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Risk factors for secondary post tonsillectomy hemorrhage

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***Abstract*---**Introduction: Tonsillectomy is one of the most common worldwide surgical procedures performed by Otolaryngologists which is usually uncomplicated. The most common complication seen after tonsillectomy is hemorrhage. This can be primary or secondary. Primary hemorrhage occurs within twenty four hours after surgery and secondary hemorrhage occurs any time following the initial 24 hours. Although the exact mechanism behind post-tonsillectomy hemorrhage remains unclear. Risk factors can be helpful in pointing toward an etiology. Methods: We performed a retrospective review of 200 patients (above 3 years and of both gender), who were subjected for tonsillectomy with or without adenoidectomy at the ENT Department, Aswan University hospital, and then 50 of them presented with secondary post tonsillectomy hemorrhage (> 24 hours) post-operative, after hospital discharge, between February 2020 and February 2021. Results: Considering risk factors, the patient ages ranged from 4-40 years with a mean of 15.42 years. Most of patients 37 (74%) were male. O positive blood group were predominant in 26 (52%) of patients. Repeated tonsillitis was the most common indication 35 (70%) of patients. bipolar technique was done in most of patients 36 (72%). The majority of patients 31 (62%) were subjected for tonsillectomy without adenoidectomy. Conclusion: Male older patient (above 10 years), O positive blood group, repeated tonsillitis, bipolar technique, were found to be among most significant risk factors for secondary post tonsillectomy hemorrhage.

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Keywords---tonsillectomy, post tonsillectomy hemorrhage, risk factors.

Introduction

Tonsillectomy is one of the oldest and most common surgeries carried out by otolaryngologist. Surgical indications of tonsillectomy include chronic or recurrent tonsillitis, hypertrophic tonsils, peritonsillar abscess or an obstructed air- way. The goal in both adult and pediatric cases is better life quality [1]. Post-operative complications following tonsillectomy are generally rare with post tonsillectomy hemorrhage being one of the most common serious complications, which may be associated with significant morbidity, including blood transfusions or emergency surgical management [2]. Post-tonsillectomy hemorrhage (PTH) may be primary, in which the bleeding happens within 24 hours of the operation, or secondary, where bleeding may happen any time following the initial 24 hour [3]. Primary hemorrhage is generally acknowledged to be caused by inadequate hemostasis during the surgery. Secondary hemorrhage is associated with detachment of the crust from the site of the removed tonsils [4]. The overall hemorrhage rate is around 4.5%, with reported rates of 0.2-2.2% and 0.1-3.5% for primary and secondary hemorrhages, respectively [5].

Several factors such as surgical technique, patient age, gender, post- operative analgesics use and surgical indication have been implicated as risk factors associated with higher rate of secondary post- tonsillectomy hemorrhage [6]. Secondary post tonsillectomy hemorrhage is more common in older patient (≥ 20 years) and not affected by gender. It has been excessive in rare cases, requiring revision surgery under general anesthesia and blood transfusion [7]. Although factors such as intraoperative blood loss volume and recent viral illness have been postulated to be associated with postoperative hemorrhage, neither factor has been proved to be statistically significant in the identification of patients at risk for post-tonsillectomy hemorrhage [5]. The aim of this work is to evaluate of risk factors of secondary post tonsillectomy hemorrhage and correlate each factor with the patients' clinico-pathological features in an attempt to better management of such condition.

Patients and methods

We performed a retrospective study of 200 patients, who were subjected for tonsillectomy with or without adenoidectomy at the ENT Department, Aswan University hospital, and then 50 of them presented with secondary post tonsillectomy hemorrhage (> 24 hours) post-operative, after hospital discharge, between February 2020 and February 2021. All patients' data collected included: Personal history including; name, age, sex, occupation, blood grouping. Present history including; onset, course, duration and episodes of bleeding. Full history taking for post tonsillectomy hemorrhage including: Indication of surgery; Technique of surgery; Tonsillectomy alone or with adenoidectomy; Hospitalization time after operation; Day of postoperative bleeding;; Postoperative treatment as blood transfusion; Hospitalization time after hemorrhage; and Day of eating.

