

Microscopic Assistance in Cold Dissection Tonsillectomy – Does it Improve Surgical Outcome?

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ABSTRACT

Introduction

Although a common surgery, tonsillectomy has a varying rate(0-20%) of life-threatening post-operative bleeding. The use of magnifying devices like microscopes helps to precisely coagulate vessels and reduce post-operative bleeding along with pain. The study aims to compare the surgical outcome between Microscopic Assisted Cold Dissection (MCD) and Conventional Dissection (CD) tonsillectomy.

Methods

This prospective study was conducted on patients undergoing tonsillectomy from March 2020 to December 2021. Patients underwent tonsillectomy where one tonsil was removed with microscopic assistance and other with traditional dissection method with unsupported vision. Intraoperative blood loss was calculated. Post-operative pain score was measured with Wong- Baker FACES® Pain rating scale till 7th post-operative day. SPSS v.21.0 for Windows was used for the statistical data analysis.

Results

Total of 32 patients were enrolled in the study with age ranging from 16-42 years of which 56.3% were male and 43.8% were females. Intraoperative time for MCD (16.44±3.46 minutes) was longer than CD technique (13.94±2.86 minutes) (p=0.04). Amount of blood loss during MCD technique was less than in CD. Pain score in both methods were higher during early post-operative period and gradually decreased with time. During rest, there was no significant difference in pain between the two methods in first three post-operative days, after which pain was significantly reduced in MCD through day 4-7(p<0.05). None of the patient had post-operative hemorrhage.

Conclusions

MCD showed significant results for reduced intraoperative blood loss and post-operative pain score than CD method.

Keywords: microscope; pain; post-operative hemorrhage; tonsillectomy.

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INTRODUCTION

Tonsillectomy being one of the common surgical procedures has varying rate (0-20%) of life-threatening post-operative bleeding.^{1,2} Post-operative pain affects almost all patients thereby requiring sufficient analgesia.³⁻⁵ It has been discussed that extensive coagulation procedures during tonsillectomy should be avoided to limit post-operative pain.⁶⁻⁸ To address these problems, various surgical techniques have been tried. However, when comparing overall rate of post-operative hemorrhage, most of the novel techniques haven't shown high superiority to cold steel dissection.^{9,10}

Use of magnifying devices like microscopes is hypothesized that precise vision of vessels during surgery allows precise coagulation and therefore reduces post-operative bleeding. Furthermore, this should reduce post-operative pain too.⁷ Use of microscope have shown promising result in decreasing post-operative complications. about the use of magnifying devices statistical significant reduction of tonsillectomy-associated complications in comparison with other methods but cold dissection tonsillectomy.^{6,8,11-14}

In our setup where high end and expensive surgical devices are not available, this type of study helps to find if optical magnification during surgery reduces tissue trauma and thereby decreasing post-operative pain and complications.

METHODS

A hospital based, comparative study was conducted in the department of Otorhinolaryngology and Head and Neck surgery in Dhulikhel Hospital, Kathmandu University Hospital, Kavre from March 2020 to December 2021. Approval from Institutional Review Committee of Kathmandu University School of Medical Sciences, Dhulikhel Hospital was taken (IRC 263/2021), and informed consent

obtained from the patient before conducting the study.

Inclusion criteria: All patients aged ≥ 18 years, both gender with recurrent tonsillitis, obstructive sleep apnoea syndrome, second attack of quinsy were included in the study.

Exclusion criteria : Patients with mental disorders, bleeding disorders, unilateral tonsillectomy, abscess or tumor of the tonsils, hemoglobin level < 10 gm%, any chronic illness affecting recovery, pregnancy, combination with other surgical procedures and patients not willing to take part in the study.

All the patient planned for tonsillectomy surgery during the study period and who met above criteria were included. Thus a sample size of 32 was taken for both the groups.

Surgical Technique:

All tonsillectomies were performed under general anaesthesia with nasotracheal intubation by single surgeon. Patients included in the study underwent tonsillectomy with cold dissection method (Dissection and snare) with punctual coagulation using bipolar forceps when necessary to control bleeding.

