

Post-operative pain in tonsillectomy: bipolar electrodissection technique vs dissection ligation technique. A double-blind randomized prospective trial

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Abstract

The two commonly employed methods for tonsillectomy at present are electrodissection and ligature dissection. This study was carried out on 70 patients as a randomized prospective double blind trial to compare the post-operative morbidity of these methods with special reference to pain. The post-operative pain appears to be much less for the ligation dissection technique compared to the electrodissection method except during the first post-operative day. Irrespective of the technique employed for tonsillectomy, the worst pain was experienced on the fifth and sixth post-operative day by almost all of the patients.

Key words: Tonsillectomy, Surgery; Electrocoagulation; Pain Measurement

Introduction

Cornelius Celsus in Rome described the blunt removal of tonsils by the use of finger in around 40 AD.¹ Since then different methods have been developed by surgeons to perform this operation. It appears that tonsillectomy was not a popular operation till the beginning of the 20th century and the most probable reason for this could be the difficulties in controlling the post-operative haemorrhage. Ligature of the vessels to stop the bleeding during tonsillectomy was first adopted by Cohen² and this technique has stood the test of time. The use of monopolar diathermy in tonsillectomy was first introduced by Haase and Noguera³ and Johnson.⁴ Reed and Snider⁵ refined the technique by using bipolar diathermy in 1974. Since then there has been an increasing number of trials conducted to assess the various aspects of these different methods. Some of these studies came to the conclusion that diathermy increases post-operative pain⁶ and bleeding.⁷ However, Phillipps and Thornton⁸ noticed that there is no significant difference in the incidence of haemorrhage between these techniques. They also pointed out that diathermy shortens the operating time by approximately a quarter. In a series of 1036 patients, Watson *et al.*⁹ reached the same conclusion that diathermy is no more likely to result in post-tonsillectomy haemorrhage than when using ligature. They also observed that diathermy is a faster method of securing haemostasis and hence recommended in preference to ligature. Choy and Su¹⁰ also claim that this is true.

More recently the application of diathermy during tonsillectomy has widened with the introduction of bipolar electrodissection.¹¹ Biopolar diathermy induces less tissue damage and allows more accurate coagulation of bleeding vessels. This technique is associated with less intra-operative blood loss with no measurable increase in post-operative morbidity compared to ligature method.¹² However, the main disadvantage of electrodissection tonsillectomy is the delayed increase in pain, though the pain is less during the immediate post-operative period.¹³

At present, the two commonly employed methods for this common operation are the electrodissection technique and the ligature technique. The advantage of one technique over the other is still a grey area. Hence we decided to carry out a randomized prospective double-blind trial to compare these two methods with special reference to the two most important aspects, i.e. associated pain and the duration of the operation.

Materials and methods

It has been seen that the majority of papers were comparing patients who underwent the electrodissection method of tonsillectomy to those who underwent ligation dissection method. One of the main drawbacks of these studies was the difficulty in assessing and comparing the pain between different individuals with varying degrees of pain thresholds. However, our study has been designed in such a way

Tonsillectomy Pain Analysis Between Dissection & Ligation and Diathermy

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ligation	118	117	104	118	110	130	77	62	46	39	32	26	21	12	13
Diathermy	91	115	131	137	144	140	126	112	95	83	67	57	45	35	31
Ave. Ligation	2.4	2.3	2.1	2.4	2.2	2.6	1.5	1.2	0.9	0.8	0.6	0.5	0.4	0.2	0.3
Ave. Diathermy	1.8	2.3	2.6	2.7	2.9	2.8	2.5	2.2	1.9	1.7	1.3	1.1	0.9	0.7	0.6

