

## Blood Loss during the Surgical Procedure in Tonsillectomy in Iraqi Children and Logistic Regression Evaluation of Risk Factors

Dr. Farah Salih Muhdy Al-Ammery<sup>1</sup>, Dr. Samih Faiq Fadhi<sup>2</sup>, Dr. Ali Hatim Arabi<sup>3</sup>, Dr. Ali Qais Abdulkafi<sup>4</sup> and Dr. Tareq Jawad kadem Al-Rubayee<sup>5</sup>

<sup>1</sup>M.B.Ch.B., F.I.C.M.S. \ (Otolaryngology), Iraqi Ministry of Health, Al-Najaf Health Directorate, Al-Najaf Teaching Hospital, Al-Najaf, Iraq.

<sup>2</sup>M.B.Ch.B., D.L.O. \ (Otolaryngology), Iraqi Ministry of Health, Diala Health Department, Baquba Teaching Hospital, Diala, Iraq.

<sup>3</sup>M.B.Ch.B., F.I.C.M.S. \ (Otolaryngology), Iraqi Ministry of Health, Al-Najaf Health Directorate, Department of Otolaryngology and Head and Neck Surgery in Al-Sader Medical City, Al-Najaf, Iraq.

<sup>4</sup>M.B.Ch.B., D.C.H. (Pediatrics), Iraqi Ministry of Health, Kirkuk Health Department, Kirkuk Teaching Hospital, Kirkuk, Iraq.

<sup>5</sup>M.B.Ch.B., M.R.C.S., Ireland, Diploma General Surgery, Ministry of Higher Education and Scientific Research, AL-Rasheed University College, Department of Pharmacy, Baghdad, Iraq

**Abstract: Background:** Tonsillectomy is one of the most common surgical procedures performed in children. The surgery of the tonsils has undergone a certain change in recent years, especially in childhood. **Objective:** This study aimed to analyze and assess clinical outcomes related to blood loss throughout the surgical procedure of tonsillectomy for Iraqi children, as well as determine findings related to a logistic regression evaluation of risk factors. **Patients and methods:** This study recruited 96 children who underwent various surgical procedures related to tonsillectomy. All data were collected from different hospitals in Iraq for a period between April 4, 2022, and August 19, 2023. These clinical data included the duration of the surgical procedure for tonsillectomy, the recovery rate, bleeding rates in patients, the mortality rate, the duration of follow-up of patients, the mortality rate during and after the operation, the rate of specific complications, and pain rates. Furthermore, this study evaluated the logistic regression of risk factors affecting pediatric patients after long-term tonsillectomy. **Results:** This study recorded the surgical and clinical outcomes of patients, which included a higher percentage of females (60.42%) compared to males. The most common reasons for admission for surgery were acute or chronic tonsillitis (52 patients) and tonsillitis (29 patients). Types of surgical procedures included cold methods in 67 children and hot methods in 29 children. Some of the patients were exposed to primary bleeding, including two cases, and three cases were exposed to secondary bleeding; the complication rate was 9 cases. The follow-up period was nine days. The quality-of-life rates showed the most significant improvement in children, including physical function (81.21) ± 9.5 and daily activity (86.78 ± 7.72). **Conclusion:** This study indicated the effect of tonsillectomy as the most effective and high-quality surgical procedure in improving and developing the recovery rate in children after surgery.

**Keywords:** Pediatrics; tonsillectomy; postoperative complications; and quality of life.

### INTRODUCTION

Tonsillectomy is an operation that is usually performed in patients with chronic or recurrent infections of the tonsils (tonsillitis) or other tissues of the back of the throat (pharyngitis). Sometimes, adenoid tissues are also removed during surgery. However, opinions vary considerably on whether the benefits outweigh the risks in these operations. (Sumilo, D. *et al.*, 2019 – The National Institute for Health and Care Excellence, 2020)

