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POSSIBLE RISK FACTORS AFFECTİNG POST-TONSİLLECTOMY BLEEDING

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ABSTRACT

Objective: This study aims to identify the risk factors for post-tonsillectomy hemorrhage (PTH). **Materials and Methods:** A retrospective analysis was conducted on 776 patients (624 children, 152 adults; 425 males, 351 females) who underwent tonsillectomy at the Düzce University Faculty of Medicine ENT Clinic between 2013 and 2018. Patients were evaluated based on age, gender, indication for surgery, tonsil size, presence of chronic diseases, and preoperative hemoglobin, platelet, and INR levels. Tonsillectomies were performed under general anesthesia using the cold dissection technique, with hemostasis achieved via bipolar cautery and suture ligation. PTH was managed with conservative or surgical methods. Statistical analysis was performed using Pearson Chi-square, Fisher-Freeman-Halton, and Fisher Exact tests ($p<0.05$ was considered significant). **Results:** The overall PTH incidence was 2.7% (0.14% in children, 7.8% in adults). Among 21 patients with PTH, 3 (14.2%) had primary hemorrhage, and 18 (85.8%) had secondary hemorrhage. In adults, the PTH rate was significantly higher in males (12%) compared to females (2.9%) ($p=0.037$). No significant association was found between PTH and indication for surgery, tonsil size, chronic diseases, or hematological parameters. Conservative treatment was applied in 52.3% of cases, while 47.7% required surgical intervention. The mean time to presentation was 5.5 days. **Conclusion and Recommmendations:** Adult age and male gender are risk factors for PTH. Early diagnosis, hospitalization, intravenous access, and laboratory tests are critical in PTH management. Careful patient selection and postoperative follow-up are essential.

KEYWORDS: Hemorrhage, risk factors, tonsillectomy.

1. INTRODUCTION

Tonsillectomy is one of the most frequently performed procedures by otolaryngologists.[1] It is typically indicated for patients with recurrent tonsillitis or obstructive symptoms.[2] Although relatively safe, post-tonsillectomy hemorrhage (PTH) is a potentially life-threatening complication.[3] PTH is classified as primary (occurring within 24 hours post-surgery, often related to surgical technique) or secondary (typically occurring within the first week, often due to damage to the granulation tissue covering the tonsil bed).[1] The reported incidence of primary hemorrhage ranges from 0.2% to 2.2%, and secondary hemorrhage from 0.1% to 3%. In a large cohort study, Gysin et al. reported primary and secondary hemorrhage rates of 1% and 2.5%, respectively.[4] Numerous studies have investigated the causes of PTH. This study aims to examine potential risk factors for PTH.

2. MATERIALS AND METHODS

This retrospective study included 776 patients (425 males, 351 females; aged 3–60 years) who underwent tonsillectomy at the Düzce University Faculty of Medicine ENT Clinic between January 2013 and December 2018. Of these, 624 (341 males, 282 females) were children (under 18 years), and 152 were adults.

All patients underwent a standardized physical examination, including otoscopy to assess the tympanic membrane and external auditory canal. Patients reporting hearing loss underwent tuning fork tests and, when necessary, audiometry and tympanometry. Anterior rhinoscopy was performed to evaluate nasal cavities, and oropharyngeal examination assessed the throat and tonsils. Patients with nasal obstruction due to concha hypertrophy or septal deviation identified during anterior rhinoscopy underwent endoscopic examination and were excluded from the study to ensure homogeneity and reliability of results.

Tonsillectomy indications included chronic or recurrent tonsillitis (at least 7 episodes in one year, 5 episodes per year for two years, or 3 episodes per year for three years), tonsillar hypertrophy causing sleep-disordered breathing (snoring and witnessed apnea), asymmetric tonsillar hypertrophy raising suspicion of malignancy, and halitosis.[5] Tonsillitis episodes required at least one of the following: body temperature >38°C, cervical lymphadenopathy, tonsillar exudate, or positive Group A beta-hemolytic streptococcus (GABHS) throat culture.[6] These criteria guided surgical decisions, considering the patient's clinical history and quality of life.

