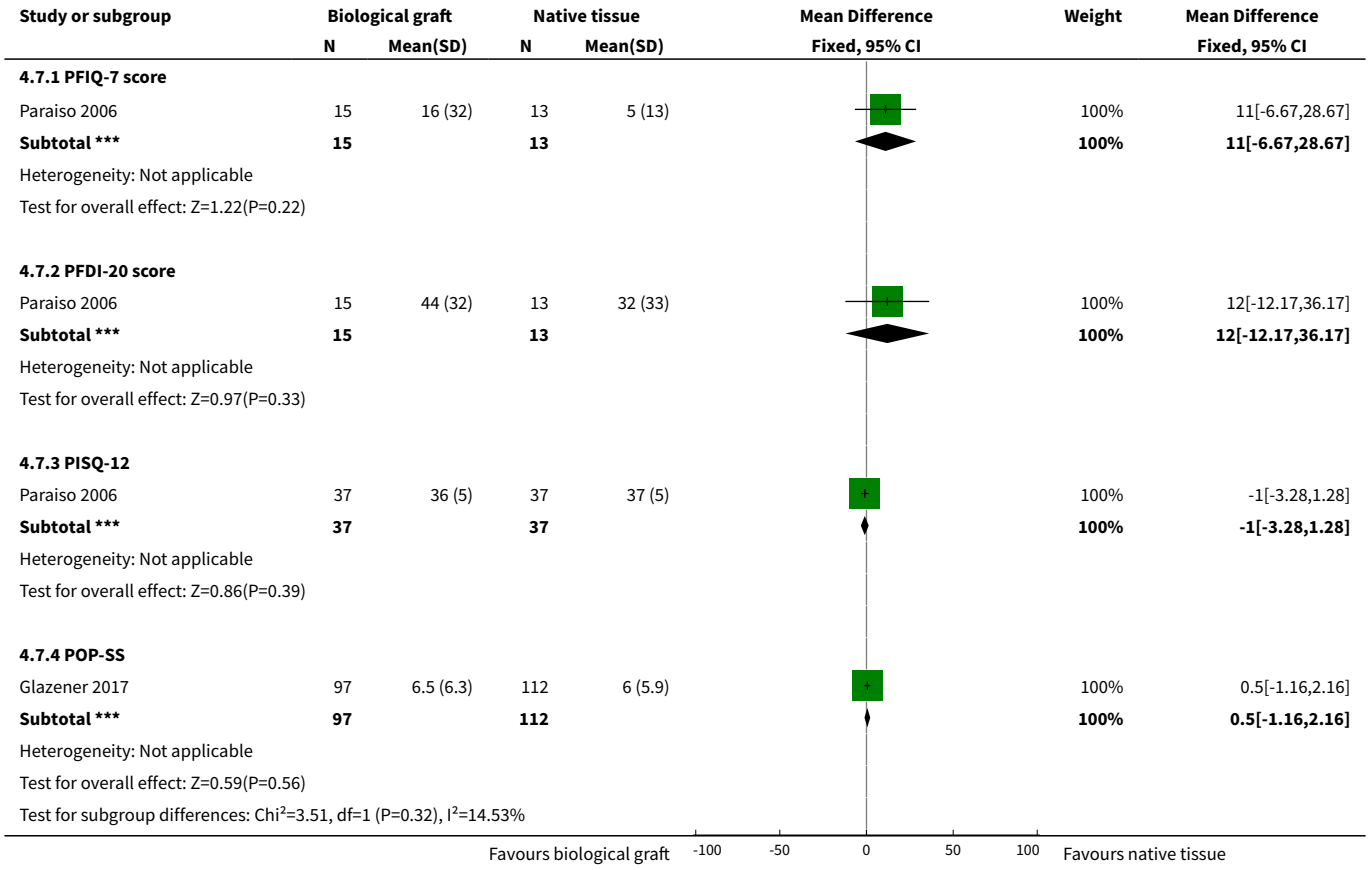


Analysis 4.6. Comparison 4 Biological graft versus native tissue, Outcome 6 Prolapse outcomes.

