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Prevalence of early postoperative complications and associated factors among children underwent adenotonsillectomy at Bugando Medical Centre Mwanza Tanzania

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Abstract

Tonsillar infections and sleep-disordered breathing (SDB) are the leading indications for performing adenotonsillectomy. Studies have shown that the majority of the complications happen during the first eight hours after the procedure. Despite this procedure being frequently performed, there are no studies reporting the prevalence of early postoperative complications and associated factors following adenotonsillectomy at Bugando Medical Centre. The study will enlighten about the complications, which in future protocols will be made to minimize the complications. It is a descriptive cross-sectional study conducted at Bugando Medical Centre from November 2023 to July 2024. The total number of study participants was 206. The majority were male (56.3%). The leading age group that was mostly affected was from 3 years to 8 years, accounting for 67.5%. The prevalence of early postoperative complications was 7.77%. Primary hemorrhage was the leading complication, followed by infection. There is significance in the pre-existing medical conditions and early postoperative complications, as shown in the study. Additionally, this study also showed that age and gender have no relationship in the development of early complications.

Keywords: Adenotonsillitis, Associated factors, Early complications, Prevalence.

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Contents

Contribution of this paper to the literature
This will raise awareness among physicians worldwide about the complications encountered in early preoperative patients in lower-resource countries, which are similar to those in high-income countries, regardless of the economic status of the country.

1. Introduction

Adenotonsillectomy is the number one surgical procedure performed worldwide by otorhinolaryngologists and Head and Neck Surgeons. This procedure involves the removal of adenoids and tonsils. It is a common procedure conducted by otorhinolaryngologists and Head and Neck surgeons [1-3]. In adults, the incidence varies from 5.4% to 45.7% [4]. However, the frequency among children is said to be as low as 1-5% [5]. The majority of obstructive sleep apnea (OSA) in children is caused by hypertrophic lymphatic tissue of the tonsils and adenoids [6, 7]. It is acknowledged as a potential risk factor for problems following surgery, such as oxygen desaturation [8]. Studies have shown that complications encountered in the early postoperative period include hemorrhage, odynophagia, dehydration, and fever. Overall complications were 33.8% (50 patients), whereby post-tonsillectomy hemorrhage occurred in only one patient (0.7%). Most postoperative complications occurred in the first eight hours. Odynophagia was found to be associated with gender and age [1]. Odynophagia was also significantly associated with weight loss within the two weeks postoperatively [1]. A study conducted in the United States of America (USA) revealed that among the patients whose records were reviewed, 80 (93.0%) did not experience any intraoperative or postoperative complications. Dehydration was the most common complication and was the cause of all documented readmissions (4.7%) in our patients, who ranged in age from 14 to 30 months [9]. A study conducted in China found that 11.2% had postoperative respiratory complications necessitating medical intervention, 80.6% required an oropharyngeal or nasopharyngeal airway, 69.4% experienced multiple episodes of desaturation, and 61.1% of cases had respiratory complications in the post-anesthesia care unit [10].

Other studies have shown that the most frequent early complications after adenotonsillectomy are respiratory compromise and secondary hemorrhage. Children with OSA have been shown to have more respiratory complications, while those without OSA are more prevalent with hemorrhage [1, 9, 11]. The analyzed data show a higher rate of early complications and unplanned admissions in children under the age of 4 years [12]. A study conducted in South Africa revealed that a large number of pediatric patients undergoing tonsillectomy and adenoidectomy in an ambulatory environment have higher rates of complications in younger patients and those with comorbidities [13]. A study done in Romania found that morbidity and mortality appeared more frequently in moderate and severe OSA compared to non-OSA patients [14]. Another study in Ireland revealed that surgical techniques, such as microdebrider intracapsular tonsillectomy, were associated with lower rates of post-tonsillectomy hemorrhage and dehydration compared to coblation and electrocautery complete tonsillectomy techniques [15]. A study conducted in the USA from 2001 to 2010 found that over a decade, a total of 141,599 hospitalized patients underwent tonsillectomy (w116,319; woA 25,280). A total of 58.1% were males. The majority of the procedures were performed in teaching hospitals (TH, 73.7%), in large (bed-size) hospitals (LH, 57.8%), and in those who were electively admitted (EA, 67.3%). Frequently present comorbid conditions (CMC) in patients included obstructive sleep apnea (OSA, 26.4%), chronic pulmonary disease (CPD, 14.6%), neurological disorders (ND, 6.7%), and obesity (4.8%). The majority of patients were discharged routinely (98%). The overall complication rate was 6.4%, with common complications being postoperative pneumonia (2.3%), bacterial infections (1.4%), respiratory complications (1.3%), and hemorrhage (1.2%) [16].

