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ORIGINAL ARTICLE

Comparative Study between Endoscopic Suction Coagulation and Conventional Adenoidectomy with Pre and Post-Operative Tympanometric Changes

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Abstract

Background: ***Adenoidectomy ranks high among the many surgical procedures done on pediatric patients. For kids having an adenoidectomy, the leading cause of complications, particularly in the immediate aftermath of the procedure, is after surgery bleeding, regardless of the distance surgical procedures have come.***

Objectives: ***This study set out to compare and contrast standard adenoidectomy with endoscopic suction coagulation, two methods of adenoidectomy that have been around for a while regarding tympanometric alterations, after-surgery recurrent grading, and overall effectiveness.***

Patients and Methods: ***Researchers conducted a prospective study on seventy patients with adenoid hypertrophy symptoms, including stuffy nose, mouth breathing, and bilateral recurrent otitis media with effusion. Radiological evidence, clinical symptoms, and nasal endoscopic examination lead to the diagnosis of adenoidal enlargement in all instances. Group A used a cold method, whereas Group B underwent the procedure using an endoscopic suction coagulator. Pre- and post-operatively, an audiologist evaluated the patient as well.***

Results: ***The mean age of Group A was 6.57 ±2.8, ranging from 3 to 12 years. Group B's mean was 7 ±2.8, ranging from three to 12 years. Both groups have significant differences in operative timing, intraoperative bleeding, and recurrence rate. There are also significant relief results from the tympanographic data of included patients, comparing preoperative and postoperative data separately.***

Conclusion: ***It is concluded that endoscopic suction coagulation adenoidectomy has an advantage over adenoidectomy using the cold technique. It was more efficacious and safer, with less morbidity and rapid recovery.***

Keywords: Adenoidectomy; Cold dissection; Suction coagulation

1. Introduction

In pediatric cases, adenoidectomy is still the treatment that is most often done. For kids undergoing an adenoidectomy, the leading cause of morbidity, particularly in the immediate aftermath of the procedure, is after surgery bleeding, regardless of how far surgical methods have come. Since adenoidectomy effectively prevents obstructive sleep apnea and its negative side effects (cognitive and behavioral disorders, nocturnal enuresis, learning difficulties), it is consistently recommended for patients with obstructive sleep apnea or recurring infections of the adenoid mass. The procedure's popularity has skyrocketed in recent years. [1,2]

New adenoidectomy procedures and equipment have come to the public as an experiment to lessen postoperative discomfort and postoperative bleeding risk. Traditional cold curettage using a curette or microdebrider and "hot techniques" such as suction coagulation, bipolar electrocautery, or radiofrequency are among the methods used to execute adenoidectomy. As of 2016, electrocautery adenoidectomy was still the gold standard for adenoidectomy in the US. [3]

This study set out to compare and contrast standard adenoidectomy with endoscopic suction coagulation, two methods of adenoidectomy that have been around for a while, regarding tympanometric alterations, after-surgery recurrent grading, and overall effectiveness.

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2. Patients and methods

Seventy patients presenting with symptoms of adenoid hypertrophy (nasal blockage, snoring, mouth breathing, and bilateral recurrent otitis media with effusion) were included in this prospective randomized trial. The patients' sources were the otorhinolaryngology (ORL) outpatient clinics at Al-Azhar University Hospitals.

After we described the research, all patients and their families gave their written permission, and the ethics committee approved it.

2.1.Inclusion criteria: Children aged three to twelve with a history of breathing problems during sleep due to adenoid hypertrophy, as well as those qualified for tonsillectomy who do not exhibit any symptoms of adenoid hypertrophy, will be evaluated.

2.2.Exclusion criteria: Individuals whose noses are severely obstructed because of conditions including sinonasal polyps, hypertrophied inferior turbinates, septal deviation, allergic rhinitis, or septal deviation, Patients with coagulation disorders, those less than three years old, those older than twelve years old, and those with congenital nasal or maxillofacial abnormalities (such as cleft lip & palate, choanal atresia, retrognathia, or macrognathia) must be carefully monitored.

The study subjects were randomly divided into two groups: 35 patients in Group A underwent adenoidectomy using conventional techniques (cold and steel), and 35 patients in Group B underwent adenoidectomy using endoscopic suction diathermy.

