

Original Research Article

Immediate and delayed complications of adenotonsillectomy

Gerald P. Sebastian^{1*}, Balasubramanian Thiagarajan², Pethuru Devadason³

Department of Otorhinolaryngology, ¹Thanjavur Medical College, Thanjavur, ²Government Stanley Medical College, Chennai, Tamilnadu, India

³Department of Community Medicine, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari, Tamilnadu, India

Received: 10 March 2019

Revised: 02 May 2019

Accepted: 04 May 2019

***Correspondence:**

Dr. Gerald P. Sebastian,

E-mail: drgerald94@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Tonsillectomy with or without adenoidectomy is the commonest pediatric otorhinolaryngological procedure. The aim of the present study was to compare the intraoperative (immediate) and postoperative (delayed) complications between in conventional and coblation tonsillectomy in children.

Methods: This observational study was conducted among 100 children between 5 and 15 years who had conventional tonsillectomy and 50 children who had coblation tonsillectomy. Intraoperative and postoperative complications were observed and compared between two groups.

Results: Of the total 150 children, 64 (42.7%) were males and 86 (57.3%) were females with mean age of 9.42 ± 2.67 years. Common preoperative symptoms were odynophagia (96.0%), throat pain (95.3%) and difficult swallowing (89.3%). Among the intraoperative anesthetic complications, compression of endotracheal tube was observed in 19 (12.7%), accidental extubation in 10 (6.7%) and dislodging of loose tooth in 9 (6.0%) patients. Regarding intraoperative surgical complications, primary hemorrhage was seen in 43 (28.7%), edema uvula in 39 (26.0%) and pillar injury in 33 (22.0%) patients. Commonest postoperative complication was oropharyngeal pain (18.7%) followed by primary hemorrhage (14.0%) and nausea, vomiting (13.3%). Immediate complications like primary haemorrhage (p value 0.0001) and uvula edema (p value 0.018) were significantly associated with conventional tonsillectomy group while delayed complications like secondary haemorrhage (p value 0.011) and referred otalgia (p value 0.0001) were with coblation tonsillectomy group.

Conclusions: Compression of endotracheal tube and primary hemorrhage were the commonest intraoperative anesthetic and surgical complication respectively. Immediate complications were significantly associated with conventional tonsillectomy group while delayed complications were with coblation tonsillectomies.

Keywords: Adenotonsillectomy, Complications, Conventional tonsillectomy, Coblation tonsillectomy

INTRODUCTION

Tonsils and adenoid act as host defense and sentinels at the portal of aerodigestive tract.¹ Aggregated mucosa associated lymphoid tissue (MALT) in the subepithelial pharyngeal layer at the entrance of the aerodigestive tract are collectively called as the Waldeyer's ring.² The T-lymphocytes in the parafollicular region of these lymphoid aggregates provide cell mediated immunity. B-

lymphocytes in the germinal centers of these lymphoid tissue produce IgA antibodies. The most common problems affecting the tonsils and adenoid tissue are recurrent infections (throat or ear), significant enlargement and obstruction that causes swallowing and breathing problems. Abscesses around the tonsils and chronic infections can also affect the tonsils and adenoids, making them sore and swollen.

Group A beta-hemolytic Streptococci is the most commonly recognized pathogen.³ Many other organisms are also involved, few of particular importance are beta-lactamase producing organisms like *Staphylococcus aureus*, *Moraxella catarrhalis*, and *Hemophilus influenzae*.⁴ In polymicrobial infections beta-lactamase producing organisms can protect group A Streptococci from eradication with Penicillins.⁵ Any virus infection can initiate an attack of acute tonsillitis which also predisposes to secondary bacterial infection. The viruses implicated in acute tonsillitis include adenovirus, Epstein barr virus and herpes simplex virus. Anaerobes have also been found to be present in moderate amounts in 30% of superficial swabs.⁶

