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ORIGINAL ARTICLE.

Assessment of Outcomes of Endoscopic-Assisted Adenoidectomy: Microdebrider *versus* Coblation in Children

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ABSTRACT

Background: A paramount adenoidectomy procedure should enhance visualization of the adenoid pad for the surgeon and promote efficient tissue excision with limited blood loss. The study thought to compare the outcomes of endoscopic-assisted adenoidectomy performed using either a microdebrider or coblation. Parameters of interest included blood loss, pain, surgical duration, and immediate postoperative complications. **Methods:** In this randomized, prospective clinical trial, 54 patients diagnosed with hypertrophied adenoiditis were enrolled. They were equally distributed into two cohorts: Group I (endoscopic-assisted adenoidectomy using a microdebrider) and Group II (endoscopic-assisted adenoidectomy using coblation). Metrics assessed encompassed operative duration, blood loss, pain intensity, related trauma, adequacy of adenoid removal, and instances of nasal/oral hemorrhage. **Results:** The mean operation time for Group I (microdebrider) was 20.19 minutes, significantly shorter than the 34.26 minutes in Group II (coblation) ($p < 0.0001$). Postoperative pain, gauged using the VAS score, was notably elevated at 1 hour ($p=0.001$) and 1 day post-operation ($p < 0.0001$) in Group I (microdebrider) relative to Group II (coblation). The two groups exhibited no statistically discernible differences in terms of post-operative complications. **Conclusion:** Endoscopic-assisted adenoidectomy via coblation is both safe and efficacious. This method facilitates comprehensive adenoid removal with decreased blood loss. Although the procedure's duration may extend longer than the microdebrider method, coblation offers fewer postoperative complications and reduced postoperative pain duration.

Keywords: Endoscopic-Assisted Adenoidectomy; Microdebrider; Coblation

INTRODUCTION

The adenoid, commonly referred to as the nasopharyngeal tonsil, is a lymphoid tissue located on the posterior superior wall of the nasopharynx. It forms part of the Waldeyer's ring, a lymphatic ring comprising the adenoids, palatine and lingual tonsils, and associated mucosal lymphoid tissue. Meyer was the first to describe the adenoid as a constituent of the Waldeyer's ring in nasopharyngeal lymphoid tissue **[1]**.

Adenoid hypertrophy in children can lead to obstruction of the upper airway. Manifestations of this condition in the pediatric population include chronic nasal obstruction, rhinorrhea, mouth breathing, snoring, recurrent sinusitis, feeding challenges, craniofacial anomalies, and recurrent otitis media with effusion **[2]**.

The primary objective of adenoidectomy is to alleviate nasal airway obstruction and address chronic nasopharyngeal respiratory infections **[3]**.

The traditional approach to adenoidectomy, using a curette, has been in practice for over a century since its initial description. While curettage adenoidectomy (CA) offers a straightforward and secure method for excising adenoid tissue, it possesses certain limitations such as incomplete removal, potential injury to adjacent tissues, and hemorrhage **[4]**.

An optimal adenoidectomy technique should afford the surgeon clear visualization of the adenoid pad, facilitate efficient tissue extraction with limited bleeding, and be cost-effective while minimizing complications. Streamlining common surgical protocols in pediatric outpatient settings can eliminate wastage, optimize overall value, and ensure the preservation of desirable outcomes **[5,6]**.

This study aimed to juxtapose and assess endoscopic-assisted adenoidectomy executed using either a microdebrider or coblation, considering metrics such as blood loss, pain, surgical duration, and immediate postoperative complications.

METHODS

A randomized prospective clinical trial was conducted in the Department of Otolaryngology - Head and Neck Surgery at Zagazig University Hospitals. The study enrolled 54 patients diagnosed with hypertrophied adenoiditis, slated for adenoidectomy. They were evenly split into two groups:

Group I: 27 patients underwent endoscopic-assisted adenoidectomy using a microdebrider.

Group II: 27 patients underwent endoscopic-assisted adenoidectomy with coblation.

Inclusion criteria:

Children aged 3 to 15 years diagnosed with hypertrophied adenoiditis. The diagnosis was confirmed via patient history and nasopharyngeal endoscopy. Those with symptoms such as nasal blockage, mouth breathing, snoring, and recurrent sinonasal infections were also considered eligible.

Exclusion criteria:

Patients with recurrent adenoids, congenital conditions like cystic fibrosis or cleft palate, and those with bleeding disorders were excluded.

All participants underwent a comprehensive medical history assessment, ENT examinations, and standard preoperative laboratory tests. The Clemens and McMurray grading system was employed to intraoperatively grade adenoid size **[7]**.

