ORIGINAL ARTICLE

A Comparative Study between Lower Pole Silk Ligation and Pillar Suturing Technique of Hemostasis in Tonsillectomy

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Abstract

Introduction: Tonsillectomy operation was first described in the literature in 1000 BC by Celsus and Paul of Aegine. Various attempts have been made till now in the literature to control bleeding, including injection of medicines into peritonsillar area, fibrin glue application to the surgical site, suturing together the pillars, lower pole silk ligation. The aim of this study was to compare the morbidity associated with tonsillectomy using two different methods of hemostasis.

Materials and methods: The study design was duration-based prospective observational study which was conducted at the ENT Department of our Institute from August 2021 to August 2022. Total of 200 patients who have undergone tonsillectomy during this 1-year duration were selected for the study. In half number of patients, pillar suturing technique was performed, and in the remaining half number of patients, lower pole silk ligation was used to control bleeding during operation to compare the morbidity associated with each technique.

Results: Pillar suturing technique shown statistically significant reduction in primary and secondary post-tonsillectomy hemorrhage as compared to lower pole silk ligation.

Conclusion: Tonsillectomy procedure with pillar suturing technique of hemostasis has shown earlier pain relief and significantly faster wound healing than lower pole silk ligation technique. Pillar suturing technique of hemostasis has shown significantly increased pillar edema without significant increase in palatal discomfort sensation, palatal hematoma, suture site infection as compared with lower pole silk ligation technique of hemostasis. However, pillar suturing technique of hemostasis has shown similar results as that of lower pole silk ligation technique in terms of velopharyngeal insufficiency.

Keywords: Cold dissection, Hemostasis, Lower pole, Pillar suturing, Post-tonsillectomy bleed, Silk ligation.

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Introduction

The most commonly performed procedure in children in the entire world is tonsillectomy which is mainly done for frequent episodes of tonsillitis or sleep-disordered breathing. The first description of tonsillectomy in the literature is done 1000 BC by Paul Aegine and Celsus.[1,2] In the old era, removal of the tonsil was done by methods, such as excising with scalpel after holding with little hook, scraping, and torning out of the tonsil. Vinegar wash and application of medicine to tonsillar fossa was used for postoperative hemostasis in the old era.[3] Different operative techniques came into practice including tonsillectomy using physick tonsillotome, guillotine tonsillectomy as time goes on.[4,5] Dissection method by finding proper plane of dissection between tonsillar capsule and superior constrictor muscle are preferred nowadays apart from the various surgical methods.[6] Nowadays, operative techniques which reduce operative time period, intraoperative and postoperative complications like pain, bleeding are preferred by most of the surgeons which include microdebrider endoscopic tonsillectomy, laser tonsillectomy, harmonic scalpel, bipolar scissor, radiofrequency.[7,8]

Various attempts have been made till now in the literature to control bleeding including injection of medicines like morphine, steroid, tramadol, bupivacaine into peritonsillar area, fibrin glue application to the surgical site, suturing together anterior and posterior tonsillar pillars, lower pole silk ligation after tonsillectomy.[9–12] Straining during coughing or vomiting leads to loosening of knot and ligature resulting in secondary hemorrhage in the lower pole silk ligation technique.[13] Pillar suturing technique reduces the exposed area of muscles of pharynx along with the reduction of irritation due to swallowing after tonsillectomy thereby leading to surgical site epithelialization and early healing.[14,15]

The aim of this study was to compare the morbidity associated with tonsillectomy using two different methods of hemostasis during surgery, that is, lower pole silk ligation versus pillar suturing technique in terms of postoperative bleeding, pain, pillar edema, palatal hematoma, suture site infection, velopharyngeal insufficiency, palatal discomfort sensation.

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Patient consent statement: The author(s) have obtained written informed consent from the patient for publication of the case report details and related images.

