REVIEW ARTICLE

Royal Australasian College of Surgeons

Fistulotomy versus fistulectomy for simple fistula-in-ano: a systematic review and meta-analysis of randomized controlled trials

Rakesh Quinn *† Alexandra Peacock‡ and Rebecca J Lendzion ‡

*Department of Colorectal Surgery, Nepean Hospital, Kingswood, New South Wales, Australia
†University of Sydney, Sydney Medical School, Faculty of Medicine and Health, Sydney, New South Wales, Australia and
‡Department of Colorectal Surgery, Concord Hospital, Concord, New South Wales, Australia

Key words
anal fistula, fistulectomy, fistulotomy, randomized controlled trials.

Correspondence
Dr Rakesh Quinn, Department of Colorectal Surgery, Nepean Hospital, Derby St, Kingswood, NSW 2747, Australia.
Email: rakesh.quinn@health.nsw.gov.au

R. Quinn MS, FRACS; **A. Peacock** MS, FRACS; **R. J. Lendzion** MS, FRACS.

Accepted for publication 11 March 2025.

doi: 10.1111/ans.70095

Abstract

Background: Perianal fistulas are a common anorectal pathology. The sphincter-cutting techniques of fistulectomy and fistulotomy are associated with high cure rates for low or simple fistula-in-ano, with negligible risk of incontinence. However, the superiority of either technique has not previously been conclusively demonstrated. The aim of this systematic review is to compare the outcomes of the two surgical techniques for the management of simple fistula-in-ano.

Methods: A search of MEDLINE, EMBASE and Cochrane Databases for randomized controlled trials (RCT) comparing fistulotomy to fistulectomy for simple fistula-in-ano was conducted. The primary outcome was healing time; secondary outcomes included operative time, length of hospital stay, post-operative pain score, post-operative complications and fistula recurrence.

Results: Thirteen RCTs meet inclusion criteria, comprising a total of 685 fistulectomy and 688 fistulotomy patients. There was no significant difference between the techniques for healing time ($P = 0.15$), operative time ($P = 0.13$), length of stay ($P = 0.05$), wound infection ($P = 0.97$), flatus or faecal incontinence ($P = 0.35$ and $P = 0.70$, respectively) or recurrence ($P = 0.19$). Post-operative pain at 24 h, assessed using a visual analogue scale, was significantly lower in the fistulectomy group (MD-0.49, 95% CI: −0.90, −0.08; $P = 0.02$), and we found significantly fewer post-operative bleeding complications in the fistulotomy group (OR: 3.81, 95% CI: 1.23, 11.80; $P = 0.02$).

Conclusion: This systematic review did not find conclusive evidence of the superiority of either fistulectomy or fistulotomy in terms of healing time. The two statistically significant findings were lower post-operative pain scores with fistulectomy and reduced post-operative bleeding with fistulotomy.

Introduction

Fistula-in-ano is an abnormal connection between two epithelialized surfaces: the anorectal canal and the perianal skin.[1] Perianal fistulas can be described as 'complex' or 'simple' based on an adaptation of Parks classification.[2] Simple fistulas are cryptoglandular in origin and involve less than one-third of the sphincter complex. Distinction between simple and complex fistulas is relevant when determining appropriate treatment.[1, 3]

The goals of anal fistula management are to eradicate perianal sepsis, disrupt the tract and prevent recurrence whilst preserving the integrity of the sphincter. The most common treatment option employed for simple fistulas with intact sphincter function is fistulotomy, which is recommended by both The American Society of Colon and Rectal Surgeons (ASCRS) and the European Society of Coloproctology (ESCP).[4, 5] Fistulotomy has been shown to have a high fistula healing rate with minimal risk of clinically significant incontinence.[4, 5] The alternate procedure, fistulectomy, involves excising the fistula tract, with the caveat of a larger wound and purported prolonged healing time, longer operative times and higher risk of incontinence.[4] However, the superiority of either technique has not been conclusively demonstrated, with a 2016 systematic review of six randomized controlled trials (RCTs) by Xu *et al.*[6] reporting no difference in healing time, operative time or

post-operative complications. Since Xu *et al.*'s review, several additional RCTs have compared fistulotomy and fistulectomy for simple anal fistulas in additional domains with conflicting results.

This updated systematic review and meta-analysis evaluates the superiority of fistulotomy versus fistulectomy for the treatment of low or simple fistula-in-ano in regard to healing time, operative time, length of hospital stay, post-operative pain score and post-operative complications.

Methods

Study design and search strategy

This systematic review was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines.[7] The protocol of this systematic review was published on the PROSPERO Register for Systematic Reviews (Registration no. CRD42024556643). The authors constructed a search strategy with the following themes: *perianal fistula, fistulectomy* and *fistulotomy*; and the associated keywords and truncations (see Appendix 1). The literature search, including MEDLINE, Cochrane Database of Systematic Reviews (CDSR), Cochrane Central Register of Controlled Trials (CENTRAL) and EMBASE, was devised and performed on 10th June 2024. References from previously published systematic reviews were reviewed to identify additional studies.

Study eligibility

Studies were included that assessed adult patients (aged 18 years or over) who underwent management for 'low' or 'simple' fistula-in-ano, defined as fistula involving less than one-third of the sphincter complex and a single tract. Inclusion criteria: (a) all studies comparing fistulotomy and fistulectomy, with or without marsupialisation; (b) randomized study design (either randomized controlled trials (RCT) or randomized prospective studies) published in peer-reviewed journals; and (c) published in English. Exclusion criteria: (a) complex fistula, defined as involving more than one-third of the sphincter complex, associated with Crohn's disease, prior irradiation or malignancy; (b) concurrent sphincteroplasty; (c) concurrent perianal abscess; (d) children (patients aged less than 18 years) and pregnant women; (e) non-English and animal studies; and (f) non-randomized studies, observational studies, case series, case reports, and abstracts.

Selection process

Following the exclusion of duplicates, the search results were independently reviewed by two authors (RQ, AP) to extract relevant studies. Title and abstract screening were conducted, followed by full-text review of eligible studies against the inclusion and exclusion criteria. Any conflicts were resolved with a discussion between the two authors.

Outcomes measured

The primary outcome was healing time, defined as complete epithelisation of the wound. Secondary outcomes were operative time, length of hospital stay, post-operative pain score, and post-operative complications comprising surgical site infection, bleeding, faecal incontinence, and fistula recurrence.

Data extraction and analysis

Data extraction and review was performed together by two authors (RQ and AP). Data extracted were the publication year, country of study, number of participants, age, gender, and outcomes (healing time, operative time, length of hospital stay, post-operative pain score, post-operative complications and fistula recurrence). Extracted data was compared; any discrepancies were resolved with discussion between the two authors (RQ, AP).

Meta-analysis of comparison studies was performed with RevMan Web Version 7.4.0[8] for all outcomes in which there were at least three studies. If the mean and standard deviation (SD) for continuous outcomes were not provided, these were calculated using the standard error, 95% confidence intervals (CI), interquartile range (IQR), *t*-statistics, and *P*-value, using algebraic calculations as described in the Cochrane Handbook v6.4, Chapter 6.5.2.3.[9] The mean difference (MD) and 95% CI were calculated for continuous outcomes and odds ratio (OR) with 95% CI for dichotomous outcomes, both using an inverse variance method with fixed or random effects models dependent on the presence or absence of heterogeneity. Heterogeneity was measured with the I^2 statistic, and a P-value <0.05 was considered significant. A sensitivity analysis was conducted excluding studies that reported a variation in surgical technique. Publication bias was evaluated using Egger's test and presented as funnel plots, conducted on IBM SPSS statistics v29.0.1.0.

Risk of bias assessment

Quality of the included studies was assessed by two authors (RQ, AP) using the Cochrane Risk of Bias tool 2 (RoB-2).[10] The following domains were assessed: randomisation, deviation from intended intervention, missing outcome data, measurement of the outcome and selection of the reported results.

Certainty of evidence

Certainty of evidence was assessed using the Grading of Recommendations Assessment Development and Evaluation (GRADE) approach with GRADEPro Guideline Development Tool software and handbook.[11, 12] Factors assessed were risk of bias, inconsistency, indirectness, imprecision and publication bias.

Results

Search strategy results

The search strategy yielded 289 articles, of which 68 were duplicates. Following screening of titles and abstracts, a further

205 were excluded. One full text could not be extracted, as it was not published in English.[13] The full text of the remaining 14 studies found two studies from India with identical participants, methods, and results, suggesting duplication[14, 15]; the study with the earliest publication date was included. Of the six studies presented in the previous review by Xu *et al.*,[6] only four were included. One included participants less than 18 years of age[16] and a further article utilized purposeful sampling rather than a randomized controlled method.[17] A total of 13 studies were included in this review. The PRISMA flowchart is illustrated in Figure 1.