Also, a study done in Germany revealed that young age, low body weight, obstructive sleep apnea, pre-existing craniofacial or syndromal disorders, and adenotonsillectomy, compared with adenoidectomy alone, were identified as risk factors for complications during or after surgery [17]. A study by Kristina et al. revealed that follow-up telephone calls are a safe and cost-effective method of post-operative management for pediatric patients who have undergone adenotonsillectomy [18]. A study conducted on children revealed that the criteria for inpatient admission for children younger than 3 years should be based on preoperative and postoperative clinical evaluation of the patient and an evaluation of the family resources for adequately caring for young children at home in the postoperative period [10]. A study done in Australia reported that routine post-operative ICU care for high-risk children may be avoided if prolonged monitoring in the post-anesthetic care unit is possible, with admission to ICU reserved for high-risk children with early adverse events [19].

Study by Brown et al reported that Risk factors for respiratory complications were an associated medical condition and a preoperative saturation nadir less than 80%. Sixteen (49%) of the medical interventions were required within the first postoperative hour. Atropine administration, at induction, decreased the risk of postoperative respiratory complications [20]. In a study by Edmonson et al. it was revealed that neither age younger than 3 years nor sleep-disordered breathing was significantly associated with mortality, but children with complex chronic conditions had significantly higher mortality than children without these conditions. Children with complex chronic conditions accounted for 2.8% of tonsillectomies but 44% of postoperative deaths. Most deaths associated with complex chronic conditions occurred in children with neurologic/neuromuscular or congenital/genetic disorders [21].

Study by Goyal et al. reported that younger age, the existence of a complex chronic condition, and OSA were all associated with higher post-T&A admission rates. Admission rates ranged from >94% for children under 2 years of age, with OSA and at least one medical comorbidity, to 14% for children older than 5 years, without OSA and without any medical comorbidities [22]. Studies have shown that the odds of having a complication in children younger than 3 years were 1.5 times greater than it is in children 3 years or older. When examining total complications, children younger than 3 years were more likely to experience a complication within the first 24 hours after surgery than children 3 years or older. The children admitted to the hospital had a greater risk of complication than those treated outpatient, independent of age. No association between weight and complications was found [23].

Another study showed that the most common complications of adenotonsillectomy, such as bleeding, generally occur in the immediate perioperative period but can develop up to 2 weeks postoperatively. This complication developed due to the general condition of the patients; some of the children are brought in very ill, hence they need

time to be cured before the operation is arranged. As a fact, bleeding can develop due to the infection the patient had, or sometimes the infection reoccurs and causes reactional hemorrhage. Long-term complications, such as nasopharyngeal stenosis, may appear months to years after surgery. These sequelae may result from scar contracture and maturation [24].

2. Methodology

2.1. Study Design

This study was a descriptive cross-sectional study

2.2. Study Duration

The study was from November 2023 to July 2024.

2.3. Study Population

The study involved all children undergone adenotonsillectomy at Bugando Medical Centre in Mwanza, Tanzania

2.4. Inclusion Criteria

The study included children who had undergone adenotonsillectomy at BMC from November to July 2024, whose consent had been obtained from their parents/guardian.

