Endoscopic coblation versus cold curettage adenoidectomy

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Objective
To compare between endoscopic coblation versus cold curettage adenoidectomy regarding operative time, blood loss, postoperative pain, and complications.

Patients and methods
This systematic review was performed in accordance to the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement. An electronic search was conducted from 1998 till 2019 using the different keywords (curettage–coblation techniques of adenoidectomy) through the MEDLINE databases.

Results
The search retrieved 163 unique records. We then retained 49 potentially eligible records for screening. Finally, 14 studies were included in the present work. Concerning the operative time, the overall effect estimates favored curettage over coblation [95% confidence interval (CI) −11.1 to −4.41; *P* = 0.001). A smaller amount of blood loss was noted in coblation group (95% CI −14.29 to −15.76; *P* = 0.23). The postoperative pain was less with coblation (95% CI −0.07 to −4.75; *P* = 0.04). One study directly compared the recurrence rate in the two groups. It favored coblation over curettage for reduction of recurrence rate.

Conclusion
Endoscopic coblation is superior to curettage adenoidectomy regarding the intraoperative blood loss and postoperative pain. However, special attention should be paid for operation time with endoscopic coblation. Nevertheless, further studies are still needed to confirm our findings.

Keywords:
cold curettage adenoidectomy, endoscopic coblation, techniques of adenoidectomy

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Background

Adenoidectomy remains one of the most commonly surgical procedures done by otolaryngologist [1]. Adenoid hypertrophy causes symptoms of nasal blockage such as snoring, sleep apnea, chronic sinusitis, and/or Eustachian tube dysfunction and is usually accompanied by hyposmia, nasal tone of voice, and craniofacial abnormalities. Most of these cases require adenoidectomy [2].

The most commonly used technique is curette adenoidectomy, which dates from the earliest attempts at the procedure. There is a range of curette widths, lengths, and curvatures all based on the original design of Jacob Gottenstein [3]. However, the traditional curettage adenoidectomy to remove adenoids is a fairly 'blind' procedure [4].

A change from cold techniques to electrosurgical approaches like electrocautery has taken place over the past few decades [5,6]. Several methods for adenoidectomy have been developed to minimize morbidity and surgical risk, for example, (microdebriding, bipolar coagulation, endoscopic control stripping, and coblation) [7].

The optimal adenoidectomy operation would ensure safe adenoid removal with shortest operating time, slight blood loss, minimal postoperative complication, and lowest recurrence rate [8].

Coblation can result in less injury to the adjacent tissues, reduced postoperative pain, and improved healing compared with diathermy and also may decrease blood loss in comparison with 'cold steel' procedures [9].

Aim

The aim was to compare between endoscopic coblation versus cold curettage adenoidectomy regarding operative time, blood loss, postoperative pain, and complications.

Patients and methods

This systematic review and meta-analysis was carried out in line with the guidance of the Preferred Reporting Items for Systematic Reviews and

Meta-Analysis Statement and the Meta-Analysis of Observational Studies in Epidemiology Statement. Preferred Reporting Items for Systematic Reviews and Meta-Analyses and Meta-Analysis of Observational Studies in Epidemiology report checklists for authors, editors, and reviewers of meta-analyses of interventional and observational studies. According to the International Committee of the Medical Journal Association (ICJME), the reviewers should record their results on each point mentioned in those checklists. Ethics approval and consent to participate: This systematic review was approved by the institutional review board. Consent to participate: Not applicable as it is a systematic review. Consent for publication: Not applicable as it is a systematic review.

Study selection and eligibility criteria

The present review included studies that fulfilled the following criteria:

(1) Studies that included children and/or adults' patients who were indicted to undergo adenoidectomy.
(2) Studies that assessed the effectiveness and safety of endoscopic coblation technique for adenoidectomy.
(3) Studies that compared the endoscopic coblation technique with cold curettage adenoidectomy.
(4) Studies that reported any of the following outcomes: operative time, blood loss, postoperative pain, and/or complications.
(5) Studies that were randomized controlled trials, comparative studies, prospective cohort, or retrospective studies.

We excluded review articles, non-English studies, theses, dissertations and conference abstracts, and trials with unreliable date for extraction.

Search strategy and screening

An electronic search was conducted from 1998 till 2019 in bibliographic databases, such as Medline via PubMed, SCOPUS, Cochrane Central Register of Controlled Trials (CENTRAL), Web of Science, and Google Scholar, to identify relevant articles. We used different combinations of the following queries: cold curettage adenoidectomy, endoscopic coblation, and different techniques of adenoidectomy.

Screening

Retrieved citations were imported into EndNote X7 for duplicates removal. Subsequently, unique citations were imported into an Excel sheet and screened by two independent reviewers; the screening was conducted in two steps: title and abstract screening, followed by a full-text screening of potentially eligible records.

