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Sinonasal debridement versus no debridement for the postoperative care of patients undergoing endoscopic sinus surgery (Review)

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[Intervention Review]

Sinonasal debridement versus no debridement for the postoperative care of patients undergoing endoscopic sinus surgery

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ABSTRACT

Background

Endoscopic sinus surgery (ESS) is often recommended for symptomatic patients with recurrent acute or chronic rhinosinusitis who have failed conservative treatment. Postoperative care has been felt to be critical for both maintaining the surgical patency of the operated sinuses and improving patient symptoms. Debridement of the sinonasal cavities is one such postoperative care measure that has frequently been studied in the literature, often with conflicting conclusions.

Objectives

To assess the effects of postoperative sinonasal debridement versus no debridement following endoscopic sinus surgery.

Search methods

The Cochrane ENT Information Specialist searched the ENT Trials Register; Central Register of Controlled Trials (CENTRAL, via the Cochrane Register of Studies); PubMed; EMBASE; Web of Science; ClinicalTrials.gov; ICTRP and additional sources for published and unpublished trials. The date of the search was 21 May 2018.

Selection criteria

Randomised controlled trials comparing postoperative nasal debridement versus no debridement in adult patients with recurrent acute or chronic rhinosinusitis undergoing endoscopic sinus surgery. We included studies in which the patients acted as self-controls (i.e. one side of the nose underwent debridement and the other side did not) only for the secondary endoscopy outcomes.

Data collection and analysis

We used the standard methodological procedures expected by Cochrane. Our primary outcome measures were: health-related quality of life, disease severity (patient-reported symptom scores) and significant adverse effects (bleeding requiring intervention, severe pain, iatrogenic injury). Secondary outcomes were: postoperative endoscopic appearance of the sinonasal surgical cavities (endoscopic scores), recorded use of postoperative medical treatment and rate of revision surgery. We used GRADE to assess the quality of the evidence for each outcome; this is indicated in *italics*.

Main results

We included four studies (152 participants), with a follow-up duration ranging from three months to 12 months. In two studies patients acted as self-controls, i.e. one side of the nose underwent debridement and the other side did not ('split-nose' studies). The risk of bias in all studies was high, mostly due to the inability to blind the patients to the debridement procedure.

Primary outcomes

Disease-specific health-related quality of life scores

Only one study (58 participants) provided data for **disease-specific health-related quality of life**. At six months follow-up, lower disease-specific health-related quality of life scores, measured using the Sino-Nasal Outcome Test-22 (SNOT-22, range 0 to 110), were noted in the debridement group but the difference was not statistically significant (9.7 in the debridement group versus 10.3 in the control group, $P = 0.47$) (*low-quality evidence*).

Disease severity (patient-reported symptom score)

Only one study (60 participants) provided data for **disease severity** measured by visual analogue scale (VAS) score. No significant differences in total symptom score were observed between groups postoperatively (*low-quality evidence*).

Significant adverse effects

Significant adverse effects related to the debridement procedure were not reported in any of the included studies, however it is not clear whether data regarding adverse effects were not collected or if none were indeed observed in any of the included studies.

Secondary outcomes

All four studies assessed the **postoperative endoscopic appearance of the sinonasal cavities** using the Lund-Kennedy score (range 0 to 10). A pooled analysis of endoscopic scores in the two non 'split-nose' studies revealed better endoscopic scores in the debridement group, however this was not a statistically significant difference (mean difference -0.31, 95% confidence interval (CI) -1.35 to 0.72; $I^2 = 0\%$; two studies; 118 participants) (*low-quality evidence*). A sub-analysis of the adhesion formation component of the endoscopic score was available for all four studies and revealed a significantly lower adhesion rate in the debridement group (risk ratio 0.43, 95% CI 0.28 to 0.68; $I^2 = 29\%$; four studies; 152 participants). Analysis of the number needed to treat to benefit revealed that for every three patients undergoing debridement, the endoscopic score would be decreased by one point in one patient. For every five patients undergoing debridement adhesion formation would be prevented in one patient.

Use of postoperative medical treatment was reported in all studies, all of which recommended nasal douching. Steroids (systemic or nasal) were administered in two studies. However, the data were very limited and heterogeneous, therefore we could not analyse the impact of concomitant postoperative medical treatment.

The **rate of revision surgery** was not reported in any of the included studies, however it is not clear whether these data were not recorded or if there were no revision surgeries in any of the included studies.

Authors' conclusions

We are uncertain about the effects of postoperative sinonasal debridement due to high risk of bias in the included studies and the low quality of the evidence. Sinonasal debridement may make little or no difference to disease-specific health-related quality of life or disease severity. *Low-quality* evidence suggests that postoperative debridement is associated with a significantly lower risk of adhesions at three months follow-up. Whether this has any impact on longer-term outcomes is unknown.

PLAIN LANGUAGE SUMMARY

Debridement of the nasal and sinus cavities in the postoperative care of patients who have had endoscopic sinus surgery for rhinosinusitis

Review question

What are the benefits and harms of postoperative debridement of the nasal and sinus cavities in patients who have had endoscopic sinus surgery for rhinosinusitis?

Background

Endoscopic sinus surgery is often used for patients with recurrent acute or chronic rhinosinusitis when medical treatment has been unsuccessful. After surgery, several care measures have been suggested to help patients recover. One such measure is sinonasal debridement, which means removal of blood clots, crusts and secretions from the nasal and sinus cavities, a procedure that is usually performed under local anaesthesia.

Study characteristics

We included four studies with a total of 152 adult participants. These studies were conducted in several countries (Norway, the United Kingdom and Canada). All of them compared debridement to no debridement after endoscopic sinus surgery. The minimum follow-up time in the studies ranged from 3 to 12 months. Only one study reported health-related quality of life scores and only one reported disease severity scores. However, all four studies reported scores for the appearance of the sinonasal cavities viewed through an endoscope. Adverse effects of this procedure and rates of revision surgery were not reported in any of these studies.

Key results

Health-related quality of life and disease severity scores were not significantly different between those patients who underwent debridement and those who did not. All four studies demonstrated better post-surgical endoscopic appearance in the debridement group, although the size of improvement was not statistically significant. A lower rate of intranasal scarring was noted in the patient group that underwent debridement. Nonetheless, the overall evidence for all of these outcomes is of low quality.

Quality of the evidence

We identified several problems or potential problems in these studies. The most important was that in each study a different protocol was used for the number of debridement interventions performed per patient and the time interval between each such intervention. In addition, the numbers of patients in the study groups were relatively small. We therefore determined the overall quality of the evidence to be low for all outcomes. The evidence in this review is up to date to May 2018.

SUMMARY OF FINDINGS

Summary of findings for the main comparison. Sinonasal debridement versus no debridement for the postoperative care of patients undergoing endoscopic sinus surgery

Sinonasal debridement versus no debridement for the postoperative care of patients undergoing endoscopic sinus surgery

Patient or population: adult patients who underwent primary endoscopic sinus surgery, with a diagnosis of recurrent acute or chronic rhinosinusitis

Setting: outpatients in a single-centre hospital

Intervention: postoperative debridement

Comparison: no postoperative debridement

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	Nº of participants (studies)	Quality of the evidence (GRADE)	Comments
	Risk with no debridement	Risk with debridement				
Health-related quality of life (SNOT-22) (range 0 to 110) Follow-up: 3 months	Mean score of 10.3	Mean score of 9.7	-	58 (1 RCT)	⊕⊕⊕⊕ Low ¹	Lower SNOT-22 score in the debridement group (not a statistically significant difference)
Disease severity, measured by patient-reported symptom score (VAS) (range 0 to 100) Follow-up: 56 weeks	Mean score of 23.5	Mean score of 17.2	-	60 (1 RCT)	⊕⊕⊕⊕ Low ¹	Lower symptom score in the debridement group (not a statistically significant difference)
Significant adverse effects: significant bleeding requiring intervention, severe pain, iatrogenic injury	-	-	-	-	-	Not reported
Postoperative endoscopic appearance of the sinonasal surgical cavities: Lund-Kennedy endoscopic score (range 1 to 10) Follow-up: 3 to 6 months	The mean Lund-Kennedy endoscopic score ranged across control groups from 1.9 to 3.7	The mean Lund-Kennedy endoscopic score ranged across intervention groups from 2 to 4.1	MD -0.31 (95% CI -1.35 to 0.72)	118 (2 RCTs)	⊕⊕⊕⊕ Low ¹	Lower endoscopic score in the debridement group (not a statistically significant difference)
Adhesion rate Follow-up: 3 to 6 months	16 per 100 operated patients	39 per 100 operated patients	RR 0.43 (95% CI 0.28 to 0.68)	152 (4 RCTs)	⊕⊕⊕⊕ Low ¹	Lower adhesion rate in the debridement group
Rate of revision surgeries	-	-	-	-	-	Not reported

***The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **MD:** mean difference; **RCT:** randomised controlled trial; **RR:** risk ratio; **SNOT-22:** Sino-Nasal Outcome Test-22; **VAS:** visual analogue scale

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

¹Quality of evidence downgraded by two levels: once due to imprecision (small sample size) and once due to study limitations (high risk of bias).