Study characteristics

Thirteen randomized controlled trials meet inclusion criteria. Study characteristics are presented in Table 1. The majority of studies were conducted in South Asia; specifically, Pakistan and India. A total of 685 patients underwent fistulectomy and 688 patients underwent fistulotomy. The weighted mean age was 36.7 years, with a male predominance (83.9%). Presenting symptoms were reported in seven studies.[18–24] Discharge was the most common complaint (87.9%) followed by pain (50.0%), pruritis (32.5%), swelling (9.6%), perianal irritation (1.1%) and bleeding (0.5%).

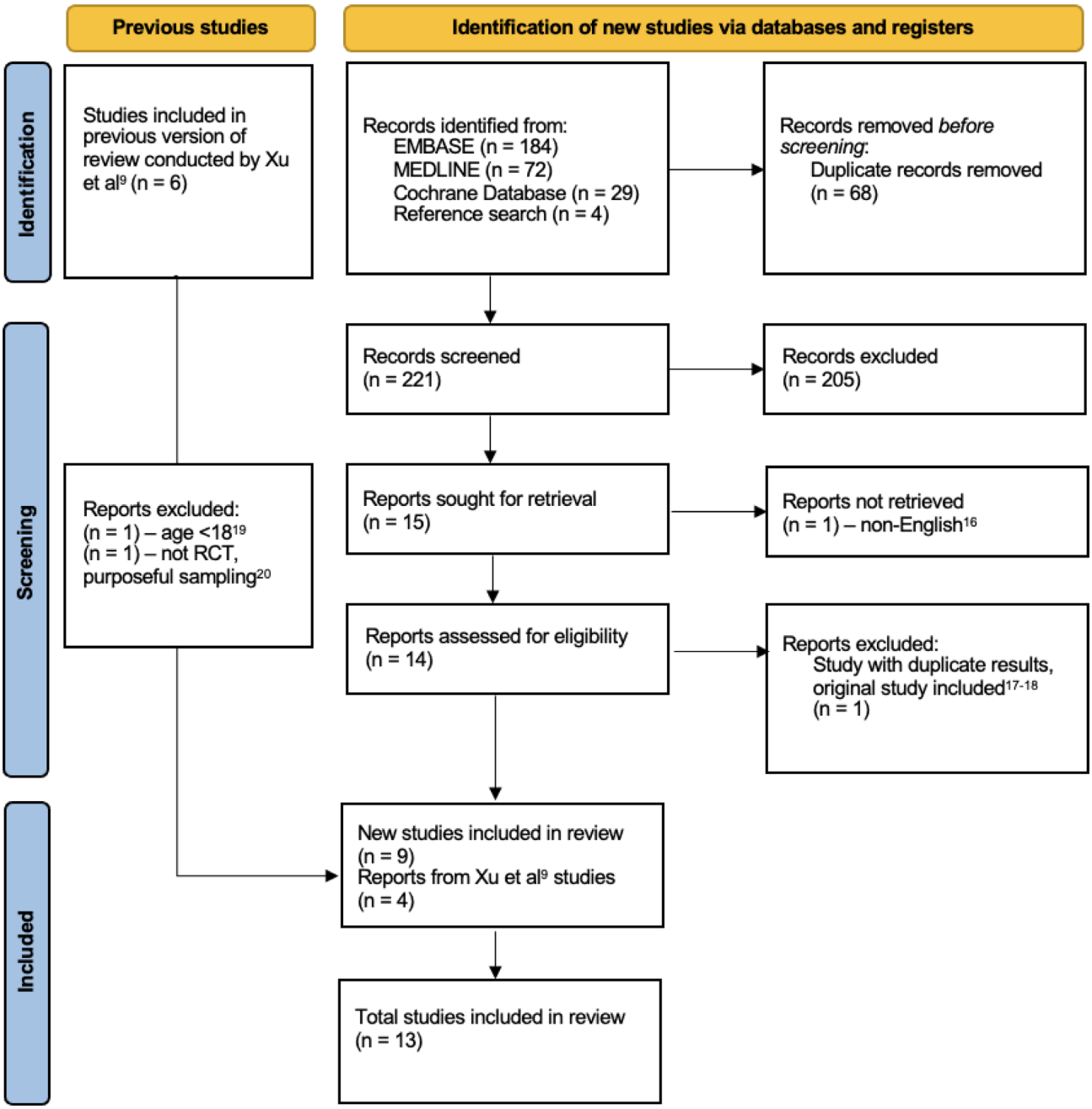


Fig. 1. PRISMA flowchart.

Table 1 Study characteristics

Author (Year)	Setting	Patients, *n* (female %)	Age, years (mean)	Intervention/ Comparator	Technique variation	Operative time (mins)	Length of stay (days)	Follow-up, (weeks)
Abbasi *et al.*[18] (2023)	Pakistan	25	37.5	Fistulectomy		30–40	1–2	12
		25		Fistulotomy		15–25	1–2	12
Aslam *et al.*[25] (2021)	Pakistan	30	36.4	Fistulectomy				6
		30	38	Fistulotomy	Marsupialisation			6
Barase *et al.*[14] (2018)	India	42 (42.8%)	39.5	Fistulectomy		31.7		26
		42 (28.6%)	37.2	Fistulotomy	Marsupialisation	28.6		26
Chalya *et al.*[19] (2013)	Tanzania	82 (7.3%)	37.8	Fistulectomy		28.4	3.9	12
		80 (7.5%)	38.6	Fistulotomy	Marsupialisation	29.2	4.2	12
Filingeri *et al.*[20] (2004)	Italy	11 (36.4%)	39	Fistulectomy	Radiofrequency	18.3		26
		11 (27.3%)	37	Fistulotomy		17.9		26
Hiremath *et al.*[26] (2022)	India	25 (16%)	38.6	Fistulectomy	Anal dilatation	31.3		26
		25 (28%)	42.7	Fistulotomy	Anal dilatation	21.9		26
Jain *et al.*[27] (2012)	India	20 (20%)	34.5	Fistulectomy				
		20 (10%)	34.3	Fistulotomy	Marsupialisation			
Kalim *et al.*[29] (2017)	Pakistan	152 (19.7%)	38	Fistulectomy				
		152 (23.1%)	40	Fistulotomy				
Krishna *et al.*[21] (2024)	India	25 (12%)		Fistulectomy				
		25 (28%)		Fistulotomy				
Kronborg *et al.*[28] (1985)	Denmark	21 (19%)	39	Fistulectomy				52
		26 (23.1%)	44	Fistulotomy				52
Nazeer *et al.*[22] (2012)	Pakistan	75		Fistulectomy			3.5	43.3
		75		Fistulotomy			2	43.3
Nour *et al.*[23] (2020)	Egypt	46 (32.6%)	30.4	Fistulectomy	Wound closure	23.9		26
		46 (28.3%)	31.8	Fistulotomy	Marsupialisation	23.2		26
Sheikh *et al.*[24] (2015)	Pakistan	131 (0%)	33.4	Fistulectomy		25.9	4.9	
		131 (0%)	32.5	Fistulotomy		14.3	3.7	

The two interventions were described in detail by seven studies.[19, 20, 23, 25–28] General or spinal anaesthesia was used, with the patient in the lithotomy position. The internal fistula opening was confirmed with the injection of methylene blue or hydrogen peroxide through the external opening. Fistulectomy involved excision of the entire tract over a probe. Hiremath *et al.*[26] described anal dilatation prior to the intervention; Filingeri *et al.*[20] utilized radiofrequency bistoury; and Nour *et al.*[23] described closure of the wound with 3–0 Vicryl suture. Fistulotomy was performed by laying open the tract over a probe with either a scalpel or diathermy, followed by curettage to the base to remove residual granulation tissue. Five studies[14, 19, 23, 25, 27] further described marsupialisation of the wound edges with 3–0 chromic catgut or Vicryl suture. Three studies[19, 25, 27] reported administration of ciprofloxacin and metronidazole for 1–3 days perioperatively, with several studies describing the use of anti-inflammatory analgesics, stool softeners and sitz baths on discharge.[18–20, 23, 25–28]

Healing time

Healing time was reported in 11 studies.[14, 19, 20, 22–29] Post-operative outcomes are presented in Table 2. Healing was defined in five studies as complete epithelisation of the wound, with no evidence of an external opening or discharge on follow-up.[19, 25, 27–29] There was no significant difference in healing time between fistulectomy and fistulotomy (MD: 0.50, 95% CI: −0.17, 1.18; $P = 0.15$), see Figure 2a. Significant heterogeneity was detected with $I^2 = 98\%$ ($P < 0.00001$). Subgroup analysis of the five studies[14, 19, 23, 25, 27] that performed marsupialisation with fistulotomy showed no significant difference in healing time (MD: 0.74, 95% CI: −1.21, 2.69; $P = 0.46$), see Figure 2b. No publication bias was observed (Egger's test $P = 0.219$), see funnel plot in Appendix 2.