Recurrent and resistant infections of adenoid and tonsils warrant the situation to go for surgical management. Studies show that quality of life significantly improves following adenotonsillectomy in sleep-disordered breathing (SDB) children.⁷ Absolute indications for adenotonsillectomy include adenotonsillar hyperplasia with obstructive sleep apnea, failure to thrive, or abnormal dentofacial growth, suspicion of malignant disease, and hemorrhagic tonsillitis (for tonsillectomy). Relative indications for both procedures are adenotonsillar hyperplasia with upper airway obstruction, dysphagia, or speech impairment, and halitosis.⁸

Roman surgeon Aulus Cornelius Celsus and Paul of Aegina in 30 AD were the first to describe early tonsillectomies by blunt removal using fingernail or hook and to remove them with a knife.⁹ Morel Mackenzie (1837-1892) is considered as true founder of modern tonsillectomy.¹⁰ In 2002, microdebrider and coblation tonsillectomy evolved with minimal intra operative bleeding. Nowadays coblation has become a more commonly practiced technique for tonsillectomy. Newer tools such as the coblator and plasma knife have gained popularity with some surgeons, which makes the practicing patterns even more diverse. Varying techniques for tonsillectomy have been described under cold and hot tonsillectomy.¹¹

This study was conducted with the following objectives: (1) to evaluate the incidence of immediate and delayed complications following adenotonsillectomy and (2) to compare the intra and postoperative complications in conventional and coblation tonsillectomy.

METHODS

Study population

This observational study was conducted among 150 patients who had undergone adenotonsillectomy in Government Stanley Medical College between June 2012 and September 2013. 100 patients who had undergone conventional tonsillectomy and 50 patients who had undergone coblation tonsillectomy within the study

period were included in the study with the following inclusion and exclusion criteria.

Inclusion and exclusion criteria

The children between the age 5 and 15 years and of both the genders were included in the study. The patients who had been diagnosed with one the following like acute recurrent tonsillitis, peritonsillitis, streptococcal carriers, OSA, conductive hearing loss due to secretory otitis media or diphtheria carriers were included in the study. Patients with one of the following like acute tonsillitis, blood dyscrasia, palatal abnormalities like submucous cleft palate or down's syndrome were excluded from the study.

Assessment

Clinical assessment was done by taking accurate history. History of throat pain, odynophagia, difficulty in swallowing, mouth breathing, snoring, ear block and recurrent upper respiratory tract obstruction were taken. Clinical examination for adenoid facies-elongated face, short open upper lip, crowded teeth, high arched palate and hyponasal speech were done. Clinical examination of oral cavity including lips, teeth, gums, tongue, palate - both hard and soft, floor of the mouth, cheeks and the clinical examination of oropharynx including uvula, soft palate, anterior and posterior tonsillar pillars, tonsils and posterior pharyngeal wall were done.

Postnasal examination was done by using St.Clair Thompson's post nasal mirror. This examination was augmented using a 2.7 mm internal diameter 0° nasal endoscope. Radiological assessment were done with x ray neck soft tissues: lateral view which will usually reveal the degree of adenoid hypertrophy.

Following investigations were done while the patients were assessed prior to surgery: haemoglobin, total count, differential count, erythrocyte sedimentation rate, bleeding time, clotting time, blood grouping and rh typing, prothrombin time, absolute partial thromboplastin time, urine-albumin, sugar and deposits, X-ray chest pa view, diagnostic nasal endoscopy and pure tone audiometry.

Outcome measures

Intra operative and postoperative events were observed among the patients. Intraoperative anesthetic complications like dislodging of loose tooth, Accidental extubation and compression of ET tube were noted. Intraoperative surgical complications like primary hemorrhage, edema of uvula and pillar injury were observed. Postoperative complications observed were the following like nausea, vomiting, loss of taste, primary hemorrhage, oropharyngeal pain, referred otalgia, secondary hemorrhage, dehydration and pneumonia atelectasis.

The study protocol was approved by the Institutional Ethical Committee. Informed written consent for adenotonsillectomy and consent for inclusion into the study was obtained from the parents of the patients.