BACKGROUND

Description of the condition

Rhinosinusitis has been defined as a group of disorders characterised by mucosal inflammation of the paranasal sinuses. According to a recent analysis of US national health interview survey data, the prevalence of rhinosinusitis is 12% among adults (Blackwell 2014). It imparts a significant disease burden both within and outside of the health system (Bhattacharyya 2009). Endoscopic sinus surgery is often recommended for symptomatic patients with recurrent acute or chronic rhinosinusitis who have failed conservative treatment.

Postoperative care after endoscopic sinus surgery has long been thought to be critical to achieving successful surgical outcomes. Several postoperative measures have been suggested to reduce postoperative infection, inflammation and synechiae and ultimately to improve patient outcome. Most commonly these include saline irrigations, topical and systemic steroids, oral antibiotics, middle meatal spacers and intranasal debridement (Dautremont 2014; Low 2014; Rudmik 2011).

It has been suggested that nasal saline irrigation assists in softening and removing postoperative nasal crusting and thus improves mucociliary clearance (Jorissen 2004). Topical nasal steroids have been shown to reduce mucosal oedema and decrease the risk of disease recurrence, with the advantage of reducing the use of systemic steroids (DelGaudio 2006). Although commonly used, there is controversy in the literature regarding the efficacy of antibiotics in the postoperative period (Albu 2010; Annys 2000; Jiang 2008). Absorbable and non-absorbable nasal packing, specifically in the middle meatus, is also often used to control immediate postoperative bleeding and as spacers to prevent lateralisation of the middle turbinate. Recently, the use of drug-eluting stents has been introduced, as temporary spacers offering slow-release steroid therapy to the middle meatus (Huang 2015; Rudmik 2011).

Intranasal synechiae, the most common complication of endoscopic sinus surgery, can occur in up to 20% of operated patients (Henriquez 2013). Synechiae can restrict nasal airflow, contribute to ostial blockage and impair delivery of topical medications to the sinuses. The presence of synechiae has been shown to be associated with significantly decreased postoperative disease-specific quality of life scores, such as the physical and emotional domain scores of the Rhinosinusitis Disability Index (RSDI) score and Chronic Sinusitis Survey (CSS) (Henriquez 2013). Lateralisation of the middle turbinate and synechiae to the lateral nasal wall, another very common postoperative complication, may impair adequate postoperative endoscopic visualisation of the sinus cavities and obstruct delivery of topical medications to the sinuses. One study demonstrated that patients who developed middle turbinate lateralisation had higher revision surgery rates compared to patients who did not develop middle turbinate lateralisation (Bassiouni 2015).

Postoperative sinonasal debridements are commonly performed by surgeons to remove the blood clots, crusts and fibrinous debris that frequently form in the postoperative sinonasal cavities. These by-products of wound healing are considered by many to serve as a potential framework for the development of scar tissue that can obstruct the sinus ostia and predispose to sinusitis. A recent survey

of the members of the American Academy of Otolaryngology - Head and Neck Surgery showed that the majority of surgeons conduct postoperative nasal debridement after endoscopic sinus surgery (Portela 2012). The contribution of postoperative debridement of the sinonasal cavities in preventing synechiae formation and improving endoscopic sinus surgery outcomes has been studied frequently in the literature. However, despite a number of studies, there remains no consensus regarding the clinical necessity or value of debridements.

Debridement procedures may increase the cost of care in terms of more frequent postoperative patient visits and increased expenditure per visit.

Description of the intervention

Nasal debridement, considered by many to be the cornerstone of postoperative care (Bugten 2006), can be performed in an outpatient clinic with a local anaesthetic and a vasoconstrictor agent, or in the operating room under general anaesthesia. After an inspection of the operated sinonasal cavities using a rigid endoscope, blood clots, crusts and secretions are gently evacuated by suction and other instruments, such as forceps. Densely adherent clots or crusts are typically left alone. Despite the potential advantages, sinonasal debridement is costlier than standard nasal endoscopy and requires a greater investment of time for both patient and surgeon. In addition, there may be procedure-related discomfort and bleeding. Furthermore, debridement requires appropriate instrumentation that may require additional expenditure on the part of the surgeon.

How the intervention might work

The aim of postoperative nasal debridement is to minimise the rate of adhesion formation and ascertain postoperative outcomes of sinus patency and symptom improvement. It is believed that the evacuation of crusts, clots and granulation tissue, mainly in the immediate postoperative period, helps remucosalisation and prevents ostial stenosis, intranasal scarring and synechiae. Thus, it may improve overall surgical success, reduce the disease recurrence rate, reduce the need for revision surgery and allow better postoperative follow-up and endoscopic visualisation of the sinus cavities.

Why it is important to do this review

Adequate postoperative care following endoscopic sinus surgery is thought by many practitioners to be of great significance in guaranteeing satisfactory results, both in terms of endoscopic appearance and patient quality of life. Nonetheless, in addition to the short-term patient inconvenience and the logistical requisites of this procedure, the role of postoperative nasal debridement in improving postoperative patient outcomes is controversial in the literature (Alsaffar 2013; Bugten 2006). Therefore, the value of postoperative nasal debridement merits further investigation in order to provide evidence-based data and recommendations.

OBJECTIVES

To assess the effects (benefits and harms) of postoperative sinonasal debridement versus no debridement following endoscopic sinus surgery.

METHODS

Criteria for considering studies for this review

Types of studies

Randomised controlled trials. We excluded any study in which patients had less than three months follow-up.

We considered studies in which the patients acted as self-controls, i.e. one side of the nose underwent debridement and the other side did not ('split-nose' studies), only for the secondary endoscopy outcomes. This study design, although important in terms of objective outcomes, can introduce a high risk of bias, as patient-reported outcome tools are more difficult to interpret as these do not typically assess laterality.

Types of participants

Inclusion criteria

- Adult patients (aged over 18 years) who underwent primary endoscopic sinus surgery, with a diagnosis of acute recurrent rhinosinusitis (ARR) or chronic rhinosinusitis, with or without nasal polyps (CRSwNP versus CRSsNP).

Exclusion criteria

- Revision cases.
- Concomitant septoplasty.

Types of interventions

Postoperative nasal debridement (removal of blood clots, crusts and secretions by suction and other instruments, such as forceps).

The comparison was:

- postoperative nasal debridement of any type *versus* no debridement.

Types of outcome measures

We analysed the following outcomes in the review. We did not use these outcomes as a basis for including or excluding studies.

Primary outcomes

- Health-related quality of life, measured by disease-specific health-related quality of life scores, such as the Sino-Nasal Outcome Test-22 (SNOT-22), Rhinosinusitis Outcome Measures-31 (RSOM-31) and SNOT-20.
- Disease severity, measured by patient-reported symptom score (such as the Chronic Sinusitis Survey (CSS) questionnaire and visual analogue scales).
- Significant adverse effect(s): significant bleeding requiring intervention, severe pain, iatrogenic injury.

Secondary outcomes

- Postoperative endoscopic appearance of the sinonasal surgical cavities (adhesions, synechiae, ostial stenosis, purulence), as measured or described by endoscopic scores such as the Lund-Kennedy score.
- Use of postoperative medical treatment.
- Rate of revision surgeries.

Search methods for identification of studies

The Cochrane ENT Information Specialist conducted systematic searches for randomised controlled trials and controlled clinical trials. There were no language, publication year or publication status restrictions. The date of the search was 21 May 2018.

Electronic searches

The Information Specialist searched:

- the Cochrane ENT Trials Register (searched via the Cochrane Register of Studies 21 May 2018);
- the Cochrane Central Register of Controlled Trials (CENTRAL) (searched via the Cochrane Register of Studies 21 May 2018);
- PubMed (1946 to 21 May 2018);
- Ovid EMBASE (1974 to 21 May 2018);
- LILACS (Latin American and Caribbean Health Science Information database), lilacs.bvsalud.org (searched 21 May 2018);
- KoreaMed (searched via Google Scholar 21 May 2018);
- IndMed, www.indmed.nic.in (searched 21 May 2018);
- PakMediNet, www.pakmedinet.com searched via Google Scholar 21 May 2018);
- Web of Knowledge, Web of Science (1945 to 21 May 2018);
- CNKI, www.cnki.com.cn (searched via Google Scholar 21 May 2018);
- ClinicalTrials.gov, (searched via the Cochrane Register of Studies 21 May 2018);
- World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP), www.who.int/ictpr (searched 21 May 2018).