All patients subjected to the following examination: General examination, for general condition, pulse, and blood pressure of the patients; Local examination for tonsillar fossae for any bleeding point, blood clot or slough. Investigations were done in the form of: Complete blood count (CBC); Coagulation profile (PT, PTT, INR). All patients underwent observation, with insertion of an intravenous line and fluid replacement as required. Antibiotics were administered in all cases. The indicators for 'severe bleeding' were either the need for a blood transfusion or a return to the operating theatre to secure hemostasis under general anesthetic.

Results

The age of patients ranged from 6-38 years with a mean of 19.53 ± 9.33 years, with the majority 29 (58%) of patients presented under age of 10 years. Regarding patients sex, 37 (74%) of patients were male, and 13 (26%) of patients were female. With reference to blood grouping, O positive blood group were predominant in 26 (52%) of patients, followed by B positive blood group in 11 (22%) of patients, then A positive in 6 (12%) of patients, as shown in (Table 1).

Tables Table (1): Demographic data of studied patients (n=50)

	Group A (50)	Group B (150)	P. value
Age (Years):			
(Range) Mean ± SD	(6-38) 19.53 ± 9.33	(6-38) 15.42 ± 10.52	0.026*
Age groups: n (%)			
< 10 years	21 (42%)	111 (74%)	
> 10 years	29 (58%)	39 (26%)	0.047*

Regarding indications of tonsillectomy, repeated tonsillitis was the most common indication 35 (70%), followed by peritonsiller abscess 8 (16%). Cold dissection technique was done in 14 (28%) of patients, while bipolar technique was done in 36 (72%) of patients. The majority of patients 31 (62%) were subjected for tonsillectomy without adenoidectomy. Most of patients 40 (80%) were hospitalized for less than 24 hours, while 10 (20%) of patients were hospitalized for more than 24 hours. As regard day of eating, 24 (48%) of patients start eating at 1st day, and 26 (52%) of patients start eating at 2nd day, as shown in (Table 2).

Gender:	Group A (50)	Group B (150)	P. value
	n (%)		
Male	37 (74%)	63 (42%)	
Female	13 (26%)	87 (58%)	0.001*

Comparison between case and control groups as regard blood grouping

Blood grouping:	Group A (50)	Group B (150)	P. value
	n (%)		
A negative	4 (8%)	18 (12%)	
A positive	6 (12%)	24 (16%)	
AB negative	2 (4%)	18 (12%)	
AB positive	1 (2%)	21 (14%)	0.003*

B positive	11 (22%)	42 (28%)	
B negative	0(0%)	0(0%)	
O positive	26 (52%)	27 (18%)	
O negative	0(0%)	0(0%)	

Table (2): Intraoperative and postoperative clinical data of tonsillectomy operation

Comparison between case and control groups as regard indications of tonsillectomy

Indications of tonsillectomy:	Group A (50)	Group B (150)	P. value
	n (%)		
Repeated tonsillitis	35 (70%)	63 (42%)	0.043*
Tonsiller hyperplasia	2 (4%)	24 (16%)	
Repeated tonsillitis and tonsiller hyperplasia	5 (10%)	36 (24%)	
Peritonsiller abscess	8 (16%)	27 (18%)	

Comparison between case and control groups as regard techniques of tonsillectomy

Techniques of tonsillectomy:	Group A (50)	Group B (150)	P. value
	n (%)		
Cold dissection	14 (28%)	78 (52%)	0.001*
Bipolar	36 (72%)	72 (48%)	

Comparison between case and control groups as regard type of surgery

Type of surgery:	Group A (50)	Group B (150)	P. value
	n (%)		
Tonsillectomy alone	31 (62%)	87 (58%)	0.633
Tonsillectomy with adenoidectomy	19 (38%)	63 (42%)	

Comparison between case and control groups as regard time of hospitalization after operation

