NATIONAL INSTITUTE FOR HEALTH AND CLINICAL EXCELLENCE

INTERVENTIONAL PROCEDURES PROGRAMME

Interventional procedure overview of suction diathermy adenoidectomy

Adenoids are small lumps of lymphoid tissue at the back of the nose, which are part of the immune system. They are largest in young children and usually disappear by adulthood. An adenoidectomy is an operation to remove the adenoids if they become enlarged and are thought to be causing health problems such as 'glue ear'. Suction diathermy adenoidectomy is a type of surgery to remove the adenoids using heat and suction to cut them away.

Introduction

The National Institute for Health and Clinical Excellence (NICE) has prepared this overview to help members of the Interventional Procedures Advisory Committee (IPAC) make recommendations about the safety and efficacy of an interventional procedure. It is based on a rapid review of the medical literature and specialist opinion. It should not be regarded as a definitive assessment of the procedure.

Date prepared

This overview was prepared in March 2009.

Procedure name

- Suction diathermy adenoidectomy

Specialty societies

- British Association of Otorhinolaryngologists – Head and Neck Surgery (BAO–HNS)

Description

Indications and current treatment

Adenoid removal is usually performed in children and could be indicated for a number of conditions including:

- nasal obstruction (enlarged adenoids)
- recurrent otitis media with effusion (OME)
- chronic rhinosinusitis
- obstructive sleep apnoea
- chronic sinusitis.

The most common indication in children is simple nasal obstruction, which causes problems such as mouth breathing, nasal discharge and eating problems, followed by OME, and then obstructive sleep apnoea.

Depending on the indication, adenoidectomy is often performed together with tonsillectomy and/or grommet insertion.

Traditionally, ‘cold’ curettage using the adenoid curette (which has a sharp edge perpendicular to its long handle) is used. Potential difficulties include incomplete removal of adenoid tissue and blood loss, which requires packing the nasopharynx or electrocautery to stop the bleeding. Other methods include power-assisted adenoidectomy using a microdebrider (a powered instrument with a very small rotating tip), laser, coblation (using radiofrequency to remove tissue) and the adenotome (a curette-like device).

Adenoid size is measured by the Wormald and Prescott grading system (grade 1: less than one third of the posterior choanae are obstructed; grade 2: one to two thirds of the posterior choanae are obstructed; grade 3: more than two thirds of the posterior choanae are obstructed).

What the procedure involves

The aim of this procedure is to remove the adenoids using suction diathermy (applying heat generated by an electric current to ablate or liquefy tissue and then suction to remove it) so as to minimise blood loss and secondary haemorrhage. The procedure is also known as suction electrocautery or coagulation.

The procedure is performed with the patient under general anaesthesia and in the supine position with the neck extended. A Boyle-Davis gag (a device used to keep the mouth open, the tongue down and the breathing tube elevated as the surgeon works) is inserted, and the palate is inspected and palpated to rule out an occult submucosal cleft. The soft palate is retracted by passing a suction catheter through the nose and out through the mouth. Visualisation is achieved either indirectly (using an antifogged laryngeal mirror) or

endoscopically (via an angled view endoscope inserted into the mouth or nose). A suction diathermy probe (coagulator) is passed through the mouth into the nasopharynx and simultaneous diathermy and suction is applied to ablate and remove swollen adenoid tissue bloodlessly. The procedure is completed when the choanae are clearly visible and the nasopharynx has a smooth contour.

List of studies included in the overview

This overview is based on 6082 patients from five published papers including one meta-analysis[1] of nine studies (two randomised controlled trials [RCTs][2,3,] one non-randomised controlled trial[4], one prospective audit[5], one historical cohort[6] and four cases series[7,8,9,10]), one non-randomised controlled trial[11], one paper[12] reporting both a retrospective case analysis and a prospective non-randomised clinical trial, one case series[13]; and one case report[14].

Other studies that were considered to be relevant to the procedure but were not included in the main extraction table (table 2) have been listed in appendix A.

Efficacy

Technical efficacy

A meta-analysis[1] of six studies including 1812 patients treated with suction diathermy reported a 95% (1721/1812) subjective success rate (defined differently in each study as scale of improvement [e.g. symptoms have resolved, improved, unchanged or worse] or parental satisfaction) (95% CI 92.7 to 97.3%, $p < 0.001$).

An RCT[2] (included in the meta-analysis described above), compared 50 patients treated by curettage with 50 patients treated by suction diathermy. Adenoid size on the Wormald and Prescott grading system was similar in all patients before surgery. Six months after surgery patients treated by suction diathermy had significantly smaller adenoids than patients treated by curettage, with fewer grade 3 adenoids ($p = 0.0184$).

Adenoid tissue regrowth

A meta-analysis[1] of seven studies including 1869 patients treated by suction diathermy reported an adenoid regrowth rate for patients who had been objectively evaluated by endoscopy or x-ray of 2.8% (3/116) (95% CI 0 to 5.5%; $p = 0.052$).

Symptom resolution

The RCT[2] of 100 patients reported no significant difference between patients treated by suction diathermy and patients treated by curettage in terms of symptom improvement (defined using a patient-reported symptom scale of ‘resolved’, ‘improved’, ‘unchanged’ or ‘worse’) and overall 96% (88/92) of patients reported that their symptoms had either resolved or improved.

A prospective audit[5] (also included in the meta-analysis by Reed et al.[1]) of 126 patients (68 treated by suction diathermy and 58 by curettage) reported that patients in both groups had significantly lower mean postoperative symptom scores (scores ranged from 0 to 6 measuring nasal obstruction, loudness and frequency of snoring, duration of coloured rhinorrhea and presence of irregular sleep patterns) compared to preoperative scores ($p < 0.001$ for both groups). However, there was no significant difference in mean symptom scores between the two groups ($p = 0.07$). Symptom recurrence prompted reassessment in five patients: one patient from each group had significant allergic rhinitis and received medical treatment; and repeat flexible nasendoscopy showed residual or recurrent adenoid tissue obstructing 5–10% of the posterior choanae in the other three (two from the suction diathermy group and one from the curette group).

A case series[9] (also included in the meta-analysis by Reed et al.[1]) of 1387 patients treated by suction diathermy reported that 1.7% (24/1387) remained symptomatic at follow-up. All 24 patients underwent a further operation. Of these, 54% (13/24) had minimal adenoid regrowth. Eleven (0.8% of all patients in the study) had 'moderately sized' adenoids and underwent revision adenoidectomy. None needed a third procedure.

Overnight hospital admission

A non-randomised controlled study[11] of 149 patients reported that no patients in the suction diathermy group (0/77) required an overnight stay in hospital compared with 60% (43/72) of patients treated by curettage.

Safety

Overall complications

A meta-analysis[1] of eight studies including 1892 patients treated by suction diathermy reported an overall complication rate of 1.9% (36/1892) (95% CI 0.5 to 3.3%; $p = 0.008$).

The prospective audit[5] of 126 patients reported complications in 8.8% (6/68) of patients treated by suction diathermy and 8.6% (5/58) of patients treated by curettage.

A case series of 1206 patients[12] treated by suction diathermy reported an overall complication rate of 0.6% (7/1206).