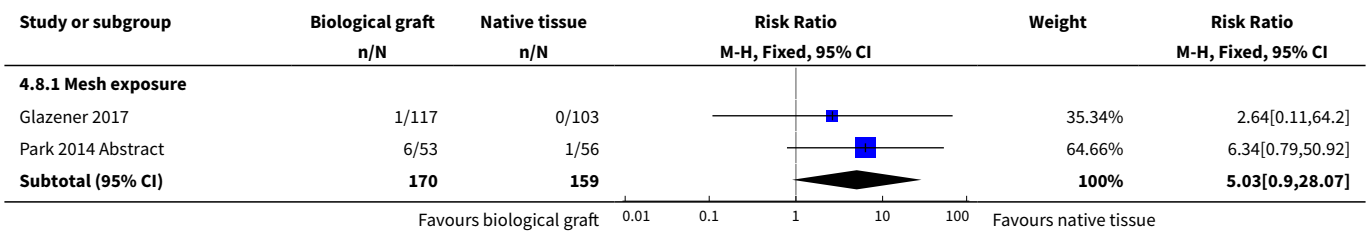


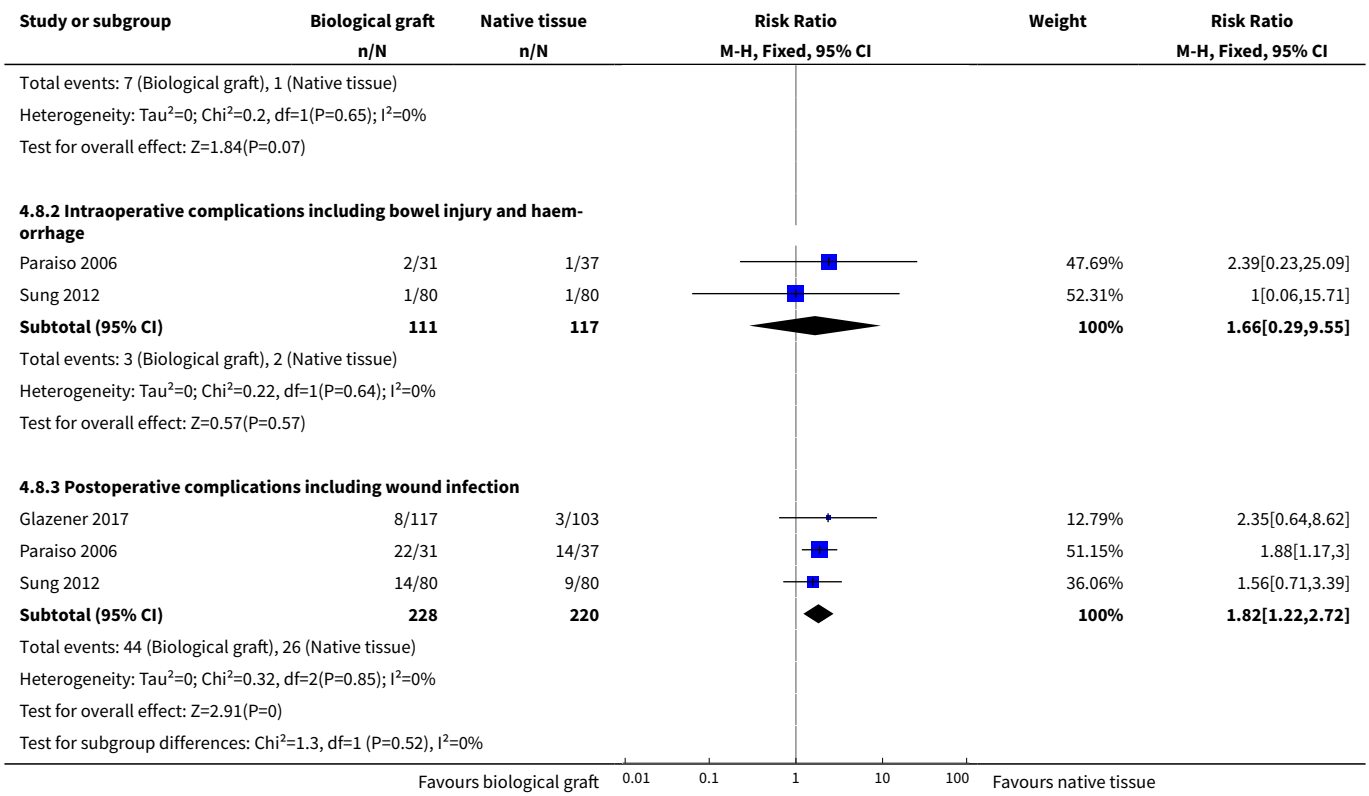


Analysis 4.7. Comparison 4 Biological graft versus native tissue, Outcome 7 Quality of life and satisfaction.

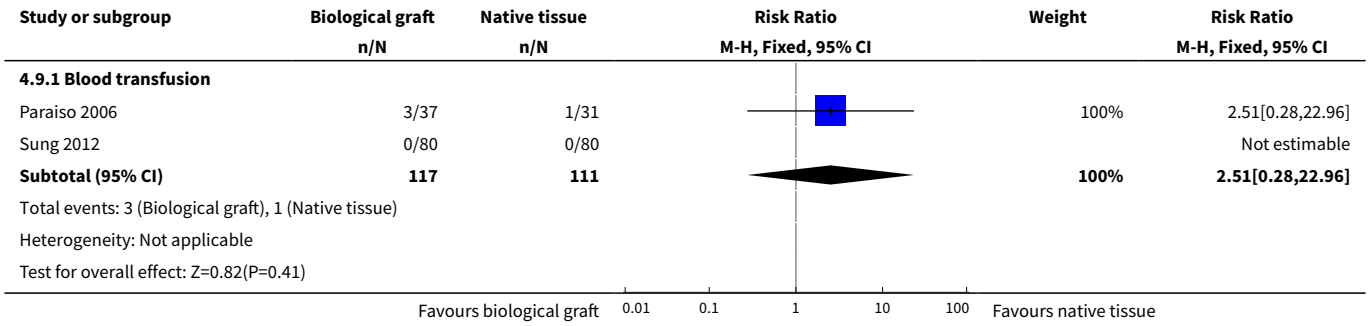