Potential risk factors for PTH, including gender, indication for surgery, tonsil size, presence of chronic diseases, and preoperative hemoglobin, platelet, and INR levels, were evaluated. Tonsillectomies were performed under general anesthesia using the cold dissection technique, with hemostasis achieved via bipolar cautery and suture ligation.

Postoperatively, all patients received oral amoxicillin-clavulanic acid to prevent infection and paracetamol for pain control. No PTH was observed in the immediate postoperative period, and all patients recovered without requiring inpatient follow-up, supporting the efficacy and safety of the treatment protocol.

For patients presenting with PTH, the initial approach was conservative, including cessation of oral intake, intravenous fluid support, and, when clots were present, careful clot removal under topical or local anesthesia followed by cold water gargles. For severe or persistent bleeding, interventions under general anesthesia included local pressure, adrenaline injection, bipolar electrocautery, and/or suture ligation, tailored to the patient's clinical condition. This multi-step approach ensured effective bleeding control and patient safety.

2.1. Ethical Considerations

This study was approved by the Düzce University Faculty of Medicine Institutional Ethics Committee (Approval No: 2019/115, Date: May 16, 2019) and conducted in accordance with the Helsinki Declaration.

2.2. Statistical Analysis

Descriptive statistics (mean, standard deviation, median, interquartile range, minimum, maximum, percentages) were calculated for all variables. Pearson Chi-square, Fisher-Freeman-Halton, and Fisher Exact tests were used to assess relationships between categorical variables, with $p<0.05$ considered significant.

3. RESULTS

Between 2013 and 2018, 776 tonsillectomy and adenotonsillectomy procedures were performed at our clinic. Of these, 425 (54.7%) patients were female, 351 (45.3%) were male, with a mean age of 11.7±12 years. The cohort included 624 (80.4%) children and 152 (19.6%) adults. The overall PTH incidence was 2.7%, with 0.14% in children and 7.8% in adults. No significant difference was found between children and adults.

Among 21 patients with PTH, the mean age was 21.47±5.2 years (range: 8–29), with 9 (42.8%) children and 12 (57.2%) adults. Of these, 3 (14.2%) had primary hemorrhage, and 18 (85.8%) had secondary hemorrhage. No patients required blood transfusion, and coagulation tests were normal.

In adults, a significant gender difference was observed ($p=0.037$), with a higher PTH rate in males (12%) compared to females (2.9%) (Table 2). No significant associations were found between PTH and other variables, including indication for surgery, chronic diseases (asthma, atrial septal defect, arrhythmia, hypothyroidism, hyperactivity, psoriasis, diabetes mellitus, hypertension), or tonsil size (grades 1–4) in either children or adults ($p>0.05$ for all) (Tables 1 and 2).

Preoperative hemoglobin, platelet, and INR levels showed no significant association with primary or secondary PTH in either group (Tables 3 and 4).

Tonsillectomies were performed using the cold dissection technique to minimize tissue damage and postoperative complications. The mean time to presentation for PTH was 5.5 days (range: 1–10 days). Conservative treatment was applied in 52.3% of cases (11 patients), involving cessation of oral intake, intravenous fluids, clot removal under local anesthesia, and cold water gargles. Surgical intervention under general anesthesia, using bipolar electrocautery and/or absorbable sutures, was required in 47.7% of cases (10 patients). No patients required further surgical intervention, and no recurrent bleeding was observed, indicating the success of the treatment protocols.

Table 1: Clinical and Demographic Characteristics of Pediatric Patients.								
		Gender						p
		M		F		Total		
		n	%	n	%	n	%	
Reason for Surgery	OSAS	92	26,9	73	25,9	165	26,4	0,932
			10,5	26	9,2	62	9,9	
	Recurrent Tonsillitis	36	0,0	0	0,0	0	0,0	
	Halitosis	0	0,3	1	0,4	2	0,3	
	Asymmetric Tonsillar Hypertrophy	1	0,3	0	0,0	1	0,2	
	History of Peritonsillar Abscess	1	62,0	182	64,5	394	63,1	
	Recurrent Tonsillitis + OSAS	212	100,0	282	100,0	624	100,0	
Presence of Chronic Disease	TOTAL	342	95,6	275	97,5	602	96,5	0,199
			4,4	7	2,5	22	3,5	
	No	327	100,0	282	100,0	624	100,0	
			16,7	0	0,0	1	11,1	-
	Yes	15	83,3	3	100,0	8	88,9	
	Total	342	100,0	3	100,0	9	100,0	
PTH Group								Primer