These reflect an incidence ranging from 2% to 16.7% in patients aged between 6 months of life and adolescence (Herbert, A. *et al.*, 2017 - Core Team R, 2020), with a peak between 2–8 years of life (Hoey, A. W. *et al.*, 2017). Its etiology in the pediatric population is clearly related to the presence of tonsillar and adenoid hypertrophy with an increase in Waldeyer's ring due to lymphatic tissue growth. (Albright, J. T. *et al.*, 2020 – Sathe, N. *et al.*, 2017)

During the REM phase of sleep, a collapse of the soft tissues into the oral cavity occurs, causing a decrease in the caliber of the upper airway and a consequent decrease in inspired flow since the airway opening pressure in children with sleep apnea-hypopnea syndrome (OSAHS) is lower (5 cmH<sub>2</sub>O) compared to (10 cmH<sub>2</sub>O) in the control population (Walton, J. *et al.*, 2012; Zhang, L. Y. *et al.*, 2019). This, in turn, can be worsened by some associated comorbidities such as obesity, facial skull malformations, neuromuscular disorders, and perhaps the main cause, adenoid and amygdalin hypertrophy (Core Team R, 2020; Albright, J. T. *et al.*, 2020). In addition to lymphoid proliferation at the tonsillar and adenoid levels, there is an obstruction in varying degrees of the airway, resulting in increased respiratory effort, hypercapnia, and increased oxidative stress due to increased expression of NADPH oxidase, with an increase in IL1, IL6, and TNF- $\alpha$  in relation to episodes of micro awakenings (Aylin, P. *et al.*,

2004; Hoey, A. W. *et al.*, 2017; Mitchell, R. B. *et al.*, 2019). Therefore, there are autonomic dysfunctions with increased heart rate, increases in blood pressure, a higher incidence of hypercoagulable states due to an increase in the expression of adhesion molecules induced by monocytes, the presence of acute phase reactants, changes at the ventricular level, and long-term hemodynamic repercussions (Azevedo, C. *et al.*, 2014).

It is currently considered that there is a relationship between patients who present with OSA and attention deficit hyperactivity disorder. The mechanism by which this condition occurs is unknown, but with an approximate incidence of 23% (Cai, Y. *et al.*, 2017; Albright, J. T. *et al.*, 2020). There are also data in various meta-analyses that reveal a learning debt related to episodes of respiratory events related to sleep; likewise, it is associated with behavioral disorders such as depression, irritability, and apathy (Cai, Y. *et al.*, 2017; Sathe, N. *et al.*, 2017; Walton, J. *et al.*, 2012). One of the most important manifestations at the systemic level is that of cardiovascular compromise, which is of late presentation, and its most complex manifestation is pulmonary hypertension, as a result of uncontrolled right heart failure, a consequence of sensitivity in the pulmonary vasculature to intermittent hypoxia (Baugh, R. F. *et al.*, 2011). Another delayed hemodynamic repercussion is biventricular cardiac remodeling, conditioned by the increased production of brain natriuretic peptide (BNP) at night and is modifiable in adults with the use of positive airway pressure (CPAP), and in children, it is resolved with tonsillectomy. All these manifestations are given by a series of changes at the endothelial level, modulated by an increase in the production of endothelins and a decrease in the production of nitric oxide, with an increase in sympathetic activity by endothelial exposure and an increase in the production of adhesion molecules. Among these changes, the increase in C-reactive protein (CRP) becomes notorious, with active participation in decreasing the production of nitric oxide, increasing the production of inflammatory cytokines (IL-6), and favoring the formation of atheromatous lesions (Berghmans, J. M. *et al.*, 2018 -Odhagen, E. *et al.*, 2020).

This has been associated with interrupted sleep and hypoxia, both of which cause a decrease in insulin at the tissue level. An increase in the lipid component has also been seen observed in patients with sleep-related disorders. We can also relate it to growth failure, probably associated with a decrease in the release of growth hormone (Sathe, N. *et al.*, 2017).

