



## Comparative Evaluation of Adenoidectomy Techniques in Pediatric Patients

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### Abstract

**Background:** Adenoidectomy is a common pediatric procedure removing enlarged nasopharyngeal tissue, preventing airway obstruction and complications like facial deformities and pulmonary hypertension. **Aim:** To compare the outcomes of adenoidectomy using three surgical techniques (three studied groups) (Conventional, Microdebrider, and Suction Diathermy) to determine which method is most effective and safest. **materials and methods:** This was a prospective randomized comparative investigation including 75 pediatric cases scheduled for adenoidectomy. Cases were randomly assigned into three equal groups (25 patients each) based on the surgical method: Group A: Conventional curette adenoidectomy, group B: Microdebrider-assisted adenoidectomy, and group C: Suction diathermy adenoidectomy. **Results:** The Microdebrider and Suction Diathermy techniques both achieved 100% excellent outcomes, compared to only 24% with the Conventional technique, with a statistically significant variance ( $P \leq 0.001$ ). The Conventional technique illustrated 52% fair results and no excellent or good outcomes, unlike the modern techniques. Operative time was shortest with the Conventional technique (9.8 min) ( $P \leq 0.001$ ). Hospitalization was similar across groups (~7 hours,  $P = 0.85$ ). Blood loss was lowest in Suction Diathermy (6.12 ml) than Microdebrider and Conventional ( $P \leq 0.001$ ). Mucosal lacerations on the vomer and torus tubarius occurred only in the Conventional group (12% and 16%, respectively), with none reported in the Microdebrider or Suction Diathermy groups ( $P = 0.003$ ). **Conclusion:** Suction Diathermy Technique offers safe, effective removal with minimal bleeding, while Microdebrider Technique has longer operative time and Conventional Technique has more complications and lower success. **Key words:** Adenoidectomy; Microdebrider; Suction Diathermy; Conventional technique; Pediatric surgery.

### Introduction

Adenoidectomy is a surgical intervention that removes the adenoid located in the nasopharynx. This procedure is among the most frequently conducted surgeries in pediatric cases [1].

A current meta-analysis revealed that the occurrence of hypertrophied adenoids in a randomized representative sample of kids and teenagers was 34.46 percent [2].

The adenoids are midline structures located on the roof and posterior wall of the nasopharynx [3].

Adenoid hypertrophy is a prevalent etiology of upper airway obstruction in kids. Sleep-related breathing disorders attributable to adenoid hypertrophy are frequently observed in kids aged four to five years of age, as the adenoid tissue and palatine tonsils attain their maximal size at this developmental stage. If left untreated, adenoid hypertrophy may result in severe complications, including pulmonary hypertension, maxillofacial anomalies, and cor-pulmonale [4].

Adenoidectomy, whether conducted independently or in conjunction with tonsillectomy, is considered among the most frequently conducted operations in pediatric otorhinolaryngology. Classical adenoidectomy, also known as conventional adenoidectomy or curette adenoidectomy, utilizes a curette for the removal of adenoids [5].

The traditional adenoidectomy technique initially defined by Meyer has been a widely utilized approach for years. The majority of surgeons frequently perform the procedure blindly, without direct vision of the nasopharynx, depending on finger probing of the adenoid tissue [3,6].

The microdebrider blade may be introduced trans orally (curved blades) or trans nasally (straight blades) (3).

Methods and instruments have advanced throughout time, particularly with the utilization of endoscopes, electrocautery, and power-assisted devices. These developments are designed to enhance hemostasis, improve visibility of the kid's nasopharyngeal area, reduce surgical duration, and minimize pain following surgery. Various approaches encompass suction diathermy adenoidectomy, traditional adenoidectomy utilizing a curette, microdebrider adenoidectomy, and coblation adenoidectomy [1].

The current investigation aimed to compare the outcomes of adenoidectomy using three different surgical techniques (three studied groups) (Conventional, Microdebrider, and Suction Diathermy) in order to determine which method is most effective and safest.



## Materials and Methods

This was a prospective randomized comparative investigation including 75 pediatric cases scheduled for adenoidectomy. Cases were randomly assigned into three equal groups (25 patients each) based on the surgical method: Group A: Conventional curette adenoidectomy, group B: Microdebrider-assisted adenoidectomy, and group C: Suction diathermy adenoidectomy.

