



EFFECT OF LOCAL COOLING ON THE OUTCOME OF TONSILLECTOMY

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ABSTRACT

Introduction: A prospective, clinical study note the effect of local cooling on tonsillectomy. Our study group was made up of 36 patients-16 men and 20 women, aged 5 to 60 years (mean: 23.1)-who were undergoing a bilateral tonsillectomy.

Objective: To describe the effect of ice treatment upon post operative edema, pain and return to normal diet after tonsillectomy.

Method: A total of 36 tonsillectomies were performed under general anesthesia. Patients were randomly grouped into 2, A and B (n=18). The former group received ice cubes throughout the procedure. The patients were evaluated in the operative period and 1, 2, 7 and 30th day postoperatively by the same surgeon. Post operative oedema of tonsillar pillars, tonsillar fossa, uvula, soft palate, post tonsillectomy pain and return to normal diet was noted at each visit and were compared between the groups.

Results: Patients age and gender distribution did not differ between the groups. (p- 0.412). The length of operative time did not differ either. Differences in pain intensity on postoperative days 1, 2, 7 and 30 were statistically insignificant. Difficulty in swallowing was grade 2 and 3 respectively (p > 0.05). Clinically significant difference in postoperative oedema was noted in Group A.

Conclusion: Ice is a suitable agent to reduce postoperative edema, swelling, discomfort and improving clinical outcome after tonsillectomy.

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INTRODUCTION

Tonsillectomy is the most routinely performed surgical operation done by ENT surgeons. It is a surgical procedure to remove tonsil from a recess in side of pharynx called tonsillar fossa when they are chronically infected or enlarged enough to blocks the respiration^{1,2}. Tonsillectomy leads to a significant tissue damage resulting in post operative sign and symptoms such as swelling of uvula, pharyngeal wall, tonsillar pillars, adjacent base of tongue and pain^{2,3}. Tonsillar fossa and adjacent structures heals by secondary intention, thus causes pain and bleeding as two major postoperative complications³. Intense pain and discomfort is one of the most important postoperative complaints after tonsillectomy and its differs depending on the surgical techniques. The reduction of post tonsillectomy morbidity is important, not only for patient comfort, but also because reducing pain improves oral intake, reducing the risk of dehydration, infection, and post surgery hemorrhage^{3,4,5}. There have been lots of controversies about tonsillectomy techniques to provide better conditions with more benefits and less complications^{4,5}.

Oedema, swelling & pain after surgery are all the direct results of the physical trauma of surgery and inflammatory response

inflammatory processes have been found to influence sensory innervations in various organs and tissues^{4,5,6}. Experimental studies have shown that inflammation is generally accompanied by abnormal sprouting of peripheral sensory and autonomic nerve fibers and it significantly intensifies pain sensation^{7,8}. In contrast, cold reduces inflammation and swelling. Ice cubes slows down the metabolism of a cell so that less oxygen is needed. At the same time it makes the nerve ending less sensitive to the pain^{7,8}. Inflammation can also be associated with atrophy, apoptosis and necrosis of the sensory nerve fibers, leading to neuropeptide-mediated neuropathy in salivary glands^{8,9}.

Using ice as a treatment for surgical wounds known as cryotherapy. The mechanism of destruction in cryotherapy and on using cold instruments is necrosis, which results from the freezing and thawing of cells^{10,11}. Oral cryotherapy causes local vasoconstriction, which reduces blood flow and reduces the cytotoxic damage to the oral mucosa, has been shown to reduce oedema and inflammation after intense cytostatic treatment. Followed by this treated areas are reepithelized^{11,12,13}. Adverse effects of cryotherapy in oropharynx are less intense such as headache, and blister

formation. Delayed complications include hemorrhage, infection, and excessive granulation tissue formation. Cryotherapy is commonly used after acute trauma, oral surgery, orthopedic procedure and ophthalmic surgery^{13,14,15}. So we want to see if it could help in patients after tonsillectomy too.

The objective of this literature review is to describe the effect of ice treatment upon post operative edema, pain and return to normal diet after tonsillectomy.

MATERIALS AND METHODS

A prospective comparative study was conducted at Pankaj E.N.T hospital and Scott E.N.T hospital, Lucknow from October 2016 to June 2017. 36 adults of both sexes aged 5- 60 years were included in the study. The patients were randomized into two groups, A and B (n = 18 for each group). All the operations were performed by the same surgeon. The patients were evaluated in the operative period and 1, 2, 7 and 30th day postoperatively by the same surgeon. Post operative oedema of tonsillar pillars, tonsillar fossa, uvula, soft palate, post tonsillectomy pain and return to normal diet was noted at each visit and were compared between the groups.

