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Effect of Hydrogen Peroxide on Hemostasis during Tonsillectomy Operations

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ORIGINAL ARTICLE

Effect of Hydrogen Peroxide on Hemostasis During Tonsillectomy Operations

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Abstract

Background: **The palatine tonsils play a role in immunological function. Their infections are among the most common causes of visits to ENT specialists. The surgeon is always mindful of the significant risk of complications in tonsillectomy, even though it is the most common and simplest procedure. Hydrogen peroxide (H_2O_2) was not mentioned as a hemostatic agent for tonsillectomy in the literature search. Orthopedic surgeons have relied on H_2O_2 as a hemostatic agent for many years.**

Aim and objectives: **To determine how well H_2O_2 works in stopping bleeding during tonsillectomy procedures.**

Patients and methods: **This prospective cross-sectional assessment was conducted in Al-Azhar University Hospitals on 200 patients of both sexes from 3 to 7 year, who counseled for the nature of the study and informed written consent. The sample size was 200.**

Result: **There was statistically significant alteration amongst the studied individuals concerning to comparison of the number of ties, comparison of the duration till hemostasis, and comparison of the amount of blood loss.**

Conclusion: **H_2O_2 applied topically to the tonsillar bed following a tonsillectomy has been shown to reduce postoperative complications, blood loss, and the need for sutures. In addition, H_2O_2 can be used as a hemostatic agent without the risk of significant consequences.**

Keywords: Hemostasis, Hydrogen peroxide, Tonsillectomy

1. Introduction

The palatine tonsils, located in a triangle tonsillar fossa along the anterolateral edge of the oropharynx on either side, are two enormous, prominent almond-shaped masses of lymphoid tissue.[1]

A tonsillectomy is an operation in which the tonsil and its capsule are removed by cutting into the peritonsillar area separating the tonsil capsule and the muscle wall, with or without the removal of the adenoids.[2]

When the pharynx, palatine tonsils, or both become infected with viruses or bacteria, it can result in a sore throat that may or may not be culture-positive for group A streptococcus. Acute tonsillitis, Aden tonsillitis, pharyngitis and tonsillopharyngitis are all included in this category.[3]

Palatine the tonsils play a role in protecting the body's defenses. Their infections are one of the most common causes of visits to ENT specialists. The tonsils have a larger role in immunity during the first several years of a person's life.[4]

These infections are extremely common, particularly among young children. Tonsillectomy is still the curative procedure of choice for managing recurrent as well as chronic tonsillitis, even if antibiotic medication is usually sufficient for acute tonsillitis.[5]

Tonsillectomy is the most common and least complicated operation, but it has a high risk of complications, including intra and postoperative bleeding that can cause shock and death.[6]

Hydrogen peroxide (H_2O_2)was not mentioned as a hemostatic agent for tonsillectomy in the literature search. For numerous years, orthopedic surgeons

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have relied on H_2O_2as a hemostatic agent.[7] Two-hundred pediatric cases who had adenoidectomy with cold H_2O_2 were analyzed in this study. Researchers discovered that applying cold H_2O_2 reduced the frequency of seeping and aggressive bleeding.[8]

Tonsillectomy with hemostasis has been attempted numerous times, but no method has proven successful. The antiseptic properties of H_2O_2 have been put to use.[9]

Purpose of this study was to determine how well H_2O_2 works in stopping bleeding during tonsillectomy procedures.

2. Patients and methods

This prospective comparative trial was performed in Al-Azhar University Hospitals on 200 patients of both sexes from 3 to 7 year, who advised on the significance of the study and the need for formal consent. The sample size was 200.

Inclusion criteria were: the age of 3–7 year, their hemoglobin level is 10% or more, and they are diagnosed with chronic tonsillitis.

Exclusion criteria were: unilateral tonsillar growth, chronic systemic diseases, tonsillar abscesses, tonsillar neoplasms, and bleeding and clotting abnormalities.

2.1. Sample size (n)

Epi Info STATCALC was used to calculate the sample size by considering the following assumptions: −95% two-sided confidence level, with a power of 80%, and an error of 5% odds ratio calculated = 1.115. The final maximum sample size taken from the Epi-Info output was 189. Thus, the sample size was increased to 200 cases to assume any drop out in cases.

