Comparison Of The Frequency Of Hemorrhage Requiring Surgical Intervention After Adenotonsillectomy In Two Methods Of Hot Dissection And Cold Dissection In 3-10 Years Old Children In Zahedan

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Abstract:

Objective: Inflammatory and infectious diseases of the throat, tonsils, and adenoids are the major causes of pediatric diseases and their health care costs. The aim of this study was to compare the frequency of hemorrhage requiring surgical intervention after adenotonsillectomy in two methods of hot dissection and cold dissection in children aged 3-10 years.

Methods: This clinical trial study was performed on 120 children who underwent adenotonsillectomy in Zahedan. Children were divided into two groups of hot dissection tonsillectomy and cold dissection tonsillectomy. Data were collected using an information form and analyzed by SPSS software and t-test statistical analysis.

Results: Amongst 120 children evaluated, 60 were girls and 60 were boys. The mean age of the hot dissection group was 6.0 ± 2.1 years and the mean age of the cold dissection group was 5.5 ± 1.7 years. The overall frequency of hemorrhage requiring intervention in the cold dissection group was 1.7% and in the hot dissection group was 6.7%, but the difference was not statistically significant. The frequency of early hemorrhage, late hemorrhage, duration of operation, and pain score 12 hours after surgery was not different between the two groups, but the pain score was significantly higher in the hot dissection group one week after surgery.

Conclusion: The frequency of postoperative hemorrhage was not significantly different in the two groups, but the pain intensity in the first week after surgery in the cold dissection group was significantly lower than the hot dissection group.

Keywords: Adenotonsillectomy, Hemorrhage, Hot Dissection, Cold Dissection, Children, Tonsillectomy.

1. INTRODUCTION

Tonsillectomy is the most common ENT surgery (1-3). More than 530,000 children under the age of 15 undergo tonsillectomy each year in the United States (4). The prevalence of tonsillectomy is 0.53 per 1000 children and the mortality rate of tonsillectomy is 1 in 15000 (5). Serious complications after tonsils and adenoids surgery include hemorrhage, postoperative pain, airway obstruction, postoperative pulmonary edema, velopharyngeal insufficiency, and nasopharyngeal obstruction; Postoperative hemorrhage is the most common serious complication of adenotonsillectomy (6).

Postoperative hemorrhage is more life-threatening than other complications (7). Causes of early hemorrhage may be a remnant of tonsil tissue or the lack of complete homeostasis during surgery. Although late postoperative hemorrhage is not as dangerous as hemorrhage during surgery and early

hemorrhage, it could be fatal if not evaluated accurately (1). A variety of techniques are used for tonsillectomy, such as unipolar and bipolar diathermy, cryosurgery, diathermy suction, bipolar scissors, KTP and CO2 laser, ultrasound resection, microscopic bipolar diathermy, and more recently radiosurgery with coblation and ablation techniques (8). Two of the most common dissection techniques in the United States are cold dissection and electrocautery dissection (9). The hot dissection technique is well developed, but there is little evidence that it is superior to cold dissection (10).

Currently, the most common adenotonsillectomy techniques are cold dissection and hot dissection techniques, both of which are routinely used by ENT surgeons, and neither method is superior to the other, also, the choice of method of operation is entirely up to the physician and depends on the surgeon's skill in each of the above techniques, but studies have shown that these two methods in some cases show contradictory results (11-16). In one study, the early hemorrhage rate was 2% in cold dissection and 3% in hot dissection groups. But in the hot method, secondary hemorrhage resulted less hospitalization than in the cold method (17). In another study, there were 8 cases of hemorrhage in the cold method and 24 cases of hemorrhage in the diathermy method, of which 1 was reactive hemorrhage and 31 cases were secondary hemorrhage (18). Another study showed that patients' pain was greater during the first hour after surgery with cold dissection. But the return to normal diet was faster in the cold method (19).

Due to the prevalence of adenotonsillectomy and the high importance of its complications, especially postoperative hemorrhage, which is the most dangerous complication, we decided to conduct this study to compare post-adenotonsillectomy hemorrhage in hot dissection and cold dissection in children 3-10 years old, and to help improve the results of the operation and reduce its mortality and morbidity by choosing the appropriate surgical technique.

2. MATERIALS AND METHODS

Study Design

This clinical trial study was performed on 120 children aged 3-10 years referred to the ENT clinic of Khatam Al-Anbia Hospital in Zahedan during 2016-2018 who were candidates for adenotonsillectomy. Eligible children were included in the study with the written consent of their parents and were examined in terms of type of surgery in two groups of 60 people.

Inclusion and Exclusion Criteria

Inclusion criteria included no history of maxillofacial and ENT surgeries, no history of other ENT diseases, no craniofacial anomalies, no history of underlying and systemic diseases, Absence of hematological diseases such as tuberculosis anemia, absence of coagulation disorders, absence of immunodeficiency or immunodeficiency syndromes, and exclusion criteria included receiving anticoagulants and lack of parental satisfaction and cooperation.