Table 2: Clinical and Demographic Characteristics of Adult Patients.								
		Gender						p
		M		F		Total		
		n	%	n	%	n	%	
reason for surgery	osas	10	12,0	6	8,7	16	10,5	0,895
	r.tonsillitis	48	57,8	42	60,9	90	59,2	
	halitosis	2	2,4	2	2,9	4	2,6	
	asymmetric tonsillar hypertrophy	4	4,8	4	5,8	8	5,3	
	history of peritonsillar abscess	7	8,4	3	4,3	10	6,6	
	r.tonsillitis+osas	12	14,5	12	17,4	24	15,8	
	Total	83	100,0	69	100,0	152	100,0	
presence of chronic disease	No	82	98,8	66	95,7	148	97,4	0,330
	Yes	1	1,2	3	4,3	4	2,6	
	Total	83	100,0	69	100,0	152	100,0	
PTH_g	No	73	88,0	67	97,1	140	92,1	0,037
	Yes	10	12,0	2	2,9	12	7,9	
	Total	83	100,0	69	100,0	152	100,0	

Table 3: Preoperative Values of Pediatric Patients.			
		pth_grp_	
		Primary	Secondary
Tonsil Grade	n	1	8
	Median	2	2
	Interquartile Range	0	1
	Minimum	2	1
	Maximum	2	3
preop hgb	n	1	8
	Avaragwe	13	11,83
	Standart Deviation	,	1,12
	Median	13	11,9
	Interquartile Range	0	1,69
	Minimum	13	9,9
	Maximum	13	13,2
preoop plt	n	1	8
	Avarage	336	325
	Standart Deviation	,	59

	Median	336	346
	Interquartile Range	0	81
	Minimum	336	220
	Maximum	336	401
preop ınr	n	1	8
	Avarage	1,23	1,07
	Standart Deviation	,	0,05
	Median	1,23	1,07
	Interquartile Range	0	0,09
	Minimum	1,23	1,01
	Maximum	1,23	1,13
kaçıncı gün tsk	n	1	8
	Avarage	1	6
	Interquartile Range	,	2
	Median	1	7
	Interquartile Range	0	1
	Minimum	1	3
	Maximum	1	8

Table 4: Preoperative Values of Adult Patients.

		pth_grp_	
		Primary	**Secondary**
tonsil grade	n	2	10
	Median	1	2,5
	Interquartile Range	0	2
	Minimum	1	1
	Maximum	1	4
preop hgb	n	2	10
	Avarage	14	14,16
	Standart Deviation	2,26	2,14
	Median	14	14,1
	Interquartile Range	3,2	3,8
	Minimum	12,4	11,2
	Maximum	15,6	17,3
preoop plt	n	2	10
	Ortalama	231	256
	Standart Deviation	63	89
	Median	231	224
	Interquartile Range	89	65
	Minimum	186	188
	Maximum	275	486
preop ınr	n	2	10
	Avarage	0,97	1,08
	Standart Deviation	0,08	0,16
	Median	0,97	1,02
	Interquartile Range	0,11	0,17
	Minimum	0,91	0,95
	Makximum	1,02	1,44
kaçıncı gün tsk	n	2	10
	Avarage	1	6
	Standart Deviation	0	2
	Median	1	7
	Interquartile Range	0	2
	Minimum	1	3
	Maximum	1	10

4. DISCUSSION

Despite advances in surgical techniques since ancient times, PTH remains a serious and potentially life-threatening complication. It not only poses a medical challenge but also has significant psychological and societal impacts on patients, families, and healthcare providers, as well as financial implications.[7] PTH is the most common and severe complication of tonsillectomy.[7] Numerous studies have explored its risk factors, including age, gender, surgical technique, surgeon experience, recent infections, hematological abnormalities, intraoperative blood loss, and postoperative blood pressure changes.[9,10] However, most studies have identified only a limited number of statistically significant factors[7,11], highlighting the multifactorial nature of PTH and the challenges in predicting and preventing it.

