International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

The Outcome of Microscopic with Bipolar Cautery Assisted and Head Light and Cold Steel Assisted Tonsillectomy: A Comparative Retrospective Study on 276 Patients

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Abstract: ***Purpose: To evaluate the advantage of microscope assisted tonsillectomy using bipolar cautery over the use of headlight assisted tonsillectomy with cold steel instruments in two comparable groups of patients. Primary objective was to ascertain the intraoperative benefit of using magnification with greater illumination. Secondary objectives were to find advantages of using novel technique in postoperative pain and hemorrage both primary and secondary as well as generation of biomedical waste. Methods The records of all patients who underwent tonsillectomy at our hospital between 2019 and 2024 were reviewed. We classified the patients in two groups solely according to the surgical techniques used. The patients in both groups fulfilled the same criteria of inclusion and exclusion. The protocols for pre-and postoperative treatment were identical. Results: The patients in the microscope with bipolar cautery assisted tonsillectomy had better visualization of tonsillar bed which translated in better hemostasis, shorter operative time, minimal injury to pharyngeal muscles and no residual lymphoid tissue in corners of tonsillar fossa specially tonsillolingual sulcus and upper pole.95% percent of the patients in the microscope and bipolar cautery assisted tonsillectomy and 91% in the head light and cold steel assisted tonsillectomy were pain free after 12 weeks (p < 0.01). The average blood loss in microscope assisted bipolar tonsillectomy was 0.5ml whereas in headlight and cold steel tonsillectomy was 15ml (p < 0.01). The average surgical time was 14min in microscope and bipolar assisted tonsillectomy whereas in another group it was 35min (p < 0.01). Conclusion: Bipolar cautery dissection under microscopic visualisation is better than Cold steel dissection with headlight in terms of intraoperative visualisation, time and hemostasis.***

Keywords: Microscope, tonsillectomy, head light, cold steel instruments

1.Introduction

Tonsillectomy is a reliable and effective treatment of recurrent acute tonsillitis (>4 attacks/yr), grade 4 hypertrophy causing obstructive sleep apnoea, tonsilloliths, tonsillar cysts, excision of styloid process via tonsillar route, excisional biopsy of tonsillar mass. Many surgical methods have been described, including cold steel dissection using headlights with or without magnification, coblation assisted tonsillectomy, laser assisted tonsillectomy, monopolar cautery assisted tonsillectomy.

In a previous comparative study, tonsillectomy with coblation technique, use of cold steel method, cryosurgery, guillotine, laser assisted tonsillectomy, harmonic scalpel assisted tonsillectomy, monpolar diathermy and bipolar diathermy assisted tonsillectomy, microdebrider assisted tonsillectomy etc. were studied. They were centered around pain and blood loss.

We performed a comparative study including 276 patients operated by either microscopic technique with bipolar cauterization (novel technique under scrutiny) or by cold steel technique without magnification with head light (traditional teaching in medical institutes), using a comparative patient selection and an identical postoperative treatment protocol. The two groups of patients solely differed in the modality of surgical approach. To our knowledge this type of comparison using advantage of microscopic magnification with greater illumination is the largest tonsillectomy study published, with highest comparability of the groups of patients.

2.Methods

Retrospective medical records were reviewed of all patients who underwent tonsillectomy between April 2019 to May 2024. A group of 152 microscopically visualized bipolar cautery assisted tonsillectomy (Novel technique) was compared to a group of 124 head light used and cold steel assisted tonsillectomy (traditional teaching method). Patients who underwent simultaneous adenotonsillectomy and those with complicated tonsillar disease like malignancy, pleomophic adenoma of palate involving the tonsils, lymphoma etc. that had not received our standard surgical and postoperative treatment, but instead had special surgical procedures done, were excluded. The microscope was focused on 2.5x magnification in beginning of surgery with 250mm objective lens. However, as the dissection proceeded, we switched to 5X magnification in cases with fibrotic adhesions of adult tonsillectomy.

The data on demographics, operation technique used, length of operation, primary and/or secondary haemorrhage encountered, pain scores on VAS scale, use of gauze rolls and reasons for re-admission were collected. The minimum age of patient was 5yrs and maximum age was 73 yrs in this study. The patients were administered IV antibiotics (preferably ceftriaxone with sulbactam) and IV tranexamic acid 2 hrs before operation and was continued till 3rd post operative period.

The IV fluids were administered for 12hrs postoperatively. It was stopped once patient started taking oral fluids and cold bland diets. However, IV fluids were

restarted in cases where patients had severe pain and refusing to take oral fluids and food.

In cases of readmission after 3rd postoperative day patients underwent examination of vitals, routine hematological evaluation, IV antibiotics, IM analgesics (diclofenac or tramadol). hydrogen peroxide gargle with or without betadine, IV pantoprazole etc.