Ethical Consideration:

The academic and ethical committee at Zagazig University approved the study. All of the subjects' written informed permission was acquired. The Declaration of Helsinki, the World Medical Association's code of ethics for studies involving humans, guided the conduct of this work.

Surgical Procedure:

Patients were orally intubated under general anesthesia using a cuffed endotracheal tube. They were positioned with slight head flexion and a Boyle-Davis retractor was used for mouth exposure. To aid endoscope usage, 0.025% oxymetazoline hydrochloride nasal drops were administered bilaterally for decongestion. Adenoidectomies were performed endoscopically using a 4mm 0-degree endoscope.

In Group I, The tip of the microdebrider was placed orally into the nasopharyngeal hollow and employing a speed of in oscillating mode. Bipolar was used for hemostasis in some cases **(Figure 1)**.

In Group II, Adenoidectomy was performed using an angled (15 degree) coblator which was inserted orally **(Figure 2)**.

Outcome Measures:

Parameters such as operation duration, blood loss, pain intensity, associated trauma, adenoid removal completeness, and instances of nasal/oral bleeding were evaluated for each patient.

Postoperative care and follow up:

Postoperatively, all patients received antibiotics, analgesics, and a local nasal decongestant for a week. Pain intensity was quantified using the Visual Analogue Scale (VAS), where patients marked their pain level on a 10-cm line, subsequently measured to produce scores ranging from 0 to 10.

STATISCAL ANALYSIS

Data were processed and analyzed using the SPSS software, version 11. Quantitative data were expressed as mean ± standard deviation, and Student's t-test was applied to determine differences between two means. Qualitative data were presented as frequencies and proportions, with the Chi-square test assessing significance. If ineffective, the Fisher's exact test was employed. A p-value of >0.05 was considered statistically significant.

RESULTS

There was no statistically significant difference between both groups regarding age, sex and adenoid grading (p= 0.783, 0.5 and 0.337) **(Table 1)**.

Operation time was significantly lower in group 1 (microdebrider) than group 2 (coblation) which

was 20.19 min in average in group 1 and 34.26 min in group 2 (p <0.0001) **(Figure 3)**.

According to intra operative complications, 3 cases in group 2 (coblation) had collateral injuries to surrounding tissues (2 cases injury to posterior pharyngeal wall mucosa and one case one case injury to Eustachian tube orifice). There was no statistically significant difference between both groups regarding collateral injury while a statistically significant difference was found between both groups regarding Intraoperative bleeding where hemostasis was done for 6 patients from group 1 (microdebrider) using bipolar to control bleeding **(Table 2)**.

Postoperative pain scores as assessed by VAS score showed significantly higher pain scores 1h post-operative (p=0.001) and 1 day postoperative (P <0.0001) in Group 1 (microdebrider) as compared to Group 2 (coblation) **(Table 3)**.

There was no statistically significant difference between both groups regarding post-operative complications (postoperative Bleeding, Local infection, AOM, Postop voice change, Ear pain, Neck pain, Halitosis, Torticollis and Fever) **(Table 4)**.

Table (1): Demographic and clinical data in both group

Patients properties		Mean ±SD / n (%)
Age		7.15 ±2.93
Sex	female	29 (53.7%)
	male	25 (46.3%)
Adenoid grading	Grade 2	8 (14.8%)
	Grade 3	37 (68.5%)
	Grade 4	9 (16.7%)

Table (2): comparison between intra operative complications in both groups

Intra-operative complications	Group 1	Group 2	X2	P value
Collateral injury	0	3	3.176	0.075
Intraoperative bleeding	6	0	6.75	0.009

Table (3): comparison between post-operative pain in both groups

Post-operative pain	Post op pain VAS 1 h	Post op pain VAS 1 d
Group 1	3.22	2.01
Group 2	2.22	0.78
T test	3.63	6.43
P value	0.001	<0.0001

Table (4): comparison between post-operative complications in both groups

Post-operative complications	Group 1	Group 2	X2	P value
postoperative bleeding	3	0	3.176	0.075
Local infection	2	1	0.353	0.552
AOM	1	2	0.353	0.552
Postop voice change	3	6	1.2	0.273
Ear pain	2	2	0	1
Neck pain	0	3	3.176	0.075
Halitosis	2	3	0.22	0.639
Torticollis	1	4	1.984	0.159
Fever	3	1	1.08	0.299