PTH rates in the literature range from 0.3% to 13.9%, with some studies reporting rates as high as 18%.[11,12] In our study, the PTH incidence was 2.7%, near the lower end of the reported range, reflecting the efficacy of our surgical techniques, patient selection criteria, and postoperative care protocols. These findings suggest that PTH risk varies based on surgical and patient-related factors.

PTH is more common in adults than in children. A large study of 17,680 patients reported a significantly higher bleeding risk in individuals aged 12 and older compared to younger children.[13] Our study found a PTH rate of 7.8% in adults and 0.14% in children, supporting the role of age as a key risk factor, possibly due to anatomical differences, vascular changes, or variations in healing processes. These results emphasize the need for age-specific surgical planning and postoperative monitoring.

PTH is classified as primary (within 24 hours) or secondary (after 24 hours).[14] Primary hemorrhages are typically linked to acute vessel injury during surgery, while secondary hemorrhages are associated with fibrinolysis or infection-related fibrin degradation.[1] A multicenter study of 17,480 patients reported a PTH rate of 1.5% (270 patients), with 128 primary and 142 secondary hemorrhages.[13] Other studies report primary hemorrhage rates of 1.2%–7% and secondary rates of 7%–9%. In our study, secondary hemorrhages predominated (85.8%), with 55.5% occurring in adults, suggesting that secondary hemorrhages are more common in adults and may be linked to age-related factors. This underscores the need for vigilant postoperative follow-up in adults.

PTH can be classified as minor or major based on severity.[9] Major hemorrhages, which are life-threatening, may require rehospitalization, urgent intervention, or repeat surgery.[10] In our study, no major hemorrhages were observed, reflecting the effectiveness of our surgical and postoperative protocols.

PTH often necessitates rehospitalization. Treatment varies based on bleeding severity, ranging from observation to surgical intervention under local or general anesthesia. In one study, all PTH patients were hospitalized, with primary hemorrhages treated conservatively and 46.3% of secondary hemorrhages managed conservatively, while 53.7% required surgical intervention.[14] Similarly, in our study, all PTH patients were hospitalized, with primary hemorrhages treated conservatively and 77.7% of secondary hemorrhages managed conservatively, while 22.3% required surgical intervention. These findings confirm that conservative treatment is often effective for secondary hemorrhages, but surgical intervention is sometimes necessary.

Secondary hemorrhages typically peak between days 5 and 10 post-surgery, though rare cases have been reported up to day 54.[14] One study reported an average presentation time of 5.9 days for PTH.[15] In our study, the mean presentation time was 5.5 days, consistent with the literature, indicating that secondary hemorrhages concentrate in the first week but may occur later. Primary hemorrhages, less common in children, typically occur within the first eight hours. These findings highlight the importance of understanding PTH timing for effective follow-up protocols.

The study was limited by being conducted at a single center, which may restrict the generalizability of the findings.

5. CONCLUSION

Post-tonsillectomy hemorrhage remains a serious and potentially life-threatening complication. Its management requires careful consideration of comorbidities and strategies to prevent mortality. Adherence to clinical guidelines and recommendations is critical to reducing PTH risk, encompassing proper surgical technique, patient selection, and postoperative care. All patients presenting with PTH should be hospitalized, even for observation, with close monitoring of vital signs (pulse, blood pressure, respiratory rate) and physical examination. Establishing intravenous access is essential for potential urgent interventions. Laboratory tests, including complete blood count, coagulation tests, and blood group analysis, are crucial for assessing bleeding severity, identifying coagulation disorders, and determining transfusion needs. These measures are vital for early diagnosis and comprehensive management to enhance patient safety and prevent severe outcomes.

All patients were evaluated for age, gender, indication for surgery, tonsil size, surgical technique, preoperative hemoglobin, platelet, and INR levels, and chronic diseases. No significant association was found between these factors and PTH, except for age and gender. Adult age and male gender should be carefully considered as risk factors for postoperative hemorrhage during preoperative planning.

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