The Information Specialist modelled subject strategies for databases on the search strategy designed for CENTRAL. Where appropriate, they were combined with subject strategy adaptations of the highly sensitive search strategy designed by Cochrane for identifying randomised controlled trials and controlled clinical trials (as described in the *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0, Box 6.4.b. ([Handbook 2011](#))). Search strategies for major databases including CENTRAL are provided in [Appendix 1](#).

Searching other resources

We scanned the reference lists of identified publications for additional trials and contacted trial authors where necessary. In addition, the Information Specialist searched PubMed to retrieve existing systematic reviews relevant to this systematic review, so that we could scan their reference lists for additional trials. The Information Specialist also ran non-systematic searches of Google Scholar to retrieve grey literature and other sources of potential trials.

We did not perform a separate search for adverse effects of sinonasal debridement. We considered adverse effects as described in the included studies only.

Data collection and analysis

Selection of studies

Two authors (TS and AU) independently assessed the titles and abstracts retrieved by the search strategy, blinded to decisions made by the other author. We obtained the full text of studies that potentially met the inclusion criteria and reviewed these independently. Differences in opinion were settled by discussion with the senior authors ES and PHH.

Data extraction and management

We extracted data from the included studies using a standardised data extraction form. TS performed the data extraction and this was rechecked by AU. We extracted data in order to allow an intention-to-treat analysis. Differences in opinion were settled by discussion with the senior author (ES).

For each study, we extracted the following data:

- year of publication and country of origin;
- demographic characteristics of the participants;
- primary diagnosis of the participants, i.e. recurrent acute rhinosinusitis, CRS with or without nasal polyps;
- extent of disease as assessed by the Lund-Mackay computerised tomography (CT) score and endoscopic scores;
- indication for endoscopic sinus surgery;
- extent of surgery;
- postoperative management other than debridement;
- details of debridement - timing and frequency;
- details of quality of life outcome assessments, assessed by symptom score (visual analogue scale (VAS) or Lund-Mackay) or with more complex tools such as the SNOT questionnaire or the SF questionnaire;
- details of endoscopic score as documented by Lund-Kennedy or equivalent scores;
- length of follow-up time.

Assessment of risk of bias in included studies

AU and TS assessed the risk of bias of the included trials independently, with the following taken into consideration, as guided by the *Cochrane Handbook for Systematic Reviews of Interventions* ([Handbook 2011](#)):

- sequence generation;
- allocation concealment;
- blinding;
- incomplete outcome data;
- selective outcome reporting; and
- other sources of bias.

We used the Cochrane 'Risk of bias' tool in Review Manager 5.3 ([RevMan 2014](#)), which involved describing each of these domains as reported in the trial and then assigning a judgement about the adequacy of each entry: 'low', 'high' or 'unclear' risk of bias.

Measures of treatment effect

We used RevMan 5.3 for data analysis. We assessed dichotomous data by calculating the risk ratio (RR) and continuous data by calculating the mean difference (MD) for outcomes measured on

the same scale and the standardised mean difference (SMD) for outcomes measured on different scales, with 95% confidence intervals (CI).

Unit of analysis issues

We included randomised controlled trials in the review, as recommended by the *Cochrane Handbook for Systematic Reviews of Interventions* ([Handbook 2011](#)). We analysed 'split-nose' studies only for the secondary endoscopy outcomes. Where studies presented results at multiple time points during follow-up (repeated observations such as one month, three months, six months), we analysed the longest follow-up from each study in order to avoid a unit of analysis error.

Dealing with missing data

In any case of missing data, we tried to contact the study investigators with open-ended questions in order to reduce the risk of receiving biased responses. Where contacting the author was not possible, we assumed that missing data were 'missing at random' and we performed data analysis using the available data (i.e. ignoring the missing data).

Assessment of heterogeneity

We analysed heterogeneity using the Chi² test and the I² statistic for quantifying inconsistency, which are included in the forest plots ([Data and analyses](#)). We used the rough guide to interpretation of the I² value as recommended by the *Cochrane Handbook for Systematic Reviews of Interventions* ([Handbook 2011](#)):

- 0% to 40%: might not be important;
- 30% to 60%: may represent moderate heterogeneity;
- 50% to 90%: may represent substantial heterogeneity;
- 75% to 100%: considerable heterogeneity.

As needed, in the presence of statistical heterogeneity, we considered using a random-effects model as recommended by the *Cochrane Handbook for Systematic Reviews of Interventions* ([Handbook 2011](#))

Assessment of reporting biases

In order to minimise publication bias, we included trial databases in the electronic search, looking for published, unpublished and ongoing trials. We considered assessing reporting biases (publication bias and other reporting biases) using a funnel plots as recommended by the *Cochrane Handbook for Systematic Reviews of Interventions* ([Handbook 2011](#)).

Data synthesis

We extracted all available data from the included studies. When dealing with missing data we contacted the relevant author to obtain further data. We carried out statistical analysis using RevMan 5.3. If data were comparable and of sufficient quality, we combined data in order to give a summary measure of effect. If data were not suitable for meta-analysis, we reported the results of the individual studies. We planned to present comparisons of continuous data as the mean difference (MD) or standardised mean difference (SMD) with 95% confidence intervals (CI). We expressed comparisons of binary outcomes as a risk ratio with 95% CI.

Subgroup analysis and investigation of heterogeneity

We assessed clinical heterogeneity by examining the following:

- Types of participants and indications for surgery – patients with a diagnosis of chronic rhinosinusitis with versus without nasal polyps versus recurrent acute sinusitis.
- Extent of disease as measured by preoperative Lund-Mackay scores and endoscopic scores.
- Extent of surgery: uncinectomy and maxillary antrostomy only versus uncinectomy and maxillary antrostomy with anterior ethmoidectomy versus uncinectomy and maxillary antrostomy with total ethmoidectomy; frontal recess surgery; sphenoidotomy.
- Use of other concomitant postoperative measures: saline irrigations; topical nasal steroids; systemic steroids; systemic antimicrobials; placement of packing material in the middle meatus.

As needed, in the presence of statistical heterogeneity, we considered using a random-effects model as recommended by the *Cochrane Handbook for Systematic Reviews of Interventions* (Handbook 2011).

Sensitivity analysis

We did not plan to carry out any sensitivity analyses.

GRADE and 'Summary of findings' table

Two authors (TS and AU) independently used the GRADE approach to rate the overall quality of the evidence. The quality of the evidence reflects the extent to which we are confident that an estimate of effect is correct and we addressed this in the interpretation of results. There are four possible ratings: high, moderate, low and very low. A rating of high quality of evidence implies that we are confident in our estimate of effect and that further research is very unlikely to change our confidence in the estimate of effect. A rating of very low quality implies that any estimate of effect obtained is very uncertain.

The GRADE approach rates evidence from RCTs that do not have serious limitations as high quality. However, several factors can

lead to the downgrading of the evidence to moderate, low or very low. The degree of downgrading is determined by the seriousness of these factors:

- study limitations (risk of bias);
- inconsistency;
- indirectness of evidence;
- imprecision; and
- publication bias.

We included a 'Summary of findings' table for the comparison of postoperative debridement versus no debridement, constructed according to the recommendations described in Chapter 11 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Handbook 2011).

The outcomes presented in the 'Summary of findings' table are health-related quality of life scores (measured by SNOT-22), patient-reported disease-specific symptom scores, significant adverse effects (significant bleeding requiring intervention, severe pain, iatrogenic injury), postoperative endoscopic appearance, adhesion rate and rate of revision surgeries.

RESULTS

Description of studies

Results of the search

From the searches up to May 2018 we identified 1382 papers, reviews, conference abstracts and registered trials. After de-duplication 550 records remained. We discarded all but 10 records.

We formally excluded five studies with reasons (see [Excluded studies](#) and [Characteristics of excluded studies](#)).

We included four studies in the review (Alsaffar 2013; Bugten 2006/8; Fishman 2011; Nilssen 2002). An additional reference reported long-term data from the study Bugten 2006/8.

We identified no ongoing studies and there are no studies awaiting assessment.

A flow chart of the study selection process is shown in [Figure 1](#).

Figure 1. Process for sifting search results and selecting studies for inclusion.

Included studies

See [Characteristics of included studies](#).

Design

Four randomised controlled trials fulfilled the inclusion criteria ([Alsaaffar 2013](#); [Bugten 2006/8](#); [Fishman 2011](#); [Nilssen 2002](#)). All studies compared postoperative debridement to no debridement. In two studies the patients acted as their own controls, as one nasal cavity was debrided and the other served as a control ([Fishman 2011](#); [Nilssen 2002](#)). We considered the studies by Bugten et al to be a single study as the latter was a long-term follow-up of the earlier study participants ([Bugten 2006/8](#)).

Sample sizes

In general, the studies included small numbers of patients. The studies by [Nilssen 2002](#) and [Fishman 2011](#) included 16 and 18 patients respectively. [Bugten 2006/8](#) included 60 patients and [Alsaaffar 2013](#) had a total of 58 patients.