Data extraction

Data entry and processing were carried out using a standardized Excel sheet, and reviewers extracted the data from the included studies. The extracted data included the following domains: (a) summary characteristics of the included studies, (b) baseline characteristics of studied populations, and (c) study outcomes. All reviewers independently extracted data from the included articles, and any discrepancies were solved by discussion.

Dealing with missing data

Missing SD of mean change from baseline was calculated from standard error or 95% confidence interval (CI) according to Altman (Altman and Bland, 2005).

Data synthesis

Continuous outcomes were pooled as mean difference (MD) or standardized MD using inverse variance method, and dichotomous outcomes were pooled as relative risk using Mantel-Haenszel method. The random-effects method was used under the assumption of existing significant clinical and methodological heterogeneity. We performed all statistical analyses using Review Manager (RevMan) 5.3 or Open Meta-analyst for Windows.

Assessment of heterogeneity

We evaluated heterogeneity by visual inspection of the forest plots, χ^2, and I^2 tests. According to the recommendations of Cochrane Handbook of Systematic Reviews and meta-analysis, χ^2 P values less than 0.1 denote significant heterogeneity, whereas I^2 values show no important heterogeneity between 0 and 40%, moderate heterogeneity from 30 to 60%, and substantial heterogeneity from 50 to 100%. If any trials were judged to affect the homogeneity of the pooled estimates, we planned to perform a sensitivity analysis to assess outcomes with and without the trials that were affecting the homogeneity of the effect estimates.

Assessment of publication biases

We intended to test for publication bias using funnel plots if any of the pooled analysis included more than 10 studies in the review.

Results

Characteristics of the included studies

In the present study, we searched Medline via PubMed, SCOPUS, Web of Science, and Cochrane Central

Register of Controlled Trials (CENTRAL) from their inception till July 2019. The search retrieved 163 unique records. We then retained 49 potentially eligible records for full-texts screening. Finally, 14 studies (number of patients = 1427) were included in the present systematic review and meta-analysis (Fig. 1).

Characteristics of the included studies

Table 1.

Single-arm meta-analysis

Outcomes for cold curettage adenoidectomy

(1) Operative time

Overall, eight studies reported the operative time in cold curettage group. The overall effect estimates showed that the operative time in cold curettage was 8.8 min (95% CI 6.25–22.8). The pooled studies showed significant heterogeneity (P = 0.001; I^2 = 99%; Fig. 2).

(2) Blood loss

Eight studies reported the intraoperative blood loss in cold curettage group. The overall effect estimates showed that the intraoperative blood loss in cold curettage was 24.1 ml (95% CI 18.6–29.6). The pooled studies showed significant heterogeneity (P = 0.001; I^2 = 99%; Fig. 3).

(3) Pain visual analog scale score

Four studies reported the postoperative pain in cold curettage group. The overall effect estimates showed that the postoperative pain in cold curettage was 5.6 (95% CI 4.5–6.8). The pooled studies showed significant heterogeneity (P = 0.001; I^2 = 98%; Fig. 4).

(4) Recurrence

Only three studies reported the rate of recurrence in cold curettage group. The overall effect estimates showed that the rate of recurrence in cold curettage was 14.9% (95% CI 3.7–26.2). The pooled studies showed significant heterogeneity (P = 0.001; I^2 = 90%; Fig. 5).