One tonsil was removed with Microscopic assisted cold dissection (MCD) using a microscope (focus 30 cm, magnification 0.6, Carl Zeiss AG, Jena, Deutschland) and other with traditional Cold dissection method with unsupported vision (CD).

For the determination of side during tonsillectomy, the lottery system was used just prior to surgery as MCD for Microscopic assisted and CD for traditional method. If MCD came, microscopic assisted tonsillectomy was done on right side first; whereas if CD came, traditional method of tonsillectomy was done right side first.

The patients were placed in the Rose position and

a Boyle-Davis mouth gag was inserted into the mouth. The tonsil was held with tonsil holding forceps and pulled medially. Mucosal incision was given at point of reflection of tonsillar mucosa with anterior pillar with number 12 blade. Tonsillar dissector was used to dissect from superior to inferior pole. Tonsillar snare was used for removal of tonsil at inferior pole. Bleeding points were identified and coagulated with bipolar cautery.

In MCD group, all this procedure was done using microscope; whereas, in CD group, it was done with headlight and normal vision.

For the assessment of blood loss, the fully soaked gauge piece weighing 1gram was calculated as 5 cc of blood loss.

During intra-operative period, the operation time was noted in both procedures from incision up to delivery of tonsils with hemostasis. Likewise, blood loss was measured with counting and weighing the gauge pieces in both procedures.

The postoperative medications included IV antibiotics (penicillin group); Betadine gargle (1:1 dilution), and Hydrogen peroxide gargle (1:10 dilution) thrice daily. Analgesia used was Ketorolac 30mg intravenous thrice daily for 48hours after which oral analgesic medication (Ibuprofen 400mg + Paracetamol 500mg combination) was used thrice daily.

Post-operative pain was measured on both sides on rest and during swallowing using Wong-Baker FACES® Pain rating scale (Figure 1).¹⁵ This scale is a scoring system with facial expression pictures and corresponding pain scale from 0-10 for easy understanding for the patients. Scoring was done at 4 hours, 8 hours, 12 hours, 24hours, 48 hours, 72 hours, 4th day, 5th day, 6th day and 7th day after surgery.

All the patients were discharged on same antibiotics, analgesics and provided with standard instructions of diet. All episodes of postoperative bleeding and treatment given were documented.

Data analysis

Normally distributed variables were analyzed with the Student's t test and non-normally distributed variables with the Mann-Whitney test. SPSS v. 21.0 for Windows (SPSS inc., Chicago, USA) was used for the statistical data analysis. A "p value" of ≤ 0.05 was taken as statistically significant. The results were interpreted within a confidence interval of 95% and a significance level of 0.05.

RESULTS

Demographic Data

Total of 32 patients were enrolled in the study with age ranging from 16-42 years (mean age of 25.19 ± 6.94 years). There were a total 18 male



Figure 1. Wong- Baker FACES® Pain rating scale.

(56.3%) and 14 females (43.8%) in the study.

Operation time

Duration of surgery was timed from start of incision to delivery of tonsil and hemostasis for each method. Average time taken in MCD technique is 16.44 ± 3.46 minutes with a range from 10-25 minutes. In case of CD technique, average time is 13.94 ± 2.86 minutes with range from 10-20 minutes. Extra time taken for MCD than CD technique shows statistical significance ($p=0.04$) (Figure 2).

Blood loss

Amount of blood loss during MCD technique was 16.47 ± 4.58 ml whereas in CD group it was 18.22 ± 4.54 ml. Lesser amount of blood loss in MCD was statistically significant in Mann Whitney test ($p=0.02$).