**Inclusion Criteria:** Children aged 1–11 years diagnosed with adenoid hypertrophy (confirmed by clinical symptoms and endoscopic findings) presenting with recurrent otitis media with effusion, obstructive sleep apnea, chronic rhinosinusitis, nasal obstruction with mouth breathing, snoring, or sleep disturbance have been involved in the investigation

**Exclusion Criteria:** Patients have been excluded if they had bleeding/coagulation disorders, craniofacial anomalies, previous adenoid surgery, acute upper respiratory tract infections, neuromuscular disorders, required concurrent major non-adenoidectomy procedures, or if parents/guardians declined participation.

### Preoperative Assessment

All cases had comprehensive clinical evaluation involving detailed history (nasal obstruction, snoring, mouth breathing, recurrent otitis media), complete ENT examination, nasal endoscopy with Clemens-McMurray adenoid grading (Grade 1: <25%; Grade 2: 25-50%; Grade 3: 50-75%; Grade 4: >75% obstruction), routine lab tests (CBC, coagulation profile), and supplemental imaging when indicated (e.g., lateral nasopharyngeal X-ray).

### Operative Techniques

**Group A: Conventional Curette Adenoidectomy:** All procedures have been carried out under general anesthesia with oral endotracheal intubation. The case was positioned supine with a shoulder roll to extend the neck, and a Boyle-Davis mouth gag was inserted to achieve suitable exposure of the oropharynx. Digital palpation was first performed to assess the size and position of the adenoid tissue, followed by selection and introduction of a suitable-sized adenoid curette through the oral cavity. The curette was passed upward behind the soft palate until it reached the superior nasopharynx, and the adenoid tissue was removed with a downward sweeping movement of the curette. Hemostasis was achieved by gauze packing for 3-5 minutes, and finally, the nasopharynx was inspected for any residual adenoid tissue and hemostasis [7,8].

**Group B: Microdebrider-Assisted Adenoidectomy:** Following administration of general anesthesia with oral endotracheal intubation, cases were positioned identically to the conventional technique. A Boyle-Davis mouth gag provided oropharyngeal exposure while a soft palate retractor elevated and protected the soft palate. A 0° or 45° endoscope was inserted orally for nasopharyngeal

visualization, through which a 4.0 mm curved microdebrider blade with suction was introduced transorally. The device operated at 1500-3000 rpm in oscillating mode, enabling systematic superior-to-inferior adenoid removal under direct endoscopic visualization. Particular attention was given to the torus tubarius, vomer, and choanae regions. Residual bleeding was addressed with suction cautery as required, concluding with final endoscopic verification of complete adenoid tissue removal [9,10].

**Group C: Suction Diathermy Adenoidectomy:** Following induction of general anesthesia with oral endotracheal intubation, cases have been positioned consistently with other study groups. A Boyle-Davis mouth gag was inserted to maintain oropharyngeal exposure, complemented by a soft palate retractor for optimal nasopharyngeal access. A 0° or 45° endoscope provided direct visualization, enabling transoral insertion of a 10 Fr suction diathermy probe connected to an electro-surgical unit set at 30–40 watts in coagulation mode. Under endoscopic guidance, adenoid tissue was meticulously coagulated and suctioned in a superior-to-inferior direction, with particular care taken near the choanae and eustachian tube orifices to ensure complete ablation. The procedure concluded with a final endoscopic assessment to verify total adenoid removal and confirm hemostasis [11,12].

**Intraoperative Assessment Parameters:** For each surgical procedure, comprehensive data collection included precise measurement of operative duration from initial insertion to final removal of the mouth gag, quantitative assessment of intraoperative blood loss through combined measurement of suction canister contents and surgical swab weights (with 1 gram equivalent to 1 milliliter of blood), and detailed documentation of any intraoperative complications such as mucosal injuries to the vomer or torus tubarius as well as any unanticipated adverse events. The thoroughness of adenoid resection was evaluated endoscopically and categorized according to standardized criteria: excellent outcomes indicated complete tissue removal without residual adenoid material, good results denoted minimal remaining tissue not warranting additional intervention, while fair outcomes represented substantial residual tissue potentially necessitating further surgical management.

### Postoperative Care and Follow-up

All cases received standard postoperative care including: Regular monitoring of vital signs, observation for bleeding or other complications, age-appropriate analgesia (paracetamol) and intravenous fluids until oral intake was adequate.

Hospital stay duration was recorded for all patients (hours).



Follow-up visits were scheduled at: 1 week postoperatively for wound healing assessment, 1 month postoperatively for symptom improvement assessment and 3 months postoperatively for final outcome evaluation.