Thus, in total 152 participants were included in this review; 118 participants were eligible for primary and secondary outcome analysis and 152 participants were eligible for secondary subgroup outcome analysis of adhesion formation.

Participants

We noted that the participants in [Alsaaffar 2013](#), [Bugten 2006/8](#) and [Fishman 2011](#) were older than 18 years. The participants in [Nilssen 2002](#) were older than 16 years; the proportion of patients aged 16 to 18 years was not reported. The average age of patients in the studies was 46.5 ([Nilssen 2002](#)), 43.5 ([Bugten 2006/8](#)), 55 ([Fishman 2011](#)) and 48.8 ([Alsaaffar 2013](#)) years. The prevalence of male gender in the studies ranged from 43% ([Bugten 2006/8](#)) to 63% ([Alsaaffar 2013](#)).

In [Nilssen 2002](#) and [Bugten 2006/8](#), patients with recurrent acute rhinosinusitis and chronic rhinosinusitis with or without nasal polyps were included. In [Fishman 2011](#), patients with bilateral symmetrical chronic sinusitis were included and in [Alsaaffar 2013](#) only patients with chronic sinusitis with nasal polyps were included. It should be noted that the study [Alsaaffar 2013](#) excluded patients with frontal and sphenoidal disease.

Regarding the surgical intervention, at least maxillary antrostomy, anterior and posterior ethmoidectomy were performed in [Alsaaffar 2013](#), [Fishman 2011](#) and [Nilssen 2002](#). In [Bugten 2006/8](#), at least uncinectomy was performed in all patients. Antrostomy, anterior and posterior ethmoidectomy were performed in the majority of patients (80% overall).

None of the studies reported performing concomitant septoplasty with the endoscopic sinus surgery. In [Alsaaffar 2013](#), absorbable packing was placed in the middle meatus bilaterally. In [Bugten 2006/8](#), in eight patients a non-absorbable tampon was placed for a minimum of three days.

Intervention

All studies compared post-endoscopic sinus surgery nasal debridement to no debridement. Nonetheless the studies differed in the timing and number of interventions. In all studies debridement was performed following the administration of topical anaesthetics.

In the two studies in which the patients acted as their own controls, randomisation was conducted to determine the intervention side ([Fishman 2011](#); [Nilssen 2002](#)). In [Nilssen 2002](#), a total of five debridement interventions were performed postoperatively at the following time intervals: three days, one week, two weeks, one month and three months postoperatively. In [Fishman 2011](#), a total of three debridement interventions were performed postoperatively at the following time intervals: two weeks, four weeks and six weeks postoperatively.

The remaining studies compared two patient groups that were randomised either to bilateral debridement or no debridement. In [Bugten 2006/8](#), debridement was performed on day six and day 12 postoperatively. In [Alsaaffar 2013](#), debridement was performed at two weeks and four weeks postoperatively.

Thus, in all studies at least one debridement intervention was performed within two weeks postoperatively.

Outcomes

Primary outcomes

Health-related quality of life, using a disease-specific health-related quality of life score, the Sino-Nasal Outcome Test-22 (SNOT-22) was measured only in one study six months postoperatively ([Alsaaffar 2013](#)).

Disease severity, as measured by patient-reported symptom score using a visual analogue scale (VAS), was reported in three studies ([Bugten 2006/8](#); [Fishman 2011](#); [Nilssen 2002](#)). The only eligible study for primary outcome assessment was [Bugten 2006/8](#). The two studies [Nilssen 2002](#) and [Fishman 2011](#) had patients acting as their own controls and therefore were not included in the analysis.

Adverse effects of the intervention were not mentioned in any of the included studies. It is not clear whether adverse effects were not recorded and documented or if none were observed in any of the included studies.

Secondary outcomes

Postoperative endoscopic appearance of the sinonasal surgical cavities was evaluated in all studies ([Alsaaffar 2013](#); [Bugten 2006/8](#); [Fishman 2011](#); [Nilssen 2002](#)). Two studies in which the patients acted as their own controls were not included in the pooled analysis endoscopic score ([Fishman 2011](#); [Nilssen 2002](#)). However, all four studies were included in subgroup analysis that we performed for adhesion as these were documented for each nostril in all studies.

In all of the studies, participants were directed to perform nasal douching. In [Nilssen 2002](#) and [Fishman 2011](#) the douching volume was not specified. [Alsaaffar 2013](#) described a high-volume saline lavage and [Bugten 2006/8](#) described nasal douching with a 50 ml syringe. The frequency of nasal douching was specified in two studies. In [Alsaaffar 2013](#), patients were instructed to perform nasal douching twice daily. In [Bugten 2006/8](#), patients were instructed to perform nasal douching three times a day for four weeks. Moreover, in [Alsaaffar 2013](#) all patients received a three-week weight-adjusted tapering course of oral prednisone after surgery. In [Fishman 2011](#), patients received betamethasone nasal drops (Betnesol) for three weeks followed by a long-term intranasal steroid spray. None of the studies reported use of postoperative antibiotics.

Revision surgeries were not reported in any of the included studies. It is not clear whether these data were not recorded or whether revision surgery was not indicated in any of the patients in these studies.

Excluded studies

Full details are provided in the [Characteristics of excluded studies](#) table.

Of the 10 potentially eligible studies that underwent full-text review we formally excluded five studies. Two were review

articles ([Green 2015](#); [Rudmik 2011](#)). We excluded the remaining three studies because they compared the effects of different frequencies of debridement interventions on patient outcomes and did not compare debridement versus no debridement. All were randomised controlled trials ([Lee 2008](#); [Shi 2015](#); [Varsak 2015](#)).

Risk of bias in included studies

Risk of bias for the included studies is reported in the individual 'Risk of bias' tables and in [Figure 2](#) and [Figure 3](#).

Figure 2. 'Risk of bias' graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

Figure 3. 'Risk of bias' summary: review authors' judgements about each risk of bias item for each included study.

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Alsaffar 2013	+	?	+	-	-	+	+	+
Bugten 2006/8	?	?	-	-	+	+	-	+
Fishman 2011	?	+	-	-	+	+	-	+
Nilssen 2002	+	?	-	-	-	+	-	+

Allocation

Sequence generation

All studies stated that allocation to study treatment arms was randomised. Two studies provided a description suggesting that sequence generation was adequately conducted (Alsaffar 2013; Nilssen 2002). Nilssen 2002, in which patients acted as self-controls, randomised the side of intervention. We rated these two studies as low risk of bias for sequence generation. Two studies did not mention how randomisation was conducted, so we judged them to have unclear risk of bias (Bugten 2006/8; Fishman 2011).

Allocation concealment

Only one study described how allocation concealment was carried out and we ranked it as low risk (Fishman 2011). We judged all other studies as unclear risk of bias (Alsaffar 2013; Bugten 2006/8; Nilssen 2002).

Blinding

Blinding of patients to the debridement procedure is not feasible. Thus, we judged all studies except Alsaffar 2013 as high risk of bias. In Alsaffar 2013, patients were reported to be quasi-blinded by deception as they were informed that the study was

investigating different types of follow-up without assessing the issue of debridement. Thus, we judged this study as low risk.

Conversely, blinding of endoscopic assessment may be performed by including trained observers blinded to whether debridement was undertaken or not. In [Nilssen 2002](#), the evaluating surgeon was not blinded to the procedure and we thus ranked the study as high risk. Two studies reported that a blinded surgeon performed the evaluation of endoscopic appearance ([Bugten 2006/8](#); [Fishman 2011](#)). We rated these as low risk for detection bias for the endoscopic assessment outcome. [Alsaffar 2013](#) did not report whether blinded assessment of endoscopic appearance was conducted and thus we judged it as unclear risk of bias.

Incomplete outcome data

We judged all studies to have a low risk of attrition bias.

In [Alsaffar 2013](#), all patients completed the follow-up period. In the two studies in which patients acted as their own controls, a number of patients failed to attend the follow-up visit: one patient in [Nilssen 2002](#) and six patients in [Fishman 2011](#). However, since each patient withdrawal was in effect a withdrawal from both groups we ranked these studies as low risk for attrition bias. In [Bugten 2006/8](#), a total of two patients withdrew from the study, one from each group. We therefore also judged this study as low risk for attrition bias.

Selective reporting

In all of the included studies the planned outcomes that were mentioned in the 'Methods' sections were reported in the 'Results' sections.

Disease severity was reported in three studies ([Bugten 2006/8](#); [Fishman 2011](#); [Nilssen 2002](#)). However, in only one study were two different groups of patients compared and thus included in the primary outcome analysis ([Bugten 2006/8](#)). In the two other studies, patients acted as their own controls and were therefore excluded from the analysis. Quality of life was reported in only one study using the SNOT-22 questionnaire ([Alsaffar 2013](#)). Adverse effects and revision surgery rates were not mentioned in any of the studies.