Statistical analysis

The data collected were entered on excel spreadsheet and analysed with SPSS version 18.0. Analysis was based on the comparison of results obtained intra operatively and post operatively. Incidence of complications observed in both groups were compared using chi square test.

RESULTS

General description of the study population

There were totally 150 patients included in the study. 100 patients were in conventional tonsillectomy group and 50 patients were in coblation tonsillectomy group. In the conventional tonsillectomy group, 43 (43.0%) were males and 57 (57.0%) were females. In the same manner, in the coblation tonsillectomy group, 21 (42.0%) were males and 29 (58.0%) were females and both groups are comparable as evident by $p > 0.05$ (Table 1). The minimum age of the study population is from 5 years to

maximum of 15 years. The mean age was 9.42 years with standard deviation of 2.67 years. The mean age (\pm SD) in conventional tonsillectomy group is 9.67 (\pm 2.69) years while the mean age (\pm SD) in coblation tonsillectomy group is 8.92 (\pm 2.58) years. This difference is not significant as the p-value is > 0.05 . So both the groups are comparable by age too (Table 2).

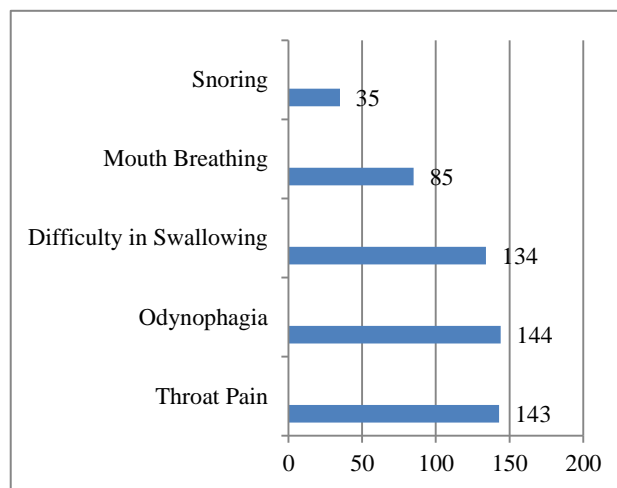


Figure 1: Preoperative symptoms of the study population.

Table 1: Gender distribution.

Gender	Number	Conventional tonsillectomy	Coblation tonsillectomy	Chi ² value	p-value
	N (%)	N (%)	N (%)		
Male	64 (42.7)	96 (96.0)	47 (94.0)	0.014	0.907
Female	86 (57.3)	4 (4.0)	3 (6.0)		

Table 2: Age distribution.

Category	Number	Mean age	Standard deviation	T-value	P value
Conventional tonsillectomy	100	9.67	2.69	2.66	0.105
Coblation tonsillectomy	50	8.92	2.58		
Total	150	9.42	2.67		

Table 3: Preoperative symptoms among the groups.

Preoperative symptoms	Category	Number	Conventional tonsillectomy	Coblation tonsillectomy	Chi ² value	P value
			N (%)	N (%)		
Throat pain	Yes	143	96 (96.0)	47 (94.0)	0.300	0.584
	No	7	4 (4.0)	3 (6.0)		
Odynophagia	Yes	144	94 (94.0)	50 (100)	3.125	0.077
	No	6	6 (6.0)	0 (0.0)		
Difficulty in swallowing	Yes	134	89 (89.0)	45 (90.0)	0.035	0.852
	No	16	11 (11.0)	5 (10.0)		
Mouth breathing	Yes	85	53 (53.0)	32 (64.0)	1.643	0.200
	No	65	47 (47.0)	18 (36.0)		
Snoring	Yes	35	24 (24.0)	11 (22.0)	0.075	0.785
	No	115	76 (76.0)	39 (78.0)		

Table 4: Comparison of immediate complications.

