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Paediatric tonsillectomy: bipolar electrodissection and dissection/snare compared

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Abstract

Tonsillectomy is a common operation in children performed by a variety of techniques. Recently we have introduced a modified form of electrodissection tonsillectomy using bipolar diathermy. A prospective study was designed to evaluate this technique against the conventional dissection/snare technique. Sixty children were entered into each section of the study (total 120 children). There is a statistically significant shorter operating time (mean 11.2 minutes) and lower intraoperative blood loss (mean 5 ml) using the bipolar diathermy technique. Post-operatively, the children who had bipolar diathermy tonsillectomy were found to be able to drink and eat significantly earlier than the cold dissection group. There was no measurable difference in analgesia requirements before discharge and the time of discharge between the two methods. Post-operative haemorrhage occurred in two out of 60 (3.4 per cent) and one out of 60 (1.7 per cent children) in the conventional and bipolar diathermy dissection, respectively, but this was not statistically significant.

Key words: Tonsillectomy; Diathermy, bipolar, complications; Child

Introduction

In the paediatric population, tonsillectomy is one of the most frequent operations performed in the U.K.

Celsius was credited with the first description of the tonsil removal in the first century AD (McAuliffe, 1987). Since then, various techniques have been evolved to accomplish this operation. Dissection tonsillectomy is now the current preferred method. The method of dissection varies, descriptions include blunt and sharp dissection (the traditional methods), electrodissection and laser tonsillectomy.

The use of diathermy for dissecting the tonsil was first described by Goycoolea *et al.* (1982) using a monopolar suction diathermy. Following this, Mann *et al.* (1984), Haberman *et al.* (1990) and Weimert *et al.* (1990) have used monopolar diathermy dissection with low morbidity. Haberman *et al.* (1990) used it as a Day-case procedure, observing the patient for six hours post-operatively and discharging them if no complications arose.

At the Royal Manchester Children's Hospital, in Salford, UK, the blunt dissection and snare method predominate. Recently we have introduced a modified form of electrodissection using bipolar diathermy. A prospective study was designed to evaluate this new technique in comparison with the dissection/snare technique.

Materials and methods

From February 1993 to March 1994, children were drawn from a waiting list for tonsillectomies with, or without, adjunctive procedures like adenoidectomies, grommets and antral washout and entered for the study. The indications for tonsillectomy were recurrent attacks of documented tonsillitis and/or sleep apnoea. Those with a history of quinsy, bleeding disorder and those over 16 years of age were excluded.

On admission, a full blood count was performed. Children weighing less than 15 kg also had their blood grouped and saved. The children were divided randomly into two groups. One group underwent bipolar dissection tonsillectomy while the second group had tonsillectomy by the dissection/snare technique. Informed consent was obtained.

The operation was conducted via general anaesthesia using endotracheal intubation. The child was placed in a supine position with a sand bag between the shoulders. The mouth was held open by a Boyle's Davis gag supported by Draffin poles. Subsequently the technique varied depending on the method used.

The technique of bipolar electrodissection has been described in an earlier paper (Pang *et al.*, 1994). Children in the first group underwent bipolar electrodissection tonsillectomy. We used the

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TABLE I
ADJUNCTIVE OPERATIONS PERFORMED WITH TONSILLECTOMY

	Bipolar diathermy tonsillectomy n = 60	Dissection/snare tonsillectomy n = 60
Adenoidectomy	33	19
Grommet insertions	3	2
Antral washouts	0	2

Eschman TDB 60 bipolar diathermy machine set at 30 W. Using an eight inch straight bipolar forceps a palatoglossal incision was made with cautery. The peritonsillar plane was identified and dissected from the superior to inferior pole. With careful dissection, it was possible to identify most of the blood vessels supplying the tonsil. These were cauterized before separating them from the tonsil. The lack of peritonsillar adhesions in children makes it possible to perform part of the operation by sharp dissection without diathermy using the forceps. No snare was used and further haemostasis was secured by point coagulation.

The second group of children had tonsillectomy by the dissection and snare technique. The palatoglossal incision was made by a pair of slightly curved blunt scissors. Once the peritonsillar plane was identified, the tonsil was separated from its fossa by a blunt tonsil dissector from the superior to inferior pole. The tonsillectomy was completed using a wire snare. The fossa was packed with a tonsil swab and tonsil removal proceeded on the opposite side. Ties were used to secure haemostasis.

The operative time was measured from the palatoglossal incision to complete haemostasis. The intraoperative blood loss was measured prior to adjunctive procedures. No perioperative antibiotics were given unless the child developed a pyrexia 24 hours after the operation. Post-operative analgesia was syrup paracetamol according to the weight of the patient based on the recommendations of the *British National Formulary (1993)*. The quantity and type of analgesia used were recorded prior to discharge. The times when drinking and eating occurred were noted as well any complications that arose. The results were analysed by the Mann-Whitney U-test and multiple regression statistical tests.

