



A STUDY OF CLINICAL OUTCOMES IN LASER TONSILLECTOMY

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ABSTRACT

This non randomised prospective analytical comparative cohort study between laser tonsillectomy and cold steel dissection tonsillectomy was conducted at a tertiary level hospital. In this study 54 subjects were divided alternatively in laser and cold steel group. Both the groups were compared in aspects of operative time, intraoperative haemorrhage, postoperative haemorrhage, postoperative pain and functional recovery in terms of improvement in odynophagia and early return to normal diet. It was found that laser tonsillectomy takes lesser time with significantly lesser intraoperative haemorrhage. There was no significant difference in postoperative haemorrhage between the groups. In the immediate postoperative period, pain was lesser in laser tonsillectomy group but it increased with subsequent days. Functional recovery was delayed in laser tonsillectomy group.

KEYWORDS

Tonsillectomy. Cold steel dissection tonsillectomy. CO₂ Laser.

INTRODUCTION

The various methods described for tonsillectomy are dissection and snare, ultrasonic scalpel assisted, coblation assisted, diathermy assisted, microdebrider assisted, LASER assisted methods. The main complication of this surgical procedure is haemorrhage which could be intraoperative or postoperative and can be life threatening (1). Strong and Jako published the first experience with lasers in 1972 (2), but the widespread use of lasers has started only recently. The reported benefits are less intraoperative blood loss, reduced postoperative pain and accelerated healing (3).

The CO₂ laser was first developed by Patel et al. in 1964 (4) and introduced for medical use in the early 1970s. Because of its wavelength (10.6 μm), the CO₂ laser has strong affinity for water. This accounts for the good absorption of CO₂ laser energy by the oral mucosa, which consists of more than 90 % water. The CO₂ laser has excellent cutting and ablating properties. Its maximum penetration depth in tissue is less than 1 mm. Small vessels of up to 0.5 mm can be cauterized, providing excellent haemostasis (5). The CO₂ laser beam itself is not reflected or scattered in the mucosa (6). The laser can be operated in pulsed mode (superpulse or ultrapulse) or in continuous mode (continuous-wave [CW]). The CW mode is preferred for oral soft-tissue surgery.

CO₂ laser has a shallow penetration depth in tissue. Theoretically this could reduce thermal damage to the surrounding tissue, with an associated reduction in postoperative morbidity (7). Martinez and Akin (8) reported on 500 CO₂ laser tonsillectomies carried out at their institution and found that laser use for tonsillectomy reduced intraoperative blood loss and operating time and was followed by less than a 2 % incidence of postoperative bleeding. The sole advantage associated with CO₂ laser tonsillectomy was decreased blood loss, which may be significant for patients with a coagulopathy.

Krespi YP et al did laser tonsillectomy in 86 patients and found it a useful tool for tonsillectomy in adults (9). Their results vary from E A Magdy et al who did a prospective, randomized, double- blinded clinical trial comparing CO₂ laser, cold steel and coblation tonsillectomy with 60 patients. They found that intraoperative blood loss and post op pain was more in laser tonsillectomy (10). ES Lourijsen, Wong Chung et al (11) compared cold steel dissection tonsillectomy with CO₂ laser tonsillectomy and found that postoperative pain and requirement of postoperative analgesia was less in CO₂ laser tonsillectomy.

There are conflicting results regarding intraoperative haemorrhage, incidence of postoperative haemorrhage, postoperative pain and functional recovery in previous studies. The aim of the study was to compare the above mentioned clinical outcomes between laser

tonsillectomy and cold steel dissection tonsillectomy.