### Statistical Analysis

Information was gathered, organized, and subjected to statistical analysis utilizing [statistical software name and version]. Quantitative data were expressed as mean  $\pm$  standard deviation (SD) or median and range as appropriate. Qualitative data were expressed as

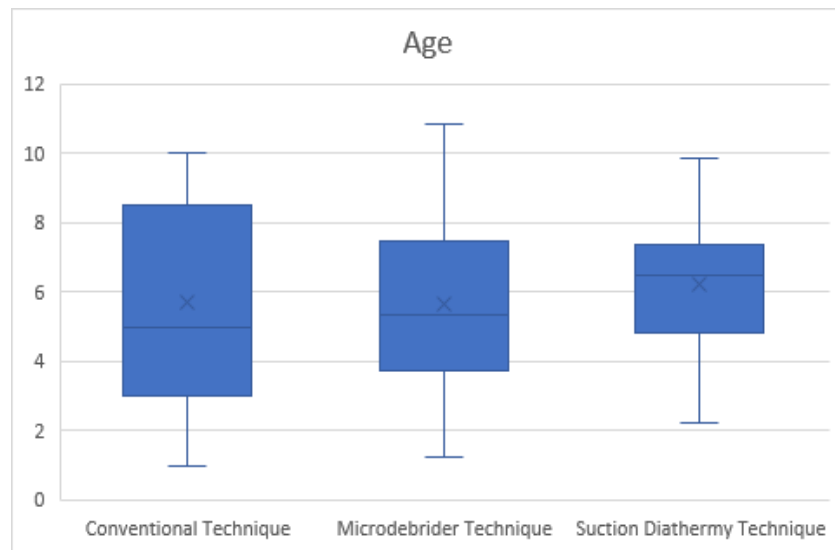
percentages and frequencies. Comparisons between the three groups have been conducted utilizing: One-way analysis of variance (ANOVA) for normally distributed quantitative variables, succeeded by a post-hoc test for pairwise comparison. Kruskal-Wallis test for non-normally distributed quantitative variables Chi-square test or Fisher's exact test for qualitative variables A P-value under 0.05 has been deemed statistically significant, whereas a P-value not more than 0.001 was regarded as extremely significant.

### Results

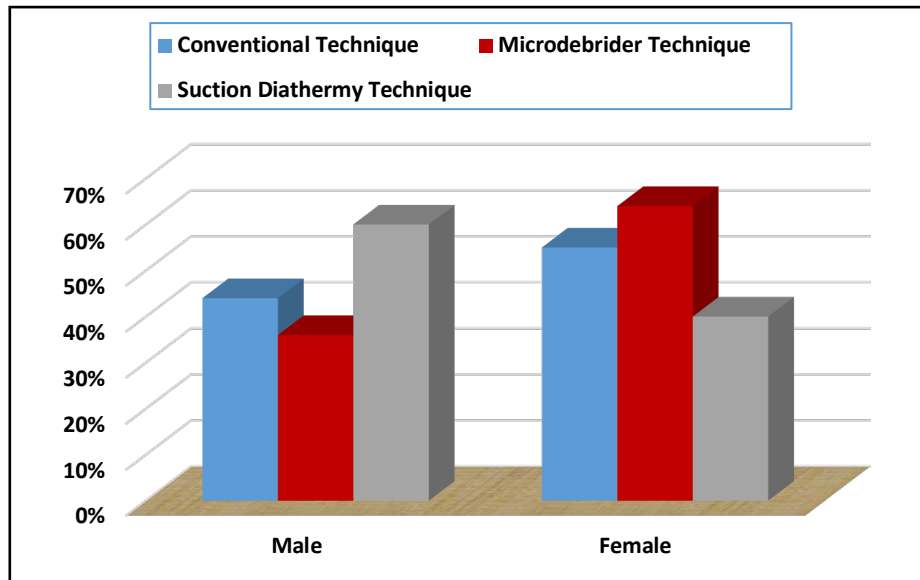
**Table 1:** Distribution of demographic data between studied groups.

	Conventional Technique N=25	Microdebrider Technique N=25	Suction Diathermy Technique N=25	P value
Age Median (range)	5 (1-10)	5 (1-11)	6 (2-10)	0.58
Gender				
Male	11 (44%)	9 (36%)	15 (60%)	0.22
Female	14 (55%)	16 (64%)	10 (40%)	

This table illustrates that, there was a statistically insignificant variance among examined groups with regard to gender, and age.