Analysis 4.8. Comparison 4 Biological graft versus native tissue, Outcome 8 Adverse events.

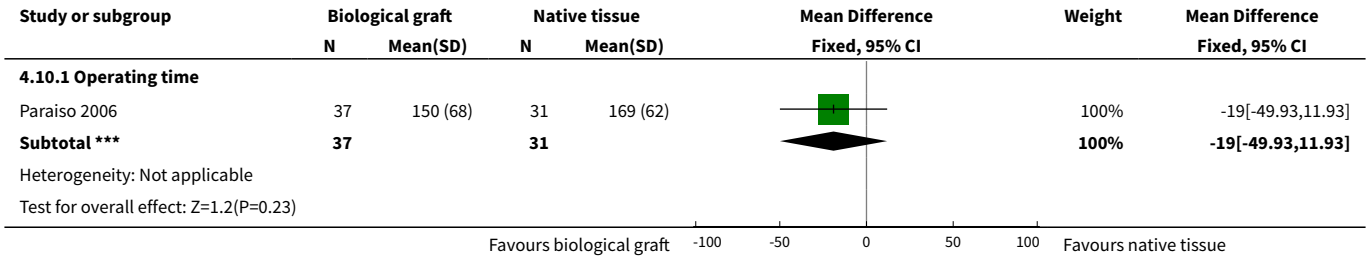




Analysis 4.9. Comparison 4 Biological graft versus native tissue, Outcome 9 Perioperative outcomes - dichotomous.