Operative time

Duration of operation was reported in six studies.[14, 19, 20, 23, 24, 26] There was a non-significant trend towards shorter operative times with fistulotomy (MD: 4.11, 95% CI: −1.23, 9.45; $P = 0.13$), see Figure 3a. Significant heterogeneity was detected with $I^2 = 99\%$ ($P < 0.00001$). No publication bias was observed (Egger's test $P = 0.210$), see funnel plot Appendix 3.

Length of stay

Length of stay (LOS) following intervention was reported by three studies.[19, 22, 24] Fistulotomy trended towards shorter stays, nearing statistical significance (MD: 0.80, 95% CI: 0.02, 1.59; $P = 0.05$). Significant heterogeneity was detected with $I^2 = 96\%$ ($P < 0.00001$), see Figure 3b. No publication bias was observed (Egger's test $P = 0.885$), see funnel plot Appendix 4.

Post-operative pain

Post-operative pain at 24 h was reported by seven studies.[14, 19, 20, 23, 26, 27, 29] All seven studies utilized a visual analogue scale (VAS) to assess post-operative pain, scoring pain from 0 to 10. Significantly lower pain scores were seen in the fistulectomy group (MD: −0.49, 95% CI: −0.90, −0.08; $P = 0.02$); however, there was significant heterogeneity with $I^2 = 82\%$ ($P < 0.00001$), see Figure 3c.

Table 2 Post-operative outcomes

Author	Intervention/ Comparator	Healing Time (weeks)	Post-operative Pain Score (VAS)	Complications				Recurrence (*n*)
				Wound Infection (*n*)	Bleeding (*n*)	Flatus Incontinence (*n*)	Faecal Incontinence (*n*)	
Abbasi *et al.*[18]	Fistulectomy	6–8		2	2	4	0	2
	Fistulotomy	4–6		2	1	2	0	1
Aslam *et al.*[25]	Fistulectomy	5.8					0	
	Fistulotomy†	4.2					0	
Barase *et al.*[14]	Fistulectomy	3	3.5				1	1
	Fistulotomy†	1.7	3.8				5	1
Chalya *et al.*[19]	Fistulectomy	5.2	4.2	27			0	0
	Fistulotomy†	4.1	4.8	28			0	0
Filingeri *et al.*[20]	Fistulectomy‡	3.5	2.8			3	0	0
	Fistulotomy	5.9	4.1			4	0	0
Hiremath *et al.*[26]	Fistulectomy§	4.4	5.6	0	1		0	
	Fistulotomy§	3.4	5.6	0	0		0	
Jain *et al.*[27]	Fistulectomy	6.7	4.1				0	0
	Fistulotomy†	4.8	4.5				0	0
Kalim *et al.*[29]	Fistulectomy	4	4.1					
	Fistulotomy	5	5.4					
Krishna *et al.*[21]	Fistulectomy					1	1	1
	Fistulotomy					1	0	2
Kronborg *et al.*[28]	Fistulectomy	5.8				3		2
	Fistulotomy	4.8				1		3
Nazeer *et al.*[22]	Fistulectomy	5.7			5		0	0
	Fistulotomy	4			1		0	0
Nour *et al.*[23]	Fistulectomy¶	2.7	5.4		2	2		6
	Fistulotomy†	4.8	5.5		0	1		1
Sheikh *et al.*[24]	Fistulectomy	4.6		5	4			20
	Fistulotomy	4		3	1			14

†With marsupialisation.

‡Radiofrequency technique.

§Concurrent anal dilatation.

¶Wound closure; VAS – visual analogue scale.

No publication bias was observed (Eggers test $P = 0.852$), see funnel plot Appendix 5.

Post-operative complications

Wound infection was reported in four studies,[18, 19, 24, 26] however only one study[19] defined wound infection, they described '*the presence of erythema, induration surrounding the wound or constitutional symptoms such as fever*'. There was no significant difference in wound infection rate between the two interventions (OR: 1.01, 95% CI: 0.57, 1.79; $P = 0.97$), see Figure 4a. No significant heterogeneity was detected with $I^2 = 0\%$ ($P = 0.75$). No publication bias was observed (Egger's test $P = 0.747$), see funnel plot Appendix 6.

Post-operative bleeding was reported by five studies.[18, 22–24, 26] There were significantly fewer post-operative bleeding episodes in the fistulotomy group (OR: 3.81, 95% CI: 1.23, 11.80; $P = 0.02$), see Figure 4b. No significant heterogeneity was detected with $I^2 = 0\%$ ($P = 0.98$). No publication bias was observed (Egger's test $P = 0.668$), see funnel plot Appendix 7.

Incontinence was assessed using a Likert scale by three studies.[19, 25, 27] The 3-point scale of 0-never, 1-sometimes and 2-always, was given '*according to the inability to distinguish between gas and stool, difficulty in holding gas and soiling of* undergarments'.[19, 25, 27] Nour *et al.*[23] assessed incontinence using the Vaizey score. The remaining seven studies that reported on incontinence did not specify how incontinence was assessed.

Flatus incontinence was reported by five studies.[18, 20, 21, 23, 28] There was no significant difference in the rate of flatus incontinence between interventions (OR: 1.57, 95% CI: 0.60, 4.10; $P = 0.35$), see Figure 4c. No significant heterogeneity was detected with $I^2 = 0\%$ ($P = 0.77$). Of note, Abbasi *et al.*[18] and Filingeri *et al.*[20] reported flatus incontinence was transient for both interventions. No publication bias was observed (Egger's test $P = 0.886$), see funnel plot Appendix 8.

Faecal incontinence was reported by nine studies.[14, 18–22, 25–27] There was no statistically significant difference in the rate of faecal incontinence between interventions (OR: 0.58, 95% CI: 0.04, 9.00; $P = 0.70$), see Figure 4d. Moderate heterogeneity was detected with $I^2 = 51\%$ ($P = 0.15$).

Recurrence

Recurrence was reported in 10 studies.[14, 18–24, 27, 28] Recurrence was inadequately defined in all of the studies, three studies[14, 20, 27] described that '*patients were observed for recurrence of the fistula during the follow-up period*', with Nour *et al.*,[23] further describing '*recurrence after complete healing in the follow-up time*'. There was no significant difference in the rate of recurrence between the interventions (OR: 1.48, 95% CI: 0.82, 2.69; $P = 0.19$), see