Bleeding – intraoperative

The meta-analysis[1] reported that mean intraoperative blood loss for patients treated by suction diathermy was 4.31 ml (95% CI 0.43 to 8.19 ml; $p = 0.03$; five studies) compared with 24 ml (95% CI 0 to 48.26 ml; $p = 0.052$; three studies) for patients treated by curettage. Blood loss was significantly less in patients treated by suction diathermy than those treated by curettage (19.8 ml; 95% CI 16.51 to 23.12 ml; $p < 0.001$; 3 studies).

The RCT of 100 patients[2] reported that 4% (2/50) of patients treated by curettage had a primary adenoid bleed and 1 had subsequent laryngospasm and profound bradycardia.

Primary/secondary bleeding

The prospective audit[5] reported no primary bleeds in either group. However 4.4% (3/68) of patients treated by suction diathermy and 1.7% (1/58) of those treated by curettage had secondary bleeds (pink-stained nasal discharge that required no intervention).

The non-randomised controlled trial[11] of 149 patients reported that no patients treated by suction diathermy (0/77) had postoperative bleeding episodes compared with 9.7% (7/72) of patients treated by curettage ($p < 0.001$). None of the patients required transfusion or an operation to arrest the haemorrhage.

In a case series[13] of 1927 patients treated by suction diathermy, 1.35% (26/1927) had primary postoperative bleeding (within 24 hours of surgery) and 2.9% (56/1927) had secondary postoperative bleeding (more than 24 hours after surgery). Five of the patients who had primary bleeding required cauterization, 4 of them under general anaesthesia; 19 of the patients who had secondary bleeding required cauterization, 13 of them under general anaesthesia.

Postoperative neck pain/Grisel's syndrome/Cervical Osteomyelitis

Grisel's syndrome is a nontraumatic, fixed rotary subluxation (incomplete or partial dislocation of a joint) of C1 on C2 (atlantoaxial).

Cervical osteomyelitis is a bacterial infection of bone and bone marrow of the neck in which the resulting inflammation can lead to a reduction of blood supply to the bone.

The non-randomised controlled trial of 276 patients treated by curettage, suction diathermy or microdebrider adenoidectomy[12] reported no significant difference between the treatment groups for neck stiffness (9.5% [8/84], 8.6% [8/93] and 17.2% [17/99], respectively; $p = 0.08$ after adjustment for age). Of the 33 patients, 4 had significant or prolonged neck pain and were evaluated with MRI. Neck pain was not associated with adenoidectomy technique ($p = 0.13$), cautery time ($p = 0.43$) or cautery setting ($p = 0.99$).

A case series of 1206 patients[12] reported that 3 had neck pain without torticollis lasting 3–5 days. One patient reported Grisel's syndrome with torticollis and type I atlantoaxial subluxation which resolved in 3 weeks. One patient had retropharyngeal fluid collection resulting in neck stiffness and low-grade fevers.

A case report[14] of two children reported one case of Grisel's syndrome and one case of cervical osteomyelitis following suction electrocautery.

Velopharyngeal insufficiency (improper closing of the velopharyngeal sphincter [soft palate muscle] during speech characterised by an acute nasal

quality of the voice).

A non-randomised controlled trial[4] of 238 patients reported that one patient of 138 treated by suction diathermy had velopharyngeal insufficiency, which resolved at 4-month follow-up.

The prospective audit[5] reported that 4.4% (3/68) of patients treated by suction diathermy had transient velopharyngeal insufficiency compared with 6.9% (4/58) of patients treated by curettage. The condition resolved in all 7 patients within 2–4 weeks.

The case series of 1206 patients[12] reported that 15 patients had transient velopharyngeal insufficiency that lasted for less than 6 months and 1 patient had persistent velopharyngeal insufficiency for more than 2 years.

Other

The non-randomised controlled trial of 238 patients[4] reported that 3 had upper respiratory tract or pharyngeal infection (which were treated with antibiotics and resolved), 3 became dehydrated, requiring admission to hospital for 24 hours, and 1 complained of excessive pain following the procedure. When all patients who underwent concurrent tonsillectomy were excluded, only 1 patient had a complication: pharyngeal infection, which resolved promptly with antibiotic treatment.

The case series of 1206 patients[12] reported 1 patient with severe nasopharyngeal stenosis, requiring laser excision and topical mitomycin-C.

The case series of 1927 patients[13] reported on a number of short and medium/long-term outcomes:

- Short-term complications:
  - 78.5% (306/390) of patients classified as high risk were not discharged on the day of surgery.
  - 21.5% (84/390) were unplanned admissions.
  - The reasons for admission were: airway complications (32%); obstructive sleep apnoea (27%); obstructive sleep apnoea in children under 3 years (17%); pain or inadequate oral intake in children under 3 years (13%); bleeding (5%); gastroesophageal complications (10%); and other complications (2%).
  - 4.7% (72/1537) of patients classified as normal risk were not discharged on the day of surgery.
  - 3% (46/1537) were unplanned admissions. The reasons for admission were airway complications (41%), bleeding (17%), gastroesophageal complications (28%) and other complications (9%).

- Medium/long-term complications:
  - 12% (48/390) of high-risk patients returned to hospital.
  - 10 had major complications requiring admission or another operation, including the patient needing cauterization under general anesthesia

(20%); bleeding (40%); gastroesophageal complications (30%); and other complications (10%).
- 38 had minor complications, which were treated in the emergency room and did not require admission, including bleeding (18%); pain (29%); gastroesophageal complications (26%); airway complications (18%); fever or viral infection (21%); and other complications (5%).
- 9.4% (145/1537) of patients classified as normal risk returned to hospital.
- 40 had major complications, included the patient needing cauterization under general anaesthesia (33%); bleeding (28%); gastroesophageal complications (35%); and other complications (5%).
- 105 had minor complications, which were treated in the emergency room and did not require admission, including bleeding (33%), pain (27%), gastroesophageal complications (34%), airway complications (8%), fever or viral infection (11%) and other complications (10%).

Literature review

Rapid review of literature

The medical literature was searched to identify studies and reviews relevant to suction diathermy adenoidectomy. Searches were conducted of the following databases, covering the period from their commencement to 27 March and updated on 30 July 2009: MEDLINE, PREMEDLINE, EMBASE, Cochrane Library and other databases. Trial registries and the Internet were also searched. No language restriction was applied to the searches (see appendix C for details of search strategy).

The following selection criteria (table 1) were applied to the abstracts identified by the literature search. Where selection criteria could not be determined from the abstracts the full paper was retrieved.

Table 1 Inclusion criteria for identification of relevant studies

Characteristic	Criteria
Publication type	Clinical studies were included. Emphasis was placed on identifying good quality studies. Abstracts were excluded where no clinical outcomes were reported, or where the paper was a review, editorial, or a laboratory or animal study. Conference abstracts were also excluded because of the difficulty of appraising study methodology, unless they reported specific adverse events that were not available in the published literature.
Patient	Patients with nasal obstruction (enlarged adenoids), obstructive sleep apnoea, otitis media (OME) and/or chronic rhinosinusitis.
Intervention/test	Suction diathermy adenoidectomy.
Outcome	Articles were retrieved if the abstract contained information relevant to the safety and/or efficacy.
Language	Non-English-language articles were excluded unless they were thought to add substantively to the English-language evidence base.

Existing assessments of this procedure

There were no published assessments from other organisations identified at the time of the literature review. However, two future Cochrane systematic reviews[15,16] are planned on the following topics:

- Alternative methods of adenoidectomy versus curettage in children.
- Adenoidectomy for recurrent or chronic nasal symptoms and middle ear disease in children up to 18 years of age.