3.Results

Demographics

A total of 276 patients were analysed. In group of patients (124) who underwent tonsillectomy with traditional technique-

Table 1

Age	Male	Female
<10yrs	5	8
10-30yrs	22	19
30-50yrs	27	33
>50 yrs	3	7

In group of patients who underwent tonsillectomy with novel technique.

Table 2

Age	Male	Female
<10yrs	11	9
10-30yrs	21	35
30-50yrs	24	40
>50 yrs	6	8

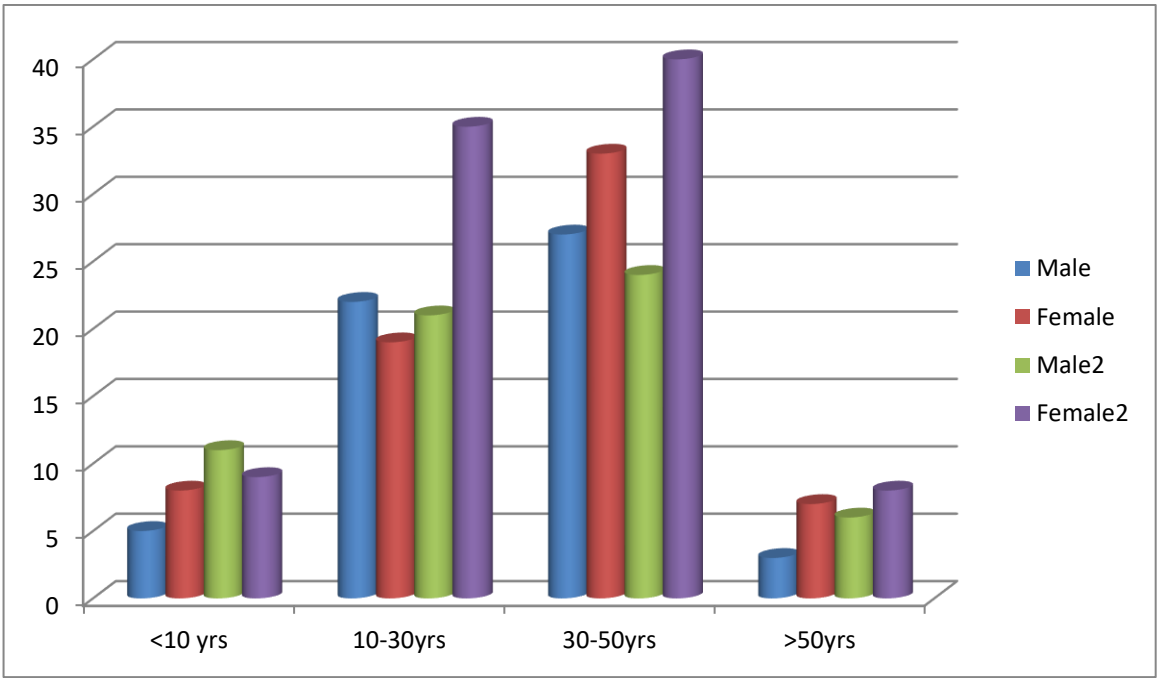

Figure 1

Table 3: Operation performed

Operation performed	No	%
Traditional tonsillectomy Head light and cold steel method assisted	124	44.97
Microscope and bipolar cautery assisted tonsillectomy	152	55.07

Table 4: Length of operation

Operation	Time (mins)
Traditional tonsillectomy-Head light and cold steel method assisted	35
Microscope and bipolar cautery assisted tonsillectomy	14

Postoperative pain

Table 5: Assessment of pain in patients underwent tonsillectomy via cold steel instruments and head light

VAS Score	3rd Post Op Day	10th Postop Day	30th Postop Day
NONE (0-4mm)	0	2	28
MILD (5-44mm)	8	53	46
MODERATE (45-74mm)	49	60	39
SEVERE (75-100mm)	67	9	21

Table 6: Assessment of pain in patients underwent tonsillectomy via bipolar tonsillectomy under microscopic visualisation

VAS Score	3rd Post Op Day	10th Postop Day	30th Postop Day
NONE (0-4mm)	0	21	57
MILD (5-44mm)	15	43	68
MODERATE (45-74mm)	87	76	25
SEVERE (75-100mm)	50	12	2

In both groups patients were assessed for pain on Visual analogue scale (VAS) [6] by 3rd, 10th and 30th postoperative days. the results were analyzed statistically on students T-test. Pain score were not different in the two groups.

Table 7: Relation of various posterative variables with age and sex of patients in traditional method of tonsillectomy.