All patients were subjected to certain protocols. Pre-operative preparation included personal history with complaints and history of present illness. History was also included, with a history of Diabetes, Cardiac disorders, and previous operations such as adenoidectomy. The general and oral examination must include occult or overt submucous cleft, bifid uvula, asymmetrical motion, and high-arched palate. A nasal examination was done also to rule out other causes of nasal obstruction. An audiological evaluation was performed with tympanometry, a radiological evaluation was performed using an X-ray nasopharynx, and an endoscopic evaluation was performed. [4]

2.3.Operative techniques:

Conventional technique (Cold and Steel): The curvature of the cervical spine is emphasized in the Rose's position (tonsillectomy posture); therefore, it may be desirable to have the neck in a neutral position, neither flexed nor stretched.

We digitally palpated the adenoid tissue and performed an adenoidectomy using a St. Clair Thompson adenoid curette after palpating the posterior and lateral pharyngeal walls for pulsation. A suitable-sized sharpened adenoid curette was passed strictly in the midline behind the soft palate and into contact with the back of the septum. The adenoids were shaved away with a firm sweeping movement of the wrist, and the curette was moved sharply away from the posterior pharyngeal wall. Remove remnants using the finger to scrape these areas clean or explore them with a curette, which may injure the superior constrictor muscle with bleeding and scarring or damage to the Eustachian entrance. In order to achieve hemostasis, ribbon gauze was inserted into the nasopharynx and then removed 5 minutes later.

2.4.Endoscopic Suction diathermy technique: The kid was put in Rose's place.

After passing two small-bore suction catheters via the nose, they are removed from the mouth. The adenoid pad and surrounding tissues may be seen immediately by inserting a four-millimeter, Seventy-degree endoscope into the oropharynx. A disposable, malleable size of ten or twelve (depending on the size of the adenoid) is used to complete the diathermy ablation of the pad. When the nasopharynx has a smooth shape and the posterior choanae are visibly apparent, the surgery is considered complete. At the same time that suction starts at the topmost aspect, a current of (38W) is administered when the tip is in touch with the adenoidal tissue. Most of the tissue may be precisely removed by moving slowly over the adenoids while using suction and diathermy simultaneously. When the nasopharynx has a smooth shape and the posterior choanae are visibly apparent, the surgery is considered complete.

All cases underwent post-operative nasal endoscopic assessment to exclude any recurrence of adenoid remnants three months after the procedure; tympanometry was performed 12 weeks after the procedure to evaluate middle ear function.

2.5.Statistical Methods

The mean value and the standard deviation were both included in the descriptive statistics group. When analyzing the association among the data, the T-test and the chi-square test were used as statistical tools. For the purpose of statistical analysis, the SPSS 22.0 programs were used. It was determined that the p-value was significant since a p-value of less than 0.05 was regarded as significant.

3. Results

Table 1. Demographic data between studied groups

	GROUP OF PATIENTS (N = 70)		STAT. TEST	P-VALUE
	Group A	Group B		
AGE (YEARS)			T = 0.59	0.553
MIN. – MAX.	6.57 ± 2.8	7 ± 2.8		
MEAN ± SD.	3 – 12	3 – 12		
SEX			2.961	0.564
MALE	19	18		
FEMALE	16	17		

This table showed no statistically significant distinction (p-value > 0.05) between studied groups as regard age and sex. The mean age of Group A was 6.57 ±2.8 ranging from three to twelve years. In Group B the mean was 7 ±2.8 ranging from 3 to 12 years.

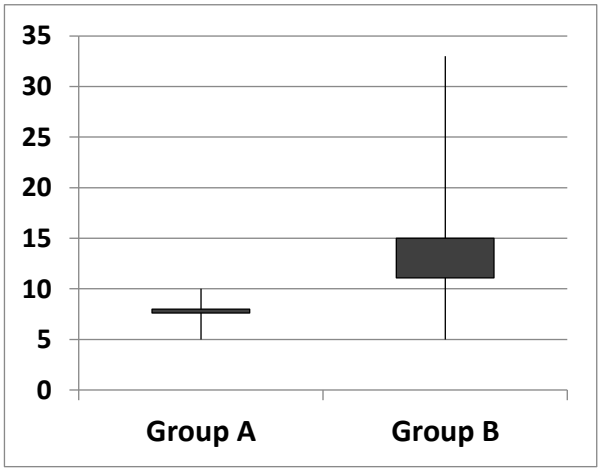

Figure 1. Operative time

The mean operative time in Group A was 7.6 ±1.75 min & in Group B was 11.1 ±7.4 min. There was longer operative period in Group A than Group B. So, difference among studied groups regarding operative time was statistically significant (p-value < 0.05) as shown in figure 1.