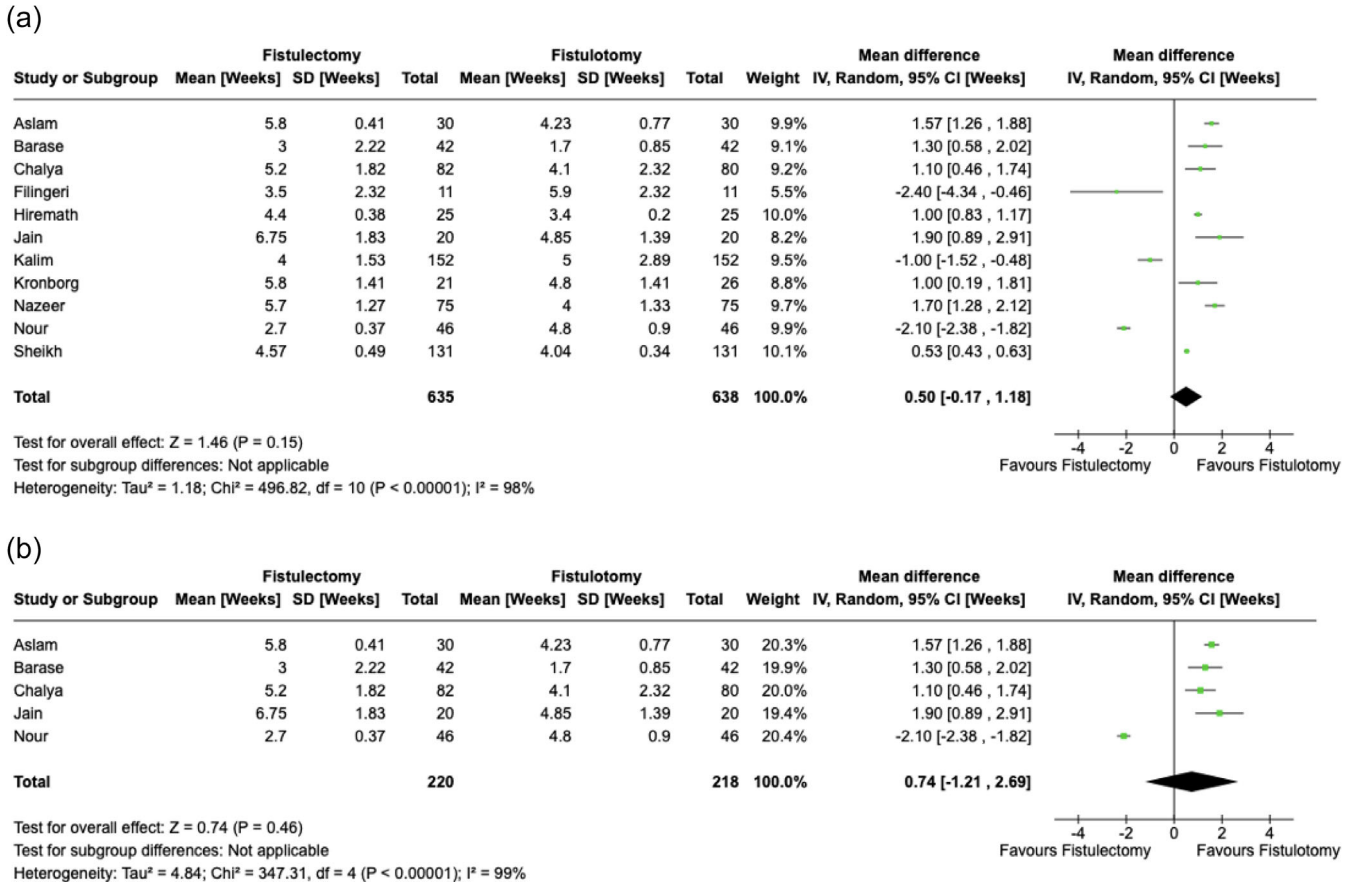


Fig. 2. Healing Time (a) and Healing Time Subgroup Analysis (b).

Figure 5. No significant heterogeneity was detected with $I^2 = 0\%$ ($P = 0.66$). No publication bias was observed (Egger's test $P = 0.492$), see funnel plot Appendix 9.

Sensitivity analysis

A sensitivity analysis was conducted, excluding studies that reported a deviation from 'standard' operative technique. This included fistulotomy with marsupialisation, radiofrequency bistoury, anal dilatation and primary closure of fistulectomy. There were insufficient studies to conduct a sensitivity analysis for the following outcomes: operative time, length of stay, pain and wound infection. For the outcomes of healing, flatus incontinence, faecal incontinence and recurrence, the confidence intervals were widened, with no change in statistical significance. For post-operative bleeding, the confidence intervals slightly widened, and there was a change in statistical significance from $P = 0.02$ to $P = 0.05$. The sensitivity analysis is provided in Appendices 10–14.

Risk of bias

Risk of bias was assessed using the Cochrane Risk of Bias tool 2 (RoB-2). The primary source of bias in the methodology stemmed from a lack of adequate documentation of the randomisation process, particularly due to unclear allocation concealment from all studies. Additionally, no study blinded the participants or researchers, raising concerns that awareness of the intervention might have influenced outcome assessments. Overall, the studies demonstrated a high risk of bias. A summary of the domain findings is presented in Figure 6, with domain-level judgements for each individual study presented as a traffic light plot in Appendix 15.

Certainty of evidence

The GRADE certainty of evidence for recurrence was rated as 'low' due to a high risk of bias. For all other outcomes, the certainty of evidence was rated as 'very low' because of a high risk of bias, inconsistency, and/or imprecision. Detailed GRADE appraisals for each outcome are presented in Appendix 16.

Discussion

Perianal fistulas are a common anorectal pathology, and optimal treatment remains a surgical challenge. Our updated systematic review of thirteen randomized studies with 1373 patients demonstrated significantly reduced postoperative pain but an increased risk of postoperative bleeding with fistulectomy. There was no significant difference in healing time, operative time, postoperative

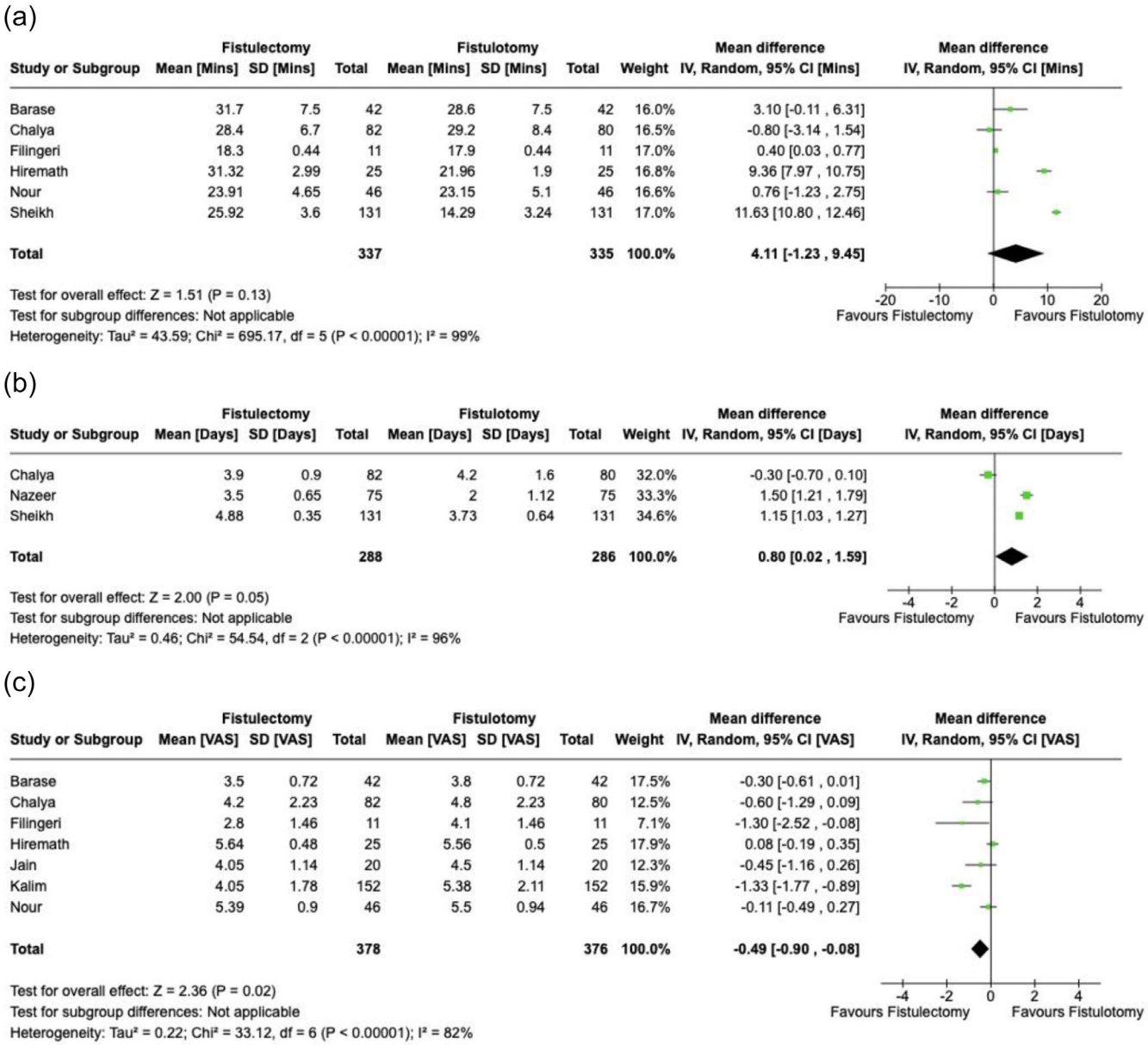


Fig. 3. Operative time (a), Length of Stay (b) and Post-operative pain at 24 h (c).

wound infection, faecal and flatus incontinence, or fistula recurrence between interventions.

Our study expanded on the earlier review by Xu *et al.*[6] comprising six studies. Two of the six studies were excluded from our review as they involved patients less than 18 years of age and utilized purposeful sampling.[16, 17] With an additional nine studies, our review substantiates Xu *et al.*'s finding of no significant difference in healing time between the two techniques.[6]

Xu *et al.*[6] excluded studies where an additional procedure was performed along with fistulotomy/fistulectomy, such as marsupialisation. The effectiveness of marsupialisation for simple fistula-in-ano was subsequently evaluated in a 2021 meta-analysis by Sahebally *et al.*[30] This found significantly shorter healing time; however, similar recurrence and incontinence rates compared to no marsupialisation. However, the six included studies exhibited significant heterogeneity, analysing both fistulectomy and fistulotomy together, and therefore the results should be interpreted with caution. Conversely, our subgroup analysis of fistulectomy compared to fistulotomy with marsupialisation, involving five studies, found no significant difference in healing time. This finding is congruent with the ESCP guidelines, which report only low-level evidence for the use of marsupialisation with fistulectomy or fistulotomy.[5]

In regards to the incidence of postoperative bleeding, Xu *et al.*[6] reported a trend favouring fistulotomy, for which our updated review was able to demonstrate statistical significance. With fistulectomy, resulting in a larger wound compared to fistulotomy, it is reasonable to infer that the larger area of non-epithelialized tissue has a greater propensity to bleed. Furthermore, our sensitivity