MATERIALS AND METHODS

It was a non randomised prospective analytical observational cohort study comparing clinical outcomes in terms of intraoperative time, intraoperative haemorrhage, postoperative haemorrhage, functional recovery in terms of improvement in odynophagia and wound healing between CO₂ laser tonsillectomy and cold steel tonsillectomy. The study was conducted at a tertiary care hospital. Children more than 03 yrs of age, with h/o Recurrent tonsillitis or Obstructive Tonsillar hypertrophy or Obstructive Sleep Apnoea due to enlarged tonsils were included in the study. Unwilling individuals with isolated adenoid hypertrophy, general contraindications for tonsillectomy, acute infection of pharynx and larynx, peritonsillar abscess, bleeding diathesis and patients with immunocompromised status were not included in the study. No bias of age, gender, socioeconomic status in sample selection was done. All the procedures were performed by a single surgeon. CO₂ LASER Machine (Lumenis, Acu Pulse 40 ST) with Surgitouch automation, 2013 make was used for performing laser tonsillectomy.

Oral pharyngeal delivery handpiece was employed for delivery of laser beam to the surgical site. CO₂ laser settings used in the surgery: Spot size- 1 mm, Depth- 1 mm, Power- 5 W, Continuous mode (continuous-wave [CW]).



Fig. 1 Incision being taken with laser

Bipolar cautery was used to achieve haemostasis as and when required. Tonsillar fossa after haemostasis in laser tonsillectomy. Blood loss was noted based on the amount in the suction canister and the soaked gauze pieces at the end of each procedure. A standard size gauze measuring 10 x 6 cm was taken (5 ml for dry gauze and 10 ml for wet). Operation time, from incision on anterior pillar to the achievement of haemostasis, was recorded for each case. All patients were given intraop analgesia in form of Inj Acetaminophen (15-20 mg/kg/dose) and Inj Dexamethasone to reduce postoperative nausea and vomiting. All patients were observed for a minimum of 2 hours following surgery in the post operative room in the operation theatre. All the children

stayed in the hospital for 24 hrs after the surgery. For postoperative analgesia Acetaminophen (15-20 mg/kg per dose) iv 8 hourly was given. No antibiotics were given in both groups. Postoperative care was same in both groups.

The postoperative pain was registered in post op evening, 3rd post op day, 1 week after surgery and then 2 weeks post op by observer pain scale. The average duration of postoperative analgesia required in both the groups was noted and compared. Intake of first soft diet (SS) and normal diet (N) post op was noted for all patients. All patients were examined for postop haemorrhage. Healing of tonsillar fossa was assessed at 1 week, 2 weeks and 4 weeks post op. The healing was assessed in terms of percentage of epithelialisation of tonsillar fossa.

RESULTS

A distribution of the study subjects regarding the age and gender was done. Both groups were equally matched in terms of age and gender. There was no bias regarding indication for tonsillectomy and grades of tonsillectomy between the two groups.

The mean duration of surgery in cold steel technique was 46.48 min and in laser group it was 19.48 min. Using unpaired t-test, the p value is < 0.05 . Laser tonsillectomy takes less time as compared to cold steel dissection tonsillectomy. The mean blood loss in Cold steel tonsillectomy was 42.22ml compared to 14.81 ml in laser method. Using unpaired t-test, the p value is < 0.05 which is highly significant. The results show that there was less intraoperative blood loss in laser tonsillectomy. There was one case of post op haemorrhage in each procedure. Using Chi-square test the p value is > 0.05 which implies that there is no statistical difference between the two procedures in terms of incidence of postoperative bleeding. The average days of analgesia required in cold steel method was 5.19 days compared to 9.59 days in laser tonsillectomy. Patients who underwent conventional tonsillectomy started taking normal diet earlier as compared to laser tonsillectomy. Mean postoperative pain was compared between the two procedures by observer pain scale at 6 hrs postoperatively, 3rd postoperative day and then at 1 and 2 weeks subsequently. P value was calculated using Mann Whitney test and found to be < 0.05 . There is a significant difference in postoperative pain in the two procedures. At immediate post operative period (6 hrs), pain is more in conventional tonsillectomy but in subsequent weeks increases gradually in laser cases. Healing of tonsillar fossa was assessed between the two groups and P value calculated using unpaired t-test which is significant after 01 and 02 weeks. Healing after conventional tonsillectomy is faster as compared with laser method.