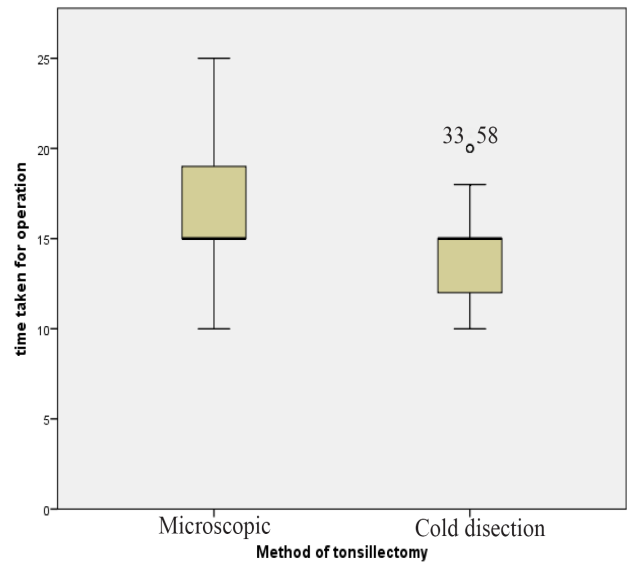


Figure 2. Duration of tonsillectomy in minutes (boxes indicate maximum to minimum): Mann Whitney test documented significant difference between the treatment groups ($p = 0.04$).