Related NICE guidance

Below is a list of NICE guidance related to this procedure. Appendix B gives details of the recommendations made in each piece of guidance listed.

Interventional procedures

- Electrosurgery (diathermy and coblation) for tonsillectomy. NICE interventional procedures guidance 150 (2005). Available from www.nice.org.uk/IPG150

Clinical guidelines

- Surgical management of OME. NICE clinical guideline 60 (2008). Available from www.nice.org.uk/CG60

Table 2 Summary of key efficacy and safety findings on suction diathermy adenoidectomy

Abbreviations used: RCT: randomised controlled trial; SD: standard deviation; ECA: suction electrocautery adenoidectomy			
Study details	**Key efficacy findings**	**Key safety findings**	**Comments**
Reed et al. (2009)[1] Study type: **meta-analysis** Country: international Study period: includes nine studies from 1997 to 2007 Study population: paediatric patients undergoing electrocautery adenoidectomy n = **2522** including 2132 electrocautery Mean sample size: 276 (range: 23–1387) Age: overall mean age: 6 years (7 studies) Sex: overall: 58% Male (4 studies) Inclusion criteria: studies assessing the success of suction electrocautery, English language, sample size > 5 and presentation of extractable data regarding outcomes with ECA. Technique: suction electrocautery Follow-up: overall mean: 5.8 months (range of means: 1.0–11.6 months) Mean loss to follow-up rate: 23.2% (range: 0–65.2%) Conflict of interest: none disclosed.	***Operative success*** Subjective success rate: 95% (95% CI 92.7 to 97.3%, p < 0.001, 6 studies, n = 1812). Objectively observed adenoid regrowth rate (defined as evaluation by endoscopy or x-ray): 2.8% (95% CI 0 to 5.5%, p = 0.052; 7 studies; 846 person-years of follow-up, n = 116).	**Complication rates**: 1.9% (95% CI 0.5 to 3.3%, p = 0.008, 8 studies; n = 1892) **Intraoperative blood loss of ECA** (4.31 ml, 95% CI 0.43 to 8.19 ml p = 0.03, 5 studies) vs curette adenoidectomy (24.00 ml, 95% CI 0 to 48.26 ml, p = 0.052, 3 studies). WMD (weighted mean difference): 19.8 ml (95% CI 16.51 to 23.12 ml, p < 0.001, 3 studies). Hedges g (standard mean difference with correction for small sample size) for blood loss difference: 1.61 (95% CI 1.35 to 1.86, p < 0.001, 3 studies) [Note: value increasingly greater than 1.0 indicates an increasingly favourable advantage in estimated blood loss for ECA].	Only Medline searched (1963–Feb 2008). Subjective success rate defined differently in each study as scale of improvement (e.g. symptoms have resolved, improved, unchanged or worse) or parental satisfaction)

Studies included in Reed et al. 2009

Name and year	Study type	Intervention	n	Male (%)	Mean age	EBL EC	EBL CUR	Regrowth in EC group	Subjective success	Country	Notes
Jonas et al. (2007)[2]	RCT	EC vs CUR	50 EC 50 CUR	49 (ALL)	6.333 years (ALL)	NR	NR	14% (Grade 3)	96% (ALL)	South Africa	See separate evidence table for further details
Clemens et al. (1998)[3]	RCT	EC vs CUR	12 EC 12 CUR	NR	4.9 years (EC only)	3.75 ml	54.4 ml	0%	NR	USA	See appendix A for further details
Wright et al. (1997)[4]	Non-randomised controlled trial	EC vs CUR	138 EC 100 CUR	56.5*	5.3 years	5.5 ml	24.8ml	0%	98.4%	Canada	See separate evidence table for further detail
Walker et al. (2001)[5]	Prospective audit	EC vs CUR	68 EC 58 CUR	NR	6.6 years (ALL)	0.5 ml	20 ml	0%	NR	Australia	See separate evidence table for further detail
Wynn et al. (2003)[6]	Historical cohort	EC only	118	NR	6.5 years	10.8 ml	NR	0%	96%	USA	See appendix A for further details
Wong et al. (2004)[8]	Prospective case series	EC only	23	NR	6 years	2.6 ml	NR	NR	82.6%†	Canada	See appendix A for further details
Skilbeck et al. (2007)[9]	Retrospective case series	EC only	1387	59	NR	NR	NR	0.8%	98.3%	UK	See separate evidence table for further details
Durr et al. (2004)[7]	Case series	EC only	96	53.1	6.08 years	NR	NR	4.3%‡	89.1%§	Canada	See appendix A for further details
Hartley et al. (1998)[10]	Retrospective case series	EC vs CUR	240 EC 170 CUR	NR	NR	NR	NR	NR	NR	UK	See appendix A for further details

EC: Electrocautery adenoidectomy; CUR: curette adenoidectomy; NR: not reported; EBL: Estimated blood loss

*Original paper only reports % males in EC group (43.47%).
† Original paper reports that one patient had a grade 3 adenoid after surgery so success rate should be 95.7%. Other 3 cases included in the calculation were all grade 1.
‡Original paper does not report a regrowth rate.
§Only 57% (55/96) completed questionnaire used to obtain this figure.

Four of the studies[2,4,5,9] included in above meta-analysis have been described in further detail in table 2 because they contained additional efficacy and safety data.

Abbreviations used: RCT: randomised controlled Trial; SD: standard deviation; ECA: suction electrocautery adenoidectomy

<table>
<tr><th>Study details</th><th>Key efficacy findings</th><th>Key safety findings</th><th>Comments</th></tr>
<tr>
<td>
Jonas et al. (2007)[2]
Study type: RCT
Country: South Africa, tertiary paediatric hospital
Study period: not stated
Study population: children scheduled for first-time adenoidectomy alone or in combination with tonsillectomy.
Indications:
<table>
<tr><th></th><th>Curette</th><th>Suction diathermy</th><th>Total</th></tr>
<tr><td>Snoring and nasal obstruction</td><td>19</td><td>29</td><td>48</td></tr>
<tr><td>Obstructive sleep apnoea</td><td>16</td><td>12</td><td>28</td></tr>
<tr><td>Recurrent adenotonsillitis</td><td>10</td><td>7</td><td>17</td></tr>
<tr><td>Recurrent OME</td><td>5</td><td>2</td><td>7</td></tr>
<tr><td>Total</td><td>50</td><td>50</td><td>100</td></tr>
</table>
n = 100
Age:
Total: mean: 6 years 4 months, SD: 34.4, range: 1 year 2 months–13 years
Curette: mean: 6 years 2 months, SD: 35.1, range: 1 year 2 months–13 years.
Suction diathermy: mean: 6 years 5 months, SD: 33.9, range: 1 year 10 months–12 years 11 months (p = 0.642)
Sex: total: female 51%; curette: female 44%; suction diathermy: female 58% (p = 0.161)
Inclusion criteria: parental consent. No exclusion criteria stated.
Technique: transoral suction diathermy using a laryngeal mirror for visualisation vs curette (conventional cutting method)
Follow-up: 6 months
Conflict of interest: none declared
</td>
<td>
Operative success
Adenoid size measured by the Wormald and Prescott grading system: grade 1: < one third of posterior choanae is obstructed; grade 2: one–two thirds of posterior choanae obstructed; grade 3: > two thirds of posterior choanae obstructed.