Table 2. Intra-operative bleeding

INTRA-OPERATIVE BLEEDING		GROUP A (N = 35)	GROUP B (N = 35)	STAT. TEST	P-VALUE
BLOOD LOSS (ML)	Mean ±SD	28.6 ± 7.8	5.0 ± 1.3	T= 48.23	< 0.001
	Range	35 – 20	7 – 3.5		

Intra-operative bleeding in the Group B was (5.0 ± 1.3) ml. and in Group A was (10.7 ± 2.8) ml. So, there was statistically significant variance (p-value <0.05) amongst studied groups as regards intra-operative blood loss and a high statistically significant variance (p-value < 0.001) as regard blood loss volume.

Table 3. Preoperative and postoperative tympanometric parameters

TYPE OF TYMPANOMETRY	GROUP A (N = 35)	GROUP B (N = 35)	X^2	P-VALUE
PRE-OPERATIVE - TYPE A	5 (2.85%)	7 (20%)	1.772	0.778
- TYPE B	2 (5.7%)	3 (14.3%)		
- TYPE C	28 (5.7%))	25 (14.3%)		
POST-OPERATIVE - TYPE A	19 (54.3%)	30 (2.85%)	8.273	0.082
- TYPE B	2 (5.7%)	2 (5.7%)		
- TYPE C	14 (40%)	3 (5.7%)		
X^2	17.375	37.552		
P-VALUE	0.002	0.0001**		

According to tympanographic data, there are only two patients with type B and another 5 patients with type A, but the rest of these patients in group A were type C. In group B, there were preoperatively

7, 3, 25 patients with type A, B, C tympanogram. Postoperatively there was relief of 30 patients of type A in group B, but only 19 patients relieved by type A in group A. There are significant relief results of tympanographic data of included patients comparing preoperative and postoperative data in each group separately. Although no significant results recorded comparing preoperative results between both groups, there are also significant results of tympanogram postoperatively comparing between both groups.

Table 4. Postoperative visual analogue score for pain

VISUAL ANALOGUE SCORE (VAS)		GROUP A (N = 35)	GROUP B (N = 35)	STAT. TEST	P-VALUE
1ST DAY	Mean ±SD	5.0 ± 2.5	7.5 ± 1.5	T= 0.915	0.783 NS
	Range	3 – 8	6 – 9		
AFTER 1 WEEK	Mean ±SD	2.0 ± 1.0	4.0 ± 2.0	T= 5.12	0.013 S
	Range	0 – 3	2 – 6		

According to pain score, VAS in the first day related to Group A was (5.0 ± 2.5) and in Group B was (7.5 ± 1.5) without statistical significant difference, but the percentage of normal activity after one week related to Group A was (2.0 ± 1.0) & in Group B was (4.0 ± 2.0) with statistical significant difference.

Table 5. Postoperative follow-up period

POSTOPERATIVE FOLLOW-UP PERIOD	GROUP A (N = 35)	GROUP B (N = 35)	STAT. TEST	P-VALUE
INFECTION	2 (2.85%)	7 (20%)	X^2= 3.137	0.535
SOFT PALATE INJURY	1 (5.7%)	5 (14.3%)		
BAD ODOUR	0 (0)	5 (14.3%)		

According to postoperative follow-up findings, there are patients had infection at site of injury about 7 cases of group B & only 2 cases of group A, there are also patients had soft palate injury as 5 cases of group B & only one case of group A, and about bad odor presence postoperatively there are occurred only in 5 cases of group B without recorded cases for group A. There is no significant variation among both groups regarding complications in follow- up period.

