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The effect of topical application of tranexamic acid after tonsillectomy in post tonsillectomy bleeding

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Abstract
Objective: Is to evaluate the effect of topical application of tranexamic acid after tonsillectomy in post tonsillectomy bleeding.
Methods: A prospective interventional self-controlled study included 100 patients aged between 3-26 years, divided into two groups, Group A(Study group) includes 50 patients (19 male & 31 female) subjected to tonsillectomy with topical application of tranexamic acid, and Group B (Control group) includes 50 patients (27 male & 23 female) subjected to tonsillectomy only.
Results: In group A (study group), there were 1 cases (2%) suffered from post-operative bleeding, While in group B (control group), there were 6 cases (12%) suffered from post-operative bleeding. The results showed that there were great effects of topical application of tranexmic acid in post-tonsillectomy bleeding.
Conclusion: Using tranexamic acid topically decreases the rate of hemorrhage (reactionary & secondary) with statistically significant difference between the study and the control group and decreases the rate of operative management of hemorrhage (reactionary & secondary).

Keywords: tranexamic acid, tonsillectomy, bleeding, Antifibrinolytics

Introduction
Tonsillectomy is one of the most common surgical procedures performed in otolaryngology practice. Tonsillectomy-related hemorrhage may occur intraoperatively or postoperative. The latter is subdivided into reactionary hemorrhage (within 24 h of surgery) and secondary hemorrhage (more than 24 h after surgery, typically one week postoperative). Intraoperatively bleeding is controlled at the time of surgery. Reactionary hemorrhage usually requires return to theater (80% of cases), while the return to theater rate is less for secondary hemorrhage (17%) [1].

Tranexamic acid (TA) is a drug used for treating and preventing bleeding [2]. TA is a synthetic derivative of the amino acid lysine. It is an antifibrinolytic that competitively inhibits the activation of plasminogen to plasmin, a molecule responsible for the degradation of fibrin, by binding to specific sites of both plasminogen and plasmin. The latter molecule is a protein that forms the framework of blood clots [3].

Several methods have been used to prevent and reduce the frequency and the amount of bleeding during and after adenotonsillectomy procedures (e.g., diathermy [4], noose tie [5], ultrasonic harmonic scalpel [6] and drugs such as TA [7, 8]). The role of TA in the management of hemorrhages is still controversial, as discussed by Chan CC *et al* in a recent systematic review and meta-analysis [9].

Aim of this study was to compare study group with topical application of tranexamic acid and control group without topical application of tranexamic acid.

Patients and Methods
Between May 2018 and May 2019, 100 patients aged between 3-26 years underwent tonsillectomy (cold dissection method) for recurrent acute tonsillitis, chronic tonsillitis and obstructive tonsiller hypertrophy at the Otorhinolaryngology Department, Faculty of Medicine, Al Azhar University at Assiut, Egypt.

The patients were classified into two groups; Group A (Study group): includes 50 patients (19 male & 31 female) subjected to tonsillectomy with topical application of tranexamic acid that's just after finishing the tonsillectomy, Group B (Control group): includes 50 patients (27 male & 23 female) subjected to tonsillectomy only.

These patients were subjected to proper assessment protocol preoperatively including history taking, general examination, full ENT examination and routine preoperative laboratory investigations (complete blood picture, coagulation profile) and chest X ray.

Exclusion criteria for surgical intervention were: Patients had adenoid hypertrophy because of the difficulty in assessing additional blood loss during adenoidectomy specifically, previous history of bleeding or spontaneous hematoma, altered coagulation tests, evidence of hematopoietic, cardiovascular, hepatic, renal, neurologic, psychiatric or auto-immune diseases, preoperative use of anticoagulant therapy or known allergy to tranexamic acid.

Operative technique
Tranexamic acid (2 ampule, Kapron 500mg/5ml, Amoun Co, Cairo, Egypt) and 2 pieces of cotton soaked in tranexamic.

A. In the group A (study group) :after removal of tonsiller mass in one side ,piece of cotton soaked in tranexamic acid(500mg/5ml) was placed in the tonsiller bed for 5 minutes and after finished the other side , another piece of cotton soaked in tranexamic acid(500mg/5ml) was placed in the other tonsiller bed for 5 minutes.
B. In the group B (control group): No tranexamic acid was applied in the tonsiller bed.

Statistical analysis

Data were analyzed and expressed in tables using Statistical Package for Social Science (SPSS). Statistical methods included descriptive methods (mean, standard deviation, frequency distribution) and significance tests (t-test for quantitative data, correlation coefficient test and analysis of variance (ANOVA) tests). The significance will be adjusted when P equal 0.05 or less.

Results

The patients' age ranged from 3 years to 26 years &divided into 3 groups from 3-10 years which is the commonest age group, from 11-15 years which is the 2nd common age group and above 15 years which is the 3rd common age group. Male and female patients were almost equal.

Table 1: Comparison between study and control groups according to demographic data.

	Study group (n=50)	Control group (n=50)	p-value
Age (Years)			
(Range) Mean ± SD	(3-26) 13.39 ± 5.59	(3-25) 12.79 ± 5.38	0.312
Age groups: n (%)			
3-10	31 (62)	32 (64)	0.556
11-15	8 (16)	10 (20)	
16-26	11 (22)	8 (16)	
Gender: n (%)			
Male	19 (38)	27 (54)	0.515
Female	31 (62)	23 (46)	
Residence: n (%)			
Rural	20 (40)	22 (44)	0.217
Urban	30 (60)	28 (56)	
Duration of anesthesia (minutes):			
(Range) Mean ± SD	(1-30) 18.57 ± 7.47	(1-29) 17.52 ± 7.96	0.357

Table 2: Comparison between study and control groups according to indications of tonsillectomy.