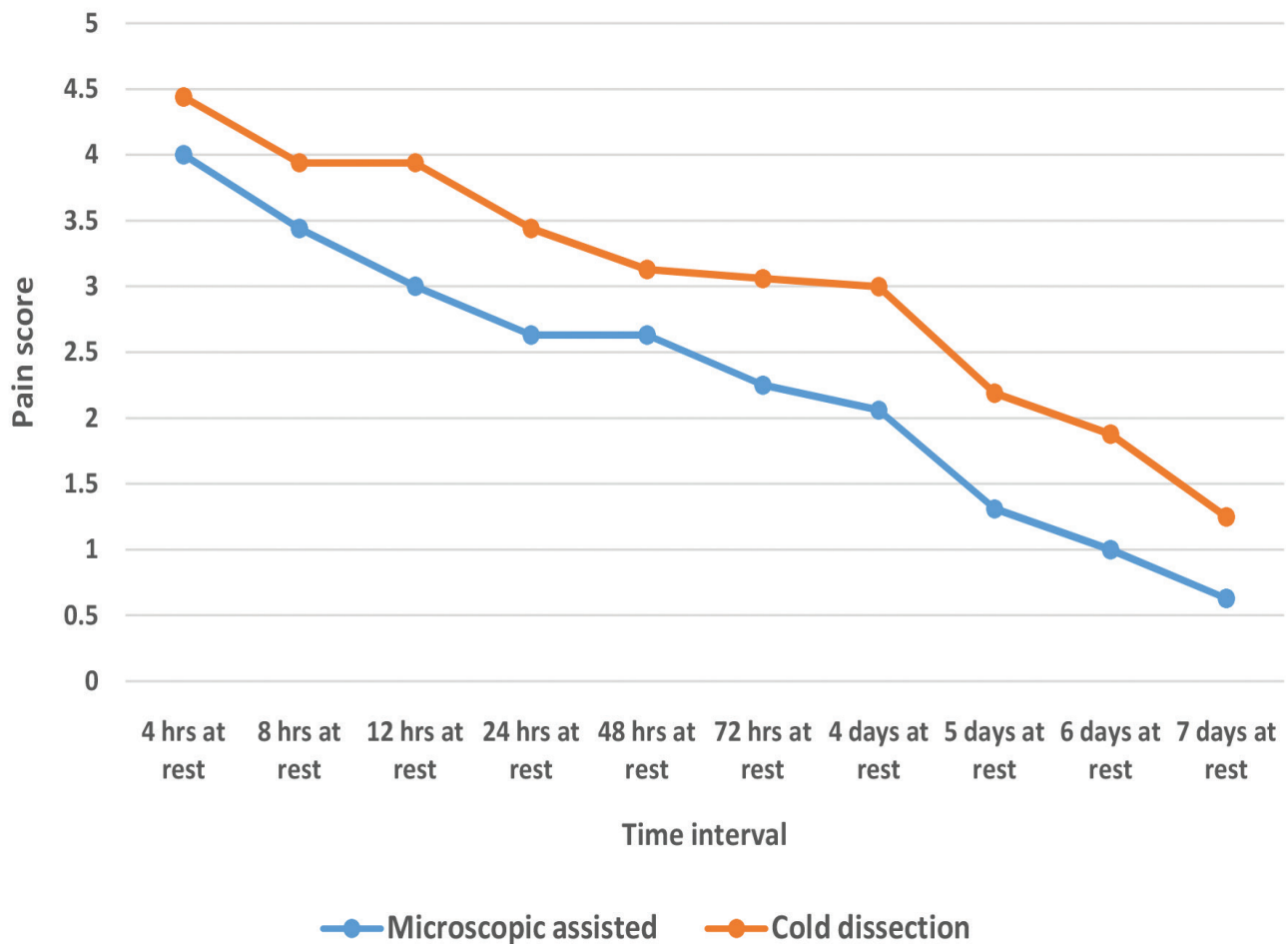


Figure 3. Pain score at rest during post-operative period.

Postoperative Pain

Post-operative pain was measured in the post-operative period on both sides at rest and during swallowing using Wong- Baker FACES® Pain rating scale.

Pain score during rest in post-operative period with MCD technique was 4 ± 2.27 at 4 hours, 3.44 ± 2.17 at 8 hours, 3 ± 2.17 at 12 hours, 2.63 ± 1.79 at 24 hours, 2.63 ± 1.86 at 48 hours, 2.25 ± 1.5 at 72 hours, 2.06 ± 1.48 at 4 days, 1.31 ± 1.2 at 5 days, 1 ± 1.02 at 6 days, and 0.63 ± 0.94 at 7 days respectively.

Similarly, pain score during rest in post-operative period with CD technique was 4.44 ± 2.14 at 4 hours, 3.94 ± 2.18 at 8 hours, 3.94 ± 2.36 at 12 hours, 3.44 ± 2.12 at 24 hours, 3.13 ± 2.15 at

48 hours, 3.06 ± 1.97 at 72 hours, 3 ± 1.9 at 4 days, 2.19 ± 1.79 at 5 days, 1.88 ± 1.43 at 6 days, and 1.25 ± 1.22 at 7 days respectively (Figure 3).

During swallowing in post-operative period with MCD, pain score was 5.69 ± 2.1 at 4 hours, 5.19 ± 2.02 at 8 hours, 5 ± 1.61 at 12 hours, 4.5 ± 1.83 at 24 hours, 4.19 ± 2.06 at 48 hours, 3.5 ± 2.1 at 72 hours, 3.19 ± 2.15 at 4 days, 2.63 ± 1.72 at 5 days, 1.94 ± 1.39 at 6 days, and 1 ± 1.25 at 7 days respectively.

For CD technique, pain during swallowing was 6.69 ± 1.94 at 4 hours, 6 ± 2.1 at 8 hours, 5.63 ± 2.06 at 12 hours, 5.5 ± 1.76 at 24 hours, 4.88 ± 1.9 at 48 hours, 4.88 ± 1.76 at 72 hours, 4.63 ± 2.06 at 4 days, 3.94 ± 2 at 5 days, 3.19 ± 1.75 at 6 days, and 2 ± 1.44 at 7 days respectively (Figure 4).