Comparing adenoid size before surgery:
curette (n = 50): mean: 2.3 SD: 0.72; suction diathermy (n = 50): mean: 2.4 SD: 0.73 (p = 0.5820)

Adenoid size 6 months after surgery:
curette (n = 44): mean: 1.9 SD: 0.82
suction diathermy (n = 47): mean: 1.5 SD: 0.75 (p = 0.0184)
<table>
<tr><th></th><th>Grade</th><th>Distribution of adenoid size before surgery</th><th>Distribution of adenoid size 6 months after surgery</th></tr>
<tr><td rowspan="3">Curette (n = 50 before, n = 44 after)):</td><td>1</td><td>7</td><td>18</td></tr>
<tr><td>2</td><td>19</td><td>14</td></tr>
<tr><td>3</td><td>24</td><td>12</td></tr>
<tr><td rowspan="3">Suction diathermy (n = 50 before, n = 47 after))</td><td>1</td><td>7</td><td>32</td></tr>
<tr><td>2</td><td>15</td><td>8</td></tr>
<tr><td>3</td><td>28</td><td>7</td></tr>
</table>
Difference in distribution of adenoid size between groups is not significant before surgery (p = 0.678)
Difference in distribution of adenoid size between groups is significant 6 months after surgery – smaller in suction diathermy group (p = 0.034)
</td>
<td>
2 patients (4%) in the curette group experienced early complications of surgical intervention. Both had primary adenoid bleed and one patient had subsequent laryngospasm and profound bradycardia.
</td>
<td>
This study is included in Reed et al. 2009

Single-blind study.

Does not state how randomisation and allocation concealment was conducted.

High follow-up rate: 92% returned for follow-up at 6 months and 91% completed the study.

All surgery done by same surgeon.

Adenoid size assessed using flexible nasopharyngoscopy.

Method for assessing symptom improvement at 6 months was a patient-reported symptom scale of ‘resolved’, ‘improved’, ‘unchanged’ or ‘worse’).
Blood loss not reported.
</td>
</tr>
</table>

Abbreviations used: RCT: randomised controlled Trial; SD: standard deviation; ECA: suction electrocautery adenoidectomy

Study details	Key efficacy findings	Key safety findings	Comments

		Symptom improvement at 6 months
Curette (n = 44)	Resolved	32
	Improved	10
	Unchanged	1
	Worse	1
Suction diathermy (n = 48)	Resolved	30
	Improved	16
	Unchanged	1
	Worse	1

Overall, there was no significant difference between the groups and 96% of patients' symptoms either resolved or improved.

Abbreviations used: RCT: randomised controlled Trial; SD: standard deviation; ECA: suction electrocautery adenoidectomy			
Study details	**Key efficacy findings**	**Key safety findings**	**Comments**
Wright et al. (1997)[4] Study type: **non-randomised controlled trial** Country: Canada Study period: electrocautery (Oct 1994–Mar 1996); curettage (Dec 1989–Dec 1990 and Feb–May 1995) Study population: adenoidectomy patients at a tertiary paediatric hospital. n = **238** total (138 electrocautery; 100 curette) Age: curette: mean: 5.5 years; suction diathermy: mean: 5.3 years, range: 1–14 years Sex: curette: not reported; suction diathermy: female 56.5% Inclusion criteria: surgery was recommended based on obstructive, infectious or inflammatory criteria. Patients with bleeding disorders or craniofacial malformations were excluded. Technique: cautery-liquefaction and suction ablation of adenoid tissue bed under clear vision (using a laryngeal mirror) vs curette (conventional cutting method) Follow-up: routine clinic check at 4 weeks. Long-term follow-up 1 year postoperatively. Range: 3–17 months Conflict of interest: not reported	***Operative success*** At 4-week follow-up: electrocautery (n = 122): 2 patients (1.64%) failed to have subjective improvement. 98.4% (120 of 122) success rate. [Improvement at 4-week follow up was initially assessed subjectively by asking patient or care giver of child if the preoperative symptoms had improved]. On examination only one patient failed to demonstrate improvement (persistent upper airway obstruction). Nasopharyngoscopy performed and no adenoid rehypertrophy was seen. No cases of recurrent adenoid hypertrophy seen during 3–17-month follow-up.	Estimated blood loss (patients who underwent concurrent tonsillectomy were excluded): electrocautery (n = 59): mean: 5.5 ml, SD: 6.7 ml, range: 0–50 ml; curette (n = 73): mean: 24.8 ml, SD: 19.3 ml, range: 5–25 ml ($p < 0.00001$). 5 of 138 (3.6%) electrocautery patients had a complication. Three had evidence of upper respiratory or pharyngeal infection (treated with antibiotics and resolved). Three experienced dehydration requiring 24-hour admission. One patient complained of excessive pain following procedure. No patients experienced perioperative or postoperative haemorrhage. When all patients who underwent concurrent tonsillectomy were excluded, only one patient had a complication: pharyngeal infection that resolved promptly with antibiotic treatment. No complications in the 1995 control group. No data reported on 1990 controls. One case (0.9%) of velopharyngeal insufficiency in the electrocautery group (n = 114) [tested at 4-week follow-up by placing a mirror under the nose] Managed	This study is included in Reed et al. 2009 All cases were ambulatory unless contraindicated. All electrocautery patients received amoxicillin for 10 days postoperatively. Patients received preoperative lateral neck radiograph to assess extent of nasopharyngeal obstruction, and sinus film.

Abbreviations used: RCT: randomised controlled Trial; SD: standard deviation; ECA: suction electrocautery adenoidectomy			
Study details	**Key efficacy findings**	**Key safety findings**	**Comments**
		expectantly and resolved by 4-month postoperative visit.	

Abbreviations used: RCT: randomised controlled Trial; SD: standard deviation; ECA: suction electrocautery adenoidectomy			
Study details	**Key efficacy findings**	**Key safety findings**	**Comments**
Walker (2001)[5] Study type: **prospective audit** Country: Australia Study period: suction diathermy (Jan 1999–Dec 2000); curette (historical controls, Jan 1997–Dec 1998) Study population: children undergoing adenoidectomy (without tonsillectomy) in a paediatric hospital n = **126** total (68 suction diathermy, 58 curette) Age: Overall: mean: 6.6 years (range: 0.5–14.3 years) Suction diathermy: mean: 6.64 years, SD: 2.67 years Curette: mean: 6.37 years, SD: 2.41 years (p = 0.555) Sex: not reported Inclusion criteria: none stated Technique: suction diathermy ablation using a mirror for visualisation vs curette (conventional cutting method) Follow-up: Suction diathermy: mean: **11.6 months (range: 4–25.7 months)** Curette: mean: **35.5 months (range: 7–47.6 months)** Conflict of interest: not reported	***Operative success*** Complete removal and haemostasis was confirmed by mirror visualisation in all cases. **Symptoms scores** Suction diathermy (n = 46): preoperative nasal symptom score: mean: 3.3 (range:1–6) postoperative nasal symptom score: mean: 0.4 (range: 0–2) (p < 0.001) Curette (n = 41): preoperative nasal symptom score: mean: 3 (range: 1–4) postoperative nasal symptom score: mean: 0.7 (range: 0–3) (p < 0.001) The suction diathermy group had a greater preoperative score which reduced to a lower score postoperatively than the curette group but was not significant (p = 0.07). Symptom recurrence prompted reassessment in 5 patients (3 in ablation and two in curette group). One from each group had significant allergic rhinitis and received medical treatment. The remaining 3 had repeat flexible nasendoscopy and showed residual/recurrent adenoid tissue obstructing 5–10% of posterior choana.	Intraoperative blood loss using suction diathermy was 0.1% of circulating blood volume, and during conventional adenoidectomy was 1.1% of circulating blood volume (p < 0.001). mean blood loss: suction diathermy (n = 68): 0.5 ml, SD: 3 ml curette (n = 58): 20 ml, SD: 17 ml (p < 0.001) Complications seen in 6 of the 68 (8.8%) suction diathermy group and 5 of 58 (8.6%) of curette group. No primary bleeds in either group. 3 secondary bleeds (pink stained nasal discharge – no intervention required) in diathermy group (4.4%) and 1 in curette group (1.7%). Transient velopharyngeal insufficiency in 3 patients in diathermy group (4.4%) and 4 in curette group (6.9%). All resolved in 2–4 weeks without intervention. No recovery complications in either group. Postoperative pain same in each group (no data given). No adenoid recurrences or nasopharyngeal stenosis identified in either group.	This study is included in Reed et al. 2009 Possible nasal symptom scores range from 0 (best) – 6 (worst).