In [Nilssen 2002](#), all outcomes were reported using graphic illustrations only. Although P values were reported in the text, mean scores were not mentioned. In [Bugten 2006/8](#), the P values and standard deviation (SD) for mean endoscopic score comparisons were not reported. We therefore performed SD calculation using a statistical t-test model derivative of mean endoscopic score. In [Fishman 2011](#), the VAS symptom score was not fully reported, providing only the P values. We therefore judged all three of these studies to be at high risk for selective reporting bias.

In contrast, in [Alsaffar 2013](#) all expected outcomes were reported and thus we considered it to be at low risk of bias.

Other potential sources of bias

We identified no other potential sources of study bias (low risk of bias).

Although in all studies debridement was compared to no debridement in the postoperative period, each study used a different protocol for the number of debridement interventions performed and the time interval between each such intervention.

Effects of interventions

See: [Summary of findings for the main comparison Sinonasal debridement versus no debridement for the postoperative care of patients undergoing endoscopic sinus surgery](#)

See [Summary of findings for the main comparison](#).

Debridement versus no debridement following endoscopic sinus surgery

Primary outcomes

Health-related quality of life, measured by disease-specific health-related quality of life scores

Only one study reported health-related quality of life, using the Sino-Nasal Outcome Test-22 (SNOT-22, range 0 to 110) ([Alsaffar 2013](#)). The baseline SNOT-22 scores were 76.8 and 73.4 in the control group and the debridement group, respectively. At six months follow-up both groups had lower SNOT-22 scores (9.7 in the debridement group versus 10.3 in the control group). Neither baseline nor follow-up SNOT-22 scores were statistically different between the groups ($P = 0.47$). The GRADE quality of evidence is low due to the small sample size and lack of blinding for the debridement procedure.

Disease severity, measured by patient-reported symptom score

Although three studies reported disease severity, as measured using a patient-reported symptom score (visual analogue scale (VAS), range 0 to 100), in two of the studies patients acted as their own controls ([Fishman 2011](#); [Nilssen 2002](#)). As mentioned in [Types of studies](#), this study design can introduce a high risk of bias, as patient-reported outcome tools are more difficult to interpret because these do not typically assess laterality. These studies were not included in the analysis.

The only study that qualified for disease severity assessment was [Bugten 2006/8](#), which found no significant difference in total symptom score (VAS range 0 to 100) between the groups at 56 weeks postoperatively (17.2 in the debridement group versus 23.5 in the control group, $P = 0.16$). Nonetheless, the debridement group reported significant improvements in nasal blockage/congestion (19.3 in the debridement group versus 34.6 in the control group, $P = 0.016$) and sneezing (6.3 in the debridement group versus 18.8 in the control group, $P = 0.004$). The GRADE quality of evidence is low due to the small sample size and lack of blinding for the debridement procedure.

Significant adverse effects: significant bleeding requiring intervention, severe pain, iatrogenic injury

Adverse effects of the intervention, although one of the primary outcomes in our review, were not reported in any of the included studies. Whether adverse effects were not observed or these data were not collected is unclear.

Secondary outcomes

Postoperative endoscopic appearance of the sinonasal surgical cavities (adhesions, synechiae, ostial stenosis, purulence)

The endoscopic score (Lund-Kennedy, range 0 to 10) was evaluated in all four studies. In [Nilssen 2002](#), the mean Lund-Kennedy endoscopic score at three months was lower in the debridement group although the difference was not statistically significant.

The adhesion rate was similar between sides. In the study by [Bugten 2006/8](#), the mean Lund-Kennedy endoscopic score at 10 to 14 weeks was similar in both groups. The number of adhesions was, however, significantly higher the control group. In [Fishman 2011](#), the mean Lund-Mackay endoscopic score at three months was lower in the debridement group, although not significantly. Nonetheless, the adhesion rate was higher in the control group. In [Alsaffar 2013](#), the mean Lund-Kennedy endoscopic score at six months was lower in the debridement group although statistically this was not significant. In neither of the study groups were adhesions noted.

A pooled analysis of postoperative endoscopic scores was possible only for the non 'split-nose' studies ([Alsaffar 2013](#); [Bugten 2006/8](#)). Although improved endoscopic scores were noted in the debridement group, this was not statistically significant (mean difference (MD) fixed-effect -0.31, 95% confidence interval (CI) -1.35 to 0.72, $P = 0.55$; two studies; 118 participants) ([Analysis 1.1](#)). There was no statistical heterogeneity ($I^2 = 0\%$). Analysis of the number needed to treat revealed that in one out of three patients undergoing debridement the endoscopic score is decreased by one point.

Adhesions

We performed a sub-analysis to identify whether there were differences in adhesion rates between groups. We evaluated the relative risk between the two groups. Since adhesion formation was reported in all four studies per each side of the nasal cavity, we were able to include all studies in the pooled analysis. A significantly lower adhesion rate was noted in the debridement group (risk ratio 0.43, 95% CI 0.28 to 0.68, $P < 0.001$) ([Analysis 1.2](#)). Heterogeneity between studies was low ($I^2 = 29\%$). From the estimate of a risk difference between the debridement and non-debridement group, we calculated the number of patients needed to treat in order to prevent adhesion formation. Our calculation revealed that in one out of five patients undergoing debridement, adhesion formation will be prevented.

Use of postoperative medical treatment

All participants were guided to perform nasal douching. In two studies the patients were guided to use a high-volume douche ([Alsaffar 2013](#); [Bugten 2006/8](#)). In [Alsaffar 2013](#), all patients received a three-week weight-adjusted tapering course of oral prednisone after surgery. In [Fishman 2011](#), patients received betamethasone nasal drops (Betnesol) for three weeks followed by a long-term intranasal steroid spray. Postoperative antibiotics were not reported to be used in any of the studies.

Rate of revision surgeries

Revision surgery, although a secondary outcome in our review, was not reported in any of the included studies. Whether revision surgeries were not observed in these studies or these data were not collected is unclear.

Due to the small sample sizes and missing/unreported data the subgroup analyses planned in our protocol could not be completed (types of participants and indications for surgery, extent of disease as measured by imaging studies, extent of surgery and postoperative concomitant therapy).

DISCUSSION

Summary of main results

In this review, we included four randomised controlled trials (RCTs) that compared postoperative debridement versus no debridement following endoscopic sinus surgery.

All patients were diagnosed with chronic sinusitis with or without nasal polyps or recurrent acute sinusitis. The majority of patients underwent at least maxillary antrostomy and anterior and posterior ethmoidectomy. Postoperative treatment was inconsistent between the studies and thus its impact on the final outcomes is unclear. For example, in all of the studies, patients were instructed to perform nasal saline lavages postoperatively. Nevertheless, the method of nasal saline lavage was different between studies, ranging from low-volume to high-volume rinses. In addition, the frequency was specified in only two studies. Postoperative systemic steroids were administered in only one study ([Alsaffar 2013](#)), and postoperative topical steroids were administered in another ([Fishman 2011](#)).

Although all studies compared debridement to no debridement in the postoperative period, there was variability in the timing and number of debridement interventions between studies.

When analysing our primary endpoints (patient-reported outcomes) and secondary outcome (nasal endoscopy scores) overall there was insufficient data to support the use of postoperative debridement after endoscopic sinus surgery. Disease-specific quality of life symptom scores were evaluated in only one study, with non-significant differences between groups. Disease severity assessment using a visual analogue scale (VAS) score also showed no significant difference. Adverse effects of postoperative nasal debridement were not reported in any of the studies. Endoscopic scores were evaluated in all four studies, however only the two non 'split-nose' studies were relevant to be included in the pooled analysis. Although there were higher endoscopic scores in the non-debridement group compared with the debridement group, these were not significant (mean difference -0.31, 95% confidence interval (CI) -1.35 to 0.72, $P = 0.55$) ([Analysis 1.1](#)).

Nonetheless, number needed to treat analysis revealed that in one out of three patients undergoing debridement, the endoscopic score is decreased by one point. A sub-analysis of this outcome revealed a lower adhesion rate in the debridement group, which was statistically significant (risk ratio 0.43, 95% CI 0.28 to 0.68, $P < 0.001$) ([Analysis 1.2](#)). Calculation of the number of patients needed to be debrided in order to prevent adhesion formation revealed that for every five patients undergoing debridement, adhesion formation will be prevented in one patient. Adhesion formation in the postoperative sinonasal cavities is often asymptomatic, however it may prevent adequate endoscopic follow-up and delivery of topical medications and thus may be associated with a higher rate of disease recurrence and revision surgery ([Henriquez 2013](#)).

The rate of revision surgery was not reported in any of the included studies.