DISCUSSION

In tonsillectomy, there could be substantial intraoperative and postoperative haemorrhage. And it usually takes few days for the child to return to normal food intake. After the introduction of laser in 1970s and its wide application in Otorhinolaryngology, the benefits and harms of laser tonsillectomy were evaluated by many researchers. CO2 laser tonsillectomy was compared with cold steel dissection tonsillectomy in terms of intraop, postop haemorrhage, postop pain and post op healing. In our study, we found that the duration of surgery including haemostasis was less in laser group. Sattar MA et al(12) in their study comparing cold steel dissection vs laser vs bipolar cautery also established that laser tonsillectomy takes less time. Decreased operative time in laser group is due to the fact that laser ablates the tissue and acts as haemostat also.

The mean blood loss in laser tonsillectomy was 14 ml and it was 42 ml in cold steel dissection method. There was lesser intra-operative bleeding in laser tonsillectomy method as laser coagulates the tissue and hence acts as haemostat also. Many studies in literature comparing laser vs cold steel dissection tonsillectomy found same. However this is in contrast with E A Magdy et al who did a prospective, randomized, double-blinded clinical trial comparing CO2 laser, cold steel and coblation tonsillectomy with 60 patients. They found that intraoperative blood loss was more in laser tonsillectomy(10). Surgeon's experience might be the reason behind this disparity.

Significant difference in postoperative bleeding was not demonstrated between laser tonsillectomy and cold steel dissection tonsillectomy group. However there are studies which demonstrated that postoperative haemorrhage is more in laser tonsillectomy when compared to cold steel because of delayed healing and more slough formation due to charring of tissue in laser method. In our study we found that in immediate

postoperative period, pain is less in laser group. This is due to the fact that there is precise dissection by laser beam and less damage and oedema of surrounding tissue. However as days progressed by, laser group experienced more pain which may be due to more slough and delayed healing of tonsillar fossa. The average duration of analgesia requirement in laser group was 9 days as compared to 5 days in cold steel group. Patients who underwent laser tonsillectomy were able to take normal diet later than cold steel dissection group. This is in accordance with the study conducted by Magdy et al who found that post op pain was more in laser tonsillectomy(10). However there are many studies contradicting this observation. Lourijsen ES et al(11) and Reichel O et al (13) in their studies comparing laser tonsillectomy with cold steel dissection tonsillectomy, found that CO2 laser tonsillectomy is associated with a shorter and less painful recovery period. The reason for this disparity in postoperative pain between our study and above mentioned studies may be due to the fact that in the above mentioned studies, the authors compared laser tonsillectomy with cold steel dissection tonsillectomy. Tonsillectomy as such is a lesser traumatic procedure than tonsillectomy.

In this study, laser group showed delayed healing of tonsillar fossa. Many studies on laser tonsillectomy also demonstrated delayed healing in laser method. Jiang Z et al (14) in their randomised prospective study comparing CO2 laser vs cold steel dissection tonsillectomy found that pseudomembrane formation is early in laser group but healing is slow when compared to cold steel dissection method. In laser tonsillectomy there is charring of tissue which leads to more slough formation and delayed healing.

CONCLUSION

We conclude that CO2 Laser tonsillectomy takes less time as compared to cold steel dissection tonsillectomy as proved in our study. There is less intraoperative haemorrhage in laser tonsillectomy as compared to cold steel dissection tonsillectomy. There is no significant difference in incidence of postoperative haemorrhage between laser tonsillectomy and cold steel dissection tonsillectomy. There is significant difference in postoperative pain between the two procedures. During the first 24 hrs after surgery, pain is less in laser tonsillectomy when compared to cold steel dissection method. However pain increases in laser tonsillectomy during the subsequent postoperative period. The mean days of analgesics requirement is more in laser tonsillectomy as compared to dissection tonsillectomy. Healing is slower in laser tonsillectomy as compared to cold steel dissection tonsillectomy.

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