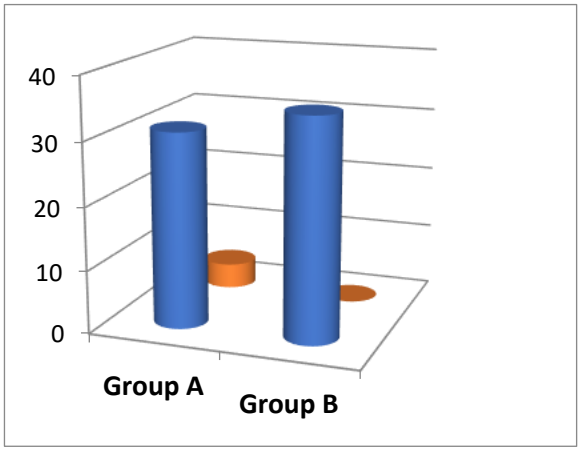

Figure 2. Comparison between studied groups as regard recurrence

after surgery endoscopic evaluation & X-ray nasopharynx of adenoid at 6th month showed that in group A there were 4 patients had grade II adenoid & 31 patients had no recurrent, adenoid in the group B there were no any recurrence. So, the variation amongst the 2 groups is statistically significant as regard after surgery endoscopic assessment at 6th month after operation p-value >0.05. The recurrence recorded in group (A) as there were 4 patients had recurrent adenoid tissue at 3rd month of the operation with grade (I) adenoid tissue and at 6th after the operation had grade (II) adenoid tissue but in the group (B) there were not any recurrence recorded.

4. Discussion

The current findings show that endoscopic coagulator adenoidectomy can safely and effectively remove all adenoid tissue, thanks to the tiny wand tip and endoscopic control, which can reach the most cranial part of the adenoid and the adenoid intranasal extension, which are inaccessible with the Beckmann curette. Coagulator adenoidectomy has several advantages over cold curettage, one of which is that the technique only requires one tool to ablate and coagulate tissue, which greatly speeds up the healing process for the patient. [5]

Coagulation adenoidectomy has several benefits over cold curettage, including a direct endoscopic view of the adenoid, no blood loss, the ability to reach all areas of the nasopharynx up to the

Eustachian tube opening, a lower risk of residual adenoid tissue after coagulator surgery, fewer complications (no cutting blade with coagulation adenoidectomy), suitability for patients of all ages (except pediatric patients, who benefit from a decrease in pain intensity & duration), less medication after surgery, & fewer days off work for parents as a result of faster post-operative healing. [6]

The average age of Group A, which ranged from three to twelve years, was 6.57 ±2.8 years, as per the research groups. With ages ranging from three to twelve, the average in Group B was 7 ±2.8. When looking at the age distribution of the groups under study, this table revealed no statistically significant differences (p-value > 0.05). In separate research, the endoscopy-assisted suction coagulation adenoidectomy was performed on 60 individuals in group A. In a similar vein, sixty-two individuals from group B had the classic curettage adenoidectomy procedure. Group B had an average age of 8±3.9, while Group A had an average age of 5.27 ± 3.5. In our research, 54.3 percent of participants were male, and 51.4 percent were female; nevertheless, in a different study, the corresponding numbers were 40% for men and 46.7 percent for women. [7]

In their research, Na'ara et al. found that participants' ages ranged from 1.2 to 15, with a mean of 5.9 years. Both sets of data were comparable in terms of demographics and clinical characteristics. The average time to do the procedure was 9.4 ± 2.2 minutes in the group using the hot approach compared to 6.6 ± 4 minutes using the cold method (p = 0.0007). [8]

In other words, to be accurate and specific and to exclude other factors, preparation, anesthesia, and time for adenoid removal, the operative time was calculated only from the beginning of tonsil removal till complete removal of tonsil and control of bleeding. The mean operative time in Group A was 7.6 ±1.75 min, and in Group B, it was 11.1 ±7.4 min. There was a longer operative period in Group A than in Group B. So, the difference among studied groups regarding operative time was statistically significant (p-value < 0.05).