Overall completeness and applicability of evidence

All studies included in this review involved relevant participants and interventions. However, the cohorts were small and data were only partially available or relevant, particularly for the primary outcomes of this review, quality of life and disease severity. Adverse effects of the debridement intervention were not reported, but it is not clear whether adverse events were not observed or whether these data were not collected. Analysis of secondary outcomes (nasal endoscopy scores) was conducted in all studies but was only blinded in half of them.

The average follow-up time in these studies was three months, thus limiting the applicability of our results to this specific time period. Whether longer-term endoscopic appearance outcomes may differ remains to be studied.

The remaining secondary outcomes (revision surgery rates, use of rescue treatment) were not reported, and it was not possible to determine whether these events were not observed or not collected. Thus, overall, the applicability of the evidence is low.

Quality of the evidence

See [Summary of findings for the main comparison](#).

We could not reach a firm conclusion regarding the effects of postoperative sinonasal debridement versus no debridement following endoscopic sinus surgery for several reasons: 1) only four RCTs were identified; 2) our GRADE assessment of evidence quality was low for all outcomes; and 3) a small number of participants was available for analysis. Moreover, we considered the risk of bias in all studies to be high, mostly due to the inability to blind the patients to the debridement procedure. In addition, we were concerned about selective reporting bias: in [Nilssen 2002](#) endoscopic scores were only reported graphically and in [Bugten 2006/8](#) the P values were not reported.

Potential biases in the review process

We reviewed the risk of bias of the studies independently and in accordance with the current recommended approach for assessing risk of bias in Cochrane Reviews ([Handbook 2011](#)). There was therefore a low risk of bias in the review process. The review authors have no conflicts of interest. We believe that the very comprehensive search process captured all of the relevant studies and thus we do not consider the search to be a source of potential bias. We did not need to make any post hoc decisions during the review process.

Data regarding Lund-Mackay scores, extent of surgery and whether concomitant septoplasty was performed were not fully reported therefore we attempted to reach the study authors. Three out of four study authors responded, which allowed us to partially complete the missing data. We assumed that the remaining missing data were 'missing at random'.

Agreements and disagreements with other studies or reviews

A recent systematic review of postoperative nasal debridement following functional endoscopic sinus surgery has been published ([Green 2015](#)). This review includes four studies comparing debridement and no debridement ([Alsaffar 2013](#); [Bugten 2006/8](#)

(as two studies); [Nilssen 2002](#)), and two studies comparing different debridement frequencies ([Kemppainen 2008](#); [Lee 2008](#)). The study [Fishman 2011](#) was not included in this review. Similar to our findings, the review authors found fewer adhesions in the debridement group, however, due to lack of clear evidence no conclusions were drawn. Moreover, a meta-analysis was not performed due to heterogeneity among studies.

AUTHORS' CONCLUSIONS

Implications for practice

The current evidence to support the use of debridement in the postoperative period following endoscopic sinus surgery is of low quality. There is heterogeneity between the currently available studies in terms of preoperative disease status, surgical interventions and extent of surgery, debridement protocols and additional postoperative measures taken. Of note, the data mainly pertain to the three-month postoperative period and data regarding long-term outcomes are lacking. The evidence does not show that postoperative debridement is better than no debridement in terms of quality of life measurements or patient-reported symptoms scores, nor overall endoscopic appearance. Nonetheless, a sub-analysis revealed that debridement may be advantageous in preventing postoperative adhesion formation, with a number needed to treat to benefit ratio of 5:1. Overall, it is thus difficult to draw firm conclusions regarding the benefit of postoperative debridement. However, the finding of an increased adhesion rate in non-debrided patients should alert surgeons to this unfavourable outcome associated with non-debridement management protocols.

Implications for research

The available data are currently insufficient to adequately assess the clinical benefit of postoperative debridement. Further research is needed to investigate this issue as there are significant implications of poor surgical outcomes with respect to quality of life as well as consumption of healthcare resources. Large, multicentre randomised controlled trials are needed, which can differentiate between surgical indications of recurrent acute sinusitis and chronic rhinosinusitis with and without polyps; control for disease severity; and standardise postoperative debridement and adjunctive care protocols. In addition, patient-reported outcome measures should be standardised and include objective evaluation of olfaction. Evaluation of endoscopic scores should be blinded, ideally by using an impartial trained observer. Long-term outcomes of at least a year should be assessed because with longer follow-up the presence of adhesions has been associated with disease recurrence and revision surgery.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

Alsaffar 2013

Methods	Prospective randomised controlled trial: 2-arm, single-blinded, with 6 months duration of follow-up
Participants	Location: Canada Setting of recruitment and treatment: outpatients after FESS in a tertiary care academic hospital (single centre) Sample size: total of 58 patients - Number randomised: 28 in intervention, 30 in comparison - Number completed: 28 in intervention, 30 in comparison Participant (baseline) characteristics: - Age: mean age of 46.3 years in intervention, 51.3 years in comparison - Gender: men and women were equally represented across the groups Inclusion criteria: CRS with nasal polyps, maxillary and ethmoid disease, failure of medical management Exclusion criteria: revision surgery, frontal or sphenoid disease
Interventions	Intervention group: debridement at follow-up visits 2 weeks and 4 weeks after surgery Comparator group: no debridement Additional intervention: oral prednisone, high-flow saline lavage

Alsaffar 2013 (Continued)

Outcomes	Primary outcome: quality of life measured by SNOT-22 score Secondary outcomes: endoscopic appearance measured by Lund-Kennedy score	
Funding sources	No information provided	
Declarations of interest	No information provided	
Notes	—	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "The patients were randomized into one of the two study groups by use of a formal computer-randomization protocol"
Allocation concealment (selection bias)	Unclear risk	Not mentioned
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "they were quasi blinded by deception during the consent process for the study"
Blinding of outcome assessment (detection bias) Patient-reported outcomes	High risk	[Patient-reported outcomes] Not mentioned
Blinding of outcome assessment (detection bias) Endoscopic assessment	High risk	[Endoscopic assessment] Not mentioned
Incomplete outcome data (attrition bias) All outcomes	Low risk	No dropouts
Selective reporting (reporting bias)	Low risk	Pre-operative CT score not reported
Other bias	Low risk	No other bias identified

Bugten 2006/8

Methods	Prospective randomised controlled trial: 2-arm, single-blinded, with 56 weeks duration of follow-up
Participants	Location: Norway Setting of recruitment and treatment: hospital outpatients after FESS (single centre) Sample size: total of 60 patients • Number randomised: 29 in intervention, 31 in comparison • Number completed: 29 in intervention, 31 in comparison Participant (baseline) characteristics:

Bugten 2006/8 (Continued)

- Age: mean age of 45 years in intervention, 42 years in comparison
- Gender: men and women were equally represented across the groups

Inclusion criteria: ARR and CRS patients

Exclusion criteria: revision surgery, septoplasty, systemic disease affecting the nose

Interventions	Intervention group: debridement at follow-up visits 6 days and 12 days after surgery Comparator group: no debridement Additional intervention: nasal douching
Outcomes	Primary outcome: disease severity measured by VAS score Secondary outcomes: endoscopic appearance measured by Lund-Kennedy score
Funding sources	No information provided
Declarations of interest	No information provided
Notes	P value for endoscopic score not reported

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "the patients were randomized" Comment: method of randomisation not reported
Allocation concealment (selection bias)	Unclear risk	Not mentioned
Blinding of participants and personnel (performance bias) All outcomes	High risk	Patients cannot be blinded to the debridement procedure
Blinding of outcome assessment (detection bias) Patient-reported outcomes	High risk	[Patient-reported outcomes] Not mentioned
Blinding of outcome assessment (detection bias) Endoscopic assessment	Low risk	[Endoscopic assessment] Quote: "two investigators blinded for which group the patient belonged to"
Incomplete outcome data (attrition bias) All outcomes	Low risk	No dropouts
Selective reporting (reporting bias)	High risk	Mean endoscopic score P value not reported
Other bias	Low risk	No other bias identified

Fishman 2011

Methods	Prospective randomised controlled trial: 2-arm, single-blinded, with 3 months duration of follow-up
Participants	Location: United Kingdom Setting of recruitment and treatment: hospital outpatients after FESS (single centre) Sample size: 18 patients, each acting as own control • Number randomised: 24 in intervention, 24 in comparison • Number completed: 18 in intervention, 18 in comparison Participant (baseline) characteristics: • Age: mean age of 55 years • Gender: men and women were equally represented Inclusion criteria: bilateral symmetrical CRS undergoing bilateral FESS Exclusion criteria: revision surgery, unilateral disease
Interventions	Intervention group: debridement at follow-up visits 2 weeks, 4 weeks and 6 weeks after surgery Comparator group: no debridement Additional intervention: nasal douching and Betnesol nasal drops followed by a long-term intranasal steroid spray
Outcomes	Primary outcome: disease severity measured by VAS score Secondary outcomes: endoscopic appearance measured by Lund-Kennedy score
Funding sources	No information provided
Declarations of interest	None declared
Notes	The Lund-Mackay endoscopic score resembles the Lund-Kennedy endoscopic score, with the addition of number of granulations