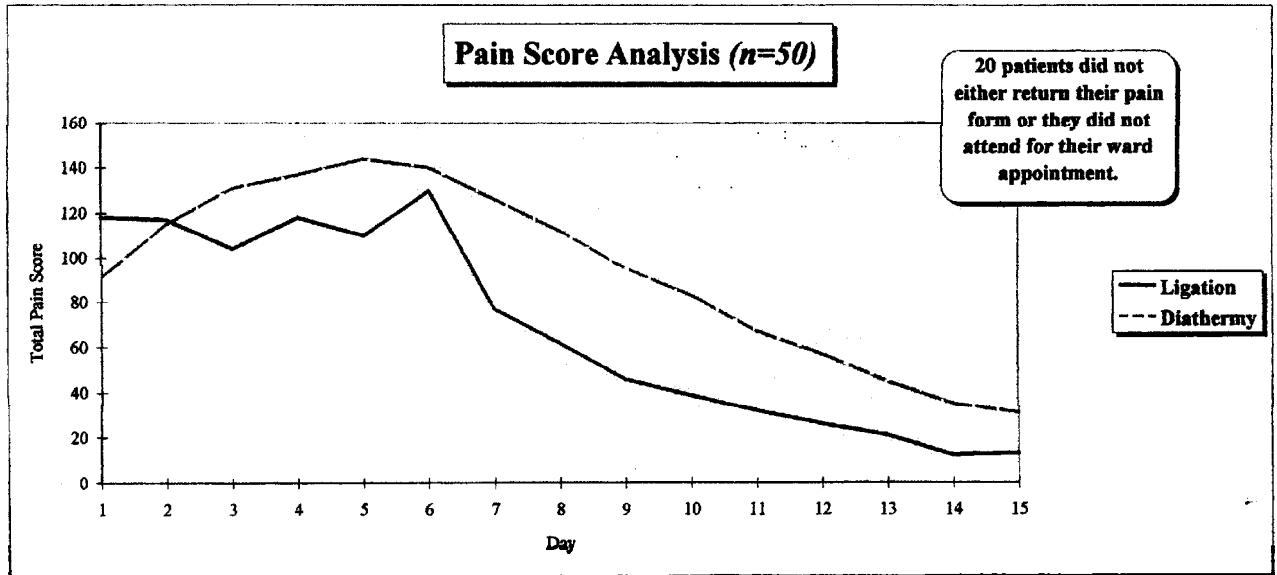


FIG. 1

Comparison of post-operative pain between the two techniques.

that patients are actually comparing the pain between the two sides, avoiding individual variation in pain assessment.

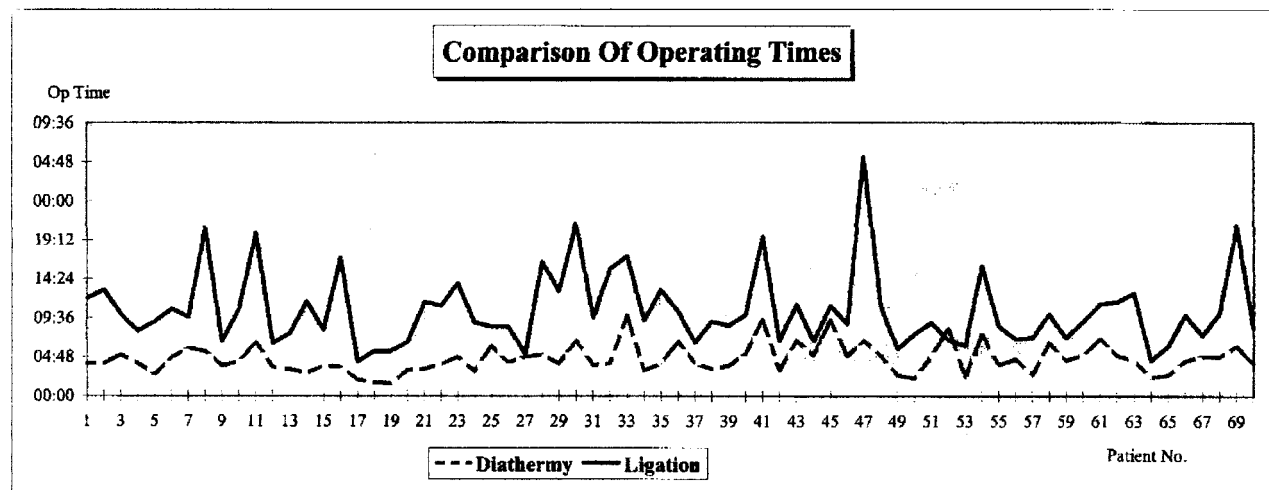
Seventy patients, both male and female, who underwent tonsillectomy at Torbay Hospital during the time period August 1997 to July 1998 were included in the study. Children below 10 years old were not included as there were doubts about their ability to complete the questionnaires accurately. Patients booked for a routine tonsillectomy were approached during the pre-assessment clinic in order to explain the study and to get consent from the willing subjects. They were informed that one of their tonsils would be removed by the dissection ligation method and the other using bipolar electrodissection technique. Post-operatively they were requested to complete a score sheet to record the amount of pain twice daily for two weeks.