Complications	Category	Number	Conventional tonsillectomy	Coblation tonsillectomy	Chi ² value	P value
			N (%)	N (%)		
Intraoperative anesthetic complications						
Dislodging of loose tooth	Yes	9	7 (7.0)	2 (4.0)	0.532	0.466
	No	141	93 (93.0)	48 (96.0)		
Accidental extubation	Yes	10	6 (6.0)	4 (8.0)	0.214	0.642
	No	140	94 (94.0)	46 (92.0)		
Compression of ET tube	Yes	19	15 (15.0)	4 (8.0)	1.476	0.224
	No	131	85 (85.0)	46 (92.0)		
Intraoperative surgical complications						
Primary hemorrhage	Yes	43	40 (40.0)	3 (6.0)	18.844	0.0001 [∞]
	No	107	60 (60.0)	47 (94.0)		
Edema uvula	Yes	39	32 (32.0)	7 (14.0)	5.613	0.018*
	No	111	68 (68.0)	43 (86.0)		
Pillar injury	Yes	33	19 (19.0)	14 (28.0)	1.573	0.210
	No	117	81 (81.0)	36 (72.0)		

*Significant at 5% level; [∞]Significant at 1% level.

Table 5: Comparison of delayed complications.

Complications	Category	Number	Conventional tonsillectomy	Coblation tonsillectomy	Chi ² value	P value
			N (%)	N (%)		
Nausea, vomiting	Yes	20	12 (12.0)	8 (16.0)	0.462	0.497
	No	130	88 ()	42 (84.0)		
Loss of taste	Yes	6	2 (2.0)	4 (8.0)	3.125	0.077
	No	144	98 (98.0)	46 (92.0)		
Primary hemorrhage	Yes	21	12 (12.0)	9 (18.0)	0.997	0.318
	No	129	88 (88.0)	41 (82.0)		
Oropharyngeal pain	Yes	28	19 (19.0)	9 (18.0)	0.022	0.882
	No	122	81 (81.0)	41 (82.0)		
Referred otalgia	Yes	12	4 (4.0)	8 (16.0)	6.522	0.011*
	No	138	96 (96.0)	42 (84.0)		
Secondary hemorrhage	Yes	12	0 (0.0)	12 (24.0)	26.087	0.0001 [∞]
	No	138	100 (100)	38 (76.0)		

*Significant at 5% level; [∞]Significant at 1% level.

Preoperative symptoms

Figure 1 shows the preoperative symptoms of the study population. Odynophagia was the most common symptom as seen in 144 (96.0%) patients followed by throat pain in 143 (95.3%) and difficulty in swallowing in 134 (89.3%) patients. Then mouth breathing was seen in 85 (56.7%) of the patients and Snoring was seen only 35 (23.3%) patients (Figure 1).

Table 3 shows the comparison of preoperative symptoms between both conventional tonsillectomy and coblation tonsillectomy group of patients. Throat pain was seen in 96 (96.0%) of the conventional tonsillectomy patients and 47 (94.0%) of the coblation tonsillectomy patients. This difference is not statistically significance as seen in p-value >0.05. In the same way, odynophagia was seen in

94 (94.0%) of the conventional tonsillectomy patients and all the 50 (100%) of the coblation tonsillectomy patients. But this difference is not statistically significance as seen in p-value is 0.077.

Regarding difficulty in swallowing, it was seen in 89 (89.0%) of the conventional tonsillectomy patients and 45 (90.0%) of the coblation tonsillectomy patients and this difference is not statistically significance (p-value – 0.852). Mouth breathing was seen in 53 (53.0%) of the conventional tonsillectomy patients and in 32 (64.0%) of the coblation tonsillectomy patients. But this difference is not statistically significance as p-value is 0.200. Snoring was observed in 24 (24.0%) of the conventional tonsillectomy patients and in 11 (22.0%) of the coblation tonsillectomy patients and there is no statistically significant difference between the groups as p-value is

only 0.785. Thus both the groups were comparable (Table 3).

Complications of adenotonsillectomy

Complications of adenotonsillectomy have been given in to two categories as immediate (intraoperative) and delayed (postoperative).