Age	Male	Female	Operati-Ve Time (Mins)	Primary Post-Op Hemorrage	Secondary Post-Op Hemorrage	Average Vas Score (3 Rd Day)	No Of Sponges Used	Re Admission
<10YRS	5	8	15	0	0	4	4	1
10-30YRS	22	19	25	2	1	6	8	2
30-50YRS	27	33	54	4	2	7	14	2
>50 YRS	3	7	50	1	0	6	12	1

Table 8: Relation of various posterative variables with age and sex of patients in novel method of tonsillectomy

Age	Male	Female	Operative Time (Mins)	Primary Postop Hemorrage	Secondary Postop Hemorrage	Average Vas Score (3 Rd Day)	No Of Sponges Used	Re Admission
<10YRS	11	9	12	0	0	4	1	1
10-30YRS	21	35	15	0	1	5	2	2
30-50YRS	24	40	16	2	2	6	2	1
>50 YRS	6	8	16	0	0	6	2	0

Multivariate regression analysis was done for age, sex, operative time, hemorrage (both primary and secondary), VAS[6] pain scores, number of sponges used intra-operatively and incidence of re-admission from 3rd postoperative day onwards till 10th postoperative day. We found in our study that in cold steel method, the use of sponges, operative time and primary hemorrage were linked with age of patient but was independent of sex of patients. However, pain score on VAS were almost identical in all age groups. However, in the novel technique all the variables were identical for all groups. In case of Re-admission both techniques had almost same incidence. Mainly readmission was related to pain associated difficulty in swallowing. They were admitted for IV fluids to correct dehydration. IV antibiotics and analgesics were administered depending upon the situation.

4.Discussion

The patients in the two groups were comparable regarding the age, sex, preoperative diagnosis, and the pre-and postoperative treatment. There is a lack of standardisation regarding which technique is associated with better intraoperative visualization, hemostasis, the lowest complication and morbidity rates.

Tonsillectomy is a routinely performed surgeries in most of hospitals with otolaryngology department. In the postoperative period major concern is bleeding and pain. The time required to attain normal activity and swallowing was a matter of concern. Traditionally, conventional techniques such as Cold steel methods with headlight illumination have been used for tonsillectomy; however, the efficacy of newer tonsillectomy techniques, including coblation and harmonic scalpel, laser assisted tonsillectomies were investigated[1, 2, 3]. Nevertheless, there is a lack of consensus regarding use of microscope or other magnification devices like loupe for proper visualization of bed. Moreover, microscope provides more illumination of field than conventional headlight.

In the present study, surgical duration was significantly less in microscope assisted and bipolar cautery used tonsillectomy then the cold steel tonsillectomy used head light illumination assisted tonsillectomy The level of surgeon experience, and familiarity with a particular technique and the equipment used is inversely correlated with surgical duration. In our study also we observed significant reduction of time in the technique of using microscope with bipolar cautery assisted tonsillectomy as we operated our fourth case onwards. The use of microscope provided magnification and better illumination[7] of areas in tonsillolingual sulcus, upper pole and lower pole which in traditional surgical technique was a hidden area. It led regrowth of lymphoid tissue in 1 of our case in cold steel dissection method with head light illumination.

Post-tonsillectomy hemorrhage both primary and secondary can present as a potentially life-threatening complication, with a reported incidence of 3.3 to 4.5%[5]. It sometimes subsides with outpatient recommendations; however, some cases require IPD admission and surgical intervention to control the bleeding. In our series bleeding was significantly less in microscope assisted bipolar cautery used tonsillectomy than the cold steel method

without magnification. In addition to tonsillectomy technique, patient age (pediatric versus adult) and tonsillectomy indication (chronic fibrotic tonsillitis versus chronic parenchymatous hypertrophy) are important factors that affect post-tonsillectomy bleeding.

Post-tonsillectomy pain negatively affects quality of life due to poor oral intake of fluids and food. It is because of disruption of nerve fibers of 9th and 10 th cranial nerves[4]. Moreover, operated area was allowed to heal by secondary intention with persistent exposure to infected oral secretions increased healing time. Postoperative pain can lead to dehydration, prolonged recovery, and restriction of normal activities if not properly managed. Nearly 12% patients in microscope assisted bipolar cautery used tonsillectomy and 16% in traditional cold steel used tonsillectomy under head light illumination were readmitted in postoperative period of 3-5 days for complains pain and difficulty in swallowing were administered IV fluids to correct dehydration, intramuscular analgesics (diclofenac in adults and paracetamol in children) and IV antibiotics for 24 hrs. Most of the patients were discharged after 24 hrs. The patients with dehydration had more propensity to develop severe pain than the ones who were hydrated. We admitted patients in IPD for 3-5 days with IV fluids and injectible antibiotics. The patients were allowed oral semisolid bland diet after 12 hrs of IPD management or hemostatic surgery (if required).

However, we did not find any extra burden of pain using bipolar cautery in the novel technique claimed in some papers.

Another less important parameter in our study was generation of biomedical waste. In cold steel dissection method with headlight used saline soaked gauze rolls (1.5cm) to pack the tonsillar bed during and following dissection. However, in case of microscope assisted bipolar cautery used tonsillectomy used gauze or cotton was rarely required.

5.Conclusion

Bipolar cautery dissection under microscopic visualisation is better than Cold steel dissection with headlight in terms of intraoperative time hemostasis, generation of bomedical waste and primary hemorrage. However, VAS for pain, secondary hemorrage and postoperative readmissions were identical in two groups.

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