## PATIENTS AND METHODS

This study evaluated the surgical outcomes of pediatric patients who suffer from tonsil problems, whether inflammation or enlargement of the tonsils and included 96 samples whose ages ranged between 3 and 14. Clinical data for pediatric patients was collected from different hospitals in Iraq for a period extending from April 4, 2022, to August 19, 2023. Also, this study determined clinical and demographic data for pediatric patients who underwent tonsillectomy surgery, which included age, gender, base of classification, indicators or symptoms, comorbidities in children, education level, and income of the children's parents.

Regarding clinical outcomes during and after the operation, this study recorded clinical and surgical data for pediatric patients, which included the duration of the surgical procedure for tonsillectomy, the type of surgical procedure for both (cold methods and hot methods), the rates of measurements, which included both (diastolic and systolic blood pressure and heart rate), and the recovery rate. Bleeding rates for patients, mortality rates, admission rates for patients in the intensive care unit, duration of follow-up for patients, and mortality rates during and after the operation.

This study also recorded the rate of specific complications, pain rates (using the VAS program version 22.0 to determine the degree of pain, where 0 represents no pain and 1 represents the highest and most severe percentage of pain in children), and quality of life, which was determined within the four criteria, which include each of (physical function, psychological function, and function). Social, emotional, and daily activities factor) during the follow-up period, which ranged within nine days. This study organized and analysed clinical data for tonsillectomy surgery in pediatric patients.

## RESULTS

**Table 1:** Demographic and perioperative characteristics outcomes associated with children's patients

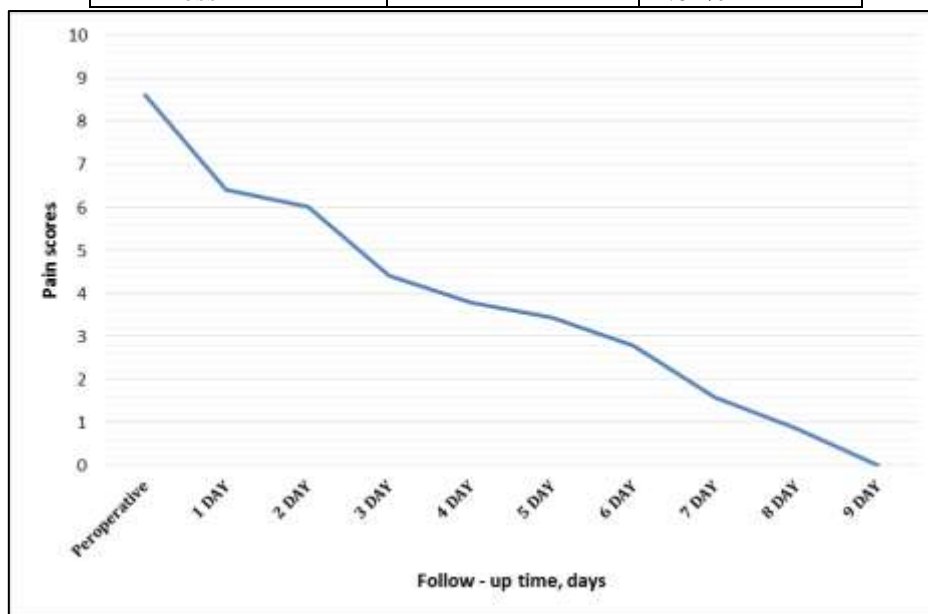
<b>Characteristics</b>	<b>Frequency (n=96)</b>	<b>Percentage (%)</b>
<b>Age [years]</b>		
3 – 6	14	14.58%
7 – 10	34	35.42%
11 - 14	48	50.0%
<b>Sex [M/F]</b>		
Male	38	39.58%
Female	58	60.42%
<b>ASA (%)</b>		
I	11	11.46%
II	15	15.63%
III	30	31.25%
IV	40	41.67%
<b>Indications</b>		
Sore throat	8	8.33%
Difficulty swallowing	7	7.29%
Fever	14	14.58%
Swollen glands	5	5.21%
Bad breath	23	23.96%
Chronic cough	20	20.83%
Mouth breathing	19	19.79%
<b>Comorbidities</b>		
Diabetes	4	4.17%
Asthma	15	15.63%
Allergies	30	31.25%
Obesity	38	39.58%
Anxiety disorders	9	9.38%
<b>Reason for admission</b>		
Acute/chronic tonsillitis	52	54.17%
Hypertrophy of tonsils	29	30.21%
Sleep Apnoea	10	10.42%
Other	5	5.21%
<b>Education status of parents</b>		
Primary	4	4.17%
Secondary	16	16.67%
College/university	76	79.17%
<b>Income status, \$</b>		
< 900	58	60.42%
901 – 1000	9	9.38%
> 1000	29	30.21%