Immediate (intraoperative) complications

Immediate complications were divided in to two categories as intraoperative anesthetic complications and intraoperative surgical complications. Among the intraoperative anesthetic complications in the study populations, compression of ET tube was the commonest complication as seen in 19 (12.7%) patients followed by accidental extubation seen in 10 (6.7%) patients and dislodging of loose tooth seen in 9 (6.0%) patients. None of the patients had any dislocation of temporo mandibular joint. Regarding intraoperative surgical complications, Primary hemorrhage was seen in maximum as many as 43 (28.7%) patients followed by edema uvula seen in 39 (26.0%) and pillar injury seen in 33 (22.0%) patients (Table 4).

Delayed (postoperative) complications

Oropharyngeal pain was the commonest postoperative complication in the study population as seen in 28 (18.7%) followed by primary hemorrhage seen in 21 (14.0%) patients and nausea, vomiting was seen in 20 (13.3%) patients. Referred otalgia and secondary hemorrhage were observed in 12 (8.0%) patients respectively each and loss of taste was seen in 6 (4.0%) of the patients. Regarding postoperative other rare complications, dehydration was observed in 9 (6.0%) and pneumonia atelectasis was seen in 3 (2.0%) of the patients. Velopharyngeal insufficiency and nasopharyngeal stenosis were not seen in any of the patients (Table 5).

Comparison of immediate and delayed complications

Immediate complications

Table 4 shows the comparison of intra operative anesthetic complications and the intra operative surgical complications between the two groups. Dislodging of loose tooth was seen in 7 (7.0%) of the conventional tonsillectomy patients but it was observed in only 2 (4.0%) of the coblation tonsillectomy patients but this difference is not statistically significant (p-value -0.466).

Accidental extubation was seen in 6 (6.0%) of the conventional tonsillectomy patients and it was seen only 4 (8.0%) of the coblation tonsillectomy patients and this difference is not statistically significant (p-value -0.642). Compression of ET tube was seen in 15 (15.0%) of the conventional tonsillectomy patients but it was seen in

only 4 (8.0%) of the coblation tonsillectomy patients but this difference is not statistically significant (p-value -0.224).

Primary hemorrhage which is the commonest intra operative surgical complications was observed in 40 (40.0%) of the conventional tonsillectomy patients while it was seen in only 3 (6.0%) of the coblation tonsillectomy patients. This is the highly statistically significant difference as seen in p-value 0.0001. In the same way, edema uvula was observed in 32 (32.0%) of the conventional tonsillectomy patients while it was seen in only 7 (14.0%) of the coblation tonsillectomy patients. This difference is also statistically significant as seen in p-value 0.018. Pillar injury was observed in 19 (19.0%) of the conventional tonsillectomy patients and 14 (28.0%) of the coblation tonsillectomy patients but this difference is not statistically significance (p-value -0.210).

Delayed complications

Table 5 compares the postoperative complications between the groups. Nausea, vomiting was observed in 12 (12.0%) of the conventional tonsillectomy patients and it was seen in 8 (16.0%) of the coblation tonsillectomy patients. But this difference is not statistically significant as seen in p-value is only 0.497. In the same way, loss of taste was observed in 2 (2.0%) of the conventional tonsillectomy patients while it was seen in 4 (8.0%) of the coblation tonsillectomy patients. But this difference is also not statistically significant as seen by p value 0.077.

Primary hemorrhage was observed in 12 (12.0%) of the conventional tonsillectomy patients and 9 (18.0%) of the coblation tonsillectomy patients but this difference is not statistically significance (p=0.318). Oropharyngeal pain which was commonest among the postoperative complications was observed in 19 (19.0%) of the conventional tonsillectomy patients and it was seen in 9 (18.0%) of the coblation tonsillectomy patients and the difference is not statistically significant as seen in p-value is only 0.882.

Referred pain was observed only in 4 (4.0%) of the conventional tonsillectomy patients but it was seen in 8 (16.0%) of the coblation tonsillectomy patients. This difference is statistically significant as seen in p-value 0.011. Secondary hemorrhage was not observed in any of the conventional tonsillectomy patients but it was observed in 12 (24.0%) of the coblation tonsillectomy patients. This difference is highly statistically significant as seen in p=0.0001.