Data Collection

The variables of age and gender were collected through case information and type of operation technique, pain, duration of operation, incidence of snoring, late hemorrhage, and early hemorrhage were recorded based on the type of adenotonsillectomy and postoperative evaluation checklist.

Method of Study

After the approval of the plan by the ethics committee, the patients referred to the ENT clinic who were candidates for adenotonsillectomy were examined and then those patients who had the inclusion criteria and also did not meet the exclusion criteria were selected by available sampling method and after entering the study written consent was obtained from the patients' parents. This study was performed in form of a single-blind randomized clinical trial. For this purpose, patients were divided into three-person blocks and were placed into one of the cold dissection and hot dissection groups and for uniformity, all patients underwent general anesthesia with one protocol and adenotonsillectomy was performed by one person in both groups; In one group, dissection of tonsils was performed using electrocoagulation instrument and in the other group, dissection was performed using sharp

instrument without the use of an electrocautery and after the operation, all patients received a single kind of analgesic.

Finally, homogenization was performed based on age and gender and coagulation profile of all patients was checked before surgery by PT, PTT and INR tests; Then, each patient was checked in terms of variables such as length of operation, incidence of hemorrhage during the first 24 hours after surgery (primary hemorrhage) or after 24 hours (secondary hemorrhage), snoring after one week of tonsillectomy, and the pain score 12 hours after the operation and one week after the operation and the results were recorded in pre-prepared checklists. Patients' pain score was estimated based on VAS scale. In this method, the patient had to rate his pain from zero to 10. Zero was a sign of no pain and 10 was a sign of maximum pain (17).

Data Analysis

After the collection, the data were analyzed by SPSS statistical software version 21 and at 95% confidence level using descriptive statistics (frequency, scattering indices and plotting) and the analytical part was analyzed by the independent t-test and chi-square test and a significance level of 0.5 was considered.

Ethical Considerations

This plan was carried out after approval by the University Research Council and obtaining permission from the authorities and observing research ethics. The information was completely confidential and anonymous checklists were used.

3. RESULTS

In this study, 120 children who underwent adenotonsillectomy during 2016-2018 were evaluated, and amongst them 60 were girls and 60 were boys. The mean age of the children in the hot dissection group was 6.0 ± 2.1 years and the mean age of the cold dissection group was 5.5 ± 1.7 years. There was no significant difference between the two groups in terms of age and gender (P>0.05).

Table 1: Gender and age variables in the studied groups

Variable	Group				P value
	cold dissection		hot dissection		
Age (years)	5.5 ± 1.7		6.0 ± 2.1		0.093
Gender	Female	Male	Female	Male	0.112
	28 (47%)	32 (53%)	31 (52%)	29 (48%)	

The overall frequency of hemorrhage requiring intervention after adenotonsillectomy was 1.7% in the cold dissection group and 6.7% in the hot dissection group, which according to the Chi-Square test, the difference was not statistically significant (P = 0.171) (Table 2).

Table 2: Comparison of the overall frequency of hemorrhage requiring intervention in the two groups

Technique	**Presence of hemorrhage**	**Absence of hemorrhage**	**P value**
cold dissection	1 (1.7%)	59 (98.3%)	0.171
hot dissection	4 (6.7%)	56 (93.3%)	

According to Table 3, the frequency of hemorrhage after adenotonsillectomy showed that the frequency of early hemorrhage requiring intervention in the cold dissection group was zero and in the hot dissection group was 5%, but the difference was not statistically significant (P = 0.079). The frequency of late hemorrhage requiring intervention in the cold dissection group of 1.7% and in the hot dissection group of 3.3%, which according to the Chi-Square test, the difference was not statistically significant (P = 0.559) (Table 3).

Table 3: Comparison of the frequency of early and late hemorrhage requiring intervention in the two groups

Type of hemorrhage	Technique	Presence	Absence	P value
Early hemorrhage	cold dissection	0	60 (100%)	0.079
	hot dissection	3 (5%)	57 (95%)	
Late hemorrhage	cold dissection	1 (1.7%)	59 (98.3%)	0.559
	hot dissection	2 (3.3%)	58 (96.7%)	

Based on gender, in male patients, the overall frequency of bleeding requiring intervention after adenotonsillectomy was 0% in the cold dissection group and 10% in the hot dissection group, but the difference was not statistically significant. In female patients, the overall frequency of bleeding requiring intervention in the cold dissection group was 3.3% and in the hot dissection group was 3.3%, but the difference was not statistically significant (Table 4).

Table 4: Comparison of the overall frequency of hemorrhage requiring intervention in male and female patients in the two groups

Gender	Technique	Presence of hemorrhage	Absence of hemorrhage	P value
Male	cold dissection	0	(100%)30	0.076
	hot dissection	(10%)3	(90%)27	
Female	cold dissection	(3.3%)1	(96.7%)29	0.1
	hot dissection	(3.3%)1	(96.7%)29	

Comparison of the mean duration of adenotonsillectomy operation showed that according to independent t-test, there was no statistically significant difference between the two groups in terms of duration of operation (P = 0.598).