**Table 2:** Intraoperative data outcomes associated with a surgical procedure in tonsillectomy

Variables	Frequency (n=96)	Percentage (%)
<b>Surgical technique, n (%)</b>		
Hot	29	30.21%
Cold	67	69.79%
<b>Surgery time, min (mean ± SD)</b>	43.86 ± 4.87	
<b>Vital signs tests</b>		
Systolic blood pressure, mmHg	91.87 ± 9.26	
Diastolic blood pressure, mmHg	51.89 ± 8.53	
Heart rate beats per minute	85.24 ± 6.91	
<b>Recovery rate, days (mean ± SD)</b>	11.30 ± 2.7	
<b>Primary bleeding</b>		
Surgical arrest of postoperative bleeding from the tonsillar bed	1	1.04%
Surgical arrest of postoperative bleeding of adenoid	1	1.04%
Death cases	0	0%
<b>Secondary bleeding</b>		
Surgical arrest of postoperative bleeding from the tonsillar bed	2	2.08%
Surgical arrest of postoperative bleeding of adenoid	1	1.04%
Death cases	1	1.04%
<b>Length of stay, days</b>	(1 – 2) days	
<b>Follow-up period</b>	Nine days	
<b>ICU admission</b>		
Yes	3 (3.13%)	
No	93 (96.88%)	

**Table 3:** Postoperative complications

Post - complications	Frequency (n=96)	Percentage (%)
Infection	4	4.17%
Nausea and vomiting	2	2.08%
Postoperative bleeding	0	0%
Fever	2	2.08%
Sweating	0	0%
Headache	0	0%
Dizziness	1	1.04%

**Figure 1:** Assessment of pain scores of children patients who underwent to tonsillectomy

**Table 4:** Determine the extent of satisfaction of pediatric patients and their parents with the quality of hospital health care during and after the surgical procedure for tonsillectomy

Level Satisfaction	Number of patients [96]	Percentage [%]
Excellent	76	79.17%
Good	12	12.5%
Fair	5	5.21%
Poor	3	3.13%

**Table 5:** Assessment of quality of life for pediatric patients who underwent to tonsillectomy

Items	QOL scores
Physical function	81.21 ± 9.5
Psychological function	76.42 ± 3.2
Social and emotional functions	79.74 ± 5.6
Daily activity	86.78 ± 7.72

**Table 6:** logistic regression evaluation of risk factors which affect children after tonsillectomy

Variables	OR	95 %
Sex [female]	2.85	0.35 – 5.6
Bad breath	4.67	1.96 – 7.78
Chronic cough	3.81	2.65 – 5.84
Surgical technique	4.11	2.75 – 6.72
Intra and post-operative bleeding	2.65	1.67 – 3.41
Infection	3.86	3.01 – 9.65
Nausea and vomiting	2.89	1.08 – 6.65
Infection	5.89	3.44 – 7.61
Postoperative pain	3.75	2.54 – 6.87
Indications	2.40	0.8 – 4.87

## DISCUSSION

Our clinical results showed that patients between the ages of 11 and 14 were the most common category, which amounted to 48 patients, as females had a higher rate of 60.42% compared to males. The most common symptoms are bad breath, which included 23 cases; chronic cough, which included 20 patients; and mouth breathing. It included 19 patients. The most common reasons for accepting surgery were acute/chronic tonsillitis (52 patients), enlarged tonsils (29 patients), sleep apnea (10 patients), and others (5 patients).

