



Original Article

Blood Loss During Adenoidectomy - Comparison of Radio frequency Ablation (Coblation) and Curettage

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Objective: *Adenoidectomy by curettage remains one of the most commonly performed otolaryngological procedures, and can lead to troublesome bleeding. This has led to the introduction of newer techniques, including radiofrequency ablation (coblation), that aim to minimise blood loss. The aim of this study is to compare blood loss in adenoidectomy performed using coblation to that found using the curette technique.*

Methods: *Children undergoing adenoidectomy were prospectively included in the study. Those having simultaneous tonsillectomy were excluded. Demographic details and an assessment of adenoid size were recorded. Blood loss was measured by comparing pre and post-operative weights of swabs in the curette group and the suction apparatus and saline bag in the coblation group. Results were analysed using SPSS for windows.*

Results: *Twenty-three children were included in the study, 13 having adenoidectomy by curette and 10 by coblation. The two groups had similar ages and average adenoid size. The curette group had a mean blood loss of 24.1 mls (range 4.5 – 52.1, SD 13.78) and the coblation group a mean blood loss of 2.6 mls (range 1.7-3.4, SD 0.57). This difference was found to be statistically significant ($p < 0.001$). There were no post-operative complications in either group.*

Conclusion: *This study confirms that, when performing adenoidectomy, the coblation technique has a significantly lower blood loss than the traditional curette technique.*

Keywords: *Adenoidectomy, Surgical blood loss.*

INTRODUCTION

Adenoidectomy remains one of the most commonly performed operations by otolaryngologists, and is carried out alone or, more usually, in combination with tonsillectomy and/or ventilation tube insertion. Complications following adenoidectomy include intra- or post-operative haemorrhage, damage to teeth, cervical spinal injury and velopharyngeal insufficiency.⁽¹⁾ Though uncommon, bleeding is the most feared complication and can be significant, particularly as the operation is most frequently performed in small children with low blood

volume. In addition, the traditional technique for adenoidectomy is blind curettage, meaning that any bleeding can be difficult to access and may necessitate prolonged intubation following placement of a postnasal pack. This has led to the introduction of techniques that use direct or indirect vision with controlled tissue removal and haemostasis.^(2,3) Such techniques also allow complete removal of the adenoid from the choanae and Eustachian cushion, areas difficult to access atraumatically with the curette. The most commonly described methods are those using the microdebrider and suction diathermy. In our department the coblation technique has proved highly

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suitable for adenoidectomy in recent years. Coblation works by having a low frequency radiofrequency current pass through integral saline irrigation via a headpiece with built in suction. The agitated sodium ions and not heat cause molecular disintegration of tissue while a low power bipolar diathermy current maintains haemostasis. This process is occurring at 60 degrees Celsius, which probably accounts for reduced spread of tissue damage when compared with conventional diathermy or laser. We present a comparison of blood loss in patients undergoing coblation adenoidectomy and curette adenoidectomy.

PATIENTS AND METHODS

Twenty-three consecutive children undergoing routine adenoidectomy were prospectively included in the study. Patients having simultaneous insertion of grommets (ventilation tubes) were included, but those requiring tonsillectomy were excluded. The indication for surgery in all cases was either obstructive sleep apnoea or chronic otitis media with effusion. Thirteen patients were consented for adenoidectomy to be performed in the usual way by surgeons in our department experienced in this procedure. A standard technique was used, with a Boyle-Davis gag, an adenoid curette to remove tissue, and a gauze pack for haemostasis. Blood loss was calculated by weighing the swabs after completion of haemostasis and subtracting the dry weight, as measured before surgery. Use of suction was avoided during the procedure.

Ten further patients were consented for and underwent coblation adenoidectomy under the care of the senior author, who is experienced in this technique. Coblation adenoidectomy is described in full elsewhere, and a video of the technique is available online.⁴⁻⁶ It consists of placement of a Boyle-Davis gag in the normal way, elevation of the palate with bilateral nasal suction catheters and use of a coblator (Evac 70 Coblator™ wand, coblation setting 9, coagulation setting 3) to remove the adenoid tissue and achieve haemostasis using a laryngeal mirror placed in the oropharynx. In the coblation group, blood loss was measured by calculating

the difference between the weight of the saline irrigation bag and the suction apparatus (including the suction tubing and collection bottle) before and after surgery. Care was taken to ensure that all saline irrigation used during the procedure was collected using the suction and not lost elsewhere e.g. by leaking onto the surgical drapes.