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "one side of the nose was chosen randomly"
Allocation concealment (selection bias)	Low risk	Quote: "Randomisation of the side selected for frequent cleaning was carried out by allocation concealment"
Blinding of participants and personnel (performance bias) All outcomes	High risk	The debridement procedure cannot be blinded to the patient
Blinding of outcome assessment (detection bias) Patient-reported outcomes	High risk	[Patient-reported outcomes] Not mentioned

Fishman 2011 (Continued)

Blinding of outcome assessment (detection bias) Endoscopic assessment	Low risk	[Endoscopic assessment] Quote: "A different surgeon who was blinded to the side of the intervention, was ask to compare and score the two sides at three months post-surgery, based on their endoscopic appearance"
Incomplete outcome data (attrition bias) All outcomes	Low risk	Patients acted as own control There were 6 dropouts in each of the study and control group
Selective reporting (reporting bias)	High risk	VAS score was not fully reported: only P value reported
Other bias	Low risk	No other bias identified

Nilssen 2002

Methods	Prospective randomised controlled trial: 2-arm, non-blinded, with 3 months duration of follow-up	
Participants	Location: United Kingdom Setting of recruitment and treatment: hospital outpatients after FESS (single centre) Sample size: 16 patients, each acting as own control - Number randomised: 18 in intervention, 18 in comparison - Number completed: 16 in intervention, 16 in comparison Participant (baseline) characteristics: - Age: mean age of 46.5 years - Gender: men and women were equally represented Inclusion criteria: extensive bilateral disease of ARR and CRS with or without polyposis Exclusion criteria: revision surgery, unilateral disease, immune system dysfunction	
Interventions	Intervention group: debridement at follow-up visits 3 days, 1 week, 2 weeks, 1 month and 3 months after surgery Comparator group: no debridement Additional intervention: nasal douching	
Outcomes	Primary outcome: disease severity measured by VAS score Secondary outcomes: endoscopic appearance measured by Lund-Kennedy score	
Funding sources	No information provided	
Declarations of interest	None declared	
Notes	Endoscopic score not fully reported – only mean score mentioned	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "computer-generated randomization was used"

Nilssen 2002 (Continued)

Allocation concealment (selection bias)	Unclear risk	Not mentioned
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: "neither the patient nor the reviewing surgeon was blinded"
Blinding of outcome assessment (detection bias) Patient-reported outcomes	High risk	[Patient-reported outcomes] Comment: the debridement procedure cannot be blinded to the patient
Blinding of outcome assessment (detection bias) Endoscopic assessment	High risk	[Endoscopic assessment] Quote: "neither the patient nor the reviewing surgeon was blinded"
Incomplete outcome data (attrition bias) All outcomes	Low risk	Quote: "one patient failed to attend for regular follow up" Comment: dropout of 5% but from both control and study group
Selective reporting (reporting bias)	High risk	Data reported by graphic illustrations; no mean score reported
Other bias	Low risk	No other bias identified

ARR: acute recurrent rhinosinusitis

CRS: chronic rhinosinusitis

CT: computerised tomography

FESS: functional endoscopic sinus surgery

SNOT-22: Sino-Nasal Outcome Test-22

VAS: visual analogue scale

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Green 2015	ALLOCATION: not a controlled study (review article)
Lee 2008	ALLOCATION: prospective randomised controlled study PARTICIPANTS: adult patients who underwent primary endoscopic sinus surgery, with a diagnosis of chronic rhinosinusitis INTERVENTION: comparison of postoperative debridement frequencies only. No control group of non debridement was studied.
Rudmik 2011	ALLOCATION: not a controlled study (review article)
Shi 2015	ALLOCATION: prospective randomised controlled study PARTICIPANTS: adult patients who underwent primary endoscopic sinus surgery, with a diagnosis of chronic rhinosinusitis with nasal polypsis INTERVENTION: comparison of postoperative debridement frequencies only. No control group of non-debridement was studied
Varsak 2015	ALLOCATION: prospective randomised controlled study

Study	Reason for exclusion
	PARTICIPANTS: adult patients who underwent primary endoscopic sinus surgery, with a diagnosis of chronic rhinosinusitis
	INTERVENTION: comparison of postoperative debridement frequencies only. No control group of non-debridement was studied

DATA AND ANALYSES

Comparison 1. Postoperative nasal debridement versus no debridement

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Postoperative endoscopic appearance (Lund-Kennedy score)	2	118	Mean Difference (IV, Random, 95% CI)	-0.31 [-1.35, 0.72]
2 Adhesions	4	186	Risk Ratio (M-H, Fixed, 95% CI)	0.43 [0.28, 0.68]

Analysis 1.1. Comparison 1 Postoperative nasal debridement versus no debridement, Outcome 1 Postoperative endoscopic appearance (Lund-Kennedy score).

Analysis 1.2. Comparison 1 Postoperative nasal debridement versus no debridement, Outcome 2 Adhesions.

APPENDICES

Appendix 1. Search strategies

CENTRAL (CRS)	PubMed	Embase (Ovid)
#1 MESH DESCRIPTOR Sinusitis EXPLODE ALL TREES	#1 Search "Sinusitis"[Mesh]	1. exp sinusitis/
#2 (rhinosinusitis or nasosinusitis or sinusitis or pansinusitis or eth- moiditis or sphenoiditis):TI,AB,KY	#2 Search (rhinosinusitis[Title/Ab- stract] OR nasosinusitis[Title/Ab- stract] OR sinusitis[Title/Abstract] OR pansinusitis[Title/Abstract] OR ethmoiditis[Title/Abstract] OR sphe- noiditis[Title/Abstract])	2. (rhinosinusitis or nasosinusitis or sinusitis or pansi- nusitis or ethmoiditis or sphenoiditis).ti,ab. 3. (inflamm* and sinus*).ti,ab.
#3 (inflamm* and si- nus*):TI,AB,KY	#3 Search (inflamm*[Title/Abstract] AND sinus*[Title/Abstract])	4. 1 or 2 or 3
#4 #1 OR #2 OR #3		5. exp chronic disease/
#5 MESH DESCRIPTOR Chronic Disease EXPLODE ALL TREES	#4 (#1 OR # OR #3)	6. (chronic or persis* or recur*).ti,ab.
#6 (chronic or persis* or re- cur*):TI,AB,KY	#5 Search "Chronic Disease"[Mesh]	7. exp recurrent disease/
#7 MESH DESCRIPTOR Recur- rence EXPLODE ALL TREES	#6 Search (chronic[Title/Abstract] OR persis*[Title/Abstract] OR re- cur*[Title/Abstract])	8. 5 or 6 or 7
#8 #5 OR #6 OR #7	#7 Search "Recurrence"[Mesh]	9. 4 and 8
#9 #4 AND #8	#8 (#5 OR #6 OR #7)	10. (CRSwNP or CRSsNP or ARS or RARS or ARR).ti,ab.
#10 (CRSwNP or CRSsNP or ARS or RARS or ARR):TI,AB,KY	#9 (#4 AND #8)	11. 9 or 10
#11 #9 OR #10	#10 Search (CRSwNP[Title/Ab- stract] OR CRSsNP[Title/Abstract] OR ARS[Title/Abstract] OR RARS[Ti- tle/Abstract] OR ARR[Title/Ab- stract])	12. exp endoscopy/
#12 MESH DESCRIPTOR En- dосcopy EXPLODE ALL TREES	#11 (#9 OR #10)	13. (endoscop* or uncinectomy or antrostomy or antro- tomy or ethmoidectomy or sphenoidotomy).ti,ab.
#13 (endoscop* or uncinectomy or antrostomy or antrotomy or ethmoidectomy or sphenoidoto- my):TI,AB,KY	#12 Search "Endoscopy"[Mesh]	14. (sinus and surg*).ti,ab.
#14 (sinus and surg*):TI,AB,KY	#13 Search (endoscop*[Title/Ab- stract] OR uncinectomy[Title/Ab- stract] OR antrostomy[Title/Ab- stract] OR antrotomy[Title/Abstract] OR ethmoidectomy[Title/Abstract] OR sphenoidotomy[Title/Abstract])	15. (fess or ess).ti,ab.
#15 (fess or ess):TI,AB,KY	#14 Search (sinus[Title/Abstract] AND surg*[Title/Abstract])	16. exp surgery/
#16 MESH DESCRIPTOR Surgical Procedures, Operative EXPLODE ALL TREES	#15 Search (fess[Title/Abstract] OR ess[Title/Abstract])	17. 12 or 13 or 14 or 15 or 16
#17 #12 OR #13 OR #14 OR #15 OR #16	#16 Search "Surgical Procedures, Operative"[Mesh]	18. 11 and 17
#18 #11 AND #17	#17 (#12 OR #13 OR #14 OR #15 OR #16)	19. exp sinusitis/su [Surgery]
#19 MESH DESCRIPTOR Sinusi- tis EXPLODE ALL TREES WITH QUALIFIERS SU		20. 11 and 19
		21. 18 or 20
		22. exp debridement/
		23. "debridement*".ti,ab.
		24. exp postoperative care/
		25. exp postoperative complication/pc [Prevention]
		26. exp tissue adhesion/pc, su [Prevention, Surgery]
		27. exp suction/