Abbreviations used: RCT: randomised controlled Trial; SD: standard deviation; ECA: suction electrocautery adenoidectomy			
Study details	**Key efficacy findings**	**Key safety findings**	**Comments**
Skilbeck et al. (2007)[9] Study type: **Retrospective case series** Country: UK Study period: 1993–2003 Study population: consecutive children undergoing adenoidectomy using suction diathermy by a single consultant paediatric otolaryngologist and a single paediatric anaesthetist in a paediatric hospital. Indications included OME, recurrent tonsillitis and obstructive sleep apnoea. n = **1411** (including 24 considered for revision surgeries) Age: 54% aged 2–4.9 years Sex: Primary surgery (n = 1387): 41% female Revision surgery (n = 24): 42% female Inclusion criteria: informed consent from patients and carers. no patients were excluded Technique: suction diathermy using a laryngeal mirror for visualisation. Postoperatively all patients prescribed simple analgesia and antibiotics Follow-up: **3 weeks and 6 months** postoperatively Conflict of interest: not reported	1.7% (n = 24) remained symptomatic at follow-up. All 24 patients underwent a further operation. On examination 13 of the 24 (54%) had minimal adenoid regrowth while the remainder had moderately sized adenoids. These 11 (0.8% of total patients) then underwent revision adenoidectomy. None required a third procedure.	No reported cases of postoperative haemorrhage.	This study is included in Reed et al. 2009 No patients lost to follow-up.

Abbreviations used: RCT: randomised controlled Trial; SD: standard deviation; ECA: suction electrocautery adenoidectomy

<table>
<tr><th>Study details</th><th>Key efficacy findings</th><th>Key safety findings</th><th>Comments</th></tr>
<tr>
<td>Hunt et al. (2005)[11]

Study type: non-randomised controlled study (reported as a cohort (audit))
Country: UK
Study period: 1999–2001

Study population: paediatric adenoidectomies in a secondary care general hospital
n = 149 (72 curettage, 77 suction coagulation)
Age:
Total: mean: 4.95 years, SD: 20.4 years, range: 1.5–12.5 years
Curettage: mean: 5.1 years, range: 2.0–12.5 years
Suction coagulation: mean: 4.8 years, range: 2.0–11.5 years.
Sex:
Total: Female: 45%
Curettage: Female: 48.6%
Suction coagulation: Female: 42.9%

Inclusion criteria: not reported

Technique: suction coagulation (including routine use of a prophylactic antiemetic and antibiotics prescribed to reduce postoperative fetor. All day case) vs curette (conventional cutting method)

Follow-up: 72 hours for suction coagulation
Conflict of interest: not reported</td>
<td>Operative success: not reported

Day case discharges
<table>
<tr><th></th><th>Curettage (no antiemetic)</th><th>Suction coagulation (+ antiemetic)</th></tr>
<tr><td>Day case</td><td>29 (40.3%)</td><td>77 (100%)</td></tr>
<tr><td>Overnight</td><td>43 (59.7%)</td><td>0 (0%)</td></tr>
<tr><td>Total</td><td>72 (100%)</td><td>77 (100%)</td></tr>
</table>
</td>
<td>Postoperative bleeding (no children required transfusion or return to operating theatre to arrest haemorrhage):
Curettage: 7/72 (9.7%)
Suction coagulation: 0/77 (0%) p < 0.001

Postoperative nausea and vomiting:
Curettage (no prophylactic antiemetic given): 15/72 (20.8–14% vomited clear fluid and 7% blood stained fluid).
Suction coagulation: 0/77 = 0% (although one patient readmitted with nausea and vomiting 3 days after surgery) p < 0.001.</td>
<td>Experienced non-trainee surgeons carried out all surgery.

Prior to 2000 all children underwent curettage adenoidectomy with an overnight stay. No prophylactic antiemetic medication was used.

Surgeons used suction coagulation for a year before the audit was carried out to avoid an observed learning effect.</td>
</tr>
</table>

Abbreviations used: RCT: randomised controlled Trial; SD: standard deviation; ECA: suction electrocautery adenoidectomy			
Study details	**Key efficacy findings**	**Key safety findings**	**Comments**
Henry et al. (2005)[12] Study type: Two studies: **retrospective case analysis + prospective non-randomised clinical trial** Country: USA Study period: retrospective (Oct 1998–Dec 2003), prospective (Nov 2002–Aug 2004) Study population: Retrospective: all paediatric patients who underwent adenoidectomy Prospective: paediatric patients undergoing adenoidectomy with or without other procedures Retrospective analysis (n = **1206**), prospective cohort (n = **276**) including curette (n = 84); cautery (n = 93); microdebrider (n = 99) Age: prospective study: overall: 6.6 +/- 3.7 years curette: 7.2 +/- 4.4 years cautery: 6.6 +/- 3.6 years microdebrider: 5.9 +/- 2.9 years Sex: prospective: overall: 38% female; curette: 44% female; cautery: 50% female; microdebrider: 35% female Inclusion criteria: prospective: children up to 18 years, informed consent. Patients with any known predisposition to atlantoaxial instability such as Down's syndrome, rheumatoid arthritis, Arnold-Chiari malformations, and achondroplasia were excluded. Technique: Retrospective: electrocautery Prospective: suction cautery vs curette vs microdebrider Follow-up: prospective study: **4 weeks** Conflict of interest: not reported	Retrospective study: not reported Prospective study: not reported	**Retrospective review:** 3 patients with neck pain lasting 3–5 days without torticollis. One Grisel's syndrome with torticollis and type I atlantoaxial subluxation (resolved in 3 weeks). One retropharyngeal fluid collection resulting in neck stiffness and low grade fevers. One severe nasopharyngeal stenosis requiring laser excision and topical mitomycin-C and one persistent velopharyngeal insufficiency of greater than 2 years duration. Overall complication rate: 0.6%. Transient velopharyngeal insufficiency (< 6 months) occurred in 15 patients (not considered a study outcome). **Prospective study:** neck pain/stiffness: total: 33 (12%); curette: 8 (9.5%); cautery: 8 (8.6%); microdebrider: 17 (17.2%) (p = 0.08 after adjustment for age). 4 of the 33 had significant/ prolonged neck pain and were evaluated with MRI. Development of neck pain was not associated with adenoidectomy technique (p = 0.13), cautery time (p = 0.43) or cautery setting (p = 0.99).	Prospective study: unclear how patients were allocated to each group. Prospective study: 28.6% received perioperative antibiotics and 69.2% received postoperative oral antibiotics. 78.6% received perioperative steroids.