Intraoperative assessment: everyone who undergoes a tonsillectomy should undergo a general examination. To prevent surgeon bias, all surgeries will be performed by the same surgeon using the same equipment and in a surgical manner (surgical manner), not using diathermy or sutures for hemostasis, only surgical ties and local compression on the tonsil bed with a gauze pad moistened with NS or 3% H_2O_2. The tonsils on the right side of the mouth are classified into the first group, while the tonsils on the left side of the mouth are classified into the second group.

Statistical analysis design: the obtained data was examined and the data was coded by manually. The Statistic Package for the Social Science Version 22 (SPSS 22) AIX, Linux, iOS, Solaris, Windows, was used to do statistical analysis on these numerical codes.

3. Results

Table 1.

Among 200 studied child patients whose age ranged between 3 and 7 years with mean value of 5.380 ± 1.250 years underwent tonsillectomy. We used H_2O_2 on hemostasis after the removal of the right tonsil (Rt tonsil) in the first group and used normal saline on hemostasis in the left side for the second group, then the differences between the two groups were measured Table 2.

Among our studied patients, most of them 59% were males and 41% were females Table 3.

There was statistically significant lower number of ties in H_2O_2 group than normal saline group of included children.

This comparison shows the difference between the two groups, as the use of H_2O_2 on hemostasis in the first group (Rt tonsil) has an effectiveness on the number of surgical ties till hemostasis, as the number of ties was less than the use of normal saline on hemostasis in the second group left tonsil (Lt tonsil) Fig. 1, Table 4.

There was statistically significant shorter duration till hemostasis in H_2O_2 group than normal saline group of included children.

This comparison shows the difference between the two groups, as the use of H_2O_2 on hemostasis in the first group (Rt tonsil) had an effectiveness on the time of hemostasis, as the time was less than the use

Table 1. The ages of the participants across the range of the research.

	Number = 200
Age (years)	
Range	3–7
Median [IQR]	5 [3]
Mean ± SD	5.380 ± 1.250

Table 2. Sex distribution of the studied patients.

	Number = 200 [n (%)]
Sex	
Male	118 (59)
Females	82 (41)

Table 3. Comparison of the number of ties in the researched sample.

	Hydrogen Peroxide 3% (first group)	Normal saline (second group)	Independent student *T* test	*P* value
	N = 200	*N* = 200	t/χ^2	
Number of tie				
Range	0–3	0–3	−4.117	<0.0001
Mean ± SD	1.455 ± 0.873	1.835 ± 0.971		

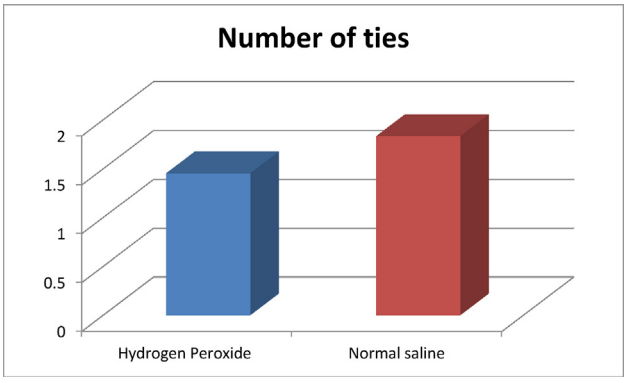

Fig. 1. The number of ties in the studied patients.

of normal saline on hemostasis in the second group (Lt tonsil) Fig. 2, Table 5.

There was statistically significant lower amount of blood loss in H_2O_2 group than normal saline group of included children.

This comparison shows the difference between the two groups, as the use of H_2O_2 on hemostasis in the first group (Rt tonsil) has an effectiveness on the amount of blood lost during hemostasis, as the amount of blood lost was less than the use of normal saline on hemostasis in the second group (Lt tonsil) Figs. 3–6.

Table 4. Comparison of the duration till hemostasis of the studied population.