METHODOLOGY

Taking all aseptic precautions, tonsillectomy was performed under general anaesthesia. Tonsillectomy was performed by cold instrument method. In group A cooling of the tonsillar fossa and pharyngeal mucosa with sterilized distil water ice cubes were done throughout the procedure. In group B no ice cubes were used. Intra operative temperature of oropharynx was recorded by using non-contact infrared thermometer (surface temperature mode). Intraoperative blood loss was assessed subjectively. Visual analogue score was used for assessment of severity of pain postoperatively. The patients were asked to rate their satisfaction according to Likert scale (1: Completely comfortable, 2: Very comfortable, 3: Slight discomfort, 4: Painful, 5: Very painful) at 1, 2, 7 and 30th day.

The pharynx of each patient was examined to assess the healing process, rated 4 – redness and edema of vast regions of pharyngeal mucosa, including the uvula; 3 – edema of the uvula with or without redness and/or edema of anterior pillar mucosa; 2 – redness and edema of peritonsillar tissues excluding the uvula; 1 – redness of anterior pillar mucosa without edema; 0 – normal mucosa, without redness or edema. Swallowing difficulties were rated on a scale 1-4: 1 – mild swallowing disorders, drinking unaffected; 2 – moderate difficulties eating and drinking; 3 – marked difficulties eating and drinking; 4 – serious difficulties eating and drinking.

Statistical analysis

Data tabulation and analysis using tests such as unpaired t test for the parametric data and Chi square test and Mann Whitney U test for non parametric data, along with other statistical tests were applied and used to draw appropriate conclusions and table recommendations merited.

RESULTS

36 patients were enrolled in the study. The age of patients in the study ranged from 5-60 years, p – 0.405. (55%) female and (45%) male met the inclusion criteria of which Male:Female ratio in group A and B are 2:3 and 1:1 ratio (p- 1.3) respectively. The two groups did not differ according to their

age, sex, and duration of anesthesia and surgery. There were no differences in postoperative heart rate, blood pressure, side effects and additional analgesic consumption such as nausea, vomiting, gastric irritation.

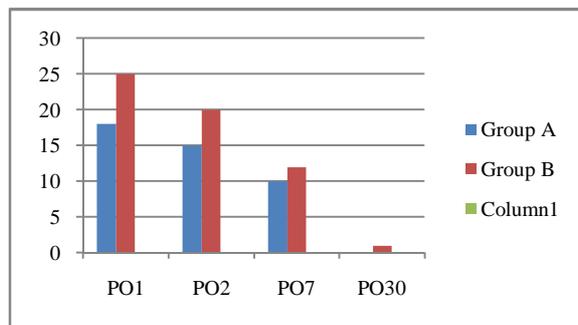
Table 1 Demographic distribution

	Group T(n=18)	Group P(n=18)	p
Age (mean± SD)	20±10	25±15	0.412
Sex			
Male	7	9	
Female	11	9	
(M:F)	2:3	1:1	1.3
Weight	75±10.5	73±12	0.435
Height	169±5.5	163±6	0.617

In our study, intraoperative oropharynx temperature was recorded by non-contact infrared thermometer (surface mode) throughout the surgery. In group A and group B temperature recorded was 77.7± 4.2 and 92±4 Fahrenheit degree respectively. In this study, duration of surgery was significantly decreased in group A, 15±5 minutes (P<0.001). On contrary time taken in group B was 25±3 minutes.

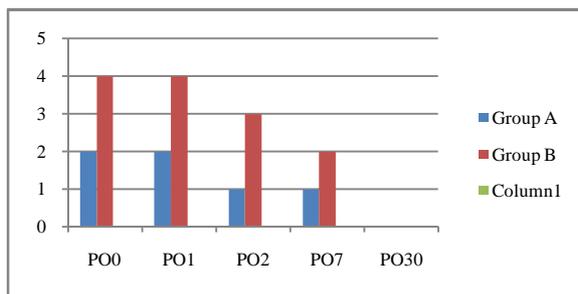
Intraoperative blood loss was assessed subjectively. We found clinically significant differences in the amount of blood loss. On average, intraoperative blood loss in group A was 40ml less than group B. The number of sutures and cautery used in group A was less as compared to group B.

In our current study group A had significantly less pain scores. VAS values were higher in Group B on the first and second postoperative hours (PO). In PO 1st day Group A and Group B has VAS 17 ± 5.4 and 20 ± 6.5 respectively, p = 0.17. In PO 2nd day the VAS score was 12.7 ± 11.7 in Group A vs. 17.7 ± 10.4 in Group B, p = 0.45. Statically insignificant and clinically significant result was seen at the PO end of 24 hour. However after 1month, postoperatively, no significant difference was found between the two groups.