Abbreviations used: SD: Standard deviation; PO: oral; OR: operating room; HRP: high-risk population; NRP: normal-risk population; OSA: obstructive sleep apnoea

<table>
<tr><th>Study details</th><th>Key efficacy</th><th>Key safety findings</th><th>Comments</th></tr>
<tr>
<td>Abou-Jaoude et al. (2006)[13]

Study type: retrospective chart analysis (case series)

Country: Canada

Study period: Oct 1997–Jun 2003

Study population: all adenotonsillectomies at a paediatric health centre. Indications include adenotonsillar hyperplasia with obstructive sleep apnoea, recurrent tonsillitis, chronic tonsillitis and halitosis, failure to thrive or abnormal dentofacial growth, and dysphagia or speech impairment.

n = reviewed 2067 adenotonsillectomies of which 1927 used suction coagulation

Age: 5.9 years, SD: 2.68 years, range: 1–17.3 years

Sex: male to female ratio 1.55:1

Inclusion criteria: all adentonsillectomies where suction liquefaction ablative adenoidectomy was used.

Technique: ablative suction-liquefaction electrocautery using a mirror for visualisation for adenoidectomy

Follow-up: not reported

Conflict of interest: none – scholarship from Canadian Institutes of Health Research</td>
<td>Not reported</td>
<td>Short term complications:
Overall, 306 of 390 (78.5%) of high-risk patients not discharged on day of surgery. In total, 84 of 390 (21.5%) were unplanned admissions.
Overall, 72 of the 1537 (4.7%) of normal-risk patients were not discharged on day of surgery. Of these, 46 (3%) were unplanned admissions.
Unplanned admissions
<table>
<tr><th>Complications</th><th>HRP % (n = 84)</th><th>NRP % (n = 46)</th></tr>
<tr><td>Airway complication</td><td>32% (27)</td><td>41% (19)</td></tr>
<tr><td>Extended admission because of OSA</td><td>27% (23)</td><td>0% (0)</td></tr>
<tr><td>Extended admission because both < 3 years and OSA</td><td>17% (14)</td><td>0% (0)</td></tr>
<tr><td>Extended admission < 3 years (pain or inadequate PO intake)</td><td>13% (11)</td><td>0% (0)</td></tr>
<tr><td>Bleeding</td><td>5% (4)</td><td>17% (8)</td></tr>
<tr><td>Gastroesophageal</td><td>10% (8)</td><td>28% (13)</td></tr>
<tr><td>Other</td><td>2% (2)</td><td>9% (4)</td></tr>
</table>
Medium/long-term complications:
Overall, 48 of 390 (12%) of high risk patients returned to the emergency room.
Overall, 145 of 1537 (9.4%) of normal risk patients returned to the emergency room.

Major complications (required admission and/or return to theatre)
<table>
<tr><th>Complications</th><th>HRP % (n = 10)</th><th>NRP % (n = 40)</th></tr>
<tr><td>Return to OR for cauterization under general anesthesia</td><td>20% (2)</td><td>33% (13)</td></tr>
<tr><td>Bleeding</td><td>40% (4)</td><td>28% (11)</td></tr>
<tr><td>Gastroesophageal</td><td>30% (3)</td><td>35% (14)</td></tr>
<tr><td>Other</td><td>10% (1)</td><td>5% (2)</td></tr>
</table>
Minor complications (treated in emergency room and not requiring admission)
<table>
<tr><th>Complications</th><th>HRP % (n = 38)</th><th>NRP % (n = 105)</th></tr>
<tr><td>Bleeding</td><td>18% (7)</td><td>33% (35)</td></tr>
<tr><td>Pain</td><td>29% (11)</td><td>27% (28)</td></tr>
<tr><td>Gastroesophageal</td><td>26% (10)</td><td>34% (36)</td></tr>
<tr><td>Airway complications</td><td>18% (7)</td><td>8% (8)</td></tr>
<tr><td>Fever/viral infection</td><td>21% (8)</td><td>11% (12)</td></tr>
<tr><td>Other</td><td>5% (2)</td><td>10% (11)</td></tr>
</table>
</td>
<td>Short-term complications defined as intraoperative and direct perioperative complications that prevented patients from being discharged postoperatively when they met selection criteria for ambulatory cases (i.e. 3+ years, living within 50km of hospital, no systemic disease and positive parental attitude).

Medium –long term complications defined as those which caused patients to return to the emergency room after discharge.

All complications: some patients admitted for more than one reason.

Gastroesophageal includes inadequate oral intake, vomiting and dehydration.</td>
</tr>
</table>

Bleeding incidence (% are of total population n = 1927)

Action taken	IOB % (n)	PPOB % (n)	SPOB % (n)
Observation		1.09% (21)	1.92% (37)
Cauterization under local anesthesia		0.05% (1)	0.31% (6)
Cauterization under general anesthesia	0.10% (2)	0.21% (4)	0.67% (13)

IOB: Intraoperative bleeding (> 5% of pts body weight)
PPOB: primary postoperative bleeding (within 24 hours of surgery)
SPOB: secondary postoperative bleeding (after 24 hours of surgery)

Both IOB cases in normal risk group.

Abbreviations used: RCT: Randomised Controlled Trial; SD: Standard Deviation; ECA: suction electrocautery adenoidectomy			
Study details	**Key efficacy findings**	**Key safety findings**	**Comments**
Baker at al. (1996)[14] Study type: case reports Country: USA Study period: not reported Study population: paediatric patients with complications following adenoidectomy/adenotonsillectomy. n = **2** Age: 11 years and 5 years Sex: one female, one male Inclusion criteria: see study population Technique: suction electrocautery Follow-up: one for 9 months, the other is unclear Conflict of interest: not reported	None reported	Case1: Previously health 11-year-old girl underwent adenotonsillectomy for recurrent tonsillitis and adenotonsillar hypertrophy. Two weeks after operation patient presented at clinic with persistent neck pain. She was treated for skeletal muscle spasm and returned for follow-up 2 weeks later with improvement in symptoms. Five months later she presented at the emergency room with persistent neck stiffness and pain. CT scan confirmed sublaxation of C-1 on C-2 with erosion of the odontoid process (Grisel's syndrome). The patient was admitted to neurosurgery and placed in traction for 10 days after which she underwent replacement of a halo for stabilisation. After 9 months the patient was neurologically intact without neck pain but has persistent decreased range of motion in her neck. Case 2: 5-year-old boy underwent adenoidectomy and placement of bilateral pressure equalisation tubes for conductive hearing loss, recurrent otitis media, snoring and mouth breathing. Six weeks postoperatively the patient had persistent neck pain and a mass was noted in the nasopharynx. CT scan confirmed the mass and revealed bony erosion of the anterior arch of C-1. Nasopharyngoscopy under general anaesthesia confirmed osteomyelitis. Patient received 4-week course of IV clindamycin. His neck pain and stiffness completely resolved.	