Outcomes for endoscopic coblation adenoidectomy

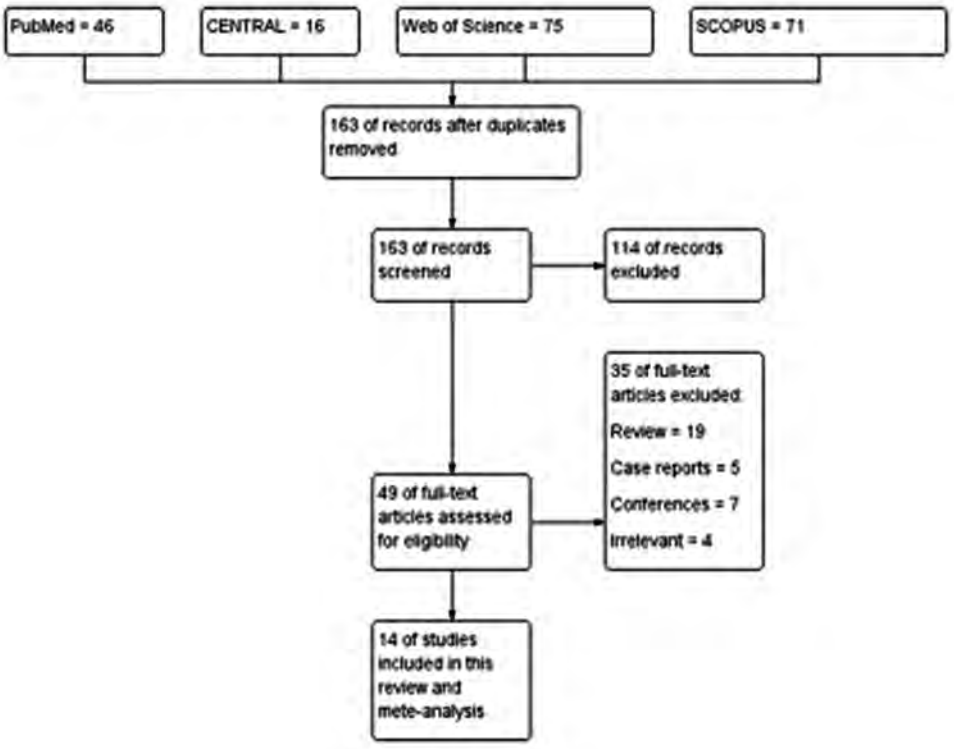
(1) Operative time

Overall, nine studies reported the operative time in endoscopic coblation group. The overall effect estimates showed that the operative time in endoscopic coblation was 13.5 min (95% CI 10.04–16.9). The pooled studies showed significant heterogeneity (P = 0.001; I^2 = 100%; Fig. 6).

(2) Blood loss

Five studies reported the intraoperative blood loss in endoscopic coblation group. The overall effect estimates

Figure 1



PRISMA flow-chart. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

Table 1 Summary characteristics of the included studies

References	Country	Study design	Population	Sample size	Age (years)	Sex, male (%)	Main findings
Ravishakar and Killera [10]	India	RCT	Patients with clinical features				
Adenoid hypertrophy	60	9	53%	Endoscopic adenoidectomy is a safe and more effective compared with curettage method, with very minimal chances of injury to the surrounding structures during the procedure			
Das *et al.* [11]	India	Prospective, observational, study	Children submitted to adenoidectomy	60	3-16	50%	The combined approach of conventional curette along with endoscopic microdebrider-assisted adenoidectomy is a safe and effective method for complete and accurate removal of large adenoids
Yang *et al.* [12]	China	Systematic review	Children submitted to adenoidectomy	331	NR	NR	Endoscopic-assisted adenoidectomy has advantages over conventional curettage adenoidectomy with regard to total operative time, blood loss and complications
Songu *et al.* [13]	Turkey	Double-blinded, RCT	Children submitted to adenoidectomy	38	9.33	52.60%	Endoscopic-assisted adenoidectomy technique was superior to curettage adenoidectomy in reducing adenoidal size after surgery, subjectively no differences were noted between two methods
Mularczyk *et al.* [14]	USA	Single-blinded, RCT	Children submitted to adenoidectomy	101	5.9	NR	Coblation demonstrated significantly less intraoperative time and less blood loss, as well as a shorter duration of postoperative pain, when compared with ME for adenoidectomy
Sjogren *et al.* [15]	USA	Prospective, observational, study	Children submitted to adenoidectomy	1065	4.5	53.50%	These results suggest that adenoidectomy with electrocautery is significantly less expensive than microdebrider and coblator, with no differences in complication rates or surgical times among the techniques
Kim *et al.* [16]	China	Prospective, observational, study	388	6.6	63.10%	This prospective multicenter study showed that CA was superior to PAA in terms of mean operation time and degree of intraoperative bleeding	
Bidaye *et al.* [17]	India	Prospective, observational, study	Children submitted to adenoidectomy	60	6.97	50%	Coblation adenoidectomy has significant advantages over conventional adenoidectomy in terms of reduced blood loss
Businco *et al.* [7]	Italy	Prospective, observational, study	Children submitted to adenoidectomy	40	8.4	45%	Endoscopic coblation adenoidectomy ensures complete removal of adenoids and reduces postoperative adenoid grade

Contd...

Table 1 Contd...

References	Country	Study design	Population	Sample size	Age (years)	Sex, male (%)	Main findings
Özkiriş *et al.* [18]	Turkey	Prospective, observational, study	Children submitted to adenoidectomy	60	5.8	51.60%	The coblation technique provides a less bleeding surgical bed but a longer operation time when compared to curettage technique
El Tahan *et al.* [8]	Egypt	RCT	Children submitted to adenoidectomy	200	10	51%	The use of the coblation technology in adenoidectomy gave more advantage to the procedure with regard to less intraoperative blood loss and lower incidences of postoperative bleeding and recurrence rate
Ferreira *et al.* [19]	Brazil	Prospective, observational, study	Children submitted to adenoidectomy	33	6.3	60%	The conventional technique was faster when compared with the more modern adenoidectomy techniques
Balasubramanian and Vrinda [20]	India	Prospective, observational, study	Children submitted to adenoidectomy	40	4-8	NR	In this study the coblation group demonstrated less postoperative pain, less intraoperative bleeding and more complete removal of adenoid tissue
Gheorghe and Zamfirchiruanton. [21]	Bucharest	Prospective, observational, study	Children submitted to adenoidectomy	93	4.66	NR	Both techniques can consume similar amount of time. Blood loss is significantly higher with microdebrider but better surgical accuracy is obtained through powered instrumentation