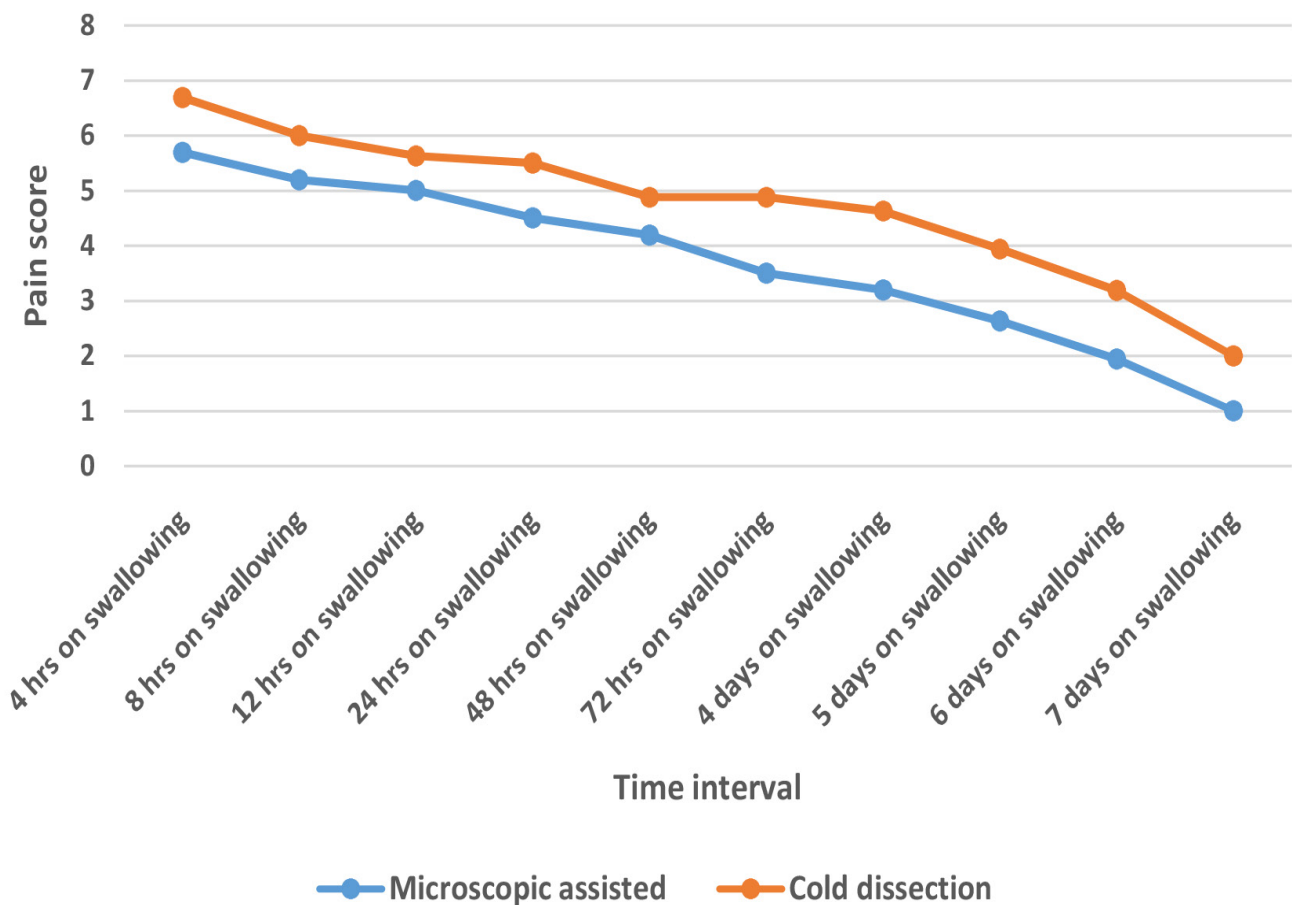


Figure 4. Pain score on swallowing during post-operative period.

Pain score in both methods were higher during early post-operative period and gradually decreased with time. During rest, there was no statistically significant difference in pain between the two methods during first three post-operative days with Mann Whitney test, after which pain was significantly reduced in MCD through day 4-7, p value <0.05. During swallowing, less pain was statistically significant on 24 hours and through day 3-7 in post-operatively.

Hemorrhage and Post-operative Complications

Use of a microscope did not affect post-operative hemorrhage. None of the patient had post-operative hemorrhage requiring intervention in operation room. Two patients in CD group and one in MCD had minor post-operative hemorrhage that was managed conservatively. None of the patients required operative intervention for the same.