2.5. Exclusion Criteria

Children aged less than 2 years and above 12 years were excluded.

2.6. Data Collection

Data for this study were obtained through a review of medical records, including information about the surgical procedure, postoperative care, and early complications, together with registration books from the ward. The information was entered in a well-structured questionnaire.

2.7. Data Analysis

Data were analyzed using Strata version 15. A simple Pearson chi-square test will be used to find the association among the participants; if $p < 0.05$, there is a statistically significant association.

2.8. Ethical Considerations

Ethical clearance to perform this study was requested from the CUHAS ethical committee. All participants were recruited only after obtaining an informed consent. The participants were assured that all information obtained would never be disclosed under any circumstance. Each participant was assured that they had a right not to participate in the study as long as they do not consent.

2.9. Study Limitations

This study was more likely prone to selection bias if the sample was not representative of all children who underwent adenotonsillectomy at Bugando Medical Centre. For example, if certain cases were systematically excluded, the prevalence rates may have not accurately reflected the entire population. Findings from a single medical center may had not be generalizable to a broader population, as patient demographics, healthcare practices, and other factors may had differed in other regions or healthcare settings.

3. Results

3.1. Social-Demographic Characteristics of the Study Participants

The total number of patients involved in the study was 206. Majority of the study population were male by 1.3%. The leading age group mostly been affected was from 3years to 8years by 67.5.%. Most of the study participants came from Mwanza urban by 67.5%. The prevalence of the study is 7.77.

Table 1. The demographical distribution of the study participants.

Age (Years)	Frequency	Percentage (%)
3-8	139	67.5
9-11	58	28.1
12	9	4.4
Male	116	56.3
Female	90	43.7
Primary education	204	99
Secondary education	2	1
Mwanza	139	67.5
Outside Mwanza	67	32.5

In Table 1, the leading age group involved is 3 years to 8 years, accounting for 67.5%. Males are involved more by 1.3%, and most of the study participants are coming from Mwanza.

Table 2. The distribution of patients according to age and gender.

Age (Years)	Female	Male	Total
3-8	64(46.04)	75(53.96)	139(100)
9-11	23(39.66)	35(60.34)	58(100)
12	3(33.3)	6(66.67)	9(100)
Total	90(43.69)	116(56.31)	206(100)

In this Table 2 it shows slightly variation in distribution although in 12years old male were more with involvement about 66.67%. This does not justify that age and gender has its significant towards postoperative complication as p value is 0.582.

Table 3. Relationship to child distribution of the study participants.

Relationship to child	Frequency	Percentage (%)
Parent	187	90.8
Guardian	19	9.2
Total	206	100

In the Table 3 most of the study participant were brought to the hospital and been cared by parent which was 90.8%.

Table 4. The distribution of pre-existing medical conditions.

Pre-existing medical condition	Frequency	Percentage (%)
No disease	193	93.69
Allergic rhinitis	4	1.94
Asthma	5	2.43
Sickle cell disease	4	1.94
Total	206	100

In Table 4 shows majority of the patients had no any underline medical condition which were 93.69%. Asthma was leading by 2.43% followed by allergic rhinitis and sickle cell disease by 1.94%.

Table 5. The distribution of early postoperative complications according to pre-existing medical conditions.

Complications	Pre-existing medical conditions				
	No	Yes; Al	Yes; As	Yes; Si	Total
None	179(94.2)	3(1.58)	4(2.11)	4(2.11)	190(100)
Bronchitis	3(100)	0(0)	0(0)	0(0)	3(100)
P. Hemorrhage	10(100)	0(0)	0(0)	0(0)	10(100)
Pneumonia	1(3.33)	1(3.33)	1(3.33)	0(0)	3(100)
Total	193(93.69)	4(1.94)	5(2.43)	4(1.94)	206(100)

This Table 5 shows there is significant distribution between the early postoperative complications and pre-existing medical conditions by 0.002.