RCT, randomized controlled trial.

showed that the intraoperative blood loss in endoscopic coblation was 13.3 ml (95% CI 7.3–19.4). The pooled studies showed significant heterogeneity (P = 0.001; I^2 = 100%; Fig. 7).

(3) Pain visual analog scale score

Four studies reported the postoperative pain in endoscopic coblation group. The overall effect estimates showed that the postoperative pain in endoscopic coblation was 2.9 (95% CI 1.3–4.7). The pooled studies showed significant heterogeneity (P = 0.001; I^2 = 99%; Fig. 8).

Two-arm meta-analysis

Operative time

Six studies directly compared the operative time between cold curettage and endoscopic coblation. The overall effect estimates favored cold curettage over endoscopic coblation for reduction of operative time (MD −7.76, 95% CI −11.1 to −4.41; P = 0.001). The pooled studies showed significant heterogeneity (P = 0.001; I^2 = 99%; Figs. 9 and 10).

Under the random-effects model, the point estimate and 95% CI for the combined studies is 3.11 (0.41, 5.81). Two studies were missing denoting publication bias. Using Trim and Fill, the imputed point estimate is 0.57 (−2.29, 3.43).

Blood loss

Six studies directly compared the blood loss between cold curettage and endoscopic coblation. The overall effect estimates favored endoscopic coblation over cold curettage for reduction of blood loss (MD −15.02, 95% CI −14.29 to −15.76; P = 0.23). The pooled studies showed no significant heterogeneity (P = 0.56; I^2 = 0%; Figs. 11 and 12).

Under the random-effects model, the point estimate and 95% CI for the combined studies is 1.13 (−1.91, 4.17). Using Trim and Fill, these values are unchanged, denoting no publication bias.

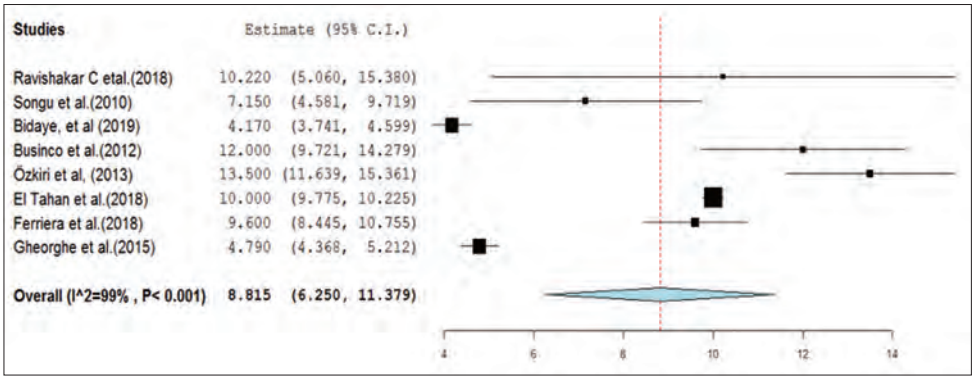
Postoperative pain

Three studies directly compared the postoperative pain between cold curettage and endoscopic coblation. The overall effect estimates favor endoscopic coblation over cold curettage for reduction of postoperative pain (MD −2.14, 95% CI −0.07 to −4.75; P = 0.04). The pooled studies showed significant heterogeneity (P = 0.001; I^2 = 99%; Fig. 13).

Recurrence

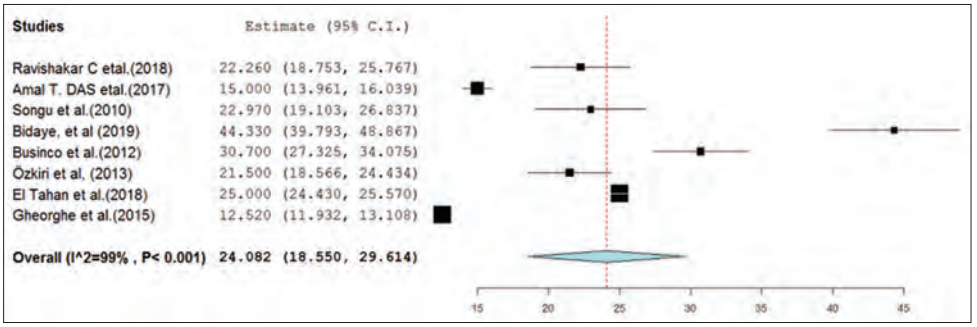
One study directly compared the recurrence rate