	Hydrogen Peroxide 3% (first group)	Normal saline (second group)	Independent student *T* test/chi-square test	
	N = 200	*N* = 200	t/χ^2	*P* value
Time till hemostasis (min)				
Range	10–17	10–18	−14.943	<0.0001
Mean ± SD	12.515 ± 1.616	15.050 ± 1.773		

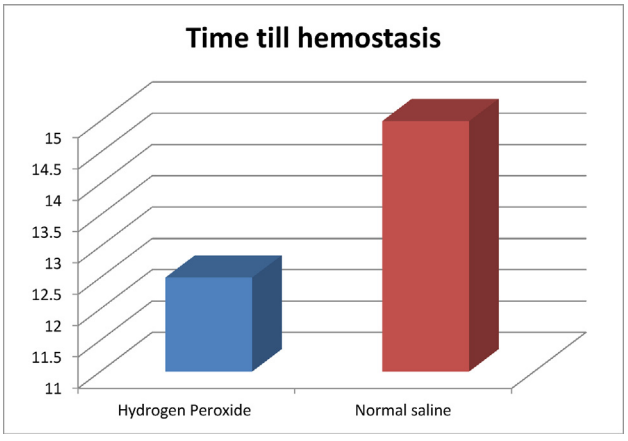

Fig. 2. The duration till hemostasis in the studied patients.

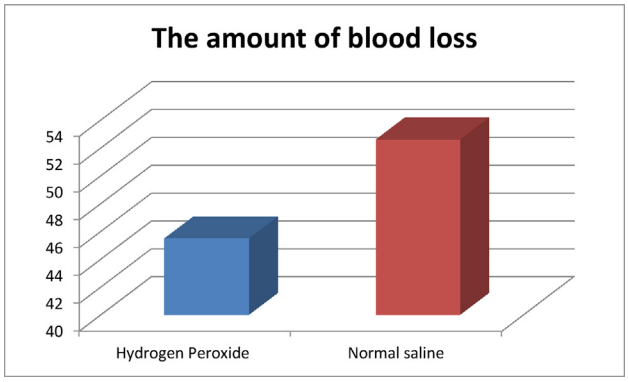

Fig. 3. The amount of blood loss in the studied patients.

Table 5. Comparison of the amount of blood loss in the studied population.

	Hydrogen Peroxide 3% (first group)	Normal saline (second group)	Independent student *T* test/chi-square test	
	N = 200	*N* = 200	t/χ^2	*P* value
The amount of blood loss (ml)				
Range	40–52	40–62	−15.013	<0.0001
Mean ± SD	45.540 ± 3.041	52.655 ± 5.973		

Fig. 4. Showing instruments needed to tonsillectomy (cold method), pieces of gauze (10 × 10 cm), silk to ties, and hydrogen peroxide (3%).

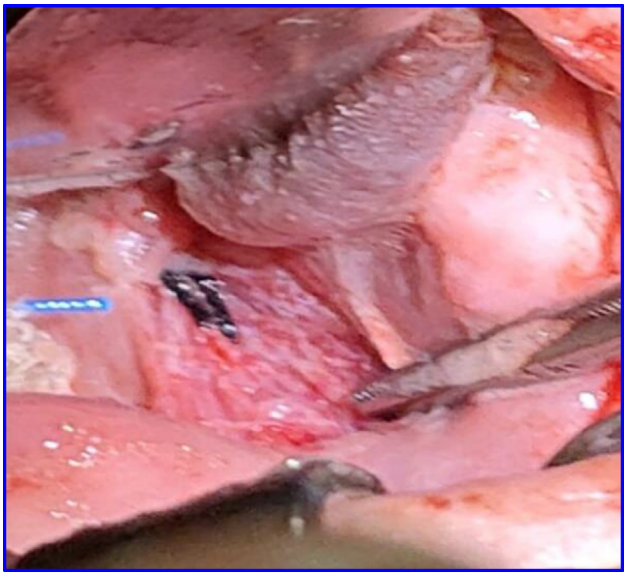

Fig. 5. Describe the effect of hydrogen peroxide (3%) on hemostasis in right tonsillar bed (first group).

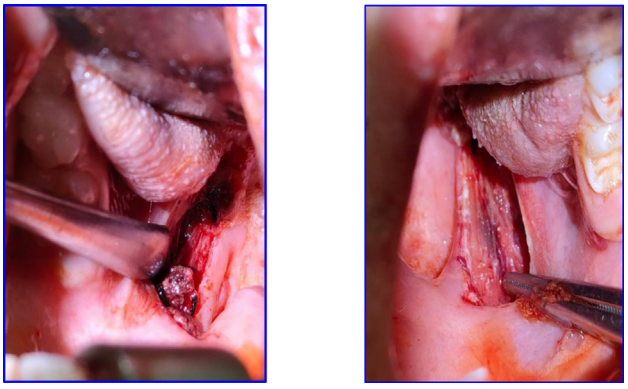

Fig. 6. Show that the number of surgical ties till hemostasis in left tonsillar bed (second group) (three ties) which more than in right tonsillar bed (first group) (one tie) and the effect of hydrogen peroxide (3%) on hemostasis.