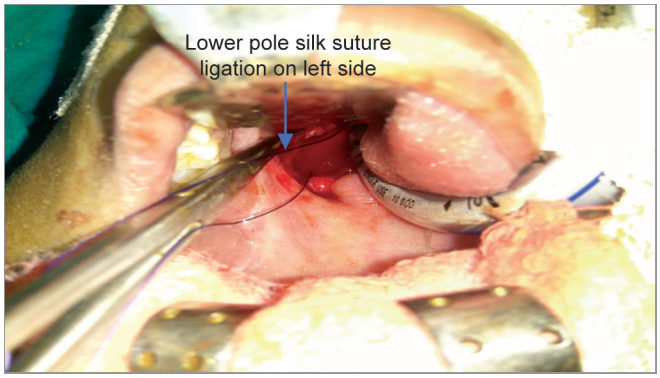

Fig. 1: Intraoperative photograph showing lower pole silk ligation technique by Negus artery forceps applied close to junction of lower pole with lingual tonsils for hemostasis during tonsillectomy

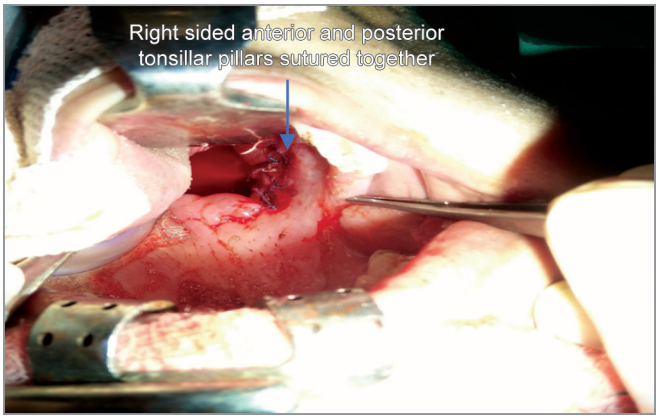

Fig. 2: Intraoperative photograph showing pillar suturing technique using simple interrupted sutures with 3-0 Vicryl material for hemostasis during tonsillectomy

Materials and Methods

The study design in our study was duration-based prospective observational study which was conducted at the ENT Department of our Institute from August 2021 to August 2022. Total of 200 patients who have undergone tonsillectomy during this 1-year duration were selected for the study. We have used the American Academy of Otolaryngology and Head Neck Surgery Criteria for undergoing tonsillectomy in all patients.[16] Inclusion criterion was chronic or recurrent tonsillitis, quinsy, too large tonsils causing throat obstruction, Obstructive sleep apnea, and unusual tonsil enlargement. While the exclusion criteria were acute tonsillitis, co-existing upper or lower respiratory infection, metastatic malignancies, Eagles syndrome, uncontrolled medical illness, bleeding and clotting disorders, contraindications to anesthesia. Preoperative investigations were performed including complete blood count, bleeding and clotting time, prothrombin time, platelets count, renal function tests, liver function tests, chest X-ray, and ECG.

Tonsillectomy was performed in all 200 patients under general anesthesia with endotracheal tube in situ by cold dissection and snare method leaving behind the capsule intact. In half number of patients (100 patients) lower pole silk ligation was used for ligation of the bleeding points in which Negus artery forceps was used to ligate the Inferior pole near to its junction with the lingual tonsils without leaving the tissue remnants and Negus ligature carrier with silk material was used for knot application (Fig. 1) and in remaining half number of patients (100 patients) pillar suturing technique was used to control the bleeding during operation in which we have sutured two pillars, that is, anterior and posterior tonsillar pillars together with 3 or 4 simple interrupted sutures using half circle blunt 26 or 30 mm needle and 3-0 Vicryl absorbable suture material starting from posterior tonsillar pillar to anterior tonsillar pillar including bleeding point if found after filling dead space in open tonsillar fossa by surgicel (Fig. 2).

All the cases were kept under observation in the recovery room for any immediate post-tonsillectomy hemorrhage. After complete recovery from anesthesia, the cases were shifted to general ward. All the cases were monitored for the vital signs during the next 24 hours. The morbidity associated with two methods of hemostasis during tonsillectomy was compared in terms of postoperative bleeding, pain, pillar edema, palatal hematoma, suture site infection, velopharyngeal insufficiency, and palatal discomfort sensation.