Figure 2



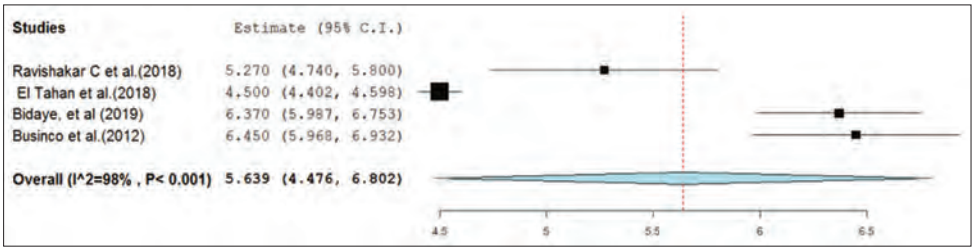
Forest plot of operative time in cold curettage group.

Figure 3



Forest plot of blood loss in cold curettage group.

Figure 4



Forest plot of postoperative pain in cold curettage group.

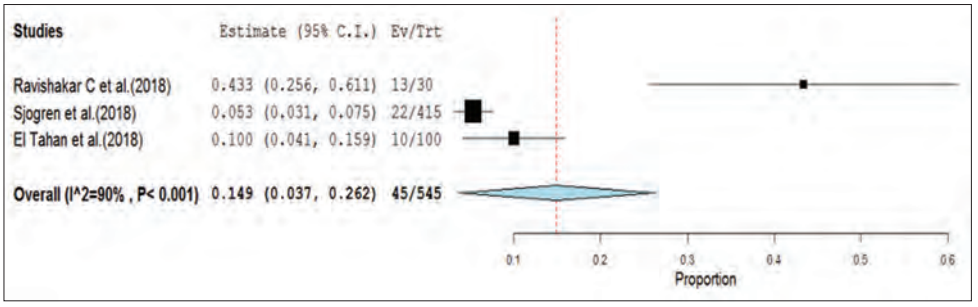
between cold curettage and endoscopic coblation. The overall effect estimates favor endoscopic coblation over cold curettage for reduction of recurrence rate (relative risk 0.2, 95% CI 0.04–0.89; $P = 0.04$; Fig. 14).

Discussion

Adenoidectomy is one of the most frequently performed surgery in children. The primary evidence-based indications for adenoidectomy are the management of secretory otitis media and obstructive sleep apnea. Moreover, this operation is always performed in conjunction with tonsillectomy in cases of marked tonsillar enlargement or a history of repeated tonsillitis that meets paradise criteria. Less common reasons for adenoid removal are in the complete treatment of rhinosinusitis, hyposmia, and suspected malignancies [22].

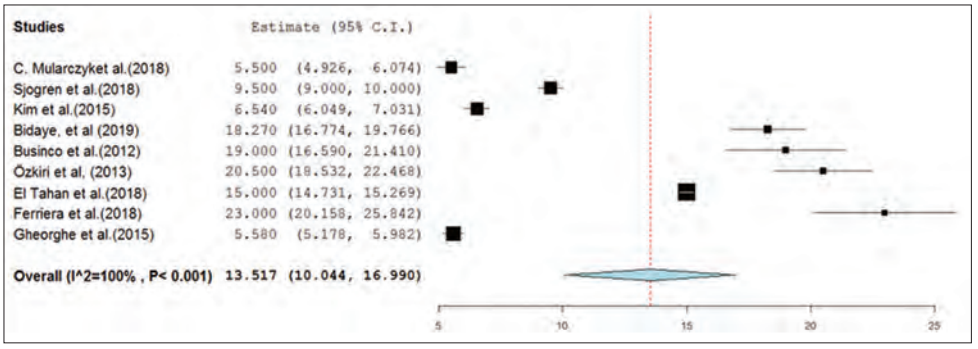
Adenoidectomy may be done using a variety of approaches and many tools. The optimal adenoidectomy operation would ensure safe adenoid removal with shortest operating time, slight blood loss, minimal postoperative complication, and lowest recurrence rate. The curettage adenoidectomy was originally designated in 1885, and since then it has been considered as the most frequently performed operation for removing the adenoid. On the contrary, the classic curettage adenoidectomy for excision of adenoids is a relatively 'blind' approach that endangers the nasopharynx and may be accompanied by inadequate removal of the adenoid [23].

