

Ligation Versus Bipolar Diathermy for Hemostasis in Tonsillectomy: A Comparative Study

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Abstract Tonsillectomy despite being less performed nowadays still is a very common surgery performed by ENT surgeons. The use of various modalities like bipolar diathermy, laser, cryosurgery, radiofrequency and ionic coblation for hemostasis in tonsillectomy remains controversial so far. A thorough scan of literature comparing the ligation with diathermy has been presented. In this prospective study, we analysed 50 patients undergoing tonsillectomy by dissection method. Right sided tonsillectomies act as study group (bipolar diathermy used) and left sided tonsillectomies as the control group (ligation for hemostasis used). The aim of our study is to compare the amount of blood loss, number of ligatures applied, average time taken and incidence of postoperative haemorrhage following the use of ligation and bipolar diathermy. The study found that diathermy hemostatic technique is associated with a quicker procedure, less intraoperative blood loss, comparable postoperative pain.

Keywords Tonsillectomy · Hemostasis · Bipolar diathermy · Ligation · Intraoperative blood loss

Introduction

In the medical literature, there are many controversial subjects. Tonsillectomy is one of them which leaves us with more questions than answers. Even though it is one of

the most commonly performed surgeries in the world over and is usually safe, simple and uncomplicated, yet the surgeons who perform this operation are keenly aware of the threat of its most frequent and dreaded complication i.e. haemorrhage which might lead to aspiration and shock.

In the present state of our knowledge it is generally agreed that certainly in the early years, the tonsils should be conserved as probable immunological assets unless by their size they are causing severe embarrassment to respiration, Eustachian tube function, speech or feeding or unless they have become the seat of a disease. In such conditions the best remedy is the excision of these masses particularly when affected tonsils may become nidus for infections or their blood flow may be so reduced that any medical therapy given may be ineffective [1].

Tonsillectomy techniques are currently undergoing something of a revolution. Dissection tonsillectomy with hemostasis performed with or without ties was the standard but more recently there has been an explosion of different dissection techniques in order to reduce postoperative pain and haemorrhage associated with this procedure. Various newer techniques are intracapsular tonsillectomy with debriider, harmonic scalpel (ultrasound) tonsillectomy, plasma mediated ablation technique, cryosurgical technique, electrocautery, laser tonsillectomy, coblation tonsillectomy and radiofrequency but all are still under consideration.

Tonsillectomy is indicated in those patients who experience recurrent episodes of incapacitating tonsillitis that results in significant loss of school or work [2]. Repeated attacks (3–4 per year for 2–3 years) of true acute tonsillitis are a definite indication for adult tonsillectomy [3].

Despite all views and counter views the commonest surgical procedure in the field of otolaryngology is tonsillectomy and it has been regarded as a major surgery because of its known postoperative haemorrhage and

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anaesthesia complications [4]. The intraoperative haemorrhage with loss of greater than 10% of the patient's blood volume is reported to be as high as 18% and postoperative haemorrhage occurs in 0–10% of cases. The mortality has been reported to be between 1 per 1100 and 1 per 16000 [5]. Haemorrhage may be conveniently divided into perioperative and postoperative and the latter subdivided into reactionary and secondary haemorrhage. Much of the mortality associated with tonsillectomy is directly or indirectly associated with this complication [6].

A variety of haemostatic agents and specialized surgical techniques have been used in an attempt to reduce the intraoperative and postoperative bleeding in tonsillectomy ligation of blood vessels/bleeding points has been the time honoured method of hemostasis [7]. Topical use of astringents such as silver nitrate, tannic acid and diluted adrenaline solution has been advocated for control of postoperative bleeding [8]. Intravenous administration of epsilon amino caproic acid (an antifibrinolytic agent) produces a significant reduction in blood loss during surgery [9].

In spite of all these efforts, bleeding following tonsillectomy is still a substantial concern and life threatening problem. So other methods of reducing the haemorrhage are being tried such as electrocauterisation of tonsils by using bipolar diathermy, cryosurgery and by laser, radio-frequency and ionic coblation.

With this aim in mind, the present study “Ligation versus bipolar diathermy for hemostasis in tonsillectomy—a comparative study” has been undertaken.