Results

The study was kept open until there were 60 patients in each section of the study. Group 1 had 28 boys and 32 girls while Group 2 has 25 boys and 35 girls. The age range was four to 15 years with a mean of 10.85 years in the bipolar diathermy group while the age range was five to 14 years with a mean of 9.8 years in the cold dissection group. The results of the operations are seen in Table I.

TABLE II
OPERATION TIME (MINUTES)

	Bipolar diathermy tonsillectomy n = 60	Dissection/snare tonsillectomy n = 60
Range	5–20	10–55
Mean	11.2	19.9
Standard deviation	2.7	9.9
Median (first, third quartile)	10 (10,11.5)	20 (10,25)

$p<0.0001$ (significant).

TABLE III
INTRAOPERATIVE BLOOD LOSS (ML)

	Bipolar diathermy tonsillectomy n = 60	Dissection/snare tonsillectomy n = 60
Range	0–25	4–200
Mean	5.0	39.5
Standard deviation	6.0	37.7
Median (first, third quartile)	4 (0,8)	30 (20,47)

$p<0.0001$ (significant).

As shown in Table II, the bipolar electrodissection method of tonsillectomy was significantly quicker than that of a dissection/snare. Similarly, the amount of blood lost during the bipolar diathermy tonsillectomy was significantly less than that of a dissection/snare (Table III). The distribution of blood loss is seen in Figure 1.

Using the time to the first oral intake of drink or food as an indication of pain severity, children in the bipolar diathermy tonsillectomy group first drank and ate significantly earlier than those in the dissection/snare group (Tables IV and V). There was however no significant difference in the analgesic requirements between the two groups (Table VI).

Most of the children were discharged by the next day. Four and five children in the bipolar diathermy and cold dissection groups respectively stayed an extra day because of a low-grade temperature. There was no significant difference in the discharge time.

In the dissection/snare group, one child (1.7 per cent) developed primary haemorrhage (<24 hours) requiring haemostasis in the theatre. Each of the groups had one case of secondary haemorrhage due to infection which was treated conservatively with intravenous antibiotics.

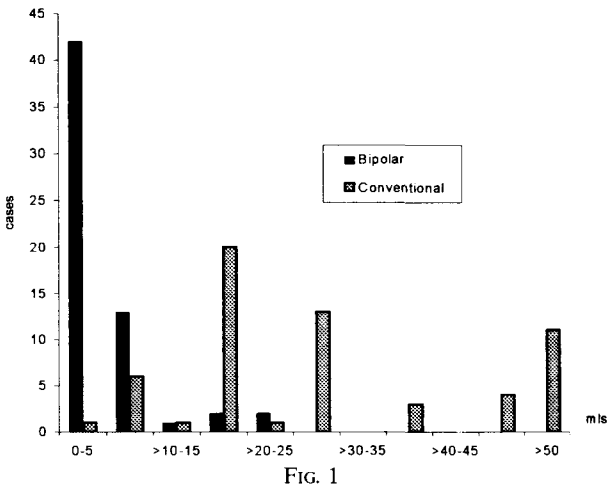


FIG. 1
Distribution of intraoperative blood loss by bipolar diathermy tonsillectomy (n = 60) and dissection/snare tonsillectomy (n = 60).

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TABLE IV
TIME TO FIRST FLUID INTAKE (HOURS)

	Bipolar diathermy tonsillectomy n = 60	Dissection/snare tonsillectomy n = 60
Range	1–24	3–20
Mean	4.8	7.2
Standard deviation	4.4	4.5
Median (first, third quartile)	4 (2,5)	6 (4,7.8)

$p<0.0001$ (significant).

Discussion

There is no consensus on the best method of tonsillectomy. Most centres now use dissection tonsillectomy with only a few centres still performing guillotine excision. The tonsil guillotine or tonsillotome, first described as a uvulotome to treat nonspecific throat complaints (McAuliffe, 1987), has been modified and is now available as the Waugh, Sluder, Popper and Pguire guillotine. Guillotine tonsillectomy was the method of choice in the past. It is most effective in children where there are few adhesions between the tonsil and fossa. Yuan *et al.* (1984) described it as a technique for all age groups and the guillotine has been said to cause less bleeding and pain compared to dissection tonsillectomy (Weligodapola, 1983, Wake and Glossop, 1989). Opponents cite trauma to the faucial pillars and the problem of tonsillar remnants as objections. The technique has been reported as unsatisfactory in adults (Weligodapola, 1983).