Figure 5



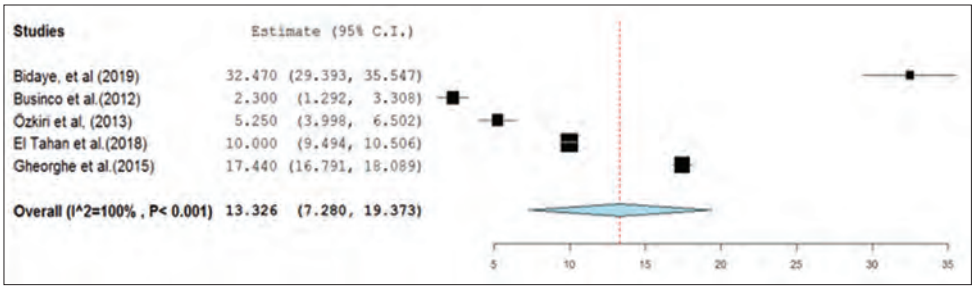
Forest plot of recurrence pain in cold curettage group.

Figure 6



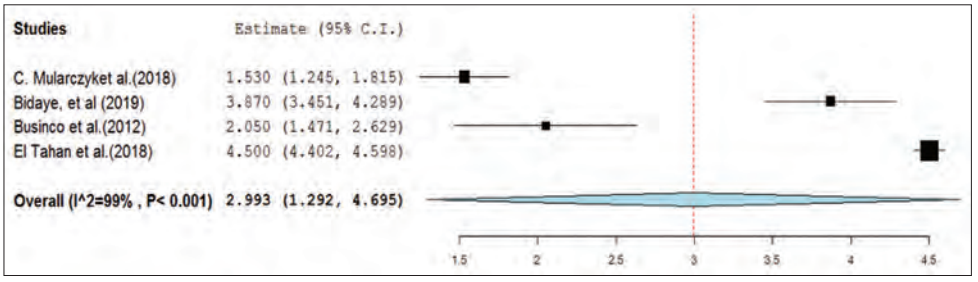
Forest plot of operative time in endoscopic coblation group.

Figure 7



Forest plot of blood loss in endoscopic coblation group.

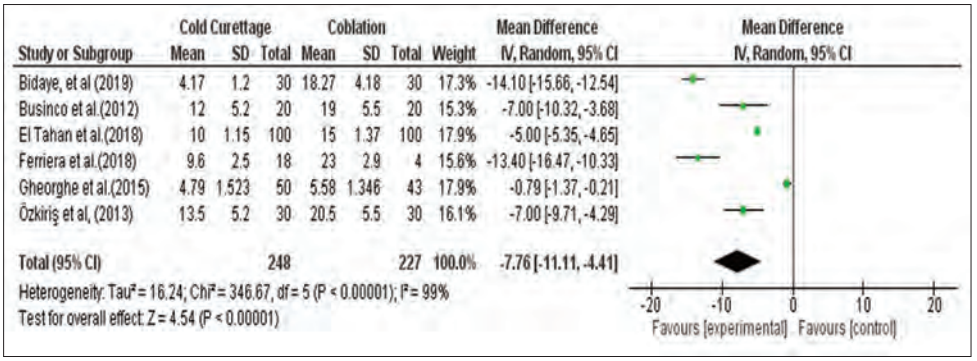
Figure 8



Forest plot of postoperative pain in endoscopic coblation group.

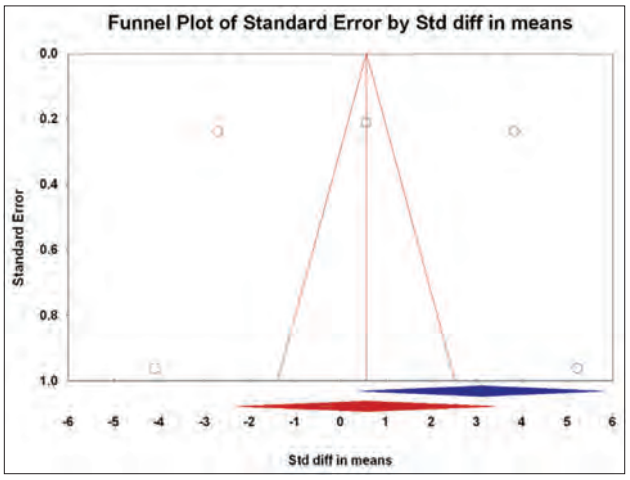
Endoscopic-assisted adenoidectomy can solve this problem, with good visualization. Endoscopic coblation has been established to be a common technique for adenoidectomy. Several authors have reported further important benefits over other techniques, suggesting that while using coblation, cooling the tissues can result in minimal tissue damage, reduce postoperative pain and blood loss, and facilitate healing [8].

Figure 9



Forest plot of operative time.

Figure 10



Funnel plot for operative time.

Despite growing number of published literature studies that support the efficacy of endoscopic coblation, there is, still, a scarcity in high-level evidence that assesses the safety and efficacy of endoscopic coblation in comparison with cold curettage. Thus, we conducted the present systematic review and meta-analysis to compare between endoscopic coblation versus cold curettage adenoidectomy regarding operative time, blood loss, postoperative pain, and complications.