Other data collected included demographic patient details and size of adenoid, judged by the surgeon on palpation or indirect vision of the post-nasal space as small (less than half of postnasal space filled), medium (half to two-thirds filled) or large (greater than two thirds filled). Results were analysed using the SPSS for Windows version 10.0 statistics package.

RESULTS

Twenty-three children were included in the study, 13 undergoing adenoidectomy by curette and 10 by coblation. Results for the two groups are summarised in Table 1. Data in the two groups was found to be normally distributed, so mean values are given for averages and parametric tests used for statistical comparison. The ages of the two groups were similar, with a mean age of 6.46 years in the curette group (range 3-10, standard deviation (SD) 2.18), and 5 years in the coblation group (range 3-9, SD 1.89). There was no statistically significant difference in the size of the adenoid pad found in the 2 groups (Chi-square comparison, $p=0.979$). Blood loss differed significantly in the 2 groups; the curette group had a mean blood loss of 24.1 mls (range 4.5 – 52.1, SD 13.78) and the coblation group a mean blood loss of 2.6 mls (range 1.7-3.4, SD 0.57).

The difference of the means was 21.5 mls (95% confidence interval 13.2 to 29.9). Statistical analysis (Student's t-test) confirmed the difference in blood loss between the two groups to be highly significant ($p<0.001$). No immediate or delayed complications were encountered in any of the patients.

Table 1. Summary of Results.

		Curette (n = 13)	Coblation (n = 10)
Age (years)	Mean	6.46	5
	Range (SD)	3-10 (2.18)	3-9 (1.85)
Size of Adenoid (no. of patients)	Small	6	4
	Medium	5	5
	Large	2	1
Blood loss (mls)	Mean	24.1	2.6
	Range (SD)	4.5 – 52.1 (13.78)	1.7 – 3.4 (0.57)

DISCUSSION

Adenoidectomy is a commonly performed operation and has been proven to be an effective treatment for a variety of otolaryngological conditions; though the exact indications for surgery are debated.⁽⁷⁾ the most commonly used surgical technique for adenoidectomy is curette dissection with pack haemostasis. As this is a blind procedure, access to achieve haemostasis can be difficult, giving the potential for significant blood loss and the need for a post-nasal space pack. It can of course be done under direct or indirect vision with the aim of more accurate or complete removal of tissue. In recent years, techniques that employ more controlled tissue removal under direct or indirect vision have therefore been advocated. These include electrocautery, power assisted adenoidectomy using the microdebrider, suction diathermy, and coblation.^(8,9)

Transnasal or transoral approaches using endoscopes for visualisation have also been described.^(10,11) To our knowledge, this study is the first to directly compare blood loss between curette and coblation adenoidectomy

alone. We found a significant difference in the mean blood loss between the two groups, who were well matched for age and adenoid size. There was a mean of 24.1 mls blood loss after curette adenoidectomy and 2.6 mls after coblation adenoidectomy ($p < 0.001$). The weight of the adenoid was not specifically included in either group, though in the coblation group it is likely that coblated adenoid tissue is aspirated with the saline. This means that the blood loss following coblation is likely to have been overestimated; demonstrating that in experienced hands there can be close to zero blood loss in some cases.

Previous studies have attempted to examine blood loss after adenoidectomy performed in different ways. These are summarised in Table 2. Shapiro et al randomised a group of 46 children undergoing adenotonsillectomy into 2 equally sized groups. In the adenoidectomy part of the study, one group underwent coblation, the other curette dissection with suction cautery haemostasis. Results showed a significantly lower estimated blood loss in the coblation group ($p < 0.001$), with the majority (14/23) of patients having between 1 and 5 mls, and none having greater than 10mls, of blood loss.⁽¹²⁾

Table 2. Summary of published studies comparing blood loss in curette adenoidectomy and other

Author	Year	Technique Curette Vs	No. of patients		Blood loss		Significance
			Curette	Other	Curette	Other	
Shapiro et al ⁹	2007	Coblation	23	23	Majority > 10 mls	Majority < 10 mls	$p < 0.001$
Wright et al ¹⁰	1997	Electrocautery	73	59	Mean 24.8 mls (5-25)	Mean 5.5 mls (0-50)	$p < 0.0001$
Clemens et al ¹¹	1998	Electrocautery	12	12	54.5 mls (SD 50.7)	3.75 mls (SD 6.4)	$p = 0.0053$
Walker et al ¹⁵	2001	Suction Diathermy	56	68	Mean 20 mls (SD 17)	Mean 0.5 mls (SD 3)	$p < 0.001$
Stanislaw et al ¹⁶	2000	Power Assisted Adenoidectomy	87	90	Mean 24 mls	Mean 17.5 mls	$p < 0.001$