In this study we have made all attempts to adhere to the maximum degree of double-blindness the situation permits. An envelope was placed in the theatre containing equal number of 'right' and 'left' marked cards. A theatre nurse was asked to pick a card at random to decide the side of dissection and ligation tonsillectomy. The possibility of picking the same side repeatedly was foreseen and to avoid this, the picked card was discarded each time, increasing the probability of picking the other side during the subsequent times. No details regarding the sides was entered in the case notes of these patients; however, this was recorded in a separate book and was kept confidential.

Tonsillectomy was performed under general anaesthesia with oral endotracheal intubation. Boyle-Davies gags supported by Draffin bipods were used as in routine tonsillectomy. In each case, one tonsil was removed by bipolar electrodissection technique while the other side was excised using the dissection and ligation technique. In the electrodissection technique, bipolar diathermy was used both to dissect out the tonsil and to attain the haemostasis. The time taken for the operation was recorded separately for each side. This was calculated from the beginning of the actual operation (i.e. holding the tonsil with tonsil-holding forceps) until the attainment of satisfactory haemostasis on the one side so that no further attention was required for that side. The timing procedure was repeated on the opposite side. The right side tonsil was always removed first irrespective of the method. All the operations were carried out by an experienced surgeon. Patients were prescribed standard post-operative doses of analgesics, i.e. cocodamol (codiene and paracetamol) and diclofenac sodium in cases of adult patients, and paracetamol and ibuprofen in cases of paediatric patients. All patients were supplied with a questionnaire to assess the post-operative pain and were requested to record the pain experienced twice daily, separately for each side from day 1 to day 15 post-operatively. A scoring system was used to record the pain in a manner where the zero score meant no pain and a score of four meant very severe pain. Fifteen days post-

Results Of Operation Time Analysis

70 patients had their operation performed by the named surgeon



Mean operating time:	Diathermy	Ligation
Median operating time:	04:32	10:32
Statistical significance of operating time:	04:09 09:27	
	P < 0.005 (<i>Highly significant</i>)	

FIG. 2

Difference in the time taken for tonsillectomy between the two methods – analysis of 70 patients.

operative these patients were interviewed and the questionnaires were collected together with any comments by the ward sister, who was unaware of the details regarding the type and side of the tonsillectomies performed. The ward sister then handed over the collected data to an independent person who was the clinical audit officer of Torbay Hospital. These data were analysed by him and a p value of <0.05 was considered significant (t -test), a value of <0.05 was very significant and a value of <0.0005 was very highly significant.

Results

Among the 70 patients who entered for the trial, only 50 patients returned the completed questionnaire. There were 21 males and 49 females. The age of the patients included in this study varied from 10 years to 37 years with a mean of 22 years. Ligation dissection method was performed on the right side in 37 patients and on the left side in 33 patients.

In the first two post-operative days, the mean pain score of the 50 patients was 2.4 on the ligation side and was found to be significantly higher than the 1.8 on the diathermy side ($p = <0.05$). However, on the third day, the electrodissection side became more painful compared to the ligation side. Detailed analysis of pain is shown in Figure 1.

As for the surgical time, it was found that the ligation dissection method took twice as long as the electrodissection technique. The mean operating time for the bipolar method was 04.32 min, while mean time for ligation method was 10.32 min ($p =$

<0.0005). Analysis of the operating time is shown in Figure 2. No patients in this series had post-operative haemorrhage.

Discussion

It is a general belief among surgeons that the use of diathermy for tonsillectomy causes more post-operative pain. This originated from the experience with monopolar diathermy. However, with the advent of bipolar diathermy it is possible to provide a precise coagulation of the tissue between the ends of the fine tips of the diathermy forceps, which is expected to cause much less tissue damage and less post-operative pain. In our study it was noted that the ligation tonsillectomy was significantly more painful in the first post-operative day ($p = <0.05$). This fact has a direct bearing on the immediate post-operative morbidity. Patients can eat and drink earlier and hence can be discharged home earlier after the electrodissection method. This is an important factor for consideration when discussing day case tonsillectomy. In another study, the mean time taken for the first oral intake of drink or food was found to be 4.8 hrs in cases of bipolar electrodissection tonsillectomy compared to 7.2 hrs in cases of dissection and snare tonsillectomies.¹²

The pain on the diathermy side steadily increased from day 1, reaching a peak on day 5 and then decreasing until day 15. The delayed increase in pain on the diathermy side may be related to the slower

healing rate on that side. However, on the ligation side, pain kept spiking up to the sixth day, when pain was at its worst.