Results

We have selected a total of 200 patients who have undergone tonsillectomy, among those 140 (70%) male and 60 (30%) female, showing slightly higher incidence in the male population or increased preponderance for treatment in the males. The distribution of patients among different age groups was, 100 cases belonging to 10–20 years, 50 cases 21–30 years and 50 cases were 31 years or above. In this study, 110 (55%) cases were having recurrent episodes of tonsillitis for the last 2–3 years, 70 (35%) cases were having bilateral tonsils enlargement along with difficulty in breathing and swallowing, in 15 (7.5%) cases, there was previous history of quinsy and there were 5 (2.5%) cases with unilateral enlargement of the tonsil. We have used lower pole silk ligation technique in 100 cases to achieve hemostasis during the surgery while in 100 cases, pillar suturing technique was used for the same purpose.

The operation time was 15 minutes for dissection snare with lower pole silk ligation technique as compared with 30 minutes on average for tonsillectomy by dissection snare with pillar suturing technique (Table 1). The study showed no significant difference in terms of need of analgesics between two groups during the first 24 hours which was nearly equal.

In our study, pillar suturing technique tended to reduce postoperative pain at day 7 as compared with lower pole silk ligation which tended to reduce it at day 10. In addition, the pillar suture group was found to have significantly faster wound healing that is 10 days than lower pole silk ligation group that is 15 days. Assessment of hemorrhage was made based on the time and intensity of blood loss. Primary hemorrhage is bleeding during first 24 hours of surgery and secondary hemorrhage is bleeding after 24 hours. In our study, we found 12% primary and 11% secondary hemorrhage after lower pole silk ligation method of hemostasis; however, 2% primary and 1% secondary hemorrhage after pillar suturing technique of hemostasis. Primary and secondary hemorrhage between 2 groups, that is, lower pole silk ligation technique and pillar suturing technique were statistically significant (Table 1).

In our study, we found cases with pillar edema, palatal hematoma, palatal discomfort sensation, suture site infection, velopharyngeal insufficiency with lower pole ligation technique of hemostasis as 3, 0, 0, 0, and 6%, respectively and pillar suturing technique of hemostasis as 24, 3, 2, 5, and 7%, respectively. The two

Table 1: Number of patients with primary and secondary hemorrhage and average surgery time with each method of hemostasis during tonsillectomy

Serial number	*Method of hemostasis*	*Average surgery time (minutes)*	*Primary hemorrhage*	*Secondary hemorrhage*
1	Lower pole silk ligation	15	12/100 (12%)	11/100 (11%)
2	Pillar suturing technique	30	2/100 (2%)	1/100 (1%)

Table 2: Number of patients with postoperative complications after tonsillectomy associated with each method of hemostasis

Serial number	*Method of hemostasis*	*Pillar edema*	*Palatal hematoma*	*Palatal discomfort sensation*	*Suture site infection*	*Velopharyngeal insufficiency*
1	Lower pole silk ligation	3/100 (3%)	0/100 (0%)	0/100 (0%)	0/100 (0%)	6/100 (6%)
2	Pillar suturing technique	24/100 (24%)	3/100 (3%)	2/100 (2%)	5/100 (5%)	7/100 (7%)

groups, that is, lower pole silk ligation technique and pillar suturing technique were statistically significant in terms of pillar edema; however, they are not statistically significant in terms of palatal hematoma, palatal discomfort sensation, suture site infection, velopharyngeal insufficiency (Table 2).