Wright et al compared 59 children undergoing electrocautery adenoidectomy with 73 historical controls operated by the conventional technique. Mean estimated blood loss for the two groups was 5.5mls and 24.8 mls, respectively ($p < 0.0001$).⁽¹³⁾ Clemens et al. prospectively randomised 24 children to undergo adenoidectomy by electrocautery or curette. They found a mean estimated

blood loss of 3.75 mls in the electrocautery group, and 54.5 mls in the curette group.⁽¹⁴⁾ Two other, non-comparative, studies of groups of children undergoing electrosurgical adenoid ablation have reported mean estimated blood losses of 2mls and 10.8mls.^(15,16)

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Hartley et al retrospectively compared 240 suction diathermy adenoidectomies with a well matched group of 170 conventional adenoidectomies. They reported 5 postoperative haemorrhages, all from the conventional group ($p=0.026$).¹⁷ Walker et al found a mean blood loss of 0.5mls in 68 children undergoing suction diathermy adenoidectomy, compared with a mean blood loss of 20mls in 58 children who had undergone conventional adenoidectomy ($p<0.001$).⁽¹⁸⁾

In a randomised comparison of power assisted adenoidectomy (PAA, $n=90$) and curette adenoidectomy ($n=87$), Stanislaw et al found a significant difference in blood loss, with a mean of 17.5 mls for the PAA group and 24 mls for the curette group.⁽¹⁹⁾ Accurate measurement of intra-operative blood loss is notoriously difficult, most of the above studies relying on some kind of estimate by the surgeon. We have attempted to introduce some objectivity to our study by measuring blood loss, though accept that the accuracy of our techniques may be limited. Other potential disadvantages of our study include multiple surgeons and lack of randomisation. Nonetheless, we believe that the size of the difference between the two groups in our study, as in other similar studies, diminishes the effect of these factors.

Assessment of adenoid size is also subjective, though we found no difference in adenoid size between the coblation and curette groups. We used a simple method similar to that used by Teppo et al.⁽²⁰⁾ Clemens et al have developed a four-grade system for adenoid size using radiographs and endoscopic assessment.⁽¹⁴⁾

Though none of the children in the curette group in our study came to harm from the degree of blood loss they experienced, it makes sense to us to minimise any bleeding in young children undergoing surgery. In addition, as with other techniques that use direct or indirect vision, coblation allows controlled tissue removal, which gives the advantage of allowing precise clearance of adenoid tissue from the posterior choanae and the Eustachian tube cushions, areas that, are difficult to access without trauma using the curette. This has particular importance when considering adenoid removal in very small children, those with velopharyngeal insufficiency, or cases with difficult access to the postnasal space e.g. Down syndrome. Coblation adenoidectomy also has a lower reported incidence of postoperative neck pain; in a retrospective study of 1997 adenoidectomies, Glade et al. found a significant difference in the incidence of postoperative neck pain or stiffness between different techniques, with 0 of 602 (0%) in the coblation group, 3 of 632 (0.5%) in the electrocautery group, and 17 of 763 (2.2%) in the combined curette/electrocautery group requiring assessment in the operating theatre.²⁰ In addition, coblation operates at a lower temperature than suction diathermy or electrocautery, and therefore carries

less risk of the thermal injury and post-operative halitosis that can be associated with these techniques.^(21,22)

As ever with Coblation surgery, there is a significant cost issue regarding the disposable headpieces, which limits the adoption of this technique in developing countries.

There is no doubt that there is a learning curve to performing the technique of coblation adenoidectomy. Though not measured in this study, we have found that once experienced in this technique, surgical time is no longer than for conventional curette adenoidectomy. There is a commonly held belief that curettage is a quicker technique, but this is only true as far as the initial tissue removal is concerned. When one considers the extra time after curettage when the post nasal pack is in situ while awaiting haemostasis, Coblation does not add time to the procedure. We feel this technique that requires regular use to get the best of its advantages, rather than occasional cases.



Dry, empty & non-charred nasopharynx at completion of radiofrequency adenoidectomy.

CONCLUSION

In our department, the coblation technique has been successfully used for adenoidectomy, and this study confirms that the blood loss is significantly less using this method than the more commonly used curette technique. This paper makes clear the facts regarding blood loss that established users already know, but which others may not have previously accepted. This is a major advantage of coblation adenoidectomy, which also allows controlled and selective tissue removal, has a lower reported

incidence of post-operative neck pain and causes less thermal injury than other techniques.

Conflict of Interest Statement: MST has had travel expenses sponsored by Arthrocare whilst on foreign instructional Courses.

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