Surprisingly, pain reduced drastically on the seventh day and then reduced gradually until the 15th day. It is also noted that, irrespective of the technique employed for tonsillectomy, the worst pain was experienced on the fifth and sixth post-operative days by almost all of the patients. A similar pattern of post-operative pain was observed in one of the previous studies.¹³ Both methods required regular analgesia routinely on discharge. However, in general, pain was much less with the dissection ligation technique compared to the electrodissection method.

Previous studies have shown that the bipolar diathermy technique needs less operating time compared to the dissection ligation technique.¹² This is found to be true in our study as well. Shorter operating time means less time under anaesthesia and this in turn is expected to be associated with a faster recovery from anaesthesia. However, in daily practice, while doing tonsillectomy by dissection and ligation method, the surgeon packs the tonsillar fossa on the first side while removing the tonsils from the other side. This in turn helps to reduce the bleeding and save some operating time. This factor was not taken into consideration while calculating the operating time in our study.

The bipolar method left the tonsil bed totally dry, as compared to ligation method. This reduced post-operative morbidity with regard to vomiting and laryngeal spasm due to blood trickling into the larynx. This fact is demonstrated in one of the recent studies.¹⁴

Intra-operative blood loss was markedly reduced using the bipolar method due to the lesser operating time. This reduced blood loss is important for children in particular, who form the majority of patients undergoing tonsillectomy.

None of our patients had reactionary or secondary haemorrhage, suggesting that there is no difference in the rate of post-operative haemorrhage between the two techniques. In essence the major difference between the two techniques is the difference in the post-operative pain, which is perhaps the most serious complication of adult tonsillectomy. The pain appears to be worse on the fifth and sixth post-operative days and this needs to be controlled by altering the routine post-operative analgesia given to patients on discharge.

References

- 1 Feldman H. Two hundred year history of tonsillectomy. Images from the history of otorhinolaryngology, highlighted by instruments from the collection of the German Medical History Museum in Ingolstadt. *Laryngorhinootologie* 1997;**76**:751–60
- 2 Cohen L. Postoperative tonsillar bleeding. Its surgical control, with mention of cases. *J Am Med Assoc* 1909; **53**:698–701
- 3 Haase FR, Noguera JT. Haemostasis in tonsillectomy. *Arch Otolaryngol* 1962;**75**:125–6
- 4 Johnson F. Electrocautery in tonsil and adenoid surgery. *Arch Otolaryngol* 1962;**75**:127–9
- 5 Reed K, Snidder CJ. Bipolar forceps for electrocautery in tonsillectomy. *Trans Am Acad Ophthalmol Otolaryngol* 1974;**78**:285–6
- 6 Salam MA, Cable HR. Post-tonsillectomy pain with diathermy and ligation techniques. A prospective randomised study in children and adults. *Clin Otolaryngol* 1992;**17**:517–9
- 7 Siodlak MZ, Gleeson MJ, Wengraf CL. Post-tonsillectomy secondary haemorrhage. *Ann R Coll Surg Engl* 1985;**67**:167–8
- 8 Phillips JJ, Thornton ARD. Tonsillectomy haemostasis: diathermy or ligation. *Clin Otolaryngol* 1989;**14**:419–24
- 9 Watson MG, Dawes PJD, Samuel PR, Marshal HF, Rayappa C, Hill J, *et al.* A study of haemostasis following tonsillectomy comparing ligatures with diathermy. *J Laryngol Otol* 1993;**107**:711–5
- 10 Choy ATK, Su A. Bipolar diathermy or ligation for haemostasis in tonsillectomy? A prospective study on post-operative pain. *J Laryngol Otol* 1992;**106**:21–2
- 11 Pang YT, El-Hakim H, Rothera MP. Bipolar diathermy tonsillectomy. *Clin Otolaryngol* 1994;**19**:355–7
- 12 Pang YT. Paediatric tonsillectomy: bipolar electrodissection and dissection/snare compared. *J Laryngol Otol* 1995; **109**:733–6
- 13 Tay HL. Post-operative morbidity in electrodissection tonsillectomy. *J Laryngol Otol* 1995;**109**:209–11
- 14 Murray D, Provan M, Crawford M, Nunez D. Post-tonsillectomy vomiting: does intraoperative blood loss play a significant role. RSM Meeting, London, 5 March 1999

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Mr M. Kumar takes responsibility for the integrity of the content of the paper.

Competing interests: None declared