Validity and generalisability of the studies

- All studies reported the procedure in paediatric patients only.
- There were only two small RCTs within the published literature.
- Few patients received nasopharyngoscopy to objectively confirm success of the procedure.
- There were no reports of thermal damage or burns to the nasopharynx and surrounding structures from diathermy in the published literature.
- The highly statistically significant difference in mean operative blood loss is not clinically significant (advice from Specialist Adviser).

Specialist Advisers' opinions

Specialist advice was sought from consultants who have been nominated or ratified by their Specialist Society or Royal College. The advice received is their individual opinion and does not represent the view of the society.

Mr Liam Flood, Ms Michelle Wyatt and Mr Peter Robb (British Association of Otorhinolaryngologists, Head and Neck Surgeons [ENT UK]).

- One Specialist Adviser had never performed this procedure and the other two perform the procedure regularly. One reported that this has been their standard method for removing adenoids for the past 10 years.
- All Specialist Advisers described the procedure as established practice and no longer new and that the standard practice comparator is conventional blind curettage adenoidectomy.
- One Specialist Adviser reported that less than 10% of specialists are engaged in this area of work, one stated that the figure was 10–50% and the other stated that it was more than 50%.
- The main theoretical adverse events were considered to be delayed (secondary) haemorrhage, thermal damage or burns to the nasopharynx and surrounding structures from diathermy, scarring, infection and Grisel's

syndrome. One Specialist Adviser reported a general unease felt by colleagues in performing this procedure.

- Key efficacy outcomes for this procedure were reduced primary bleeding rates, completeness of adenoidectomy (avoiding revision, nasal patency scores and positive parental satisfaction), reversal of symptoms (for example, infection and obstructive sleep apnoea), minimal blood loss in small children and suitability as a day case procedure.
- The procedure requires endoscopes, angled diathermy (both standard equipment in most ear, nose and throat [ENT] units) and a supply of disposable handpieces.
- One Specialist Adviser considered that the procedure required training, mentoring and observation of the procedure in a centre of excellence.
- All Specialist Advisers stated that the procedure, if safe and efficacious, is likely to be carried out in district general hospitals.
- One Specialist Adviser considered that it was strange that the procedure was not widely used, despite some years of small studies, however, another Specialist Adviser felt this procedure was already accepted as standard practice by the paediatric ENT community.

Patient Commentators' opinions

NICE's Patient and Public Involvement Programme was unable to obtain patient commentary for this procedure.

Issues for consideration by IPAC

- n/a

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7. Durr DG (2004) Endoscopic electrosurgical adenoidectomy: technique and outcomes. Journal of Otolaryngology 33:82-87

8. Wong L, Moxham JP and Ludemann JP (2004) Electrosurgical adenoid ablation. Journal of Otolaryngology 33:104-106

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10. Hartley BE, Papsin BC, and Albert DM (1998) Suction diathermy adenoidectomy. Clinical Otolaryngology & Allied Sciences 23:308-309

11. Hunt A, Karela M, and Robb PJ (2005) Day-case adenoidectomy: outcomes are improved using suction coagulation and prophylactic anti-emetic treatment. International Journal of Pediatric Otorhinolaryngology 69:1629-1633

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16. van den Aardweg Maaike TA, Schilder Anne GM, Herkert E et al (2009) Adenoidectomy for recurrent or chronic nasal symptoms and middle ear disease in children up to 18 years of age. Cochrane Database of Systematic Reviews: Protocols.

Appendix A: Additional papers on suction diathermy adenoidectomy

The following table outlines the studies that are considered potentially relevant to the overview but were not included in the main data extraction table (table 2). It is by no means an exhaustive list of potentially relevant studies.

Article	Number of patients/follow-up	Direction of conclusions	Reasons for non-inclusion in table 2
B.J. Wiatrak, C.M.I.I.I. Myer and T.M. Andrews, Complications of adenotonsillectomy in children under 3 years of age. Am. J. Otolaryngol. (1991)12 (3): 170–2	Retrospective case series N = 200 Follow-up: not reported	No efficacy data. 5 (12.5%) had complications after adenotonsillectomy. 14 had airway complications, 8 dehydration, 3 post operative haemorrhage. The average stay in hospital for airway complications was 3.5 days (range:1–7 days). Patients in the dehydration group were admitted for an average of 2.2 days.	Larger studies included in table 2.
Clemens J, McMurray JS, and Willging JP. (1-3-1998) Electrocautery versus curette adenoidectomy: comparison of postoperative results. International Journal of Pediatric Otorhinolaryngology 43:115–122.	RCT Total N = 24. suction electrocautery (N = 12)vs. Curettage (N = 12) Follow up: Suction electrocautery: 8.8 months (SD: 9.7 months) Curette: 8.7 months (SD: 10.9 months)	Blood loss significantly lower in suction group. No evidence of regrowth	Key outcomes already reported in Reed et al. meta analysis in Table 2
Durr DG. (2004) Endoscopic electrosurgical adenoidectomy: technique and outcomes. Journal of Otolaryngology 33:82–87.	Case series N = 96 Follow-up: 6 months	89.1% (49 of the 55 who responded) reported improvement Complications not reported.	Key outcomes already reported in Reed et al. meta analysis in Table 2

Article	Number of patients/follow-up	Direction of conclusions	Reasons for non-inclusion in table 2
Hartley BE, Papsin BC, and Albert DM. (1998) Suction diathermy adenoidectomy. Clinical Otolaryngology & Allied Sciences 23:308–309.	Retrospective review Total = 410. suction diathermy adenoidectomy (N = 240) vs. Conventional adenoidectomy [curettage)(N = 170) Follow-up: not reported	No efficacy data. 5 patients in curette group had a haemorrhage. Unclear which patients had other complications of neck pain (2) and post-op pyrexia (5) and hypernasality (1)	Key outcomes already reported in Reed et al. meta analysis in Table 2
Lee TJ and Rowe M. (2004) Electrocautery versus cold knife technique adenotonsillectomy: A cost analysis. Otolaryngology – Head and Neck Surgery 131:723–726.	Retrospective case review Total N = 275. electrocautery T&A (N = 121) vs. Cold knife tonsillectomy + adenoid curettage (N = 106) vs. Electro tonsillectomy + adenoid curettage (N = 48)	No efficacy data. Blood loss significantly lower in electrocautery group.	Larger studies included in table 2.
Lo S and Rowe-Jones J. (2006) How we do it: Transoral suction diathermy adenoid ablation under direct vision using a 45 degree endoscope. Clinical Otolaryngology 31:440–442.	Prospective case series n = 56 Follow-up: not reported	Satisfactory adenoid ablation in all cases. No complications.	Larger studies included in table 2.