Dissection tonsillectomy can be accomplished by blunt, laser or diathermy dissection. Laser tonsillectomy (Martinez and Akin, 1987; Oas and Bartels, 1990) has achieved a growing popularity in the United States with the increasing availability of machines and reported reductions in morbidity. There is a significant decrease in intraoperative blood loss (Martinez and Akin, 1987; Oas and Bartels, 1990), reduction in post-operative pain and more rapid healing (Martinez and Akin, 1987) though these have been disputed by some authors (Linden *et al.*, 1990; Oas and Bartels, 1990). The incidence of post-operative haemorrhage has been quoted as two to five per cent which is comparable to the conventional technique.

Historically diathermy was not used during tonsillectomy because flammable gases were used for induction. With the advent of non-flammable agents, monopolar, and subsequently bipolar, diathermy was introduced as a means of securing haemostasis. Electrodissection tonsillectomy is usually performed with a monopolar suction dissector. Various authors (Hall, 1984; Mann *et al.*, 1984; Weimert *et al.*, 1990) have used this method with low morbidity. In general it affords a shorter operative time as little time is spent in securing haemostasis after the tonsils are out. There is also a significantly lower volume of blood loss (Goycoolea *et al.*, 1982; Hall, 1984; Weimert *et al.*, 1990) compared to the dissection/snare method (Mann *et al.*, 1984; Tami *et al.*, 1987; Wake and Glossop, 1989; Oas and Bartels, 1990; Weimert *et al.*, 1990).

TABLE V
TIME TO FIRST SOLID INTAKE (HOURS)

	Bipolar diathermy tonsillectomy n = 60	Dissection/snare tonsillectomy n = 60
Range	2–36	15–30
Mean	11.1	15.9
Standard deviation	7.3	6.1
Median (first, third quartile)	10.5 (4,10)	18 (10,20)

$p<0.0001$ (significant).

TABLE VI
ANALGESIC REQUIREMENT BEFORE DISCHARGE (DOSES)

	Bipolar diathermy tonsillectomy n = 60	Dissection/snare tonsillectomy n = 60
Range	1–7	1–7
Mean	3	3
Standard deviation	1.2	1.17

$p<0.95$ (non significant).

The use of bipolar diathermy tonsillectomy also achieves these advantages. The precise nature of bipolar diathermy dissection allows the blood vessels to be identified and diathermized keeping blood loss to minimal. In our study this averaged 5 ml (ranging from 0 to 25 ml). This is significantly less than the dissection/snare group which averaged a blood loss of 39.5 ml. It is comparable to other electrodissection series which are associated with a lower intraoperative blood loss ranging from 0.5 to 23 ml (Goycoolea *et al.*, 1982; Hall, 1984; Weimert *et al.*, 1990). In the dissection/snare technique blood loss ranges from 53 to 132 ml (Hall, 1984; Tami *et al.*, 1987; Wake and Glossop, 1989; Weimert *et al.*, 1990).

Various series using monopolar cautery demonstrated a shorter operating time when compared with cold dissection (Mann *et al.*, 1984; Weimert *et al.*, 1990). We found this to be the case in our series with a mean of 11.2 minutes in bipolar diathermy dissection compared to 19.9 minutes in the dissection/snare technique for the removal of both tonsils.

Opponents to the use of diathermy in tonsillectomy cite an increase in post-operative haemorrhage, pain and slower healing as major deterrents (Lawrenson and Stephens, 1970; Kristensen and Tveteras, 1984; Handler *et al.*, 1986). These have been demonstrated to be unfounded in the series presented by Mann *et al.* (1984) and Weimert *et al.* (1990). The volume of current operations is much less for bipolar than for monopolar diathermy. With practice, part of the dissection can be performed using the bipolar forceps as sharp dissectors; diathermizing only when blood vessels are encountered. This would reduce the degree of post-operative pain, oedema and delayed healing. Roy *et al.* (1976) also found that there was more morbidity if 'zonal' cautery was used compared to point electrocautery. In theory, the bipolar diathermy technique should produce less pain and oedema than monopolar electrodissection.

Our series showed no difference in the analgesic

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requirements between the two groups. This concurs with other studies (Hall, 1984; Mann *et al.*, 1984) using electrodissection compared with the conventional technique. However if the time to the first drink and food are taken as a rough indicator of post-operative pain, then that would mean less pain was caused by bipolar diathermy than by conventional dissection. This would require further study.

Bipolar diathermy presented less risk of current leak causing burns to the lips and oropharynx from faulty instruments when compared to monopolar diathermy but any occurrence of burns would be unacceptable.

The laser has no noticeable advantage over electrocautery and there are conflicting reports in comparison of pain with the various methods (Oas and Bartels, 1990). One definite advantage is that the bipolar forceps is more efficient in controlling large vessel bleeding.