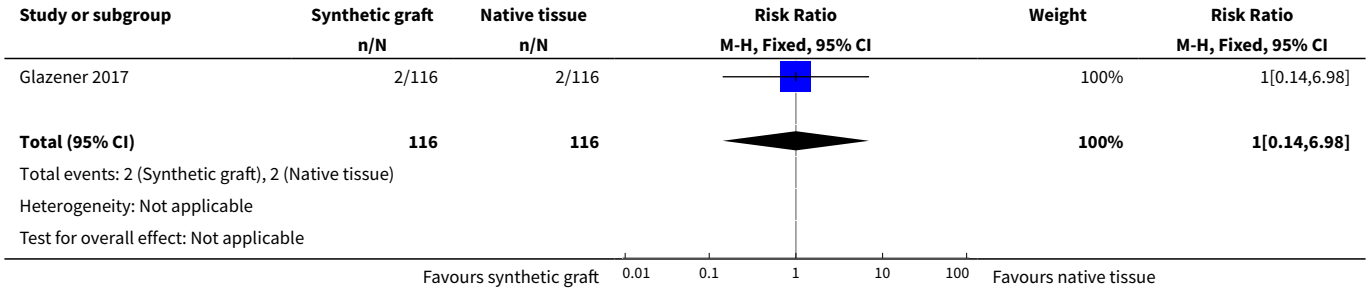
Analysis 4.10. Comparison 4 Biological graft versus native tissue, Outcome 10 Perioperative outcomes - continuous.



Comparison 5. Synthetic graft versus native tissue

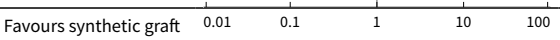
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Repeat surgery for any prolapse	1	232	Risk Ratio (M-H, Fixed, 95% CI)	1.0 [0.14, 6.98]
2 Objective failure (prolapse)	1	200	Risk Ratio (M-H, Fixed, 95% CI)	0.68 [0.20, 2.34]
3 Prolapse outcomes	2		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
3.1 Mean postoperative Bp	1	191	Mean Difference (IV, Fixed, 95% CI)	0.20 [-0.18, 0.58]
3.2 Mean postoperative C	1	190	Mean Difference (IV, Fixed, 95% CI)	0.0 [-0.61, 0.61]
3.3 Mean postoperative Ba	1	191	Mean Difference (IV, Fixed, 95% CI)	-0.10 [-0.54, 0.34]
4 Quality of life and satisfaction	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
4.1 POP-SS	1	232	Mean Difference (IV, Fixed, 95% CI)	0.70 [-0.75, 2.15]
5 Adverse events	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 Mesh exposure	1	252	Risk Ratio (M-H, Fixed, 95% CI)	18.70 [1.10, 317.94]
5.2 Postoperative complications including wound infection	1	252	Risk Ratio (M-H, Fixed, 95% CI)	0.39 [0.14, 1.06]
6 Perioperative outcomes - dichotomous	2		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
6.1 Blood transfusion	2	228	Risk Ratio (M-H, Fixed, 95% CI)	2.51 [0.28, 22.96]

Analysis 5.1. Comparison 5 Synthetic graft versus native tissue, Outcome 1 Repeat surgery for any prolapse.



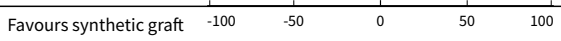
Analysis 5.2. Comparison 5 Synthetic graft versus native tissue, Outcome 2 Objective failure (prolapse).

Study or subgroup	Synthetic graft n/N	Native tissue n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
Glazener 2017	4/99	6/101		100%	0.68[0.2,2.34]
Total (95% CI)	**99**	**101**		**100%**	**0.68[0.2,2.34]**
Total events: 4 (Synthetic graft), 6 (Native tissue)					
Heterogeneity: Not applicable					
Test for overall effect: Z=0.61(P=0.54)					



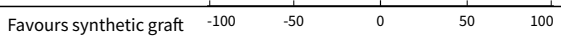
Analysis 5.3. Comparison 5 Synthetic graft versus native tissue, Outcome 3 Prolapse outcomes.