Materials and Methods

The present study was based on the analysis of 50 patients undergoing tonsillectomy in the Department of ENT in a Government Medical College Hospital. Each case after being screened from the outpatient department underwent a general physical, local ENT, laboratory and radiological examination. Indications for tonsillectomy were recurrent infections of throat, hypertrophy of tonsils causing airway obstruction (sleep apnoea and snoring) and tonsillitis causing febrile seizures. Any patient with bleeding disorder such as leukaemia, purpura, aplastic anaemia was excluded. Prior to surgery, each case was put on a course of antibiotics for 4–5 days to remove any focus of subclinical infection. After that these patients were admitted and subjected to the surgery.

Brief Technique

Taking all aseptic precautions, tonsillectomy was performed under local anaesthesia while in uncooperative

adults and children it was performed under general anaesthesia. Irrespective of the type of anaesthesia (local or general) tonsillectomy was performed by dissection method. Right sided tonsillectomies were chosen as the study and left side as the control group, automatically making patients their own controls, thus eliminating other potential influencing physiological factors. In order to measure the intraoperative blood loss, the bottles of two suction apparatus were used for each fossa separately. Hemostasis on right side (study group) was established by using bipolar diathermy and on left side (control group) was established by using ligatures/stitches to the main bleeders and time taken for each fossa hemostasis was recorded.

The numbered plain soaked cotton and gauze balls used for pressure hemostasis was weighed pre and postoperatively. Blood collected in suction bottle was also measured. Amount of blood loss for each fossa was measured by calculating the difference in weight of swabs etc. before and after use and then adding the total so obtained (1 gm = 1 ml) to the volume of blood collected in the respective suction bottles [10].

Visual analogue score was used for assessment of severity of pain postoperatively.

| | |
|----------------|---|
| 0 (none) | No pain |
| 1–3 (mild) | Uncomfortable but no pain medication needed |
| 4–6 (moderate) | Using pain medication |
| 7–10 (severe) | Pain not resolving with pain medication |

Patients were discharged on the next day and were called for follow up on 4th, 7th and 14th postoperative days. It is pertinent to mention here that same surgical team performed each tonsillectomy and its follow up. The incidence and severity of any postoperative bleeding in the tonsillar fossa was noted and recorded (Fig. 1).

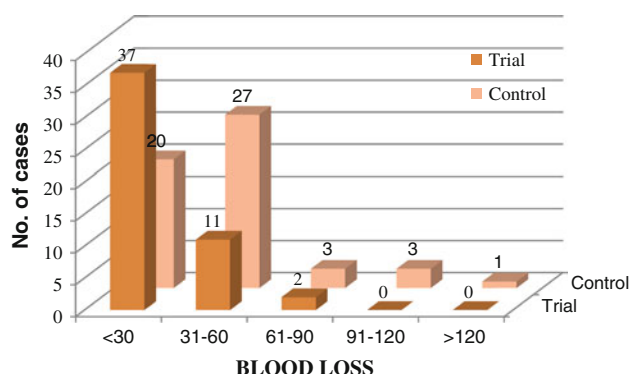


Fig. 1 Comparing intraoperative blood loss during tonsillectomy in trial (right) and control (left) tonsillar fossa

Results

The age of the patient included in our study ranged between 5 and 40 years; 38% of them were in the age group of 5–10 years, 32% were in the age group of 11–20 years, 20% were in the age group of 21–30 years and only 10% cases were in the age group of 31–40. It was evident that incidence of recurrent attacks of tonsillitis gradually reduced with increasing age and it was a problem of younger age group. 58% in our study were males and 42% were females. The percentage of urban versus rural patients in the study was 56 versus 44%.

The recurrent sore throat was present in 100% of cases, intermittent attacks of fever was present in 78% especially during acute attacks of sorethroat, difficulty in swallowing in 36% and pharyngeal irritation in 30%. In addition to the above, some patients also had symptoms suggestive of associated nasal pathology out of which 30% presented with nasal discharge which was predominantly mucoid and copious and 36% had symptoms of some nasal obstruction. It used to be associated with upper respiratory tract infection or catarrh, however in all the cases surgery was done when there was no nasal symptoms. 14% patients reported with complaint of ear heaviness and 10% patients came with complaint of earache in one or both ears. Three key signs of chronic tonsillitis recorded in the study were hypertrophied tonsils (92%), congestion of ant pillars (88%) and palpable jugulodiagastric lymph nodes in 68%.

43 Cases (86%) were operated under general anaesthesia while 7 cases (14%) underwent tonsillectomy under local anaesthesia.