Regarding the results during and after tonsillectomy surgery, the types of surgical procedures included cold methods in 67 children and hot methods in 29 children. Some patients were exposed to primary bleeding, which included two cases, and three cases were exposed to secondary bleeding, and the duration of stay in the hospital ranged from one to two days. The follow-up period was nine days, and the average number of patients admitted to the intensive care unit included three cases. The complication rate was 9 cases, which is attributed to a decrease in pain of less than five starting from the sixth day down to

the ninth day, with a value of zero. The rate of satisfaction with the operation and care.

The clinical trial included 67 patients with excellent, 12 patients with good, five patients with anxiety, and three patients with poor. Quality of life scores for pediatric patients evaluated for long-term survival after tonsillectomy included physical function (81.21 ± 9.5), psychological function (76.42 ± 3.2), social and emotional functions (79.74 ± 5.6), and daily activity (86.78 ± 7.72).

Tonsillectomy is a frequently performed surgical intervention in pediatric patients, including the extraction of their tonsils (Sathe, N. *et al.*, 2017). A possible issue that may arise during the surgical procedure is hemorrhage since it might result in difficulties and extended periods in recuperation. Based to the study, the volume of blood loss following a tonsillectomy could show variation contingent on a range of circumstances. (Gudnadottir, G. *et al.*, 2017; Magdalena, M. L. *et al.*, 2016)

The incidence of bleeding was a feasible hazard after tonsillectomy surgery, especially for the first 24-hour period following the procedure. Monitoring for indications of bleeding disorders

and according to post-operative care guidelines supplied through the healthcare team are important for caregivers. Numerous studies have been conducted to investigate the influence of risk variables on the occurrence of blood loss after tonsillectomy in pediatric patients (Chimona, T. *et al.*, 2008). The degree of blood loss may be influenced by several factors, including the surgical method used, the level of expertise possessed through the surgeon, and the presence of any underlying medical disorders (Leinbach, R. F. *et al.*, 2003).

According to some studies, electrocautery procedures have shown a reduced incidence of blood loss in comparison to conventional cold steel treatments. Ongoing study is being conducted to investigate the long-term impacts in children after tonsillectomy, specifically focusing on the consequences of blood loss during the surgical procedure (Lowe, D. *et al.*, 2004). Complications, including postoperative hemorrhage, may arise as a result of excessive blood loss, necessitating further medical intervention (Stanko, D. *et al.*, 2013). Moreover, it has been shown that infants who have tonsillectomy and encounter substantial blood loss may encounter extended periods of recuperation and an elevated susceptibility to postoperative problems (Stewart, D. W. *et al.*, 2012). Tonsillectomy surgery may enhance the quality of life for children suffering from chronic tonsillitis as well as sleep-related problems. This is achieved by decreasing the occurrence of throat infections, enhancing sleep quality, and promoting general well-being. (Subramanyam, R. *et al.*, 2013)

## CONCLUSION

The current study showed that tonsillectomy is an optimal and safest surgical procedure for children. However, blood loss is one of the most important concerns which affects the rate of life expectancy during surgery. According to the surgical procedure, tonsillectomy has shown a high success rate in improving the quality of life of pediatric patients due to its high recovery rate, shorter duration of hospital stays, and very low rate of complications and pain, which is attributed to an improvement in the long-term recovery rate in children.