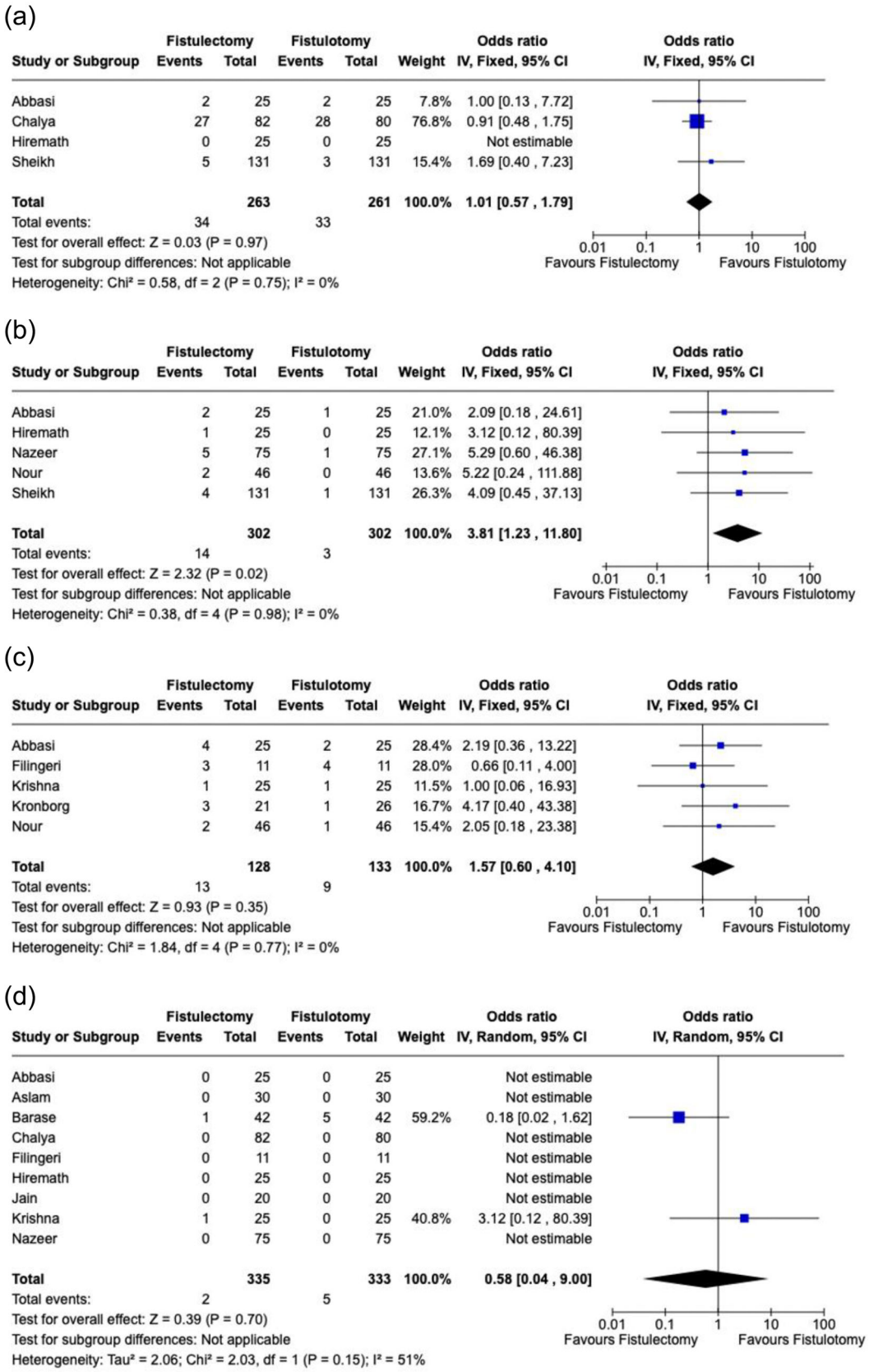


Fig. 4. Postoperative complications: Wound infection (a), Bleeding (b), Flatus Incontinence (c) and Faecal Incontinence (d).

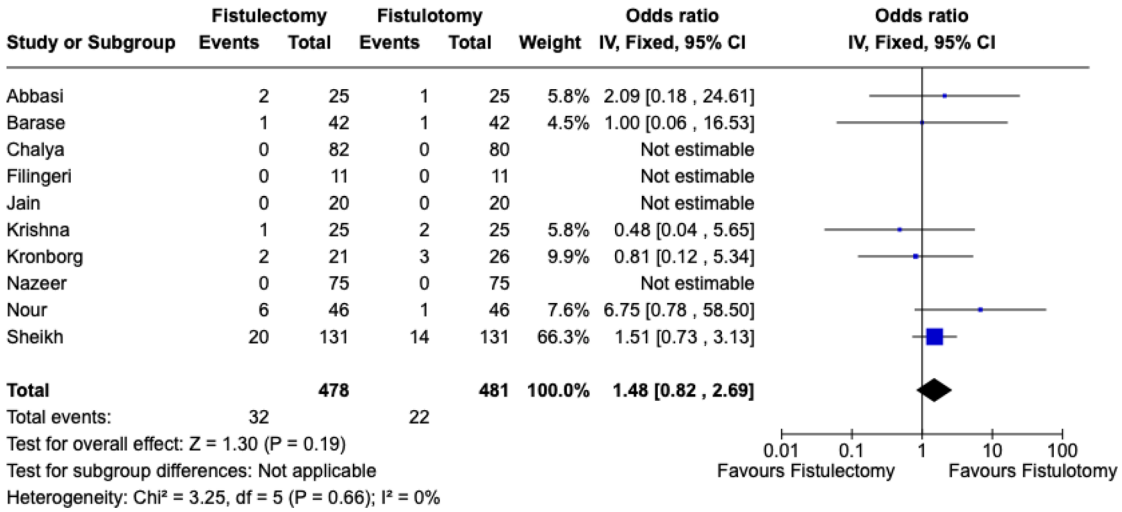


Fig. 5. Recurrence.

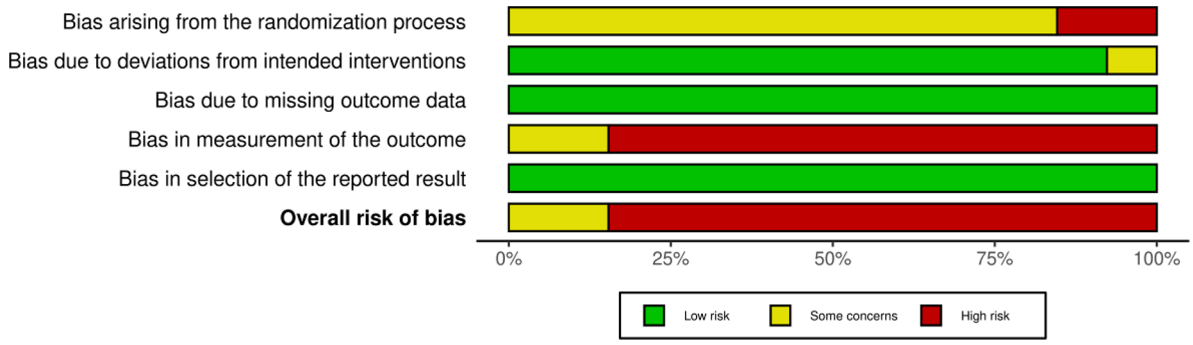


Fig. 6. Risk of bias summary.

analysis excluding studies involving fistulotomy with marsupialisation eliminated the statistical significance ($P = 0.02$ *vs.* $P = 0.05$), again implying the size of the exposed wound correlates with postoperative bleeding.

In contrast to Xu *et al.*,[6] our review found significantly higher post-operative pain scores following fistulotomy. Of the seven studies that reported post-operative pain scores at 24 h, only two found statistically significant differences within their cohort. Filigeri *et al.*[20] attributed reduced pain to the use of radiofrequency ablation to excise the fistula tract. The lower temperatures utilized with this technique were hypothesised to cause less tissue trauma than fistulotomy with diathermy. Kalim *et al.*[29] did not provide a rationale for their positive finding. Of note, four of the seven studies included fistulotomy with marsupialisation, in which suturing of the wound may potentially increase pain due to tension, therefore confounding the results.[14, 19, 23, 27] Further RCT studies exploring the impact of marsupialisation on post-operative pain are needed to investigate this finding.

Fistulectomy provides the additional advantage of allowing histopathological assessment of the excised tract. Tuberculosis (TB) associated fistula disease, for instance, is classified as a complex fistula and therefore excluded from this review. Despite this, the majority of studies included in our review were conducted in countries defined by the World Health Organization (WHO) as having a high burden of TB, including India, Pakistan, and Tanzania.[31] Incidental diagnosis of TB on histopathology was reported in two studies,[21, 24] with Sheikh *et al.*[24] subsequently excluding these patients from their analysis. The diagnostic and therapeutic implications provide an argument for fistulectomy over fistulotomy in these high-risk patient groups.