The technique used for the tonsillectomy did not influence the time of discharge in our series. In reviewing post-operative haemorrhage in other studies, it seems that our use of bipolar diathermy did not show any significant difference in haemorrhage rates. Post-operative haemorrhage rates have been quoted as 1.2 to 7 per cent in large series of 500 cases or more (Kristensen and Tveteras, 1984; Siodlack *et al.*, 1985; Handler *et al.* 1986; Carithers *et al.*, 1987; Martinez and Akin, 1987; Tami *et al.*, 1987; Weimert *et al.*, 1990). In the present series, post-operative haemorrhage rates were for two children (2.34 per cent) by conventional dissection and one child (1.17 per cent) by bipolar electrodissection and were comparable to other reported series.

Conclusions

Bipolar diathermy tonsillectomy is a safe and effective method of tonsillectomy. There is significantly less intraoperative blood loss with no measurable increase in post-operative morbidity compared to dissection tonsillectomy. It is especially useful in children with bleeding disorders and those with difficult oropharyngeal access such as children with mucopolysaccharidosis.

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References

British National Formulary (1993) Number 25, British Medical Association.

Carithers, J. S., Gebhart, D. E., Williams, J. A. (1987) Postoperative risk of paediatric tonsilloadenoidectomy. *Laryngoscope* **97:** 422–429.

Goycoolea, M. V., Cubillod, P. M., Martinez, G. C. (1982) Tonsillectomy with a suction coagulator. *Laryngoscope* **92:** 818–819.

Haberman, II. R. S., Shattuck, T. G., Dion, N. M. (1990) Is outpatient suction cautery tonsillectomy safe in a community hospital setting? *Laryngoscope* **100:** 511–515.

Hall, G. M. (1984) Cautery tonsillectomy–saves time. *Laryngoscope* **94:** 1381–1382.

Handler, S. D., Miller, L., Richmond, K. H., Corso Baranak, C. (1986) Post-tonsillectomy haemorrhage: incidence, prevention and management. *Laryngoscope* **96:** 1243–1247.

Kristensen, S., Tveteras, K. (1984) Post-tonsillectomy haemorrhage: a retrospective study of 1150 operations. *Clinical Otolaryngology* **9:** 347–350.

Lawrenson, K. B., Stephens, F. O. (1970) The use of electrocutting and electrocoagulation in surgery. *Australian and New Zealand Journal of Surgery* **39:** 417–421.

Linden, B. E., Gross, C. W., Long, T. E., Lazar, R. H. (1990) Morbidity in pediatric tonsillectomy. *Laryngoscope* **100:** 120–124.

Mann, D. G., St George, C., Granoff, D., Scheiner, E., Imber, P., Mlynarczyk, F. A. (1984) Tonsillectomy – some like it hot. *Laryngoscope* **94:** 677–679.

Martinez, S. A., Akin, D. P. (1987) Laser tonsillectomy and adenoidectomy. *Otolaryngologic Clinics of North America* **20:** 371–376.

McAuliffe, C. J. (1987) The history of tonsil and adenoidal surgery. *Otolaryngologic Clinics of North America* **20:** 415–419.

Oas, R. E., Bartels, J. P. (1990) KTP-532 laser tonsillectomy: A comparison with standard technique. *Laryngoscope* **100:** 385–388.

Pang, Y. T., El-Hakim, H., Rothera, M. P. (1994) Bipolar diathermy tonsillectomy. *Clinical Otolaryngology* **19:** 355–357.

Roy, M., De La Rosa, C., Vecchio, Y. A. (1976) Bleeding following tonsillectomy: a study of electrocoagulation and ligation techniques. *Archives of Otolaryngology* **102:** 9–10.

Siodlack, M. Z., Gleeson, M. J., Wengraf, C. L. (1985) Post-tonsillectomy secondary haemorrhage. *Annals of the Royal College of Surgeons of England* **67:** 167–168.

Tami, T. A., Parker, G. S., Taylor, R. E. (1987) Post-tonsillectomy bleeding: an evaluation of risk factors. *Laryngoscope* **97:** 1307–1311.

Unlu, Y., Terkalan, S. A., Cemiloglu, R., Ketenci, I., Kutluhan, A. (1992) Guillotine and dissection tonsillectomy in children. *Journal of Laryngology and Otology* **106:** 817–820.

Wake, M., Glossop, P. (1989) Guillotine and dissection tonsillectomy compared. *Journal of Laryngology and Otology* **103:** 588–591.

Weimert, T. A., Babyak, J. W., Richter, H. J. (1990) Electrodissection tonsillectomy. *Archives of Otolaryngology, Head and Neck Surgery* **116:** 186–188.

Weligodapola, G. S. (1983) Comparative study of tonsillectomy performed by guillotine and dissection methods. *Journal of Laryngology and Otology* **97:** 605–606.

Yuan, C. C., Yu, D., Jun, T. S. (1984) Guillotine tonsillectomy without anesthesia. *Auris Nasus Larynx* **11:** 29–35.

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