Time of hospitalization after operation:	Group A (50)	Group B (150)	P. value
	n (%)		
< 24 hours	40 (80%)	102 (68%)	0.089
> 24 hours	10 (20%)	48 (32%)	

Comparison between case and control groups as regard post-operative day of eating

postoperative day of eating	Group A (50)	Group B (150)	P. value
	n (%)		
1st	24 (48%)	84 (56%)	0.687
2nd	26 (52%)	66 (44%)	

Clinical data of post tonsillectomy hemorrhage

Mean day of hemorrhage (days):	
(Range) Mean ± SD	(2-10) 5.44 ± 2.35
Post-operative day of hemorrhage: n (%)	
2nd	6 (12%)
3rd	9 (18%)
4th	3 (6%)
5th	9 (18%)
6th	2 (4%)
7th	12 (24%)
8th	2 (4%)
9th	6 (12%)
10th	1 (2%)

Time of hospitalization after hemorrhage

Time of hospitalization after hemorrhage: n (%)	
< 24 hours	33 (66%)
> 24 hours	17 (34%)

Management of post tonsillectomy hemorrhage

Blood transfusion: n (%)	
Need	8 (16%)
Not need	42 (84%)
Treatment of hemorrhage: n (%)	
Conservative treatment	40 (80%)
Operative treatment Cauterization with bipolar diathermy Ant. and post pillar ligation	10 (20%) 5 (10%) 5 (10%)
< 24 hours	33 (66) %
> 24 hours	17 (34)%
Blood transfusion: n (%)	
Need	8 (16)%
Not need	42 (84)%
Treatment after hemorrhage: n (%)	
Conservative treatment	40 (80)%
Operative treatment Cauterization with diathermy Ant. and post pillar suturing	10 (20)% 5 (10) 5 (10)

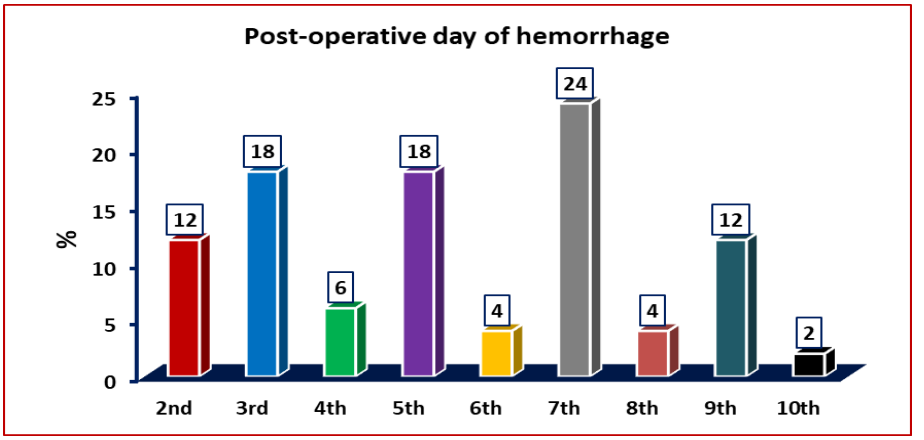

Figure (1): Clinical data of post tonsillectomy hemorrhage.

The onset of hemorrhage ranged from 2-10 days with a mean of 5.44 ± 2.35 days, with the majority 12 (24%) of patients had onset of hemorrhage at 7th day, as shown in (figure 1). With reference to hospitalization after hemorrhage, 33 (66%) were hospitalized for less than 24 hours, and 17 (34%) of patients were hospitalized for more than 24 hours. Regarding treatment, most of patients 40 (80%) received conservative treatment, 10 (20%) of patients received operative treatment (5 patients needed cauterization with bipolar diathermy, 5 patients needed anterior and posterior pillar suturing) and 8 (16%) of patients need blood transfusion.