A limitation of our review is the high degree of heterogeneity regarding surgical technique and post-operative management, including analgesic, aperient and antibiotic regimens. The majority of included studies also lacked adequate documentation of the randomisation process and presence or absence of blinding, resulting in an overall high risk of bias and impacting the certainty of evidence.

Conclusion

Our systematic review did not find conclusive evidence of the superiority of either fistulotomy or fistulectomy in terms of healing time. The two statistically significant findings of lower post-operative pain scores with fistulectomy, and reduced post-operative bleeding with fistulotomy may be confounded by the effect of

marsupialisation in some studies. We recommend consideration of fistulectomy in cases when histopathological assessment is warranted.

Acknowledgement

Open access publishing facilitated by The University of Sydney, as part of the Wiley - The University of Sydney agreement via the Council of Australian University Librarians.

Conflict of interest

None declared.

References

1. Charalampopoulos A, Papakonstantinou D, Bagias G, Nastos K, Perdikaris M, Papagrigoriadis S. Surgery of simple and complex anal fistulae in adults: a review of the literature for optimal surgical outcomes. *Cureus* 2023; **15**: e35888.
2. Parks A, Gordon P, Hardcastle J. A classification of fistula-in-ano. *Br. J. Surg.* 1976; **63**: 1–12.
3. Whiteford MH, Kilkenny J 3rd, Hyman N *et al*. Practice parameters for the treatment of perianal abscess and fistula-in-ano (revised). *Dis. Colon Rectum* 2005; **48**: 1337–42.
4. Gaertner WB, Burgess PL, Davids JS *et al*. The American Society of Colon and Rectal Surgeons clinical practice guidelines for the Management of Anorectal Abscess, fistula-in-Ano, and rectovaginal fistula. *Dis. Colon Rectum* 2022; **65**: 964–85.
5. Reza L, Gottgens K, Kleijnen J *et al*. European Society of Coloproctology: guidelines for diagnosis and treatment of cryptoglandular anal fistula. *Color. Dis.* 2024; **26**: 145–96.
6. Xu Y, Liang S, Tang W. Meta-analysis of randomized clinical trials comparing fistulectomy versus fistulotomy for low anal fistula. *Springerplus* 2016; **5**: 1722.
7. Moher D, Liberati A, Tetzlaff J, Altman DG, Group P. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Int. J. Surg.* 2010; **8**: 336–41.
8. The Cochrane Collaboration. Review Manager (RevMan). Version 7.4.0. Available from: revman.cochrane.org.
9. Higgins J, Li T, Deeks J. Chapter 6: choosing effect measures and computing estimates of effect. In: *Cochrane Handbook for Systematic Reviews of Interventions Version 6.4*. Chichester, UK: John Wiley & Sons, 2019. www.training.cochrane.org/handbook.
10. Sterne J, Savović J, Page M *et al*. RoB 2: a revised tool for assessing risk of bias in randomised trials. *BMJ* 2019; **366**: l4898.
11. Schünemann, H, Brożek, J, Guyatt, G, Oxman, A. GRADE handbook for grading quality of evidence and strength of recommendations: The GRADE Working Group, 2013; 2013. Available from: guidelinedevelopment.org/handbook.
12. GRADEpro Guideline Development Tool [Software]: McMaster University and Evidence Prime, 2014. Available from: gradepro.org.
13. Belmonte Montes C, Ruiz Galindo GH, Montes Villalobos JL, Decanini Teran C. Fistulotomy vs fistulectomy. Ultrasonographic evaluation of lesion of the anal sphincter function. *Rev. Gastroenterol. Mex.* 1999; **64**: 167–70.
14. Barase AK, Shinde AM. A comparative study of fistulotomy and fistulectomy in management of simple fistula in ano. *Int. Surg. J.* 2018; **5**: 3704–6.
15. Dubey RD, Singh S, Chalotra V. A comparison of fistulotomy and fistulectomy for the treatment of ano fistula. *J. Cardiovasc. Dis. Res.* 2023; **14**: 1272–7.
16. Ali Gafar AMA. Fistulotomy versus fistulectomy as a treatment for low anal fistula in infants. *Ann. Pediatr. Surg.* 2013; **9**: 103–7.
17. Bhatti Y, Fatima S, Shaikh GS, Shaikh S. Fistulotomy versus fistulectomy in the treatment of low fistula in ano. *Rawal. Med. J.* 2011; **36**: 1–8.
18. Abbasi MA, Rahim A, Sulaiman H, Rehman A, Khatoon N, Soomro IA. Should low anal fistula be treated with fistulotomy or fistulectomy? *HIV Nurs.* 2023; **23**: 2188–91.
19. Chalya PL, Mabula JB. Fistulectomy versus fistulotomy with marsupialisation in the treatment of low fistula-in- ano: a prospective randomized controlled trial. *Tanzan. J. Health Res.* 2013; **15**: 193–8.
20. Filingeri V, Gravante G, Baldessari E, Casciani CU. Radiofrequency fistulectomy vs diathermic fistulotomy for submucosal fistulas: a randomised trial. *Eur. Rev. Med. Pharmacol. Sci.* 2004; **8**: 111–6.
21. Krishna B, Sinha PK, Siddesh GB, Nagekar SS. A study on the outcome of fistulectomy versus fistulotomy in management of low anal fistulae with special reference to sphincteric function. *J. Cardiovasc. Dis. Res.* 2024; **15**: 355–68.
22. Nazeer MA, Saleem R, Ali M, Ahmed ZN. Better option for the patients of low fistula in ano: fistulectomy or fistulotomy. *Pak. J. Med. Health Sci.* 2012; **6**: 888–90.
23. H N, H M. Fistulotomy with marsupialisation versus fistulectomy with wound sutures in simple anal fistula, a comparative clinical trial. *Res. J. Pharm., Biol. Chem. Sci.* 2020; **11**: 163–8.
24. Sheikh IA, Shukr I, Hanif MS, Rashid MM, Karim N, Ateeq S. Fistulotomy vs fistulectomy in the treatment of simple low anal fistula of male patients. *Pak. Armed. Forces Med. J.* 2015; **65**: 798–802.
25. Aslam D, Zaheer F, Siddiqui SA *et al*. Is fistulotomy with Marsipulization more effective than fistulectomy alone for low fistula in Ano? *J. Coloproctol.* 2021; **41**: 355–60.
26. Hiremath SCS, Patil R. Fistulotomy versus fistulectomy for fistula-in-Ano: a randomized prospective study. *Surg. J. (N. Y.)* 2022; **8**: e336-e40.
27. Jain BK, Vaibhaw K, Garg PK, Gupta S, Mohanty D. Comparison of a fistulectomy and a fistulotomy with marsupialization in the management of a simple anal fistula: a randomized, controlled pilot trial. *J. Korean Soc. Coloproctol.* 2012; **28**: 78–82.
28. Kronborg O. To lay open or excise a fistula-in-ano: a randomized trial. *Br. J. Surg.* 1985; **72**: 970.
29. Kalim M, Umerzai FK. Comparison of mean healing time and pain scores between fistulectomy and fistulotomy for the treatment of low fistula in ano. *J. Postgrad. Med. Inst.* 2017; **31**: 118–21.
30. Sahebally SM, O'Byrne L, Troy A, Byrnes KG, Burke J, McNamara D. A meta-analysis of marsupialisation versus none in the treatment of simple fistula-in-ano. *Int. J. Color. Dis.* 2021; **36**: 429–36.
31. World Health Organisation. *Global tuberculosis report 2023*. Geneva: World Health Organization; 2023. Licence: CC BY-NC-SA 3.0 IGO, 2023.