In the present study, we searched Medline via PubMed, SCOPUS, Web of Science, and Cochrane Central Register of Controlled Trials (CENTRAL) from their inception till July 2019. The search retrieved 163 unique records. We then retained 49 potentially eligible records for full-texts screening. Finally, 14 studies (number of patients = 1427) were included in the present systematic review and meta-analysis.

Adenoid hypertrophy is common in children. Size of the adenoid increases up to the age of 6 years and then slowly atrophies and completely disappears at the age of 16 years. Adenoid hypertrophy in adults is rare [24]. On the contrary, adenoid hypertrophy, the most common indication for adenoidectomy, shows a slight male predominance [25].

In the present systematic review and meta-analysis, most included studies recruited patients aged 6–9 years, with male predominance.

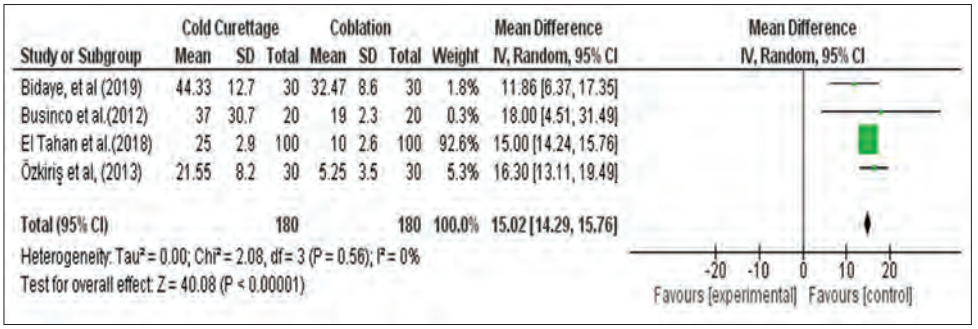
In line with our findings, Szalmás *et al.* [a26] performed a prospective study on 59 children with adenoid hypertrophy undergoing adenoidectomy. The average age of the included patients ranged from 5 to 10 years old, and most patients were males.

The current body of evidence shows that increasing operative time is associated with increased odds of complications, and, therefore, it appears that speed may matter in adenoidectomy [27]. In the present systematic review and meta-analysis, the operative time in cold curettage was 8.8 min (95% CI 6.25–22.8), whereas the operative time in end studies showed significant heterogeneity oscopic coblation was 13.5 min (95% CI 10.04–16.9). The overall effect estimates favored cold curettage over endoscopic coblation for reduction of operative time (MD −7.76, 95% CI −11.1 to −4.41; $P = 0.001$).

In concordance with our findings, Özkiriş *et al.* [18] compared the cold curettage and coblation techniques for pediatric adenoidectomy. The study included 60 consecutive patients undergoing adenoidectomy operation upon the diagnosis of adenoid hypertrophy. Mean operative time was significantly longer for coblation adenoidectomy group than curettage adenoidectomy group.

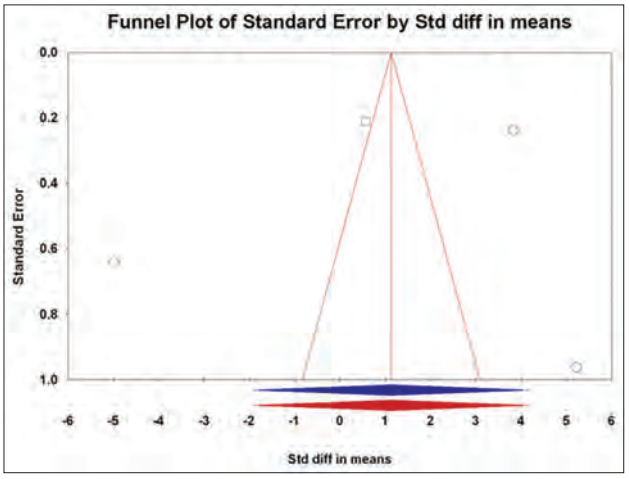
Similarly, Businco *et al.* [7] assessed the efficacy and safety of endoscopic coblator adenoidectomy compared with cold curettage in pediatric patients. A total of 40 homogeneous children (4–16 years of age) with adenoid hypertrophy were divided in two groups to receive

Figure 11



Forest plot of blood loss.

Figure 12



Funnel plot for operative blood loss.

adenoidectomy using cold curettage or coblator. Mean operative time was significantly longer for coblation adenoidectomy group than curettage adenoidectomy group.

Although adenoidectomy is a commonly performed procedure in children and it can be performed alone, the most serious risk associated with the procedure is excessive operative blood loss and postoperative hemorrhage [28].