4. Discussion

Tonsils in the soft palate play a role in immunity. Ear, nose and throat infections are a common cause for medical attention. In the first year of life, tonsils perform a larger role in the immune system. Age causes a regression of this tissue, with sub epithelial tissue becoming fibrotic and crypts becoming voids to be filled with keratin.[10]

The main results of this study were as follows:

Regarding demographic data of the researched group, it was revealed that the mean age of the investigated cases was 5.380 ± 1.250 years and ranged between 3 and 7 years. Among our studied patients, most of them 59% were males and 41% were females.

Comparing the number of surgical ties until homeostasis, the amount of blood lost, and the time required for complete hemostasis for the study population showed that there are differences between the H_2O_2 group (Rt tonsil) and the saline group (Lt tonsil), as we find that there are surgical ties less, the amount of blood lost is less, and the time of hemostasis is less in the H_2O_2 group than in the normal saline group for children included.

In agreement with the current study Al-Abbasi and Saeed, evaluated the time required during tonsillectomy, blood loss and the usage of surgical ties as a result of 3% H_2O_2. Thirty people were included in the trial and randomly assigned to one of two groups (H_2O_2 or saline).[11]

Participants evaluated ranged in age from 2 to 32, with 17 men and 13 females included in the sample. In terms of starting conditions, the two groups were comparable. The study showed that the usage of H_2O_2 resulted in a significant decrease in the number of ties compared with normal saline group.[11]

The comparison of the duration till hemostasis of the studied population showed that there was

shorter duration till hemostasis in H_2O_2 group than normal saline group of included children.

In concordance with the current study Thejas et al. intended to investigate the hemostatic and vasoconstrictive effects of H_2O_2 in tonsillectomy.[10]

The study revealed that significantly less time was needed to achieve hemostasis in the H_2O_2 group (3.43 ± 2.75 min vs. 4.49 ± 3.35 min, $P = 0.07$). Furthermore, the study revealed that H_2O_2 individuals also had a considerably shorter median time to surgery (8.02 ± 3.59 min against 9.22 ± 3.88 min, $P = 0.019$).[12]

The comparison of the amount of blood loss in the studied population showed that there was statistically lower amount of blood loss in hydrogen peroxide group than normal saline group of included children.

In concordance with the current study Thejas et al. showed that the average loss of blood in saline group was 56.47 ml and in H_2O_2 group, the average blood loss was 47.41 ml. Loosing blood in H_2O_2 group was 16.04% lower in saline group. There was statistically significant lower amount of blood loss in H_2O_2 group than normal saline group of included children.[10]

Also, consistent with the results of the present research Majeed et al. revealed that three percent H_2O_2 applied locally to the tonsillar bed following tonsillectomy reduced blood loss higher than cooled saline and the no treatment group.[13]

Furthermore, Abo Alhussein et al. evaluated topical H_2O_2 application on wound in thoracolumbar laminectomy was performed on 80 individuals.[14]

Group H received a topical H_2O_2 solution of 3% in 100 ml saline, while group C received a saline wash of the same volume. The study revealed that the use of topical H_2O_2 resulted in significant reduction in the postoperative blood loss and transfusion and Hb and PLT levels in the H_2O_2 group rose significantly after 48 h in comparison to the control group.[14]

The study by Farhang and Weiss during routine excisions, repairs along with dermabrasion, as well as those individuals with active bleeding immediately after surgery, the authors suggested using a stack of 4 × 4 inch gauze saturated with 3% H_2O_2 on the surgical tray and used by the surgeon additionally surgical assistant throughout the procedure.[15]

4.1. Conclusion

In conclusion: H_2O_2 applied locally to the tonsillar bed during tonsillectomy operation has been shown to reduce hemostatic time, blood loss, and the need for surgical ties. In addition, H_2O_2 can be used as a hemostatic agent without risk of significant consequences.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article.

Conflicts of interest

The authors declared that there were no conflicts of interest.

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