Study or subgroup	Synthetic graft N	Mean(SD)	Native tissue N	Mean(SD)	Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
5.3.1 Mean postoperative Bp							
Glazener 2017	95	-1.9 (1.4)	96	-2.1 (1.3)		100%	0.2[-0.18,0.58]
Subtotal ***	**95**		**96**			**100%**	**0.2[-0.18,0.58]**
Heterogeneity: Not applicable							
Test for overall effect: Z=1.02(P=0.31)							
5.3.2 Mean postoperative C							
Glazener 2017	95	-6.2 (2.1)	95	-6.2 (2.2)		100%	0[-0.61,0.61]
Subtotal ***	**95**		**95**			**100%**	**0[-0.61,0.61]**
Heterogeneity: Not applicable							
Test for overall effect: Not applicable							
5.3.3 Mean postoperative Ba							
Paraiso 2006	95	-1.6 (1.5)	96	-1.5 (1.6)		100%	-0.1[-0.54,0.34]
Subtotal ***	**95**		**96**			**100%**	**-0.1[-0.54,0.34]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.45(P=0.66)							
Test for subgroup differences: Chi^2=1.06, df=1 (P=0.59), I^2=0%							

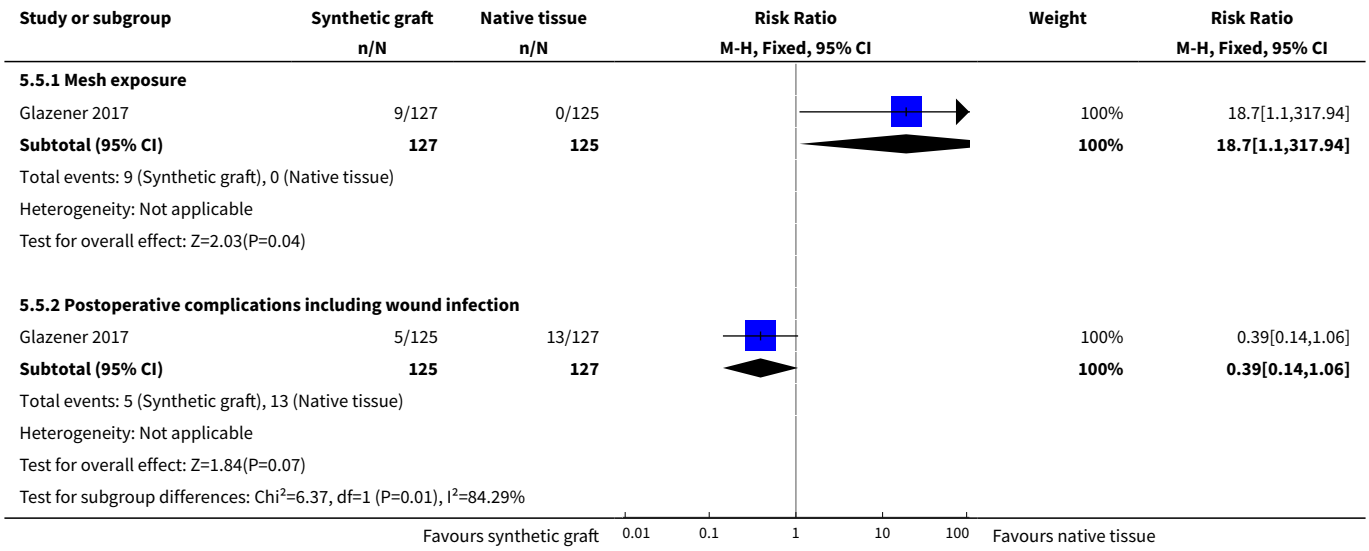


Analysis 5.4. Comparison 5 Synthetic graft versus native tissue, Outcome 4 Quality of life and satisfaction.