Graph 1 VAS values

Clinically significant difference in postoperative oedema of tonsillar fossa, tonsillar pillars, uvula and soft palate was observed between the two groups. Follow-up also showed similar results.



Graph 2 Post operative oedema

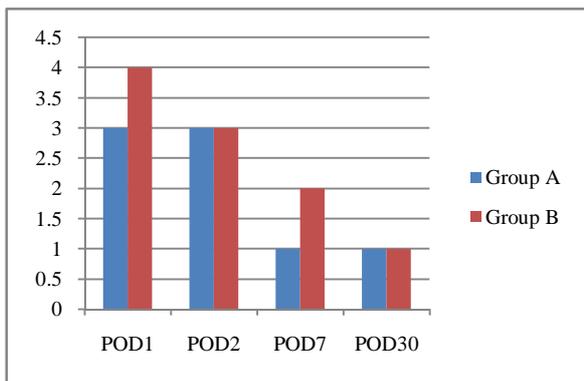


Fig 1 Post operative image of soft Palate same day every when ice cubes used



Fig 2 Post operative image of soft Palate same day every when ice cubes not used

Group A had clinically less difficulty in swallowing both soft and liquid diet on postoperative day 1 and 2 . It was grade 2 and 3 respectively (p > 0.05)



Graph 3 Difficulty in swallowing

DISCUSSION

Cryotherapy suppresses the metabolic rate of the affected soft tissue, this results in decrease tissue metabolism, associated with reduction in enzymatic activity preventing tissue damage caused by hypoxia^{13,14,15}. Cold induces vasoconstriction, which reduces extravasations of blood into surrounding tissue, local inflammation and oedema production while cold also reduces pain by reduction in oedema & decrease in motor and sensory nerve conduction. So beneficial effect of local cold treatment are decreased postoperative swelling, oedema, pain inflammation & haemorrhage as well as the reduction of metabolism, bleeding & hematoma^{15,16,17}.

Several published investigations have proved that cryotherapy is useful in acute trauma orthopaedic procedure, and ophthalmic surgery while some study showed inconclusive effect¹⁷. Cryotherapy also studied for postop pain in tonsillectomy patient while no study available for postoperative oedema and swelling.

During first phase of injury known as inflammatory phase there is damage to soft tissue structure and blood vessels. The damage to build up in the injured area causing the swelling that is typically seen in new injury. Cryotherapy decreases the circulation to the area there by reducing swelling¹⁷. While Knight, K proposed that by decreasing tissue temperature, ice can diminish pain metabolism and muscle spasm, minimizing the inflammatory process and there by adding recovery after soft tissue injury and minimizing secondary hypoxic injury. Cryotherapy studied in tonsillectomy with reference to pain which showed improvement in pain after use of ice during tonsillectomy^{11,19}.

Sarvar D C *et al.* demonstrated that relevant dose of cryotherapy produces negligible acute biochemical & molecular change in the skeletal muscle of human subject²⁰. Westermann in a study showed cryotherapy inhibits tumor necrosis factor- alpha induced microvascular perfusion failure, leucocyte adhesion and apoptosis in striated muscles decreasing inflammation²¹. Oliveiria and colleagues concluded in one study that the intermittent sessions of cryotherapy minimized the citrate synthetase and LDH activities which may be related to the reduction of secondary muscle injury inherent to cryotherapy treatment while the negative effect of cryotherapy on muscle regeneration showed by Takagi R *et al.* as cryotherapy retarded TGF-beta-1 and IGF -1 expression secreted by macrophages & impaired muscle regeneration but Gracielle *et al.* demonstrated that cryotherapy have a beneficial effect on inflammation process without affecting regeneration process even there are decreased infiltration of macrophages in injured area^{22,23,24}.

In the view of above studies we used ice after tonsillectomy procedure on tonsillar bed and adjacent area and demonstrated that using ice during tonsillectomy without any adverse effect improved patient's outcome with decreased oedema and swelling in uvula soft pallet post pharyngeal wall and tonsillar pillars & less discomfort^{25,26,27}. Patients also reported less postoperative We believe that if control postoperative edema and swelling of tonsillar bed and adjoining area after tonsillectomy it will help patient in less discomfort early recovery & healing and less pain.

So the use of cold therapy following tonsillectomy improved clinical outcome compared to no treatment.

CONCLUSION

Ice is a suitable agent to reduce postoperative edema, swelling, discomfort and improving clinical outcome after tonsillectomy. It offers the advantage of low cost, no secondary effect, no adverse effects and easy application and handling.

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