	Study group (n=50)	Control group (n=50)	p-value
Indications of tonsillectomy: n (%)			
Chronic tonsillitis only	33 (66)	34 (68)	0.132
Chronic tonsillitis with OSAS	6 (12)	7 (14)	
Recurrent acute tonsillitis	11 (22)	9 (18)	

Table 3: Comparison between study and control groups according to investigation profile.

		Study group (n=50)	Control group (n=50)	p-value
		(Range) Mean ± SD		
Hb	Pre-operative	(8-14.9) 12.33 ± 1.3	(9.2-14.7) 12.46 ± 2.1	0.337
	Post-operative	(8-14.7) 11.01 ± 0.7	(9.1-14.6) 11.21 ± 1.3	0.331
HTC	Pre-operative	(30.4-40.1) 35.94 ± 2.7	(30.2-40) 34.01 ± 4.3	0.437
	Post-operative	(31.1-40.2) 33.94 ± 2.1	(31.3-40.4) 32.01 ± 3.4	0.352
PLT	Pre-operative	(89-328) 198.32 ± 70.97	(86-331) 196.89 ± 68.19	0.343
	Post-operative	(87-366) 196.71 ± 68.58	(88-315) 195.98 ± 67.62	0.243
PTT	Pre-operative	(16-33) 25.71 ± 7.59	(15-33) 26.42 ± 35.88	0.553
	Post-operative	(14-34) 25.71 ± 4.59	(15-34) 25.71 ± 5.88	0.527

Table 4: Comparison between study and control groups according to types of bleeding.

	Study group (n=50)	Control group (n=50)	p-value
Reactionary hemorrhage: n (%)			
Positive	1 (2)	4 (8)	0.001*
Negative	49 (98)	46 (92)	
Secondary hemorrhage: n (%)			
Positive	0 (0)	2 (4)	0.001*
Negative	50 (100)	48 (96)	

Table 5: Comparison between study and control groups according to management of bleeding.

	Study group (n=50)	Control group (n=50)	p-value
Management of reactionary bleeding: n (%)			
Conservative	1 (2)	3 (6)	0.453
Operative	0 (0)	1 (2)	
Management of secondary bleeding: n (%)			
Conservative	0 (0)	2 (4)	0.001*
Operative	0 (0)	0 (0)	

Tranexamic effects of the study group:

In group A (study group), there were 1 cases (2%) suffered from post-operative bleeding. While in group B (control group), there were 6 cases (12%) suffered from post-operative bleeding. The results showed that there were great effects of topical application of tranexmic acid in post-tonsillectomy bleeding.

Discussion

Tonsillectomy is one of the most common surgical procedures performed worldwide [10]. Post-tonsillectomy bleeding is the main complication in otorhinolaryngological surgery, in particular in oral and nasal surgery [11]**.** Post-tonsillectomy bleeding still remain the major cause of morbidity [12]**.**

This study included both male and female and included children and adults from 3-26 years. Majority were in the age group of 3-10 years. The mean age was 13.39 years in study group and 12.79 years in control group.

In this study 5 patients suffered from reactionary

hemorrhage from total 100 patients , there were 1 patient in the study group (2%) , 4 patients in the control group (8%).There were significant difference in the rate of reactionary hemorrhage between the study group and the control group(p-value=0.001) , 4 cases were managed conservatively and 1 case was managed operatively. In the study group the only case who had reactionary hemorrhage was managed conservatively. In the control group there were 4 cases had reactionary hemorrhage, 3 of them were managed conservatively and 1 of them were managed operatively. So using tranexamic acid topically decreases the rate of operative management of reactionary without significant difference between the study group and the control group (p-value =0.453).

In this study 2 patients suffered from secondary hemorrhage from total 100 patients. All of them were in the control group (4%), there were no patients in the study group (0%).There were significant difference in the rate of secondary hemorrhage between the study group and the control group(p-value=0.001) , all the cases managed conservatively(100%) in control group .

Many studies discussed the medical uses of systemic effect of tranexamic acid for patients of cardiothoracic surgery [13], orthopedic surgery and joint replacement [14], caesarean section [15], epistaxis [16] and adenotonsillectomy [8].

There had been many trials suggesting the efficacy of the topical use of tranexamic acid in cardiac surgery [17] **,**orthopedic surgery including joint replacement [18], it was also used as mouthwash form after dental extractions [19]. It was also used topically in the management of bleeding in endoscopic sinus surgery [20] and used topically intra-nasally in cases of epistaxis [21].

Recently in Albirmawy OA *et al*(2013)had performed study on 300 patient about the effect of topical application of tranexamic acid after adenoidectomy and there was a significant reduction in blood loss during surgery and decrease in the rate of postoperative bleeding as well as the need for postnasal packing and blood transfusion [9].

In our study and Albirmawy OA *et al* (2013), there was a decrease in the rate of intra-operative bleeding with statistically significant difference after topical application of TXA.

In Albirmawy OA *et al* (2013)study, there was a decrease in the rate of postoperative bleeding without statistically significant difference, but in our study, there was a decrease in the rate of postoperative bleeding with statistically significant difference after topical application of TXA. There was no other works on the effect of tranexamic acid with tonsillectomy only.

Conclusion

In conclusion, using tranexamic acid topically decreases the rate of hemorrhage (reactionary & secondary) with statistically significant difference between the study and the control group and decreases the rate of operative management of hemorrhage (reactionary & secondary).

At the end, we recommend to do the same study on a larger number of cases for more accurate results.

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