Discussion

We have selected a total of 200 patients who have undergone tonsillectomy, among those, 140 (70%) were males and 60 (30%) were females indicating a higher incidence in the males. It may be due to increased proportion of male patients seeking treatment due to male dominant society. In our study for the first 24 hours, analgesics were required in almost equal in both the groups. Similar study compared the electrodissection with the conventional technique.[17] In our study, pillar suturing technique tended to reduce postoperative pain at day 7 as compared with lower pole silk ligation which tended to reduce it at day 10. In addition, the pillar suture group was found to have significantly faster wound healing, that is, 10 days than lower pole silk ligation group, that is, 15 days. One of the causes for postoperative pain are the stimulation of exposed sensory nerve endings at the surgical site by saliva and food. Epithelial coverage in the tonsillectomy bed develops gradually from 7th postoperative day after the separation of fibrin clot from the operative site.[12] Various studies have evaluated postoperative pain relief due to covering exposed nerve endings on the open tonsillar fossa using various grafting materials as well as pillar suturing technique.[18,19]

In our study, pillar suturing technique showed statistically significant reduction in primary and secondary post-tonsillectomy hemorrhage as compared with lower pole silk ligation. According to Genc E et al. compression of source of bleeding, that is, dead space by covering the open tonsillar fossa to improve the hemostasis was done for rapid wound healing and reduction in secondary bleeding.[14]

In our study, pillar suturing technique showed significantly increased pillar edema as compared with lower pole silk ligation technique but the incidence of palatal discomfort sensation, palatal hematoma, suture site infection had not increased significantly without additional complications or increase in pain which showed that pain would not be because of edema. Two groups, that is, lower pole silk ligation technique and pillar suturing technique were statistically significant in terms of pillar edema; however, they are not statistically significant in terms of palatal hematoma, palatal discomfort sensation, suture site infection, velopharyngeal insufficiency. Similar study done by Genc E et al. had shown significantly increased pillar edema as compared with control group without significant increase in palatal discomfort sensation, palatal hematoma, suture site infection.[14]

In our study, pillar suturing technique showed nearly similar incidence of velopharyngeal insufficiency as compared with lower pole silk ligation technique, so it was difficult to assess the effect of pillar suture on velopharyngeal function. Similar study done by Genc E et al. had shown a higher incidence of velopharyngeal insufficiency in the pillar suture group than control group[14] According to the study done by Shu Y et al., velopharyngeal insufficiency is due to excessive manipulation affecting position and height of palate with uvula resulting in structural modification of the upper airway.[20] Hu TL, et al. showed incidence of velopharyngeal insufficiency to be rare and tonsillectomy alone could also cause velopharyngeal insufficiency.[21] Since our study is duration-based observational study, further studies with large sample size and with randomization are required in future to obtain good level of evidence.

Conclusion

Tonsillectomy is the procedure performed commonly in males with common age group of 10–20 years. Tonsillectomy procedure with pillar suturing technique of hemostasis shown earlier pain relief and significantly faster wound healing than lower pole silk ligation technique. The pillar suturing technique of hemostasis was found to be better than lower pole silk ligation group in terms of primary and secondary post-tonsillectomy hemorrhage. Pillar suturing technique of hemostasis has shown significantly increased pillar edema without significant increase in palatal discomfort sensation, palatal hematoma, suture site infection as compared with lower pole silk ligation technique of hemostasis. However, pillar suturing technique of hemostasis has shown similar results as that of lower pole silk ligation technique in terms of velopharyngeal insufficiency.

Ethical Approval

Ethical approval taken from institutional ethical committee of our institute as per ICMR guidelines.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the

1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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References