Discussion

Multiple reports within the last two decades have demonstrated the safety of ambulatory (outpatient), pediatric tonsillectomy. However, posttonsillectomy hemorrhage remains the most serious complication of tonsillectomy, which may require re-hospitalization, as the tonsils are close to major blood vessels **[4]**. Our study aimed to assess the possible risk factors of secondary post tonsillectomy hemorrhage in an attempt to better management of such condition in our country.

The age is one of the most significant risk factors for post-tonsillectomy hemorrhage. The children who experienced post-operative bleeding were significantly older that those who did not. For every increase in age by one year, the risk of bleeding post-operatively significantly increased by 1.1 times [8]. Kim et al., [9], who made a study on 60 patients with post-tonsillectomy haemorrhage, and they reported that, the mean age of patients was 17.1 years. Also, Subha et al., [10], reported that, there is a significant association between age group and post-tonsillectomy haemorrhage. Patients who underwent tonsillectomy above the age of 12 years old have the higher chance of posttonsillectomy haemorrhage. As well, Gabriel et al., [11], reported similar results.

This is probably related to the fact that adult patients have repeated infections which leads to more fibrosis and more vigorous surgery. In addition to this, older patients have more autonomy with regard to dietary intake. This may lead to

increased risk of post-tonsillectomy hemorrhage secondary to dietary trauma [12]. In this study, the majority of patients were males. In agreement with our findings, Ikoma et al., [1], made a study on 694 patients who underwent tonsillectomy with or without adenoidectomy, and they reported that, with respect to the gender of the patient, male patients had an increased risk of posttonsillectomy hemorrhage. Also, Bhattacharyya and Shapiro, [13], found a significantly lower risk of post-operative bleeding in females. As well, studies by Coordes et al. [14] and Tomkinson et al., [15], found significantly higher rate of post-tonsillectomy hemorrhage in males.

In Gonçalves et al, [16] study, found that, gender was an independent factor for post-tonsillectomy bleeding, although there was a slight risk for men to bleed. However, other studies did not show any statistically significant difference in post-tonsillectomy hemorrhage rates between genders [7, 10, 17, 18] Blood group typing was not part of the preoperative testing for children undergoing tonsillectomy, till numerous reports found increased risk of bleeding in individuals with Type-O blood group [19]. Similarly in our study, Type-O blood group was predominant in more than 50% of patients.

This goes in accordance to the study of Leonard et al., [20], who made a cohort study on 303 patients suffered secondary post-tonsillectomy haemorrhages and demonstrated that, blood type is disproportionately over-represented in their study of secondary haemorrhage patients when compared with the general population. It can explained by that, Type-O blood group is associated with decreased expression of factors VIII and von Willebrand factor, also, patients with Type-O blood group suffer from fewer thrombotic problems and may be more prone to haemorrhage.

Natasha et al., [21], made a recent retrospective cohort study of 14 951 patients younger than 22 years who underwent tonsillectomy with or without adenoidectomy at a single institution, and hypothesized that bleeding would be increased in our Type-O blood group (BT O) cohort and VWF values would be lower. As regard indication of tonsillectomy, repeated tonsillitis was the most common indication of tonsillectomy which presented in 35 (70%) of patients, followed by peritonsiller abscess 8 (16%). The same results recorded by Sarny et al., [22], who reported that, the most frequent original indication for surgery in patients was recurrent tonsillitis (75%), followed by peritonsillar abscess (12.5%). Several studies also, reported recurrent tonsillitis as common indication for tonsillectomy [10, 18, 23].

Some researchers have discovered an association between the reason for tonsillectomy and the likelihood of post-tonsillectomy hemorrhage as Ikoma et al., [1]. Also, Sarny et al., [24]. and Susaman et al., [25], reported significant relation between indication for surgery and risk of post-tonsillectomy hemorrhage. In contrast, Gonçalves et al, [16] demonstrated that, there was no association between chronic tonsillitis and the risk of having a post-operative bleeding episode, although hemorrhage was more common in patients with chronic tonsillitis. Also, Arora and colleagues [26], failed to identify an association between reason for surgery and subsequent risk of post-tonsillectomy hemorrhage.