## REFERENCES

1. Sumilo, D., Nichols, L., Ryan, R. & Marshall, T. "Incidence of indications for tonsillectomy and frequency of evidence-based surgery: a 12-year retrospective cohort study of primary care electronic records." *British Journal of General Practice*, 69.678 (2019): e33-e41.
2. Lowe, D., van der Meulen, J. & Cromwell, D., *et al.* "Key messages from the National Perspective Tonsillectomy Audit." *The Laryngoscope*, 117.4 (2007): 717-724.
3. The National Institute for Health and Care Excellence. "Electrosurgery (diathermy and coblation for tonsillectomy." *Interventional procedure guidance [IPG490]*. 14th December (2005).  
<https://www.nice.org.uk/guidance/ipg150> [2020].
4. Herbert, A., Wijlaars, L., Zylbersztejn, A., Cromwell, D. & Hardelid, P. "Data resource profile: hospital episode statistics admitted patient care (HES APC)." *International Journal of Epidemiology*, 46.4 (2017): 1093-1093i.
5. Cai, Y., Lopata, L., Roh, A., Huang, M., Monteleone, M. A., Wang, S. & Sun, L. S. "Factors influencing postoperative pain following discharge in pediatric ambulatory surgery patients." *Journal of Clinical Anesthesia*, 39 (2017): 100-104.
6. Aylin, P., Tanna, S., Bottle, A. & Jarman, B. "Dr. Foster's case notes: how often are adverse events reported in English hospital statistics?" *BMJ*, 329.7462 (2004).
7. Core Team R. "R: A Language and Environment for Statistical Computing." *R Foundation for Statistical Computing, Vienna, Austria*. Available from <http://www.R-project.org/> [2020].
8. Hoey, A. W., Foden, N. M., Hadjisymeou Andreou, S., *et al.* "Coblation ((R)) intracapsular tonsillectomy (tonsillotomy) in children: a prospective study of 500 consecutive cases with long-term follow-up." *Clinical Otolaryngology*, 42.6 (2017): 1211-1217.
9. Albright, J. T., Duncan, N. O., Smerica, A. M. & Edmonds, J. L. "Intracapsular complete tonsillectomy, a modification of surgical technique to eliminate delayed post-operative bleeding." *International Journal of Pediatric Otorhinolaryngology* (2020).
10. Sathe, N., Chinnadurai, S., McPheeters, M. & Francis, D. O. "Comparative effectiveness of partial versus total tonsillectomy in children." *Otolaryngology Head and Neck Surgery*, 156.3 (2017): 456-463.
11. Walton, J., Ebner, Y., Stewart, M. G. & April, M. M. "Systematic review of randomized controlled trials comparing intracapsular