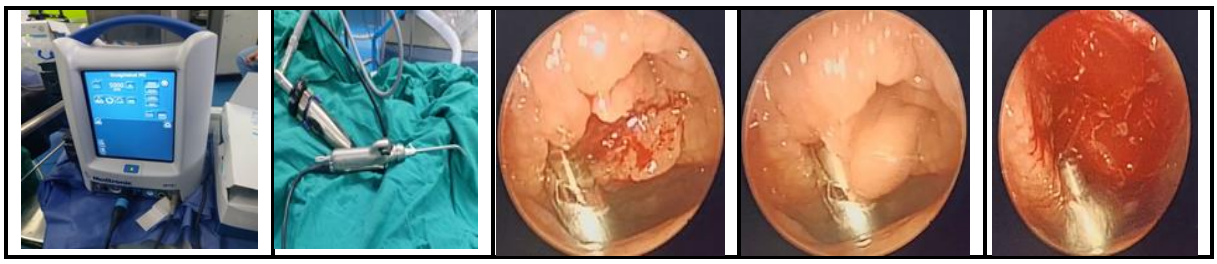

Figure (1): Surgical steps using Microdebrider device and Hand for adenoid removal in group I patients.

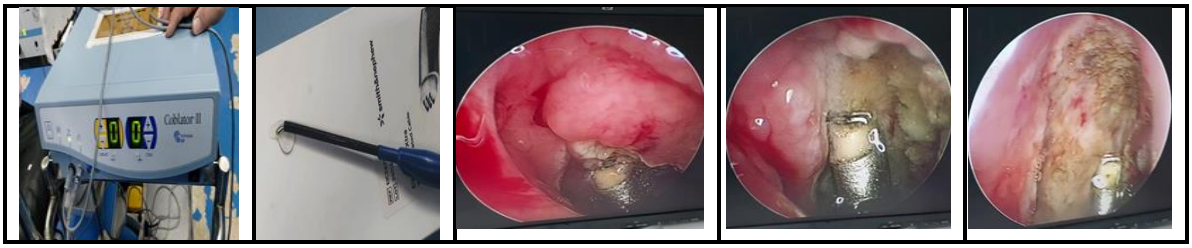

Figure (2): Surgical steps using Coblation device and hand (Evac 70 Plasma Wand) for adenoid removal in group I patients.

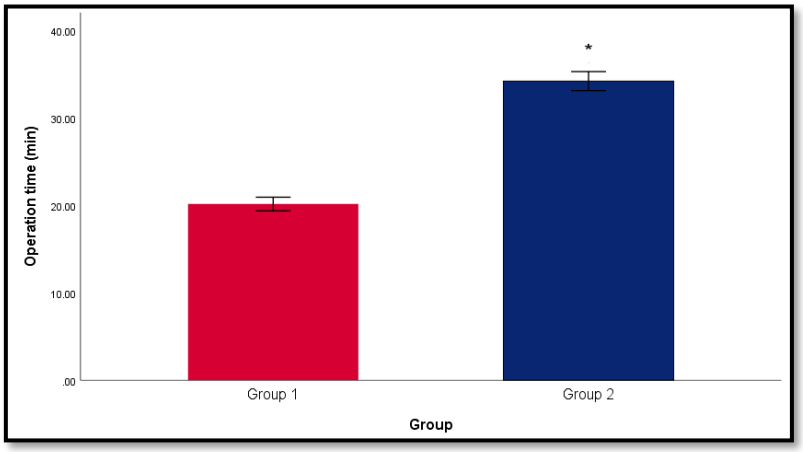

Fig. (3): Comparison between operation time in both groups

DISCUSSION

Since the inception of the curettage adenoidectomy technique, various alternative approaches have emerged, encompassing tools such as the microdebrider, molecular resonance device, and coblation wand, in addition to methods like suction diathermy, laser, and radiofrequency ablation **[8]**.

Amidst this plethora of techniques, the overarching goal for researchers remains the identification of a method that ensures comprehensive adenoid removal, optimal symptom alleviation, and minimal postoperative complications **[6]**.

This study sought to determine the efficacy and safety of endoscopic-assisted adenoidectomy using either a microdebrider or coblation in enhancing outcomes and mitigating complications associated with conventional curettage adenoidectomy. This comparative study involved 54 patients with hypertrophied adenoiditis, divided equally between Groups I and II.

There was no statistically significant difference between both groups regarding age, sex and adenoid grading (p= 0.183, 0.5 and 0.337). It was similar to **Singh et al. [9]** who revealed that coblation group showed the average age was 6.9± 2.8, while in the microdebrider group, it was 7.2± 2.3. In the cobation and microdebrider groups, there were 41:47 men, respectively. In the coblation group, the average adenoid grade was 3 ± 0.7, while in the microdebrider group, it was 2.9 ± 0.6.