DISCUSSION

Tonsillectomy is a common surgical procedure done by ENT surgeon. There are different methods of doing this surgery and many high end expensive devices are also used for this. Ideal tonsillectomy should be quick, painless and associated with no blood loss. This study aimed to find out if microscopic assistance decreased intra-operative blood loss, post-operative pain and other associated complications comparing with conventional dissection method. As microscope is available in ENT OT setup there is no unwanted financial burden to the patients.

In our study we did tonsillectomy on one side by MCD and other side by CD technique. By doing this, the patient served as his/her own control and thus reduce the confounding variable like age, sex, race, tolerance to pain and anxiety. For this method to work, patient should be able to compare pain on individual sides. This method has been tried and tested in earlier studies as well.^{16,17}

From the patient's perspective, the main concern after tonsillectomy is the post-operative pain. In the present study, patients were asked to represent pain at rest or on swallowing using Wong- Baker FACES® Pain rating scale with a maximum of 10 points representing worst imaginable pain.

Pain score in both methods were higher during early post-operative period and gradually decreased with time. During rest, there was no statistically significant difference in pain between the two methods during first three post-operative days, after which pain was significantly reduced in MCD through day 4-7, p value <0.05. During swallowing, less pain was statistically significant on 24 hours and through day 3-7 in post-operatively. This finding is similar to the studies of Kujawski et al, De Carpentier et al, Lassaletta et al, and Pizzuto et al.^{8,11-13}

Studies have shown that use of bipolar cautery for haemostasis during tonsillectomy leads to damages of the surrounding tissue up to a depth of several millimetres.¹⁸ This tissue injury may be the reason for the dose-response relationship between diathermy energy and post-operative pain.⁷ We think that magnification-supported tonsillectomy led to less post-operative pain as it allowed more precise vision of vessels.

This finding is in contrast to the study by Schrötzlmair et al, whose study showed patients did not suffer less pain when magnification devices had been used, regardless whether they were at rest or under stress.¹⁹

It has been reported that early post-operative pain may be more intense after the mechanical trauma of cold dissection technique, whereas hot methods may have a higher incidence of late post-operative pain.²⁰ In a systematic review of Leinbach et al. electrodissection caused increased postoperative pain in comparison with cold dissection tonsillectomy.²¹

Amount of blood loss during MCD technique was 16.47 ± 4.58 ml whereas in CD group it was 18.22 ± 4.54 ml ($p=0.02$). This is due in part to the use of preventive hemostasis, as done with other electrocautery but also to the use of the surgical microscope, which allows clear visualization of small tonsillar bed vessels.^{22,23} This amount of blood loss might not have an obvious clinical significance in normal adults but the possibility of an almost bloodless operation is a distinct advantage in children.

Average time taken in MCD technique is 16.44 ± 3.46 minutes with a range from 10-25 minutes. In case of CD technique, average time is 13.94 ± 2.86 minutes with range from 10-20 minutes. Extra time taken for MCD than CD technique shows statistical significance ($p=0.04$). This finding is in line with previous publications. However, training on magnifying devices may overcome these disadvantages. This was not in case with Kujawski et al, whose surgical time was similar in both groups.⁸

Post-tonsillectomy hemorrhage remains the most significant complication following tonsillectomy, sometimes requiring revision surgery under general anaesthesia.² Therefore, we analysed whether the use of magnification devices reduced the rate of postoperative

haemorrhage. Due to the relatively low number of patients and consequently the low number of bleeding complications, a statistical comparison was not possible which was similar to other studies.^{6,7,10,11,13} Thus, larger series of tonsillectomies must be performed to address this question.

CONCLUSIONS

The use of microscope in conventional dissection of tonsillectomy helped to decrease intraoperative bleeding and early improvement of post-operative pain scores. This helps in lesser hospital stay for the patient and less use of pain medications. This conclusion is based on a study of small group of subject, so larger randomized studies would be required to confirm the findings. Similar study comparing different techniques with multiple types of magnification device could be an area of future research. Use of microscope also results in better operative visualization than loupes and headlamps, and can be connected to an image display system to facilitate teaching students.

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