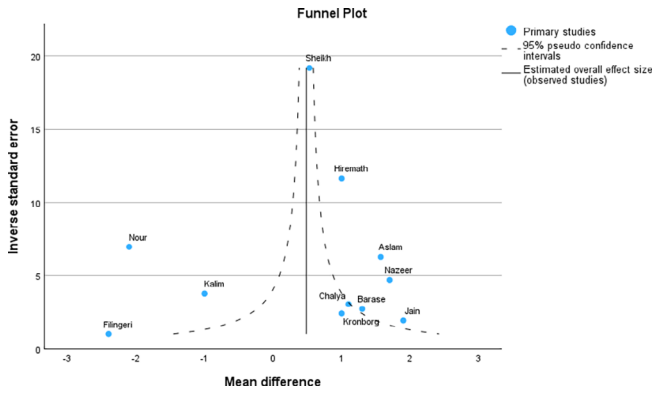
Appendix 1 Search strategy

Database: Embase <1974 to 2024 June 07>

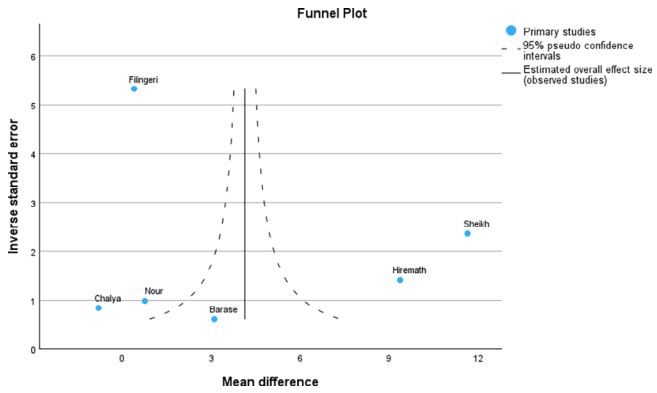
Search Strategy:

1. fistula/ or anus fistula/ or "fistula in ano".mp. (43553)
2. perianal fistula.mp. (1688)
3. low fistula.mp. (113)
4. 1 or 2 or 3 (43812)
5. fistulotomy.mp. (1393)
6. fistulectomy.mp. (949)
7. 4 and 5 and 6 (184)

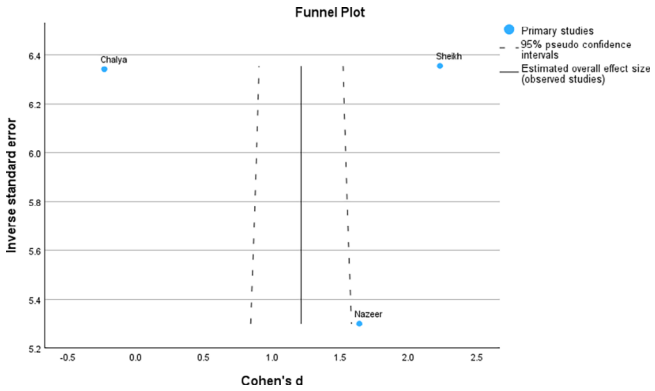
Appendix 2 Publication bias – healing time



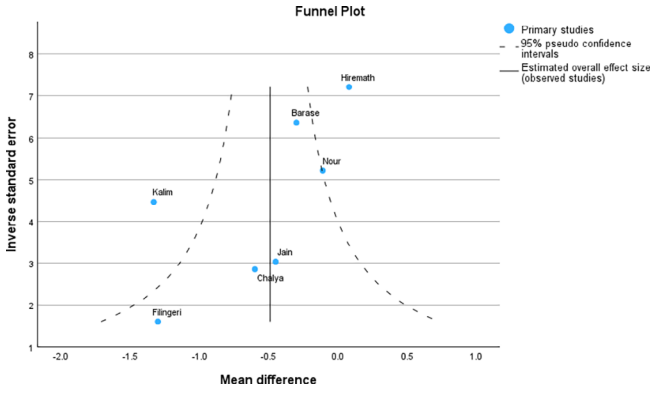
Appendix 3 Publication bias – operative time



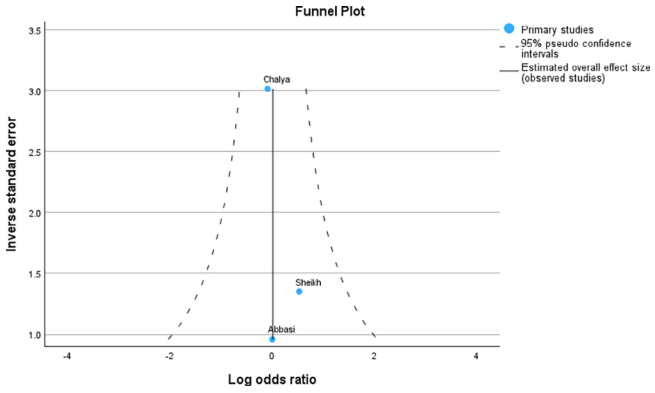
Appendix 4 Publication bias – length of stay



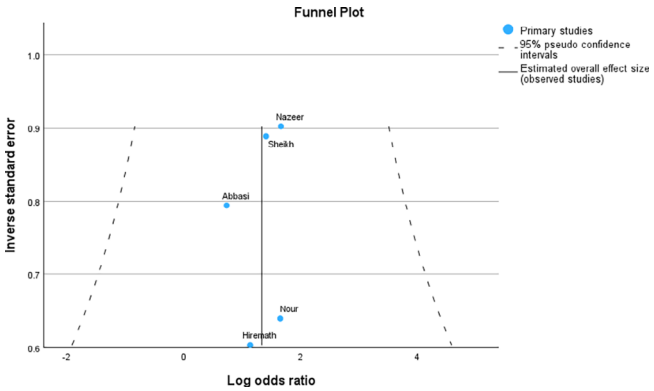
Appendix 5 Publication bias – post-operative pain



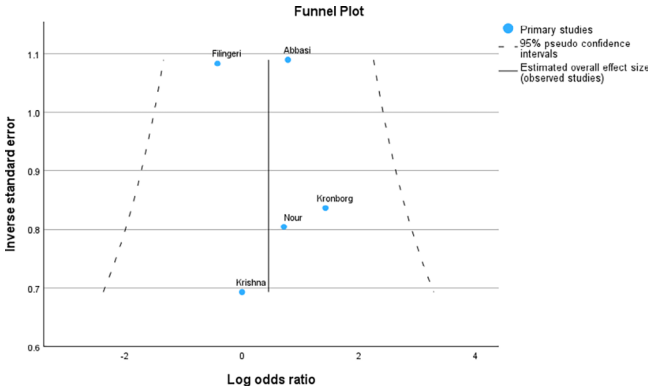
Appendix 6 Publication bias – wound infection



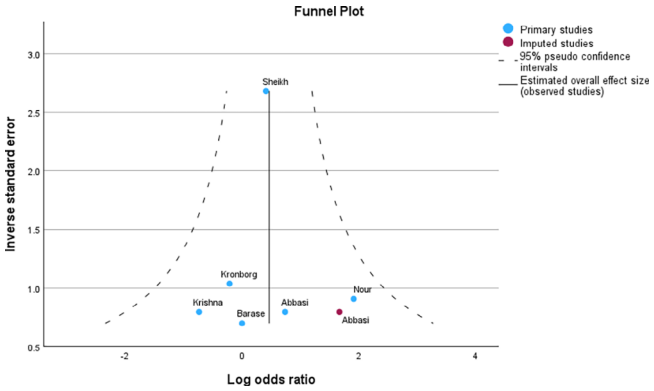
Appendix 7 Publication bias – bleeding



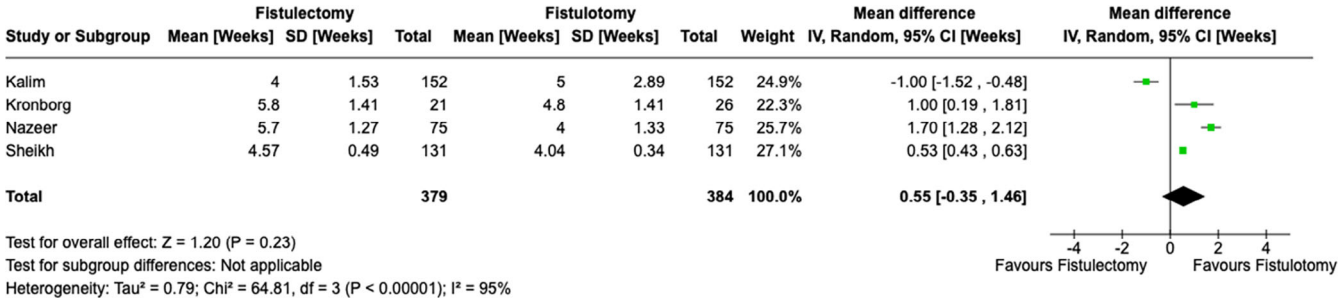
Appendix 8 Publication bias – flatus incontinence



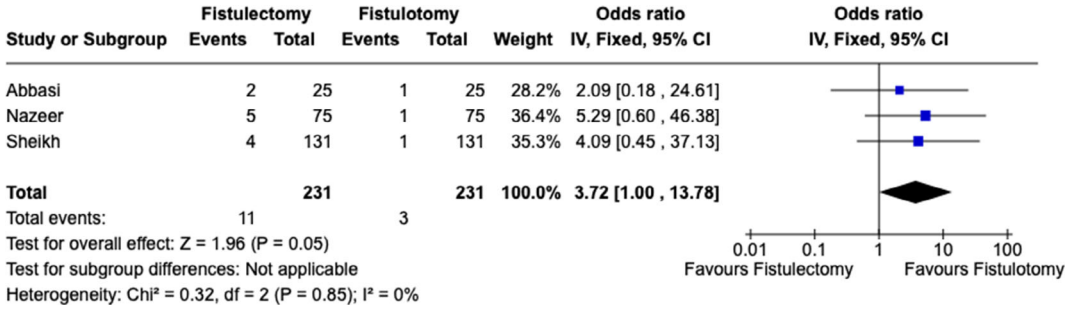
Appendix 9 Publication bias – recurrence