The prevalence of early postoperative complications following adenotonsillectomy among children attending at Bugando Medical Centre in Mwanza Tanzania

The prevalence of early postoperative complications was 7.77%.

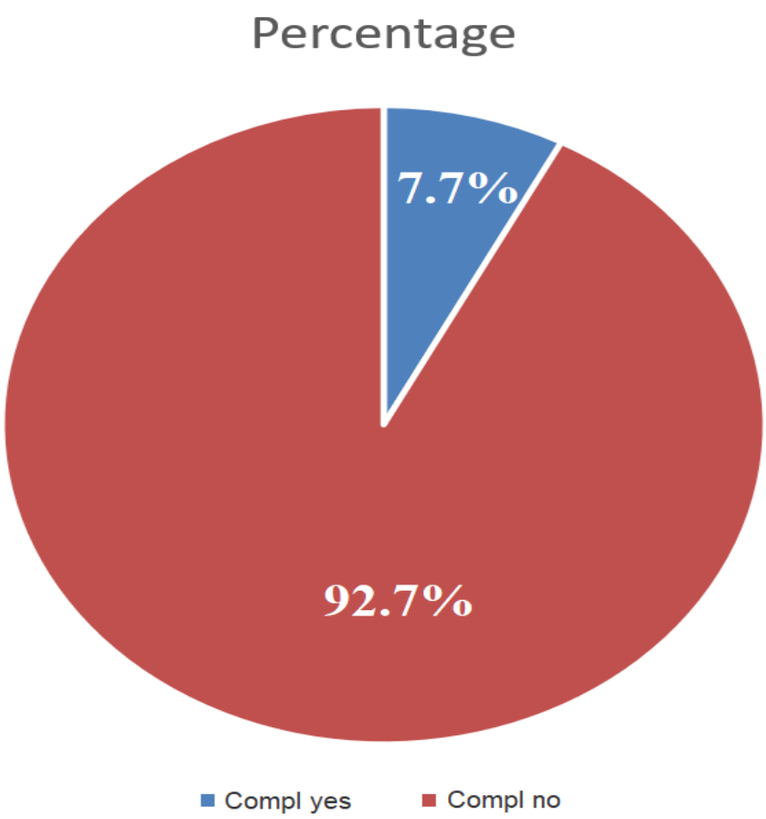

Figure 1. Shows the early post operative complications of all study participants were 7.7%.

Figure 1 Illustrates majority of the patient didn`t get complications by 92.7% and few about 7.7% got early post operative complications.

Table 6. The distribution of the early post operative complications.

Post operative complications	Frequency	Percentage (%)
No complication	190	92.23
Infection	6	2.9
Primary hemorrhage	10	4.85
Total	206	100

This Table 6 shows primary hemorrhage leading by 4.85% among the early complications.

Table 7. The distribution of gender according to early post- operative complications.

Gender	Early post -operative complications				
	Bronchitis	P. Hemorrhage	Pneumonia	No complaint	Total
Female	1(1.11)	3(3.33)	1(1.11)	85(94.44)	90(100.00)
Male	2(1.72)	7(6.03)	2(1.72)	105(90.52)	116(100.00)
Total	3(1.46)	10(4.85)	3(1.46)	190(92.23)	206(100.00)

In Table 7 shows that there is no significant in the distribution of gender and early post -operative complications with the p value of 0.785.

4. Discussion

In a nutshell, this study has shown that the prevalence of early postoperative complications following adenotonsillectomy among children attending Bugando Medical Centre in Mwanza, Tanzania, was 7.77%, with primary hemorrhage leading at 4.85%. In contrast, a study conducted by Ye, et al. [11] reported that 11.2% of children post-adenotonsillectomy suffer from significant postoperative complications, especially respiratory complications necessitating medical intervention, which was a study conducted in China. The difference may be attributed to the surgeon's technique or the postoperative surgical care provided to the patients.