1. Bicknell PG. Role of adeno-tonsillectomy in the management of paediatrics ear nose and throat infection. Paediac Infect Dis J 1994; 13:575–578. DOI: 10.1097/00006454-199401001-00016.
2. Kaerns BD, Pransky SM, Seid AB. Current concepts in paediatric adeno-tonsillar disease. Net J 1991;17:15–20. PMID: 2065614.
3. Curtain MA. The history of tonsils and adenoids otolaryngologic clinic of north america 1987;20:60–62. DOI: https://doi.org/10.1016/s0030-6665(20)30509-0.
4. Murty GE, Watson MG. Diathermy haemostasis at tonsillectomy: Current practice. J Larygo Otol 1990;104:549–552. DOI: 10.1017/S0022215100113131.
5. Hommer JJ, William BT, Semple P, et al. Tonsillectomy by guillotone is less painful than by dissection. Int J Paed Otorhinolarygol 2000; 52(1):25–29. DOI: 10.1016/S0165-5876(99)00296-7.
6. Zwack GC, Derkay CS. The utility of preoperative haemostasis assessment in adeno-tonsil-Lectomy. Int J Ped Otolaryngology 1997;39(1):67–76. DOI: 10.1016/S0165-5876(96)01465-6.
7. Wiatrak BJ, Willging JP. Harmonic scalpel for tonsillectomy. Laryngoscope 2002;112 (suppl 100):14–16. DOI: 10.1002/lary.5541121406.
8. Koempal JA. On the origin of tonsillectomy and the dissection method. Laryngoscope 2002;112:1583–1586. DOI: 10.1097/00005537-200209000-00009.
9. Ayatollahi V, Behdad S, Hatami M, et al. Comparison of peritonsillar infiltration effects of ketamine and tramadol on post tonsillectomy pain: A double-blinded randomized placebo-controlled clinical trial. Croat Med J 2012;53:155–161. DOI: 10.3325/cmj.2012.53.155.
10. Vaiman M, Eviatar E, Shlamkovich N, et al. Effect of modern fibrin glue on bleeding after tonsillectomy and adenoidectomy. Ann Otol Rhinol Laryngol 2003;112(5):410–414. DOI: 10.1177/000348940311200504.
11. Akural EI, Alahuhta S, Ohtonen P, et al. Peritonsillar morphine infiltration to prevent early postoperative pain after tonsillectomy: A randomised controlled trial. Eur J Anaesthe-Siol 2016;33(8):607–609. DOI: 10.1097/EJA.0000000000000402.
12. Nandapalan V, McIlwain JC. Tonsillar fossa obliteration and post-operative pain. Clin Otolaryngol Allied Sci 1995;20:127–129. DOI: 10.1111/j.1365-2273.1995.tb00028.x.
13. Carmody D, Vamadeva T, Cooper SM. Post tonsillectomy haem-orrhage. J Laryngol Otol 1982;88:117–121. DOI: 10.1017/S0022215100092926.
14. Genc E, Hanci D, Ergin NT, et al. Can mucosal sealing reduce tonsillectomy pain? Int J Pediatr Otorhinolaryngol 2006;70(4): 725–730. DOI: 10.1016/j.ijporl.2005.12.005.
15. Tawfik A, Elkholy T. Modified surgical technique with pillars repair in Reducing post tonsillectomy haemorrhage. Int Inv J Med Med Sci 2016;3:108–114. Available from: http://internationalinventjournals.org/journals/IIJMMS.
16. Baugh RF, Archer SM, Mitchell RB, et al. American Academy of Otolaryngology–Head and Neck Surgery Foundation. Clinical Practice Guideline: Tonsillectomy in children. Otolaryngol Head Neck Surg 2011;144(1 suppl):S23. DOI: 10.1177/0194599810389949.
17. Mann DG, George CSt., Scheiner D, et al. Tonsillectomy, some like it not. Laryngoscope 1984;94:677–679. DOI: 10.1288/00005537-198405000-00019.
18. Gross CW, Gallagher R, Schlosser RJ, et al. Autologous fibrin sealant reduces pain after tonsillectomy. Laryngoscope 2001;111:259–263. DOI: 10.1097/00005537-200102000-00014.
19. Sclafani AP, Jacono AA, Dolitsky JN. Grafting of the peritonsillar fossa with an acellular dermal graft to reduce posttonsillectomy pain. Am J Otolaryngol 2001;22:409–414. DOI: 10.1053/ajot.2001.28077.
20. Shu Y, Yao HB, Yang DZ, et al. Postoperative characteristics of combined pharyngoplasty and tonsillectomy versus tonsillectomy in children with obstructive sleep apnea syndrome. Arch Argent Pediatr 2018;116:316–321. DOI: 10.5546/aap.2018.eng.316.
21. Hu TL, Yun C, Wang R, et al. Management of velopharyngeal insufficiency in the presence of enlarged tonsils: Comparing a one-stage versus two-stage treatment result. J Plast Reconstr Aesthet Surg 2008;61:883–888. DOI: 10.1016/j.bjps.2007.05.003.