When the bleeding during tonsillectomy was compared between Control i.e. left fossa and trial i.e. right fossa, it was found that from the control fossa significant no. of cases (27 cases) had bleeding between 30 and 60 ml, 3 cases had bleeding between 60 and 90 ml and 20 cases had bleeding less than 30 ml. one case bled quite heavily (>100 ml), probably due to subacute infection and underlying fibrosis. In comparison, in the trial fossa bleeding was less than 30 ml in majority of cases (37 cases) whereas 11 cases had bleeding between 30 and 60 ml and 2 cases between 60 and 90 ml. None of the case in trial fossa had bleeding more than 90 ml. When the results were combined it was found that, the average operative blood loss in control fossa was 41.5 ± 25.059 while that in trial side was 26.32 ± 11.72 . These results were statistically highly significant ($t = 4.557$; $P < 0.001$).

In our study, bleeding from stubborn bleeders was stopped using ligatures in both the fossa (Fig. 2). In the control fossa 36 cases required more than 2 ligatures, 9 cases required only 1 ligature and 5 cases required no ligatures while in trial fossa, vast majority of cases i.e. 39 cases required no ligatures, 9 cases required only 1 ligature

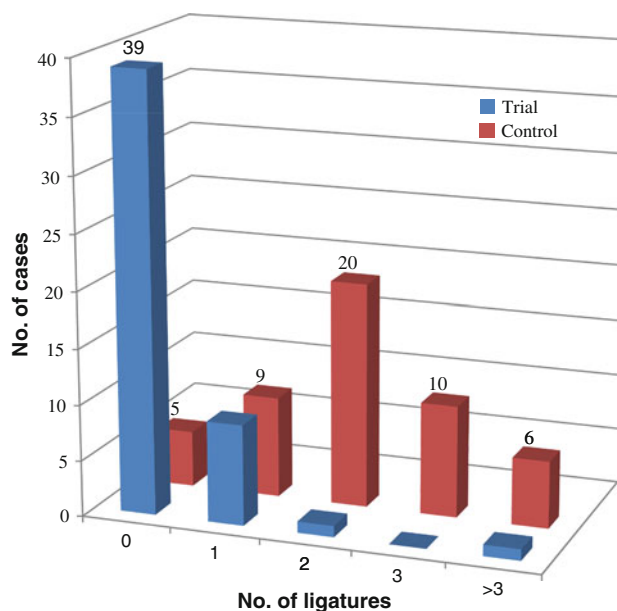


Fig. 2 Comparing number of intraoperative ligatures in both fossa

and only 2 cases required more than 2 ligatures. In the trial fossa where bleeding was apprehending the ligatures were applied to avoid any undue risk of reactionary haemorrhage as we were not certain about the results of bipolar diathermy at that stage.

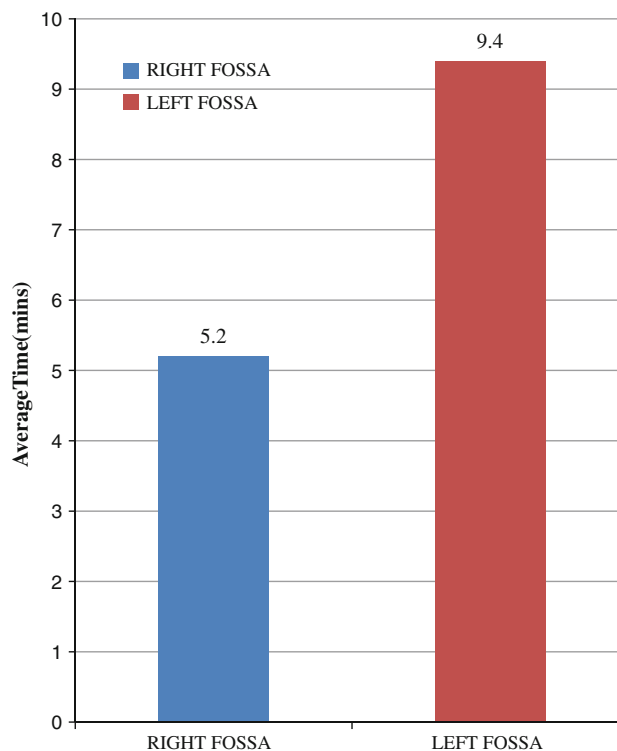


Fig. 3 Comparing average time taken for tonsillectomy intrial (right) and control (left) tonsillar fossa

The average time taken for hemostasis of each tonsil was 5'2" in trial tonsillar fossa and 9'2" in control tonsillar fossa. The statistical analysis of the data by comparing the means using 't' test showed that tonsillectomy using bipolar diathermy was significantly quicker method than using ligatures ($P < 0.001$; highly significant) (Fig. 3).