In a study by Johnson, et al. [24], it was revealed that the prevalence of postoperative complications following adenotonsillectomy was 19.6% in Nairobi, Kenya, whereas bleeding was the most common complication [8]. This shows that our study has a lower prevalence compared to these studies, which may be due to the surgeons' technique. In another study by Muninnob Pamasa et al., the prevalence of complications included anesthetic complications at 1.6%, primary bleeding at 4.1%, secondary bleeding at 3.9%, dysphagia at 29.0%, dehydration at 4.6%, and wound pain at 48.1%, with an average length of hospital stay of 3.6 days and re-admission at 3.7% [25]. This study has findings that are almost similar regarding the complication of primary bleeding, but other factors were not measured in this study. Additionally, the postoperative hospital stay for our patients was 24 hours.

Association between Patient demographic characteristic such as age and gender showed no significance in relationship with the development of the complications. In a study by Edmonson et al. it revealed that neither age younger than 3 years nor sleep-disordered breathing was significantly associated with mortality, but children with complex chronic conditions had significantly higher mortality than children without these conditions [22].

The pre-existing medical condition has shown marked significance in the development of early complications. This finding is similar to Edmonson et al. Children with complex chronic conditions accounted for 2.8% of tonsillectomies but 44% of postoperative deaths. Most deaths associated with complex chronic conditions occurred in children with neurologic/neuromuscular or congenital/genetic disorders Goyal, et al. [22]. Gallagher, et al. [15]. A study by Gehrke et al. conducted in Germany revealed that young age, low body weight, obstructive sleep apnea, pre-existing craniofacial or syndromal disorders, and adenotonsillectomy, compared with adenoidectomy alone, were identified as risk factors for complications during or after surgery [17].

5. Conclusion

With a prevalence of 7.77%, this study provides valuable insights into the challenges faced in pediatric surgical care in Mwanza, Tanzania. The research highlights that while adenotonsillectomy is a frequently performed procedure, early complications such as primary hemorrhage and infection are prevalent and warrant attention. Educating healthcare providers on recognizing and managing potential complications early can significantly improve patient outcomes. Furthermore, increasing awareness among parents about the importance of postoperative follow-up can help in the timely identification of complications. Future research should focus on longitudinal studies to examine the long-term outcomes of adenotonsillectomy and assess the effectiveness of interventions designed to minimize early complications. By prioritizing these areas, healthcare systems can enhance the safety and efficacy of adenotonsillectomy procedures, ultimately improving the quality of care for children in Tanzania and similar regions.

6. Recommendation

Based on the findings of this study on early postoperative complications, several recommendations can be made to improve patient outcomes and reduce complication rates. It is crucial to enhance preoperative assessments. Implementing standardized protocols that evaluate the medical history and specific risk factors of children scheduled for adenotonsillectomy can help identify those at higher risk for complications. This process should include thorough examinations for any underlying health issues, such as respiratory infections or allergies, which may affect surgical outcomes. Workshops and seminars focusing on the latest surgical techniques, as well as the management of potential complications, can equip healthcare providers with the skills necessary to minimize risks. Encouraging mentorship programs where experienced surgeons guide junior staff can also foster a culture of learning and excellence in surgical practice. Improving postoperative care is vital. Establishing clear protocols for monitoring patients after surgery can facilitate early detection of complications. Regular follow-up appointments should be emphasized to ensure that any issues are addressed promptly. Additionally, educating parents/guardians about signs of complications and the importance of postoperative care can empower them to seek help when necessary.

Furthermore, fostering a collaborative approach among healthcare professionals, including anesthetists, nurses, and pediatricians, can create a more integrated care model.

References

[1] H. Nono, *Determinants of early complications of adenotonsillectomy*. University of Nairobi, 2007.