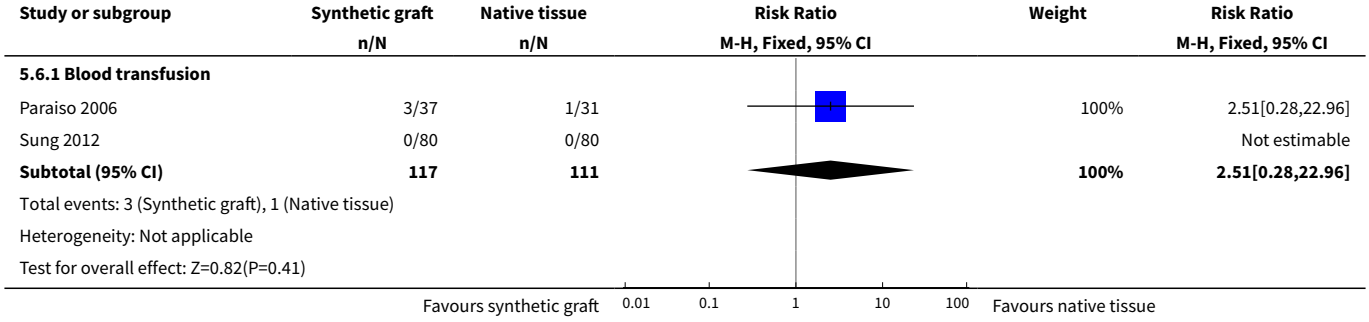
Study or subgroup	Synthetic graft N	Mean(SD)	Native tissue N	Mean(SD)	Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
5.4.1 POP-SS							
Glazener 2017	116	6.4 (6.3)	116	5.7 (4.9)		100%	0.7[-0.75,2.15]
Subtotal ***	**116**		**116**			**100%**	**0.7[-0.75,2.15]**
Heterogeneity: Not applicable							
Test for overall effect: Z=0.94(P=0.34)							



Analysis 5.5. Comparison 5 Synthetic graft versus native tissue, Outcome 5 Adverse events.



Analysis 5.6. Comparison 5 Synthetic graft versus native tissue, Outcome 6 Perioperative outcomes - dichotomous.



APPENDICES

Appendix 1. Searches

Search strategy:
The Incontinence Group Specialised Register was searched using the Group's own keyword system (all searches were of the keyword field of Reference Manager 2012). The search terms used were:
({design.cct*} OR {design.rct*})
AND
({topic.posterior vaginal prolapse*}) OR ({topic.rectocele*}
AND
({intvent.surg*})
Date of the most recent search of the register for this review: April 2017.

Appendix 2. Types of operations

Transvaginal repair of posterior vaginal wall prolapse - midline fascial plication

- **Indications**

Treatment of rectocele (rectum bulges or herniates forward into the vagina) and defects of the perineum (area separating entrance of the vagina and anus).

- **Aim**

Correct defects in the rectovaginal fascia separating rectum and vagina while allowing bowel function to be maintained or corrected without interfering with sexual function.

- **Surgical technique**

1. An incision is made on the posterior wall of the vagina starting at the entrance and finishing at the top of the vagina.
2. Vagina and rectovaginal fascia are dissected from the vagina until the pelvic floor muscles (puborectalis) are located.
3. Defects in the fascia are corrected by central plication of the fascia with delayed absorption sutures.
4. Perineal defects are repaired by placing deep sutures into the perineal muscles to build up the perineal body.
5. Overlying vaginal and vulval skin is then closed.
6. A pack is usually placed into the vagina and a catheter into the bladder at the end of surgery.

Transanal repair of posterior vaginal wall prolapse

- **Indications**

Treatment of rectocele (rectum bulges or herniates forward into the vagina).

- **Aim**

Correct defects in the rectovaginal fascia separating rectum and vagina while allowing bowel function to be maintained or corrected without interfering with sexual function.

- **Surgical technique**

1. Transverse incision is made at the dentate line, followed by two vertical incisions at either end of the transverse incision and extended about 7 cm proximally.
2. A mucomuscular flap with a broader base was created and haemostasis was obtained by electrocoagulation.
3. Around four vertical sutures with delayed absorbable sutures are placed in the rectovaginal fascia.
4. Around two horizontal sutures were then placed in the rectovaginal fascia.
5. Any excess of the mucomuscular flap was excised and closed with a running suture.
6. A haemostatic sponge was left in the anal canal and was removed on the first postoperative day.