While in **Mularczyk et al. [10]** study the mean age was lower (about 4.9 years) and also in **Liu et al. [11]** study, the average age was 4.3 ± 1.5 years.
In the present study, the mean operation time in all endoscopic adenoidectomy was 27.22 min ±8.61. The intra operative complications was collateral injury in 3 cases (5.6%) and iintraoperative bleeding in 6 (11.1%) cases of microdebrider group where bipolar was used for hemostasis.
Operation time was significantly lower in group 1 (microdebrider) than group 2 (coblation) which was 20.19 min in average in group 1 and 34.26 min in group 2 (p <0.0001).
In endoscopic-assisted adenoidectomy with coblation, surgeon uses one of his hands for lens and the other hand for the coblator, so all lymphoid tissue of adenoid needed to be dissected and sucked through coblator hand which obstructs many times during surgery and needs to be cleaned. This problem waste time and effort.
In the same line with **El-daly et al. [12]**, The operative time was shorter in microdebrider group with mean duration (15.30 ± 5.12 minutes) than coblation group (28.0 ± 4.61 minutes) (p <0.001).
The same in many previous studied as **Singh et al. [9]** who observed that the coblation group's average intraoperative duration was 22.038±3.3 min, compared to 12.78±3.18 min for the microdebrider group.
In contrast to our results, **Mularczyk et al. [10]** and **Liu et al. [11]** established that, when compared to a microdebrider for adenoidectomy, coblation exhibited much less intraoperative time, less blood loss, as well as a shorter length of postoperative pain. Nevertheless, **Mularczyk et al. [10]** used different coblation hand (Procise Max wand) for patients older than 5 years which isn't provided in Egypt and may be more suitable for adenoidectomy and that may explain that contrast in results in the literature.
There was no statistically significant difference between the two groups regarding collateral injury in the current study's intraoperative complications, but there was a statistically significant difference between the two groups regarding intraoperative bleeding because hemostasis was performed for six patients in group 1 (the microdebrider) using bipolar to control bleeding.
Postoperative pain scores as assessed by VAS score showed significantly higher pain scores 1h post-operative (p=0.001) and 1 day postoperative (P <0.0001) in Group 1 (microdebrider) as compared to Group 2 (coblation).
After head and neck surgical procedures, pain is prevalent, and poor post-adenoidectomy pain management is associated with trouble swallowing and eating. Adenoidectomy recovery is also impacted by inadequate pain management. Thus, a surgical technique that lessens discomfort may result in a better surgical outcome **[9].**
Our finding is in agreement with **Singh et al. [9]** who recognized that the post-operative 24 hour mean pain scores were 2.6±0.99 and 7.14±0.99 in the coblation and microdebrider groups, respectively. In the coblation group, the post-operative 72-hour mean pain score was 1.17±1.1, whereas in the microdebrider group, it was 4.08±1.42. Both of them had a significant p value.
Also, **Mularczyk et al. [10]** observed that days of pain were significantly different between groups.
In a study of **Thomas et al. [13]** who conducted 25 kids between the ages of 3 and 15 had coblation adenoidectomy procedures. 80% of patients reported no pain immediately following surgery, and 88% reported no pain upon their initial hospital visit. 76% of patients required less than one day of hospitalisation, while 24% required more than one day.
On the other hand, **Mehta et al. [14]** revealed that when comparing coblation assisted adenoidectomy to microdebrider assisted surgery, postoperative pain scores using the Wong Baker pain scale where 0 indicates no pain and 10 indicates the worst pain showed consistently greater pain scores at all periods (p<0.000). In comparison to the coblation group, the children in the microdebrider group cured more quickly and were released from the hospital earlier (p<0.05).
However, using Wong Baker as a pain scale have many issues when applied to pediatric community as reported in many studies. The Wong Baker pain scale was originally designed for use by paediatric patients to communicate with healthcare professionals, but due to its popularity, it was also made available to adults. It also has weaknesses due to its lack of standardisation in interpreting pain experiences **[15,16].**

Conclusions:

Endoscopic-assisted adenoidectomy either by coblation or microdebrider is a safe and effective method achieving a complete adenoidectomy with low incidence of complications. Endoscopic-assisted adenoidectomy with coblation showed lower incidence of bleeding and lower pain score than microdebrider while endoscopic-assisted adenoidectomy with microdebrider precedes coblation in term of operation time.

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