At first follow up (4th Postop day) there was not significant difference in pain between right and left fossa (visual analogue score 5.12:4.98). At second follow up (7th Postop day) though pain had almost decreased it was slightly higher in right fossa (average being 1.42) as compared to left fossa (average being 1.36). However there was no pain at all in both the groups at third follow up.

One patient who was operated under general anaesthesia developed secondary haemorrhage on 4th postoperative day from the left fossa (control group) and was readmitted and managed by silver nitrate cautery and systemic antibiotics.

Discussion

Ideally tonsillectomy should be quick, painless and associated with minimum blood loss. A variety of haemostatic agents and techniques have been used in an attempt to reduce intra-operative blood loss and postoperative bleeding/haemorrhage incidence. The efficacy of most of these substances and techniques has been judged primarily on clinical impressions. Because of the paucity of prospective studies with bipolar diathermy for hemostasis in tonsillectomy, a randomized prospective study of 50 tonsillectomy cases using each patient as its own control was conducted.

Several studies have compared the effect of ligation of vessels with bipolar diathermy. Carmody et al. [11]; Malik et al. [7]; Watson et al. [12] found that reactionary haemorrhage (1%) was three times more frequent in patients where ligatures were used than in a group where diathermy was used (0.3%) [11]. However, incidence of late tonsillar (secondary) haemorrhage following the use of diathermy (1.8%) was greater than occurring after ligation of vessels (0.9%). Watson et al. [12] found that only operation time was reduced when diathermy was used while there was no significant difference in either frequency or severity of post operative haemorrhage [12]. Choy et al. [13] conducted study and concluded that bipolar diathermy is equally as effective as ligation in control of haemorrhage, not more painful postoperatively and did not cause more secondary haemorrhage. It is easier, takes less time for hemostasis than ligation resulting in shorter operative and anaesthetic time [13].

Tay carried out a prospective randomized study to assess the post-tonsillectomy morbidity of the electrodissection technique as opposed to the blunt dissection and ligation technique. One hundred and four patients, each serving as

his or her own control, were randomized to have either the right or left tonsil removed by electrodissection. There was significantly less pharyngeal pain on the electrodissection side in the first postoperative day in adult patients. This, however, was transient as there was increased pharyngeal discomfort and otalgia, both in severity and duration, on the electrodissection side by the end of first week. There was no difference in the incidence of haemorrhage between the two techniques [14].

The national prospective tonsillectomy audit has collected data on the occurrence of complication following tonsillectomy. They demonstrated overall haemorrhage rate following tonsillectomy of 3.3%. The relative risk of haemorrhage in the bipolar diathermy dissection and hemostasis group was 3% [15].

In recent years, the technique has evolved of using diathermy not only as an aid of hemostasis when the tonsil has been delivered, but to dissect the tonsil from its bed. Major disadvantage with this technique was an increase in rate of secondary haemorrhage. This was confirmed by retrospective audit done throughout the UK, which reported an increase of secondary haemorrhage as high as 16.85% with diathermy. However, cochrane review of dissection versus diathermy for tonsillectomy demonstrated reduced intraoperative bleeding but increased pain in the diathermy group, with no significant difference in secondary haemorrhage [16].

Hemant et al. [17] conducted study on 50 patients in which electro dissection tonsillectomy using bipolar diathermy versus dissection and snare method was compared. They found that electro dissection tonsillectomy is associated with a quicker procedure, less intraoperative blood loss, less initial postoperative pain, reduced postoperative morbidity and early discharge from the hospital [17].

In our study, it was evident that incidence of recurrent tonsillitis gradually reduced with age and it was a problem of younger age group. Tonsillectomy using bipolar diathermy was significantly quicker than that of tonsillectomy using ligation. Average blood loss was remarkably reduced while using bipolar diathermy as compared to ligation. There was comparable postoperative pain and less incidence of postoperative haemorrhage in bipolar diathermy group as compared to ligation.

Key Message

To conclude tonsillectomy using bipolar diathermy was associated with quicker procedure, less intraoperative blood loss, comparable postoperative pain and less postoperative haemorrhage. Presently we are using bipolar diathermy in both the tonsillar fossa for hemostasis in tonsillectomy in routine and very rarely there comes the

need for ligation. So, the message for the residents is that they should master the technique of applying ligatures before attempting bipolar diathermy. Secondly, answer to the controversy as to whether diathermy is better than ligatures is “Use both the modalities judiciously while performing tonsillectomy”.

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