DISCUSSION

Adenotonsillitis is one of the commonest health problems encountered in the general population particularly in children. Tonsillectomy with or without adenoidectomy is the most commonly performed pediatric

otorhinolaryngological procedure.¹² Variety of techniques and approaches for adenotonsillectomy have been tested and tried over the years. Since adenotonsillectomy procedure by both conventional and coblation methods are routinely happening in the centre where this study was conducted, a comparison was made between them on the immediate and delayed complications.

Among the intraoperative anesthetic complications in the study population, compression of ET tube was the commonest complication as seen in 19 (12.7%) patients followed by accidental extubation seen in 10 (6.7%) patients and dislodging of loose tooth seen in 9 (6.0%) patients. It has been found that the compression and obstruction of the anesthetic tube is the predominant complication due to selection of faulty size of the blade of Davis mouth gag.¹³ Accidental extubation while changing the head position and also during Doughty's tongue blade removal is another commonly encountered anaesthetic complications in both conventional and coblation tonsillectomy.

Regarding intraoperative surgical complications, primary hemorrhage was seen in maximum as many as 43 (28.7%) patients followed by edema uvula seen in 39 (26.0%) and pillar injury seen in 33 (22.0%) patients. Primary haemorrhage is the most commonly recorded intra operative surgical complication.¹⁴ The reason for primary haemorrhage may be due to inadequate preoperative patient preparation, faulty surgical technique, in advertent injury to superior constrictor muscles and difficulty in ligating the bleeders in the tonsillar bed especially in superior and inferior pole. Edema of the uvula, is another intra operative complication which is mainly encountered due to in advertent and frequent suctioning over the uvula.

Oropharyngeal pain was the commonest postoperative complication in the study population as seen in 28 (18.7%) patients followed by primary hemorrhage seen in 21 (14.0%) patients. Oropharyngeal pain has been found to be the most commonest postoperative complication in a study by Linden et al.¹⁵

Odynophagia is due to muscle spasm, especially the superior constrictor fibres and dissection of the tonsil substance. Similar irritation of the superior constrictor occurs while curreting the adenoids. In our study referred otalgia and secondary hemorrhage were observed in 12 (8.0%) patients respectively. Referred otalgia is probably due to close removal of the tonsil from the tongue base. In our study it was significantly higher with coblation group. But in a study Schmidt et al, the pain scores were compared it was significantly lower, which is 3.3 in the coblation group and 3.7 in conventional group.¹⁶ Secondary hemorrhage was observed in 12 (8.0%) patients. It is significantly more associated with coblation tonsillectomy because of dislodgement of the infective slough.

Invention of equipments like coblation, mono/bipolar electrocautery and laser have made the outlook better for adenotonsillectomies with respect to intraoperative and postoperative complications. Primary haemorrhage is less in coblation technique because: (a) dissection is done extracapsular, hence no surgical trauma to the paratonsillar vein and the superior constrictor muscle which lies in the tonsillar bed, (b) hemostasis was possible for vessels less than 1 mm in diameter and (c) histopathological thermal injury of only 0.13-mm depth is reported.¹⁷ Hence training and experience of the surgeon, technical preferences and its complications, cost-effectiveness should be considered in choosing the surgical technique. All trainee surgeons should become competent in conventional dissection method and in achieving haemostasis using ligatures before learning other modern techniques.

Irrespective of seniority and experience, every surgeon should undergo appropriate training before using new techniques like coblation. Emphasis must be placed on explaining the risk of postoperative haemorrhage to the patient, teaching the correct technique like checking the power settings prior to surgery and the potential hazards of coblation technique. Every complication should be recorded and analyzed regularly to improve the patient's safety. Yet it can be argued that the use of coblation tonsillectomy is equivalent to the use of conventional technique in the current scenario with respect to intra and post operative complications.