(Continued)

#20 #11 AND #19	#18 (#11 AND #17)	28. ((suck or suction* or removal or evacuat* or forcep* or clean* or clear* or aspirat* or drain*) and (blood or clot* or crust* or adhesion* or fibrin or secretions or granulation* or synechia)).ti,ab.
#21 #18 OR #20	#19 Search "Sinusitis/surgery"[Mesh]	29. wound healing/
#22 MESH DESCRIPTOR Debridement EXPLODE ALL TREES	#20 (#11 AND #19)	30. "wound heal* ".ti,ab.
#23 debridement*:TI,AB,KY	#21 (#18 OR #20)	31. 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30
#24 MESH DESCRIPTOR postoperative care EXPLODE ALL TREES	#22 Search "Debridement"[Mesh]	32. 21 and 31
#25 MESH DESCRIPTOR Postoperative Complications EXPLODE ALL TREES WITH QUALIFIERS PC	#23 Search debridement*[Title/Abstract]	33. (random* or factorial* or placebo* or assign* or allocate* or crossover*).tw.
#26 MESH DESCRIPTOR Tissue Adhesions EXPLODE ALL TREES WITH QUALIFIERS PC,SU	#24 Search (("Tissue Adhesions/prevention and control"[Mesh] OR "Tissue Adhesions/surgery"[Mesh]))	34. (control* adj group*).tw.
#27 MESH DESCRIPTOR Suction EXPLODE ALL TREES	#25 Search "Postoperative Care"[Mesh]	35. (trial* and (control* or comparative)).tw.
#28 ((suck or suction* or removal or evacuat* or forcep* or clean* or clear* or aspirat* or drain*) and (blood or clot* or crust* or adhesion* or fibrin or secretions or granulation* or synechia)):TI,AB,KY	#26 Search ("Postoperative Complications/prevention and control"[Mesh])	36. ((blind* or mask*) and (single or double or triple or treble)).tw.
#29 MESH DESCRIPTOR Wound Healing	#27 Search "Suction"[Mesh]	37. (treatment adj arm*).tw.
#30 ("wound heal*"):TI,AB,KY	#28 Search ((suck[Title/Abstract] OR suction*[Title/Abstract] OR removal[Title/Abstract] OR evacuat*[Title/Abstract] OR forcep*[Title/Abstract] OR clean*[Title/Abstract] OR clear*[Title/Abstract] OR aspirat*[Title/Abstract] OR drain*[Title/Abstract])) AND (blood[Title/Abstract] OR clot*[Title/Abstract] OR crust*[Title/Abstract] OR adhesion*[Title/Abstract] OR fibrin[Title/Abstract] OR secretions[Title/Abstract] OR granulation*[Title/Abstract] OR synechia[Title/Abstract])	38. (control* adj group*).tw.
#31 #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30	#29 Search "Wound Healing"[Mesh]	39. (phase adj (III or three)).tw.
#32 #21 AND #31	#30 Search ("wound healing"[Title/Abstract] OR "wound healings"[Title/Abstract] OR "wound heal"[Title/Abstract] OR "wound healed"[Title/Abstract])	40. (versus or vs).tw.
	#31 (#22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30)	41. rct.tw.
	#32 (#21 AND #31)	42. crossover procedure/
		43. double blind procedure/
		44. single blind procedure/
		45. randomization/
		46. placebo/
		47. exp clinical trial/
		48. parallel design/
		49. Latin square design/
		50. 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49
		51. exp ANIMAL/ or exp NONHUMAN/ or exp ANIMAL EXPERIMENT/ or exp ANIMAL MODEL/
		52. exp human/
		53. 51 not 52
		54. 50 not 53
		55. 32 and 54

Web of Science (Web of Knowledge)

LILACS

Trial Registries

(Continued)

11 #10 AND #7

10 #9 OR #8

9 TOPIC: ((suck or suction* or removal or evacuat* or forcep* or clean* or clear* or aspirat* or drain*) and (blood or clot* or crust* or adhesion* or fibrin or secretions or granulation* or synechia))

8 TOPIC: (debridement* or "wound heal*")

7 #6 AND #5

6 TOPIC: (endoscop* or uncinectomy or antrostomy or antrotomy or ethmoidectomy or sphenoidotomy or fess or ess or (sinus and surg*))

5 #4 OR #3

4 TOPIC: (CRSwnp or CRSsnp or ARS or RARS or ARR)

3 #2 AND #1

2 TOPIC: (chronic or persis* or recur*)

1 TOPIC: (rhinosinusitis or nasosinusitis or sinusitis or pansinusitis or ethmoiditis or sphenoiditis or (inflamm* and sinus*))

(TW:sinusit* OR TW:rhinosinusi-
tis) AND (TW:surg* OR TW:Quirúrgi-
cos OR TW:Cirúrgicos) AND (TW:de-
bridement* OR TW:Desbridam* OR
TW:"wound heal*" OR TW:"Cica-
trizaci3n de Heridas" OR TW: Cica-
trizac3o)

ClinicalTrials.gov

(rhinosinusitis OR nasosinusitis OR sinusitis OR pansinusitis OR ethmoiditis OR sphenoiditis OR (inflammation AND sinus)) AND (debridement OR "wound healing")

OR

(rhinosinusitis OR nasosinusitis OR sinusitis OR pansinusitis OR ethmoiditis OR sphenoiditis OR (inflammation AND sinus)) AND (suck OR suction OR removal OR evacuat* OR forcep OR clean OR cleaning OR clear OR clearing OR aspirate OR aspiration OR drain OR drainage) AND (blood OR clot OR crust OR crusting OR adhesion OR fibrin OR secretions OR granulations OR synechia)

ClinicalTrials.gov (via CRS)

1 rhinosinusitis or nasosinusitis or sinusitis or pansinusitis or ethmoiditis or sphenoiditis or (inflamm* and sinus*) AND INSEGMENT

2 debridement* or "wound heal*" AND INSEGMENT

3 (suck or suction* or removal or evacuat* or forcep* or clean* or clear* or aspirat* or drain*) and (blood or clot* or crust* or adhesion* or fibrin or secretions or granulation* or synechia) AND INSEGMENT

4 #2 OR #3

5 #1 AND #4

6 nct*:au AND INSEGMENT

7 #5 AND #6

8 rhinosinusitis or nasosinusitis or sinusitis or pansinusitis or ethmoiditis or sphenoiditis or (inflamm* and sinus*) AND CENTRAL:TARGET

9 debridement* or "wound heal*" AND CENTRAL:TARGET

10 (suck or suction* or removal or evacuat* or forcep* or clean* or clear* or aspirat* or drain*) and (blood or clot* or crust* or adhesion* or fibrin or secretions or granulation* or synechia) AND CENTRAL:TARGET

11 #9 OR #10 AND CENTRAL:TARGET

12 #8 AND #11 AND CENTRAL:TARGET

13 nct*:au AND CENTRAL:TARGET

14 #12 AND #13 AND CENTRAL:TARGET

15 #14 OR #7

ICTRP

sinus* AND surg* AND debridement OR sinus* AND surg* AND wound heal* OR rhinosinusitis AND surg* AND debridement OR rhinosinusitis AND surg* AND "wound heal*"

CONTRIBUTIONS OF AUTHORS

Ethan Soudry initiated the review, selected eligible studies, analysed and interpreted the data, assessed study risk of bias, revised the review and approved the final content.

Tzelnick Sharon selected eligible studies, assessed study risk of bias, performed data extraction, analysed and interpreted the data, drafted and revised the review.

Alkan Uri selected eligible studies, assessed study risk of bias, performed data extraction, drafted and revised the review.

Peter Hwang analysed and interpreted the data, revised the review and approved the final content.

Moshe Leshno analysed and interpreted the data, revised the review and approved the final content.

DECLARATIONS OF INTEREST

Ethan Soudry: none known.

Tzelnick Sharon: none known.

Alkan Uri: none known.

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INDEX TERMS

Medical Subject Headings (MeSH)

*Endoscopy; Acute Disease; Chronic Disease; Debridement [*methods]; Nasal Cavity [*surgery]; Paranasal Sinuses [*surgery]; Postoperative Care [*methods]; Postoperative Complications [etiology]; Quality of Life; Randomized Controlled Trials as Topic; Rhinitis [*surgery]; Severity of Illness Index; Sinusitis [*surgery]; Tissue Adhesions [etiology]

MeSH check words

Adult; Humans