- tonsillectomy with total tonsillectomy in a pediatric population." *Arch Otolaryngol Head Neck Surg* 138. 3 (2012): 243-249.
12. Zhang, L. Y., Zhong, L., David, M. & Cervin, A. "Tonsillectomy or tonsillotomy? A systematic review for paediatric sleep-disordered breathing." *Int J Pediatr Otorhinolaryngol* 103 (2017): 41-50.
  13. Mitchell, R. B., Archer, S. M. & Ishman, S. L., et al. "Clinical practice guideline: tonsillectomy in children (update)-executive summary." *Otolaryngol Head Neck Surg* 160. 2 (2019): 187-205.
  14. Azevedo, C., Careni, L., Queiroz, D., Anselmo-Lima, W. & Valera, F. "Clinical utility of PPM and FPS-R to quantify post-tonsillectomy pain in children." *Int J Pediatr Otorhinolaryngol* 78 (2014): 296-9.
  15. Baugh, R. F., Archer, S. M., Mitchell, R. B., Rosenfeld, R. M., Amin, R., Burns, J. J., Darrow, D. H., Giordano, T., Litman, R. S., Li, K. K., Mannix, M. E., Schwartz, R. H., Setzen, G., Wald, E. R., Sandberg, G., Patel, M. M., American Academy of O-H. & Neck Surgery F. "Clinical practice guideline: tonsillectomy in children." *Otolaryngol Head Neck Surg* 144. 1(2011): S1-30.
  16. Berghmans, J. M., Poley, M. J., van der Ende, J., Veyckemans, F., Poels, S., Weber, F., Schmelzer, B., Himpe, D., Verhulst, F. C. & Utens, E. "Association between children's emotional/behavioral problems before adenotonsillectomy and postoperative pain scores at home." *Paediatric Anaesth* 28 (2018): 803-12.
  17. Boss, E. F., Marsteller, J. A. & Simon, A. E. "Outpatient tonsillectomy in children: demographic and geographic variation in the United States, 2006." *J Pediatr* 160 (2012): 814-19.
  18. Cai, Y., Lopata, L., Roh, A., Huang, M., Monteleone, M. A., Wang, S. & Sun, L. S. "Factors influencing postoperative pain following discharge in pediatric ambulatory surgery patients." *J Clin Anesth* 39 (2017): 100-4.
  19. Elinder, K., Soderman, A. C., Stalfors, J. & Knutsson, J. "Factors influencing morbidity after paediatric tonsillectomy: a study of 18,712 patients in the National Tonsil Surgery Register in Sweden." *Eur Arch Otorhinolaryngol* 273. 8 (2016): 2249-2256.
  20. Odhagen, E., Sunnergren, O., Hemlin, C., Hessen Söderman, A. C., Ericsson, E. & Stalfors, J. "Risk of reoperation after tonsillotomy versus tonsillectomy: a population-based cohort study." *European Archives of Oto-Rhino-Laryngology*, 273.10 (2016): 3263-3268.
  21. Sathe, N., Chinnadurai, S., McPheeters, M. & Francis, D. O. "Comparative effectiveness of partial versus total tonsillectomy in children." *Otolaryngology-Head and Neck Surgery*, 156.3 (2017): 456-463.
  22. Gudnadottir, G., Tennvall, G. R., Stalfors, J. & Hellgren, J. "Indirect costs related to caregivers' absence from work after paediatric tonsil surgery." *European Archives of Oto-Rhino-Laryngology*. (2017).
  23. Magdalena, M. L., Sole, A., Blanco, V. & Rodrigo, J. P. "Histological analysis of tonsillectomies: relationship with surgical technique, post-operative pain and haemorrhage." *The Journal of Laryngology & Otolaryngology*, 130.12 (2016): 1142-1146.
  24. Aydin, S., Taskin, U., Altas, B., Erdil, M., Senturk, T., Celebi, S. & Oktay, M. F. "Post-tonsillectomy morbidities: randomised, prospective controlled clinical trial of cold dissection versus thermal welding tonsillectomy." *The Journal of Laryngology & Otolaryngology*, 128.2(2014): 163-165.
  25. Chimona, T., Proimos, E., Mamoulakis, C., Tzanakakis, M., Skoulakis, C. E. & Papadakis, C. E. "Multiparametric comparison of cold knife tonsillectomy, radiofrequency excision and thermal welding tonsillectomy in children." *International Journal of Pediatric Otorhinolaryngology*, 72.9 (2008): 1431-1436.
  26. Leinbach, R. F., Markwell, S. J., Colliver, J. A. & Lin, S. Y. "Hot versus cold tonsillectomy: a systematic review of the literature." *Otolaryngology-Head and Neck Surgery*, 129.4 (2003): 360-364.
  27. Lowe, D. & van der Meulen, J. "Tonsillectomy technique as a risk factor for postoperative haemorrhage." *The Lancet*, 364.9435 (2004): 697-702.
  28. Stanko, D., Bergesio, R., Davies, K., Hegarty, M. & von Ungern-Sternberg, B. S. "Postoperative pain, nausea, and vomiting following adenotonsillectomy—a long-term follow-up." *Paediatric Anaesthesia*, 23 (2013): 690-696.
  29. Stewart, D. W., Ragg, P. G., Sheppard, S. & Chalkiadis, G. A. "The severity and duration of postoperative pain and analgesia requirements in children after tonsillectomy,

- orchidopexy, or inguinal hernia repair." *Paediatric Anaesthesia*, 22 (2012): 136–143.
30. Subramanyam, R., Varughese, A., Willging, J. P. & Sadhasivam, S. "Future of pediatric

tonsillectomy and perioperative outcomes." *International Journal of Pediatric Otorhinolaryngology*, 77 (2013): 194–199.

**Source of support:** Nil; **Conflict of interest:** Nil.

**Cite this article as:**

Al-Ammery, F.S.M., Fadhil, S.F., Arabi, A.H., Abdulkafi, A.Q and Al-Rubayee, T.J.k. "Blood Loss during the Surgical Procedure in Tonsillectomy in Iraqi Children and Logistic Regression Evaluation of Risk Factors." *Sarcouncil Journal of Medicine and Surgery* 3.4 (2024): pp 8-15.