In the present study, we found that the intraoperative blood loss in cold curettage was 24.1 ml (95% CI 18.6–29.6) and it was 13.3 ml (95% CI 7.3–19.4) in endoscopic coblation. However, the overall effect estimates favored endoscopic coblation over cold curettage for reduction of blood loss (MD 2.09, 95% CI – 1.33 to 5.51; $P = 0.23$).

In line with our findings, El Tahan *et al.* [8] compared the advantages and disadvantages of the coblation technique with the standard conventional curettage technique in the operation of adenoidectomy in pediatric patients. This was a prospective randomized clinical study that included 200 patients presented with obstructive adenoid hypertrophy. The conventional curettage adenoidectomy group recorded significantly less operative time, and the coblation-assisted adenoidectomy group recorded significantly less intraoperative blood loss.

Similarly, Bidaye *et al.* [17] compared conventional cold curettage adenoidectomy with endoscopic-assisted coblation. This prospective nonrandomized study was carried out on 60 patients aged 5–12 years. Mean blood loss was significantly higher in conventional cold curettage adenoidectomy than endoscopic-assisted coblation adenoidectomy.

Pain is a common complaint after adenoidectomy. More than 50% of children experience pain after discharge and need analgesics at home. Because pain is perhaps the most poignant of all hospital fears, a proactive pain treatment is advocated to allow for a peaceful recovery after surgery [29].

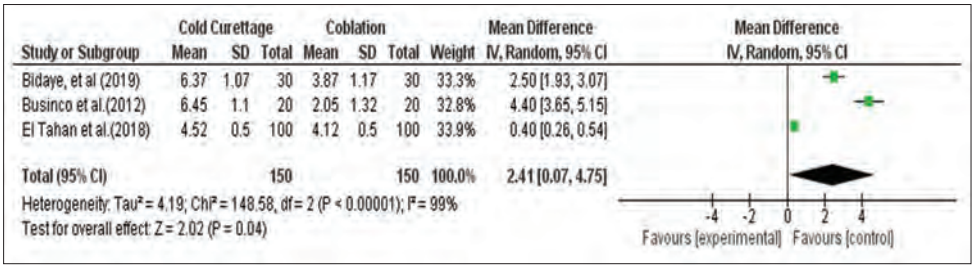
In the present systematic review and meta-analysis, the overall effect estimates showed that the postoperative pain was 5.6 (95% CI 4.5–6.8) for cold curettage and 2.9 (95% CI 1.3–4.7) for endoscopic coblation. The overall effect estimates favored endoscopic coblation over cold curettage for reduction of blood loss.

Similarly, Özkiriş *et al.* [18] reported that the mean operative pain score was significantly lower for coblation adenoidectomy group than curettage adenoidectomy group.

In addition, Songu *et al.* [13] performed a prospective, randomized, double-blinded study on 38 patients who underwent adenoidectomy Children were prospectively and randomly assigned into two groups: the endoscopic assisted adenoidectomy and the curettage adenoidectomy. The mean operative pain score was significantly lower for coblation adenoidectomy group than curettage adenoidectomy group.

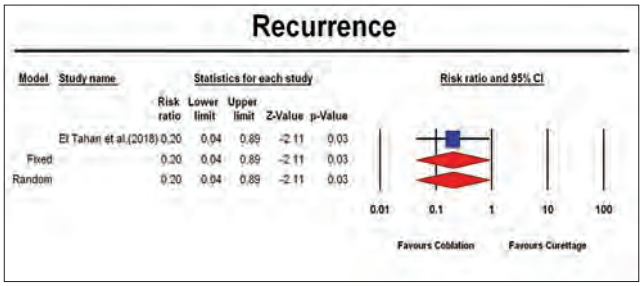
The favorable outcomes with endoscopic coblation technique than the cold curettage technique can be

Figure 13



Forest plot of postoperative pain.

Figure 14



Forest plot of recurrence.

explained by many factors. Endoscopic coblation adenoidectomy can ensure complete and safe removal of adenoid tissue, owing to endoscopic control and the small wand tip, which is able to reach the most cranial part of adenoid and the adenoid intranasal extension (impossible to access with the curette). Another benefit of coblation adenoidectomy is the ability to use a single instrument to ablate and coagulate tissue, with significant improvement of patient recovery compared with cold curettage [12].

Conclusion

Endoscopic coblation technique is superior to cold curettage adenoidectomy in pediatric population. The present systematic review and meta-analysis showed that endoscopic coblation technique had better outcomes in terms of intraoperative blood loss and postoperative pain. However, special attention should be paid for operation time with endoscopic coblation. Nevertheless, further studies are still needed to confirm our findings and to identify patient factors that significantly increase the rate of recurrence in both techniques.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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