Endoscopic nasopharyngeal approaches need nasal decongestion, secretion suctioning, and meticulous inspection; nonetheless, they provide more accurate and progressive adenoid tissue removal than "en bloc" removal, which may explain why cold curettage groups required less surgical time in certain studies. Even if the total amount of time required is reduced due to an improvement in the learning curve of surgeons and nurses, this data should be considered when operating room surgical planning is being examined. One possible solution may be to schedule a series of endoscopic coagulation adenoidectomies to save time in preparation. [9]

Group A had an intraoperative blood loss of 10.7 ± 2.8 ml, whereas Group B reported 5.0 ± 1.3 ml. Regarding intra-operative bleeding, there was a statistically significant distinction (p-value <0.05) among the evaluated groups. As mentioned in the operation specifics, bleeding was calculated. The following was done to calculate bleeding: (A) A system for evaluating suction, and (B) the number of cotton soaked in blood (where applicable). There was an extremely significant variation (p-value < 0.001) in bleeding volume across the tested groups, as seen in this table. Comparatively, Datta et al. found that coagulator endoscopic adenoidectomy resulted in less intraoperative blood loss, with just twenty-one milliliters, compared to the standard curettage procedure, which had 31.67 ml in their research. [9]

The intraoperative hemorrhage caused by suction coagulation adenoidectomy was 4.53 ±1.16 ml, which was decreased in our research. There was about 49.47 ±9.05 ml of intraoperative hemorrhaging with the traditional curettage method. This is in line with the findings of Reed et al., who also measured blood loss during suction diathermy (mean 4.1 ml). [10]

This research used the nasal endoscope to analyze patients before surgery. Group (A) had 20 patients with grade III adenoids and fifteen patients with grade IV adenoids; group (B) had seventeen patients with grade III and 56.7 percent with grade IV adenoids (P-value 0.774). Group A included 13 patients with adenoid grade (III) and twenty-two patients with grade (IV) according to preoperative X-ray grading. In contrast, fourteen patients in group B had a grade of III, and twenty-one in grade IV. There was no statistically significant variation among the groups regarding the pre-operative X-ray grading of the adenoid (P-value 0.774).

Abdul Salem's research found that nineteen patients in group A (coagulation adenoidectomy) had all of their adenoids removed after three months of follow-up endoscopic grading. Partial remains (grade 2 or grade 3) were seen in three individuals in group A. In contrast, five patients in group B had their adenoids surgically removed. A partial removal of adenoid tissue was seen in twenty patients in group B, who had typical adenoidectomy. Compared to other methods, there was a statistically significant increase in the proportion of adenoid tissue completely removed by coblation adenoidectomy (P < 0.05). The Eustachian tube function was evaluated three months post-op using post-operative tympanometry. There were no post-operative type B tympanograms in group B, while all patients in group A had type A tympanograms.

The p-value was 0.149. [11]

In this study, there were only two patients with type B and another five with type A, but the rest of the patients in group A were type C. In group B, there were preoperatively 7, 3, and 25 patients with type A, B, and C tympanograms. Postoperatively, there was relief of 30 patients of type A in group B, but only 19 patients were relieved by type A in group A. Significant relief results from the tympanographic data of included patients were obtained by comparing preoperative and postoperative data in each group separately. Although no significant results were recorded comparing preoperative results between both groups, there are significant results of tympanogram postoperatively comparing between both groups.

According to research by Di Rienzo, conventional cold curette therapy increases the risk of recurrence by causing a significant increase in lymphocytic infiltration. In this study, the recurrence was recorded in group (A) as four patients had recurrent adenoid tissue in the third month of the operation with grade (I) adenoid tissue and at 6th after the operation had grade (II) adenoid tissue, but in the group (B) there was not any recurrence recorded. [5]

In research by Datta et al., three instances in Group A had collateral harm, but no further injuries were reported in Group B. Only patients who had adenoidectomy alone were the subjects of the postoperative discomfort study. The pain scores for Group A (n=8) and Group B (n=11) were 1.64-2.63-3.63 (95% CI) and 1.19-2.13-3.06 (95% CI), respectively.[9] In research by Naraa et al., the results at the one-year follow-up remained higher than the baseline. Significant progress was seen in both follow-up intervals for patients in the hot technique group, with no regression observed after one year. [8]

4. Conclusion

It is concluded that Endoscopic suction coagulation adenoidectomy has an advantage over adenoidectomy using cold technique and was found to be more efficacious and safer with less morbidity and rapid recovery.

Disclosure

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

Authorship

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There are no conflicts of interest.

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