[2] M. Friedman, M. Wilson, H.-C. Lin, and H.-W. Chang, "Updated systematic review of tonsillectomy and adenoidectomy for treatment of pediatric obstructive sleep apnea/hypopnea syndrome," *Otolaryngology—Head and Neck Surgery*, vol. 140, no. 6, pp. 800-808, 2009. https://doi.org/10.1016/j.otohns.2009.01.043

[3] P. E. Peppard, T. Young, J. H. Barnet, M. Palta, E. W. Hagen, and K. M. Hla, "Increased prevalence of sleep-disordered breathing in adults," *American Journal of Epidemiology*, vol. 177, no. 9, pp. 1006-1014, 2013. https://doi.org/10.1093/aje/kws342

[4] R. Heinzer *et al.*, "Prevalence of sleep-disordered breathing in the general population: The HypnoLaus study," *The Lancet Respiratory Medicine*, vol. 3, no. 4, pp. 310-318, 2015. https://doi.org/10.1016/S2213-2600(15)00043-0

[5] E. O. Bixler *et al.*, "Sleep disordered breathing in children in a general population sample: Prevalence and risk factors," *Sleep*, vol. 32, no. 6, pp. 731-736, 2009. https://doi.org/10.1093/sleep/32.6.731

[6] C. L. Marcus, "Sleep-disordered breathing in children," *American Journal of Respiratory and Critical care Medicine*, vol. 164, no. 1, pp. 16-30, 2001. https://doi.org/10.1164/ajrccm.164.1.2008171

[7] C. L. Marcus *et al.*, "Diagnosis and management of childhood obstructive sleep apnea syndrome," *Pediatrics*, vol. 130, no. 3, pp. e714-e755, 2012. https://doi.org/10.1542/peds.2012-1671

[8] G. Wijayasingam, P. Deutsch, and M. Jindal, "Day case adenotonsillectomy for paediatric obstructive sleep apnoea: A review of the evidence," *European Archives of Oto-Rhino-Laryngology*, vol. 275, no. 9, pp. 2203-2208, 2018. https://doi.org/10.1007/s00405-018-5101-0

[9] G. De Luca Canto *et al.*, "Adenotonsillectomy complications: A meta-analysis," *Pediatrics*, vol. 136, no. 4, pp. 702-718, 2015. https://doi.org/10.1542/peds.2015-1283

[10] D. J. Spencer and J. E. Jones, "Complications of adenotonsillectomy in patients younger than 3 years," *Archives of Otolaryngology–Head & Neck Surgery*, vol. 138, no. 4, pp. 335-339, 2012. https://doi.org/10.3410/f.715347808.793462435

[11] J. Ye, H. Liu, G. Zhang, Z. Huang, P. Huang, and Y. Li, "Postoperative respiratory complications of adenotonsillectomy for obstructive sleep apnea syndrome in older children: prevalence, risk factors, and impact on clinical outcome," *Journal of Otolaryngology-Head & Neck Surgery= Le Journal d'oto-rhino-Laryngologie et de Chirurgie Cervico-Faciale*, vol. 38, no. 1, pp. 49-58, 2009.

[12] M. T. Brigger and S. E. Brietzke, "Outpatient tonsillectomy in children: A systematic review," *Otolaryngology—Head and Neck Surgery*, vol. 135, no. 1, pp. 1-7, 2006. https://doi.org/10.1016/j.otohns.2006.02.036

[13] M. Amoils, K. W. Chang, O. Saynina, P. H. Wise, and A. Honkanen, "Postoperative complications in pediatric tonsillectomy and adenoidectomy in ambulatory vs inpatient settings," *JAMA Otolaryngology–Head & Neck Surgery*, vol. 142, no. 4, pp. 344-350, 2016. https://doi.org/10.1001/jamaoto.2015.3634

[14] F. Keserű *et al.*, "The risk of postoperative respiratory complications following adenotonsillar surgery in children with or without obstructive sleep apnea: A systematic review and meta-analysis," *Pediatric Pulmonology*, vol. 57, no. 12, pp. 2889-2902, 2022.