Table 5: Comparison of operation duration in the two groups

Technique	Mean	standard deviation	P value
cold dissection	13.0	2.9	0.598
hot dissection	12.7	3.5	

The mean pain score 12 hours and one week after the operation in the study groups is shown in Table 6. Based on the independent t-test, there was no statistically significant difference between the two groups in terms of mean pain score 12 hours after surgery (P = 0.229); But the mean pain score in the first week after surgery in the cold dissection group was significantly lower than the hot dissection group (P = 0.006).

Table 6: Comparison of pain score 12 hours and one week after surgery in the two groups

	Technique	Mean	standard deviation	P value
12 Hours	cold dissection	5.8	1.0	0.229
	hot dissection	6.1	1.1	
One week	cold dissection	2.7	1.1	0.006
	hot dissection	1.2	3.3	

4. DISCUSSION

Postoperative hemorrhage is the most common serious complication of adenotonsillectomy, which varies from 0.5% to 10% and has been reported in different surgical techniques. Hemorrhage may occur during surgery or within 24 hours after surgery (early hemorrhage) or after 24 hours (late hemorrhage) (6, 7).

In the present study, the overall frequency of hemorrhage, early hemorrhage, and late hemorrhage requiring intervention in the cold dissection group was not statistically significant. In a 2016 study by Dadgrenia et al., it was reported that none of the patients in the two groups experienced postoperative bleeding during the one-week follow-up (11). Saravakos et al. conducted a similar study in Germany in 2013-2014 and it was demonstrated that hemorrhage occurred in the cold dissection group in 10.9% of cases, while in the bipolar group hemorrhage occurred in 13.9% of cases (12). Also, in a study by Silveira et al. In 2000, there was one case of early hemorrhage in the cold dissection group and one case of late hemorrhage in the hot dissection group (14). In another study of children undergoing tonsillectomy, no group reported postoperative hemorrhage (20). In general, by comparing the results of various studies in this field, it could be indicated that the amount of postoperative hemorrhage is not significantly different between cold dissection and hot dissection. In the present study, there was no statistically significant difference between the two groups in terms of pain score 12 hours after the surgery. But the mean pain score one week after surgery in the cold dissection group was significantly lower than the hot dissection group. In a study conducted by Silveira et al. To compare postoperative morbidity in cold dissection and hot dissection in Portugal, 60 children aged 3-14 years were selected and divided into two groups of 30 who underwent tonsillectomy. In the first group the operation was performed by cold dissection method and in the other group by hot dissection method and it was observed that in group 1, the duration of the operation and intraoperative bleeding were higher but postoperative pain and length of hospital stay were less, which is consistent with the results of our study (14). In another study, it was observed that the hot dissection group needed more analgesics than the cold dissection group during the 12 days after surgery (16). In another similar study conducted by ST Chettri et al. In 2013 in Nepal, it was reported that postoperative pain intensity was higher in the electrocautery group than in the cold dissection group (20). In another study conducted by Muhammad Ali et al. In 2014, they reported that the intensity of postoperative pain on the seventh and fourteenth days after the surgery in the electrocautery group was significantly higher than in the cold dissection group (21). Various researches have been conducted on the type of operation technique, amount of pain, duration of operation, and hemorrhage in tonsillectomy, all of which have pointed to the importance of recognizing better solutions (22-24). It should be noted that the severity of postoperative pain in the patients (especially after the first day) in the electrocautery group is higher than the cold dissection group.

According to the above findings, it seems that surgery with both methods has no effect on the amount of hemorrhage after the operation, and according to the doctor, both methods could be used, however, in terms of speed in the homeostasis stage, the hot dissection method is faster. On the other hand, the average pain score and pain stability in the hot method is higher than the cold method, which could be controlled by consuming analgesics and is a minor complication of surgery.

In general, it seems that due to the higher speed of homeostasis in the hot method and less bleeding during surgery, which has been mentioned in various studies, this method is mostly used by surgeons.

Due to the time constraints of the project and the limited number of samples, a smaller sample size was examined, and certainly, an increase in the sample size in future studies would have a beneficial effect on the accuracy of the findings. Also, a number of patients that were included in the plan and underwent adenotonsillectomy, did not return at the scheduled time after discharge from the center, which led to the exclusion of a number of patients from the study.

5. CONCLUSION

The frequency of postoperative hemorrhage was not significantly different between the two groups, but the pain intensity in the first week after surgery in the cold dissection group was significantly lower than the hot dissection group. Since the hot method had no significant advantage over the cold method, it is recommended that tonsillectomy be performed using the cold dissection method, but on the other hand, due to the shorter length of postoperative homeostasis, surgeons use the hot dissection method more often. However, it is recommended that larger studies be conducted to further evaluate and compare the two methods.

Conflict of Interest: None.

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