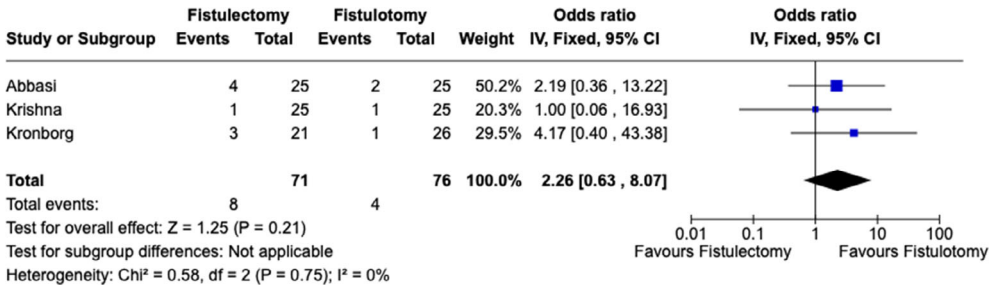
Appendix 10 Sensitivity analysis – healing



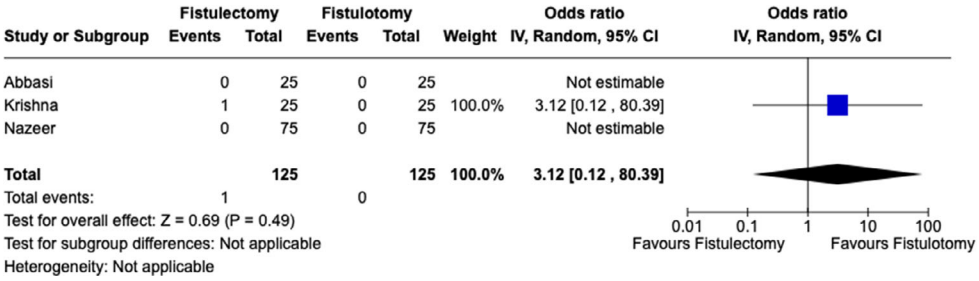
Appendix 11 Sensitivity analysis – bleeding



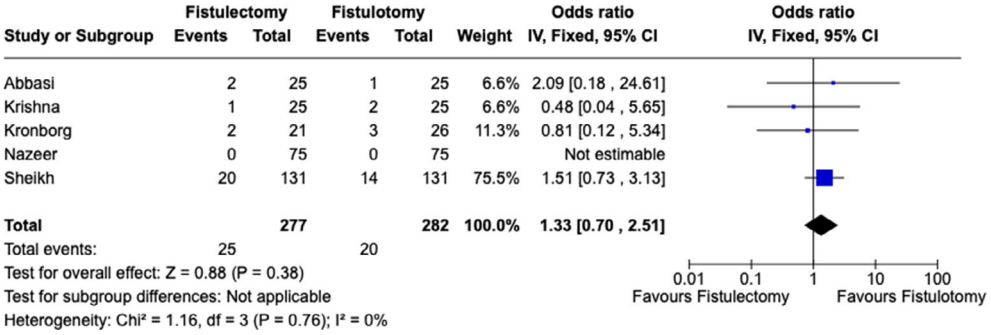
Appendix 12 Sensitivity analysis – flatus incontinence



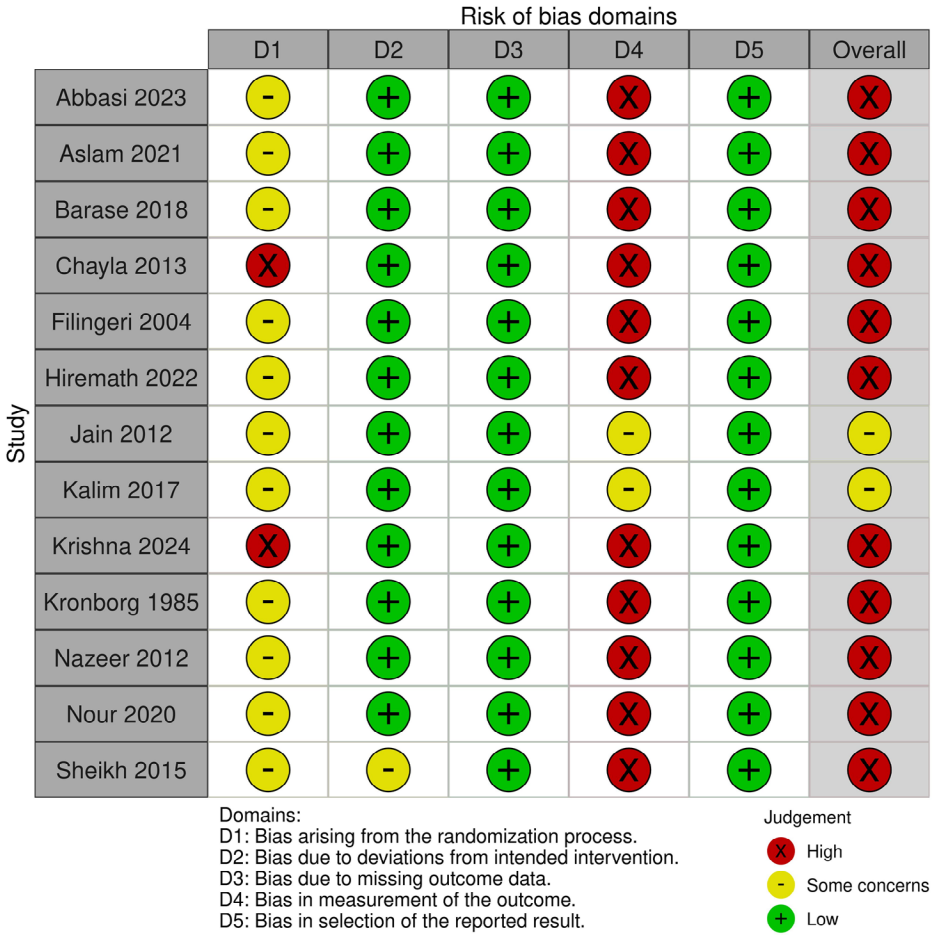
Appendix 13 Sensitivity analysis – faecal incontinence



Appendix 14 Sensitivity analysis – recurrence



Appendix 15 Risk of bias traffic light plot



Appendix 16 GRADE certainty of evidence

Author(s):
Question: Fistulectomy compared to Fistulotomy for Simple anal fistula
Setting:
Bibliography:

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Fistulectomy	Fistulotomy	Relative (95% CI)	Absolute (95% CI)		
Healing Time (assessed with: weeks)												
11	randomised trials	very serious[a]	very serious[b]	not serious	not serious	none	635	638	-	MD **0.5 weeks more** (0.17 fewer to 1.18 more)	⨁◯◯◯ Very low[a,b]	
Operative Time (assessed with: Mins)												
6	randomised trials	very serious[a]	very serious[b]	not serious	serious[c]	none	337	335	-	MD **4.11 Mins more** (1.23 fewer to 9.45 more)	⨁◯◯◯ Very low[a,b,c]	
Post-operative pain (assessed with: VAS)												
7	randomised trials	very serious[a]	very serious[b]	not serious	not serious	none	378	376	-	MD **0.49 VAS lower** (0.9 lower to 0.08 lower)	⨁◯◯◯ Very low[a,b]	
Bleeding												
5	randomised trials	very serious[a]	not serious	not serious	serious[c]	none	14/302 (4.6%)	3/302 (1.0%)	**OR 3.81** (1.23 to 11.80)	**27 more per 1,000** (from 2 more to 96 more)	⨁◯◯◯ Very low[a,c]	
Flatus Incontinence												
5	randomised trials	very serious[a]	not serious	not serious	serious[c]	none	13/128 (10.2%)	9/133 (6.8%)	**OR 1.57** (0.60 to 4.10)	**35 more per 1,000** (from 26 fewer to 162 more)	⨁◯◯◯ Very low[a,c]	
Faecal Incontinence												
9	randomised trials	very serious[a]	serious[d]	not serious	serious[c]	none	2/335 (0.6%)	5/333 (1.5%)	**OR 0.58** (0.04 to 9.00)	**6 fewer per 1,000** (from 14 fewer to 106 more)	⨁◯◯◯ Very low[a,c,d]	
Recurrence												
10	randomised trials	very serious[a]	not serious	not serious	not serious	none	32/478 (6.7%)	22/481 (4.6%)	**OR 1.48** (0.82 to 2.69)	**21 more per 1,000** (from 8 fewer to 68 more)	⨁⨁◯◯ Low[a]	

CI: confidence interval; **MD:** mean difference; **OR:** odds ratio

Explanations

a. RoB-2 – high risk bias
b. I2>75%
c. OIS criterion not met
d. I2 40-75%

Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Data S1. PRISMA Checklist.