In this study, bipolar technique was done in 36 (72%) of patients, while cold dissection technique was done in 14 (28%) of patients. This finding goes in accordance with study done by Kocaturk et al., [27]. On the other hand, Gonçalves et al, [16] demonstrated that, there is no agreement regarding the influence of the surgical technique in posttonsillectomy bleeding risk. Moreover, another study show no difference between techniques (Schrock et al., 2009) [28] Some studies show that bipolar dissection is associated with higher rates of postoperative hemorrhage when compared with cold dissection (Negm et al., [18]. Also, Gallagher et al., [29], concluded that, intracapsular tonsillectomy is associated with lower rates of post-tonsillectomy hemorrhage and dehydration when compared to coblation and electrocautery complete tonsillectomy technique.

Adenoidectomy at the same surgical time as tonsillectomy revealed to be a predictive factor for post-tonsillectomy hemorrhage. However, in our study, the majority of patients (62%) were subjected for tonsillectomy without adenoidectomy. In agreement with our finding, Gonçalves et al, [16], found the existence of a higher risk of postoperative bleeding when adenotonsillectomy is performed compared to tonsillectomy alone. Mattheeuws et al., [30], demonstrated that, because most procedures are performed in a one-day clinic, clear postoperative instructions are necessary when the patient leaves the hospital. There are reports suggesting that outpatient follow-up may be appropriate for cases of tonsillectomy or adenotonsillectomy, discharge from hospital being after enough observation period in order to decrease risk of post-tonsillectomy hemorrhage **[30]**.

As rgard post operative time of hospitalization in our study, most of patients (80%) were hospitalized for less than 24 hours. Similarly, Abdullah et al., [31], made a retrospective study on 2038 patients and found that, the majority of their patients were discharged from hospital on day one postoperatively (97%), furthermore, no association was found between day of discharge and incidence of post-tonsillectomy hemorrhage. Also, in a study done by Susaman et al., [25], they found that, 88.9% of pediatric cases and 91.3% of the adults had been discharged by 24 hours post-surgery, however, there was no statistically significant relasion in time hospitalized post-operatively, and risk of posttonsillectomy hemorrhage. In contrast, Mattheeuws et al., [30], found that, recurrent episodes of hemorrhage occur in a minority of patients who had been discharged within 24 hours after surgery and reported that, it should always be regarded as a warning sign.

In this study, the majority of patients had onset of hemorrhage at 7th day. In agreement with our finding, Iqbal et al., [32], reported that, most of cases of hemorrhage were seen post-operatively occurring between 7th and 10th postoperative days. Also, Alexander et al., [7], reported that, the majority of secondary tonsillectomy haemorrhages presented between the fourth and seventh day post-operation. Moreover, Dharmawardana et al., [33], reported that, Day 6 post tonsillectomy was the most common day for secondary posttonsillectomy hemorrhage presentation for both adults and children, however, with no statistically significant difference between the day post tonsillectomy and the grade of post-tonsillectomy hemorrhage.

Regarding management of secondary post-tonsillectomy hemorrhage for our patients, most of patients (n=40) received conservative treatment, while 10 patients received operative treatment (5 patients needed cauterization with diathermy and 5 patients needed anterior and posterior pillar suturing), and 8 (16%) of patients need blood transfusion due to massive bleeding. In Windfuhr and Chen, [34] study, pillar suture had to be performed in 6 of 7 patients to stop secondary hemorrhage occurring 5 days, 6 days, 8 days, and 10 days after tonsillectomy. This finding and the fact that excessive bleeding caused death should emphasize that secondary hemorrhage may be a rare complication following tonsillectomy, but is still potentially life-threatening, and ligation of the external carotid artery certainly can be regarded as the ultimate surgical procedure to stop excessive bleeding **[35]**.

Conclusion

According to the present results, we can conclude male older patient (above 10 years), bipolar technique, with O positive blood group, were found to be among most significant risk factors for secondary post tonsillectomy hemorrhage.

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