Article	Number of patients/follow-up	Direction of conclusions	Reasons for non-inclusion in table 2
Shin JJ and Hartnick CJ. (2003) Pediatric endoscopic transnasal adenoid ablation. Annals of Otology, Rhinology & Laryngology 112:511–514.	Case reports n = 3 Follow-up: not reported	All reported symptom improvement. No complications.	Larger studies included in table 2.
Wong L, Moxham JP, and Ludemann JP. (2004) Electrosurgical adenoid ablation. Journal of Otolaryngology 33:104–106.	Prospective case series N = 23 Follow-up: 12 months max	95.7% success rate. Average blood loss: 2.6ml No post operative complications in immediate 6–8 weeks.	Key outcomes already reported in Reed et al. meta analysis in Table 2
Wynn R and Rosenfeld RM. (2003) Outcomes in suction coagulator adenoidectomy. Archives of Otolaryngology – Head and Neck Surgery 129:182–185.	Historical cohort study N = 118 Follow-up: Mean: 30.4 days, SD: 9 days, range:9–52 days	96% success rate. Mean estimated blood loss: 10.8mL Complications: one patient had post-op bleeding greater than 5mL and one patient had a loosened tooth. Three patients required a return visit to the clinic or emergency dept. Five patients requested or required visits within first postoperative month.	Key outcomes already reported in Reed et al. meta analysis in Table 2

Appendix B: Related NICE guidance for suction diathermy adenoidectomy

Guidance	Recommendations
Interventional procedures	**Electrosurgery (diathermy and coblation) for tonsillectomy. NICE interventional procedures guidance 150 (2005).** 1.1 Current evidence on the safety and efficacy of electrosurgery (diathermy and coblation) for tonsillectomy appears adequate to support the use of these techniques, provided that normal arrangements are in place for consent, audit and clinical governance. 1.2 Surgeons should avoid excessive use of diathermy during tonsillectomy. Surgeons using diathermy in tonsillectomy for dissection and/or haemostasis should be fully trained in its use and should understand the potential complications. 1.3 Use of coblation for tonsillectomy can result in higher rates of haemorrhage than other techniques and clinicians wishing to use coblation should be specifically trained. The British Association of Otorhinolaringologists –Head and Neck Surgeons have agreed to produce standards for training. 1.4 Surgeons should ensure that patients or their parents/carers understand the risk of haemorrhage after tonsillectomy using these techniques. In addition, use of the Institute's Information for the public is recommended. 1.5 Surgeons should audit and review the rates of haemorrhage complicating tonsillectomy in their own practices and in the context of the techniques they use. Publication of further information about the influence of different techniques and other factors (such as age) on the incidence of haemorrhage after tonsillectomy would be useful in guiding future practice.
Clinical guidelines	**Surgical management of OME. NICE clinical guideline 60 (2008).** <u>Diagnosis of OME</u> Formal assessment of a child with suspected OME should include:

	• clinical history taking, focusing on: – poor listening skills – indistinct speech or delayed language development – inattention and behaviour problems – hearing fluctuation – recurrent ear infections or upper respiratory tract infections – balance problems and clumsiness – poor educational progress • clinical examination, focusing on: – otoscopy – general upper respiratory health – general developmental status • hearing testing, which should be carried out by trained staff using tests suitable for the developmental stage of the child, and calibrated equipment • tympanometry. <u>Children who will benefit from surgical intervention</u> • Children with persistent bilateral OME documented over a period of 3months with a hearing level in the better ear of 25–30dBHL or worse averaged at 0.5, 1, 2 and 4kHz (or equivalent dBA where dBHL not available) should be considered for surgical intervention. <u>Surgical interventions</u> • Once a decision has been taken to offer surgical intervention for OME in children, the insertion of ventilation tubes is recommended. Adjuvant adenoidectomy is not recommended in the absence of persistent and/or frequent upper respiratory tract symptoms. <u>Non-surgical interventions</u> • The following treatments are not recommended for the management of OME: − antibiotics − topical or systemic antihistamines − topical or systemic decongestants − topical or systemic steroids − homeopathy − cranial osteopathy − acupuncture − dietary modification, including probiotics − immunostimulants

	− massage. • Hearing aids should be offered to children with persistent bilateral OME and hearing loss as an alternative to surgical intervention where surgery is contraindicated or not acceptable. <u>Management of OME in children with Down's syndrome</u> • Hearing aids should normally be offered to children with Down's syndrome and OME with hearing loss. <u>Management of OME in children with cleft palate</u> • Insertion of ventilation tubes at primary closure of the cleft palate should be performed only after careful otological and audiological assessment. • Insertion of ventilation tubes should be offered as an alternative to hearing aids in children with cleft palate who have OME and persistent hearing loss.

Appendix C: Literature search for suction diathermy adenoidectomy

Databases	Date searched	Version/files	No. retrieved
Cochrane Database of Systematic Reviews – CDSR (Cochrane Library)	30/07/09	Issue 3, 2009	1
Database of Abstracts of Reviews of Effects – DARE (CRD website)	30/07/09	N/A	2
HTA database (CRD website)	30/07/09	N/A	0
Cochrane Central Database of Controlled Trials – CENTRAL (Cochrane Library)	30/07/09	Issue 3, 2009	26
MEDLINE (Ovid)	30/07/09	1950 to July Week 4 2009	9
MEDLINE In-Process (Ovid)	30/07/09	July 29, 2009	3
EMBASE (Ovid)	30/07/09	1980 to 2009 Week 30	6
CINAHL (NHS Evidence)	30/07/09	1981 to Present	17
Current Contents - CBIB	30/07/09	1995 to date	3

Database	Date searched	Version/files	No. retrieved
BLIC (Dialog DataStar)	27/03/2009	-	0
National Research Register (NRR) Archive	27/03/2009	-	0
UK Clinical Research Network (UKCRN) Portfolio Database	27/03/2009	-	0
Current Controlled Trials *meta*Register of Controlled Trials - *m*RCT	27/03/2009	-	The effectiveness of adenotonsillectomy in children (ISRCTN04973569) Effectiveness of adenoidectomy in children with recurrent upper respiratory tract infections (ISRCTN03720485)

Clinicaltrials.gov	27/03/2009	-	Adenoidectomy, Myringotomy and Tubes' Insertion vs Adenoidectomy and Myringotomy Alone in Children With Otitis Media With Effusion and Adenoid Hypertrophy (NCT00629694) Adenoidectomy for Otitis Media in 2-3 Year Old Children (NCT00016497) Prevention Recurrent Otitis Media in the Young Children (NCT00162994) Childhood Adenotonsillectomy Study for Children With OSAS (CHAT) (NCT00560859)

Websites searched on 24-30/03/2009

- National Institute for Health and Clinical Excellence (NICE)
- Food and Drug Administration (FDA) - MAUDE database
- Australian Safety and Efficacy Register of New Interventional Procedures – surgical (ASERNIP-S)
- Australia and New Zealand Horizon Scanning Network (ANZHSN)
- Conference websites
- General internet search

The following search strategy was used to identify papers in MEDLINE. A similar strategy was used to identify papers in other databases.

1	exp Diathermy/
2	diatherm*.tw.
3	exp Suction/

4	suction*.tw.
5	(suction* adj3 monopolar* adj3 diatherm*).tw.
6	exp Electrocoagulation/
7	coagulat*.tw.
8	heat*.tw.
9	exp Ablation Techniques/
10	ablat*.tw.
11	storz.tw.
12	valleylab.tw.
13	valley lab.tw.
14	or/1-13
15	exp Adenoidectomy/
16	adenoidectom*.tw.
17	exp Adenoids/
18	adenoid*.tw.
19	or/15-18
20	14 and 19
21	Animals/
22	Humans/
23	21 not (21 and 22)
24	20 not 23