CONCLUSION

Compression of ET tube was the commonest intraoperative anesthetic complication (12.7%) and primary hemorrhage was observed as the commonest intraoperative surgical complication (28.7%) in the study population. Immediate complications like primary haemorrhage and uvula edema were significantly associated with conventional tonsillectomy group. Delayed complications like secondary haemorrhage and referred otalgia were significantly associated with coblation tonsillectomies.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kenna MA, Amin A. Anatomy and physiology of the oral cavity. In: Snow JB, Wackym PA. Ballenger's Otorhinolaryngology Head and Neck Surgery. 17th edition. Shelton: BC Decker Inc; 2009: 769-774.
2. Hellings P, Jorissen M, Ceuppens JL. The Waldeyers ring. *Acta Otorhinolaryngologica Belgica.* 2000;54:237-41.

3. Falagas ME, Vouloumanou EK, Matthaïou DK, Kapaskelis AM, Karageorgopoulos DE. Effectiveness and safety of short-course vs long-course antibiotic therapy for group A -hemolytic streptococcal tonsillopharyngitis: ameta-analysis of randomized trials. *Mayo Clin Proc.* 2008;83(8):880-9.
4. Stjernquist- Destnik A, Preneller K, Schalen C. High recovery of haemophilus influenza and group A streptococci in recurrent tonsillar infection and hypertrophy as compared with normal tonsils. *J Laryngol Otol.* 199;105:439-41.
5. Polvogt LM, Crowe SJ. Predominating organisms found in cultures from tonsils and adenoid. *J Am Med Association* 1929;92:962-4.
6. Toner J, Stewart G, Campbell TB, Hunter JB. Tonsil flora in the very young tonsillectomy patient. *Clin Otolaryngol.* 1986;11:171-4.
7. Ali A, Nisar J, Ali I, Ahmad R. Study of impact of surgical intervention (adenotonsillectomy) and conservative management on quality of life in patients with SDB. *Int J Otorhinolaryngol Head Neck Surg.* 2018;4:448-54.
8. Subramaniam V, Pai V, Mazumdar MR. Effects of adenotonsillectomy on humoral immunity. *Int J Otorhinolaryngol Head Neck Surg.* 2016;2:230-3.
9. Berkovitz BKB, Holland GR, Moxham BJ. Oral anatomy, histology and embryology. 3rd edition. London: Mosby; 2002.
10. Júnior JFN, Hermann DR, Américo RR, Stamm RG, Hirata CW. A brief history of tonsillectomy. *Int. Arch. Otorhinolaryngol.* 2006;10(4):314-7.
11. Blanchford H, Lowe D. Cold versus hot tonsillectomy: state of the art and recommendations. *ORL* 2013;75:136-41.
12. Nithya V, Dutta A, Sabarigirish K. A comparative study of coblation assisted adenotonsillectomy and cold dissection adenotonsillectomy in children. *Int J Otorhinolaryngol Head Neck Surg.* 2017;3:122-7.
13. Davis DD. Reanaesthetizing cases of Tonsillectomy and adenoidectomy because of persistent post operative haemorrhage. *Br J Anaes.* 1964;36:244-9.
14. Liu JH, Anderson KE, Willging JP, Myer CM, Shott SR, Bratcher GO, et al. Post tonsillectomy hemorrhage: what is it and what should be recorded? *Arch Otolaryngol Head Neck Surg.* 2001;127(10):1271-5.
15. Linden BE, Gross CW, Long TE, Lazar RH. Morbidity in pediatric tonsillectomy. *Laryngoscope.* 1990;100:120-4.
16. Schmidt R, Herzog A, Cook S, O'Reilly R, Deutsch E, Reilly J. Complications of tonsillectomy: a comparison of techniques. *Arch Otolaryngol Head Neck Surg.* 2007;133(9):925-8.
17. Shah UK, Galinkin J, Chiavacci R, Briggs M. Tonsillectomy by means of plasma-mediated ablation: prospective, randomized, blinded comparison with monopolar electrosurgery. *Arch Otolaryngol Head Neck Surg.* 2002;128(6):672-6.

Cite this article as: Sebastian GP, Thiagarajan B, Devadason P. Immediate and delayed complications of adenotonsillectomy. *Int J Otorhinolaryngol Head Neck Surg* 2019;5:1013-9.