- **Site-specific versus midline fascial plication**

1. These two techniques differ at step 3 above. Midline fascial plication is a global repair of the fascia from proximal to distal. The fascia on right and left of the rectum is brought together at the midline, providing global support to the rectum.
2. The site-specific technique involved identifying specific defect in the rectovaginal fascia by inspection and repairing each defect individually. It can involve repairing fascia to fascia or fascia to arcus tendineus fascia pelvis (the lateral pelvic side wall support structure for the vagina) depending on where the defects are.
3. Levator ani plication with midline fascial plication.
4. Vijaya 2011 Abstract compared levator ani plication with midline fascial plication with midline fascial plication alone. This means that the bilateral levator ani muscles were brought together at the midline with the fascial repair.

- **Graft repair**

1. If a graft (absorbable, biological, synthetic mesh) is used, then graft is placed overlying the fascial repair (step 3 of transvaginal repair above) before the vaginal mucosa is closed (step 5 above). Some synthetic meshes are anchored to the sacrospinous ligaments and some are not anchored.

WHAT'S NEW

Date	Event	Description
23 February 2018	New citation required but conclusions have not changed	The addition of 3 new studies has not led to a change in the conclusions of this review.
23 February 2018	New search has been performed	A comparison of surgical interventions for management of posterior vaginal wall prolapse was formerly part of the 2013 Cochrane review "Surgical management of pelvic organ prolapse

Date	Event	Description
		in women". We now present this as a separate review. Three new trials are included that were not in the previous review: Glazener 2017; Park 2014 Abstract; Wei 2015.

HISTORY

Review first published: Issue 3, 2018

Date	Event	Description
12 June 2014	New citation required but conclusions have not changed	Review updated with 1 new trial incorporated
14 April 2010	Amended	Citation changed, conflicts added
17 November 2009	New citation required but conclusions have not changed	Full reports of 59 potentially eligible studies assessed; for this update, 23 new eligible studies 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 excluded from the review - 6 during this update (Barber 2006; Biller 2008; Carramao 2008a; Glavind 2007; Meschia 2007a; Segal 2007). Full details given in Characteristics of excluded studies tables In this, the second update, 18 new trials 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 3 previously included studies updated (Brubaker 2008; Meschia 2007; Roovers 2004)
9 February 2009	New search has been performed	New search conducted February 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). Findings still insufficient to provide robust evidence to support current and new practice (such as whether to perform a concurrent continence operation, or whether to use mesh or grafts)

CONTRIBUTIONS OF AUTHORS

All review authors contributed to writing the protocol. Four review authors (A. Mowat, D. Maher, C Christmann-Schmid, K. Baessler) assessed the relevance and eligibility of studies for inclusion in this review. They then assessed the quality of included studies; three review authors (A. Mowat, C. Maher, N. Haya) independently extracted data from trial reports, interpreted the results, and contributed to writing of the draft version of this review.

DECLARATIONS OF INTEREST

AM, DM, KB, CC, NH, and CM have no interests to declare.

SOURCES OF SUPPORT

Internal sources

- None, Other.

External sources

- National Institute for Health Research (NIHR), UK.

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DIFFERENCES BETWEEN PROTOCOL AND REVIEW

None.

INDEX TERMS

Medical Subject Headings (MeSH)

Awareness; Dyspareunia [epidemiology] [surgery]; Gynecologic Surgical Procedures [methods]; Pelvic Organ Prolapse [*surgery]; Postoperative Complications [epidemiology] [surgery]; Randomized Controlled Trials as Topic; Recurrence; Reoperation [statistics & numerical data]; Surgical Mesh; Urinary Incontinence, Stress [epidemiology] [surgery]; Uterine Prolapse [surgery]

MeSH check words

Female; Humans