[15] T. Q. Gallagher, L. Wilcox, E. McGuire, and C. S. Derkay, "Analyzing factors associated with major complications after adenotonsillectomy in 4776 patients: comparing three tonsillectomy techniques," *Otolaryngology—Head and Neck Surgery*, vol. 142, no. 6, pp. 886-892, 2010. https://doi.org/10.1016/j.otohns.2010.02.019

[16] V. Allareddy *et al.*, "Predictors of complications of tonsillectomy with or without adenoidectomy in hospitalized children and adolescents in the United States, 2001-2010: A population-based study," *Clinical Pediatrics*, vol. 55, no. 7, pp. 593-602, 2016. https://doi.org/10.1177/0009922815616885

[17] T. Gehrke, A. Scherzad, R. Hagen, and S. Hackenberg, "Risk factors for children requiring adenotonsillectomy and their impact on postoperative complications: A retrospective analysis of 2000 patients," *Anaesthesia*, vol. 74, no. 12, pp. 1572-1579, 2019. https://doi.org/10.1111/anae.14844

[18] K. W. Rosbe, D. Jones, S. Jalisi, and M. A. Bray, "Efficacy of postoperative follow-up telephone calls for patients who underwent adenotonsillectomy," *Archives of Otolaryngology–Head & Neck Surgery*, vol. 126, no. 6, pp. 718-722, 2000. https://doi.org/10.1001/archotol.126.6.718

[19] M. Theilhaber, S. Arachchi, D. S. Armstrong, M. J. Davey, and G. M. Nixon, "Routine post-operative intensive care is not necessary for children with obstructive sleep apnea at high risk after adenotonsillectomy," *International Journal of Pediatric Otorhinolaryngology*, vol. 78, no. 5, pp. 744-747, 2014. https://doi.org/10.1016/j.ijporl.2014.01.032

[20] K. A. Brown, I. Morin, C. Hickey, J. J. Manoukian, G. M. Nixon, and R. T. Brouillette, "Urgent adenotonsillectomy: An analysis of risk factors associated with postoperative respiratory morbidity," *Anesthesiology*, vol. 99, no. 3, pp. 586-595, 2003. https://doi.org/10.1097/00000542-200309000-00013

[21] M. B. Edmonson *et al.*, "Association of patient characteristics with postoperative mortality in children undergoing tonsillectomy in 5 US states," *Jama*, vol. 327, no. 23, pp. 2317-2325, 2022. https://doi.org/10.1001/jama.2022.7410

[22] S. S. Goyal, R. Shah, D. W. Roberson, and M. L. Schwartz, "Variation in post-adenotonsillectomy admission practices in 24 pediatric hospitals," *The Laryngoscope*, vol. 123, no. 10, pp. 2560-2566, 2013. https://doi.org/10.1002/lary.24172

[23] C. M. Lawlor, C. A. Riley, J. M. Carter, and K. H. Rodriguez, "Association between age and weight as risk factors for complication after tonsillectomy in healthy children," *JAMA Otolaryngology–Head & Neck Surgery*, vol. 144, no. 5, pp. 399-405, 2018. https://doi.org/10.1001/jamaoto.2017.3431

[24] L. B. Johnson, R. G. Elluru, and C. M. Myer III, "Complications of adenotonsillectomy," *The Laryngoscope*, vol. 112, no. S100, pp. 35-36, 2002. https://doi.org/10.1002/lary.5541121413

[25] T. Muninnobpamasa, K. Khamproh, and G. Moungthong, "Prevalence of tonsillectomy and adenoidectomy complication at Phramongkutklao hospital," *The Journal of the Medical Association of Thailand*, vol. 95, no. 5, pp. 69-74, 2012.