**Figure (1):** Age between studied groups.

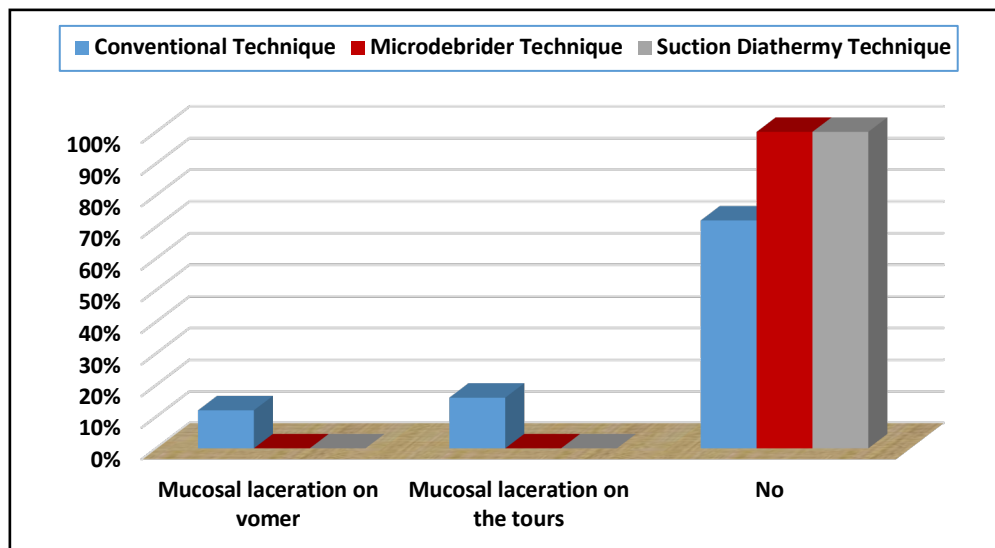


**Figure (2):** Gender between studied groups.

**Table 2:** Distribution of Intraoperative complications between studied groups.

	Conventional Technique N=25	Microdebrider Technique N=25	Suction Diathermy Technique N=25	P value
Mucosal laceration on vomer	3 (12%)	0 (0%)	0 (0%)	<b>P=0.003</b>
Mucosal laceration on the tours	4 (16%)	0 (0%)	0 (0%)	
No	18 (72%)	25 (100%)	25 (100%)	

This table illustrates that; a statistically significant variance has been observed among examined groups with regard to intraoperative complication.



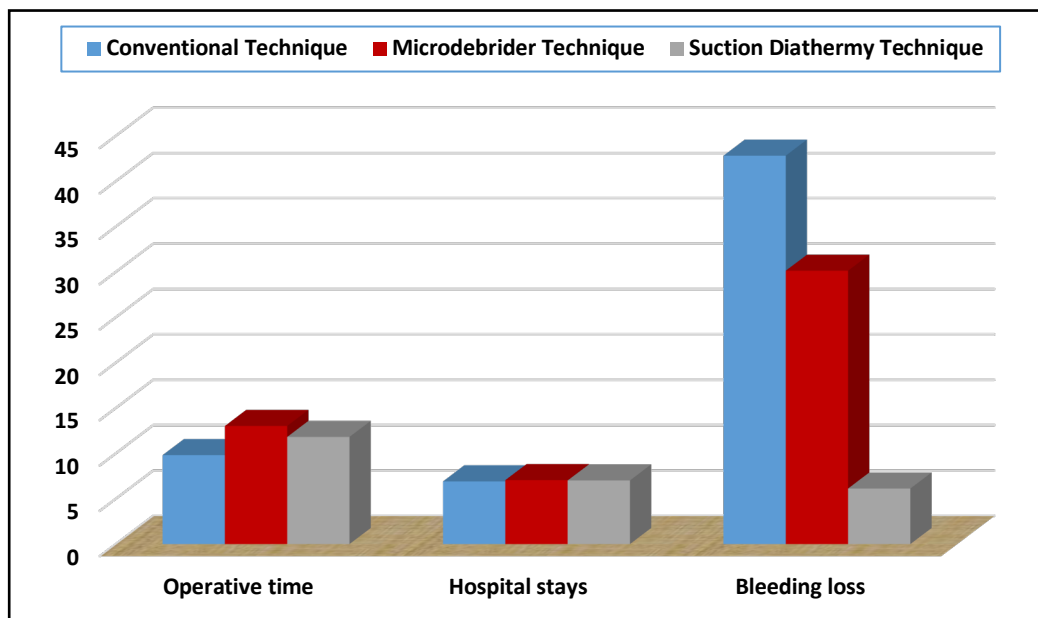
**Figure 3:** Intraoperative complications between studied groups.

**Table 3:** Distribution of outcome between studied groups.

Mean $\pm$ SD	Conventional Technique N=25	Microdebrider Technique N=25	Suction Technique N=25	Diathermy	P value
Operative time (min)	9.8 $\pm$ 1.33	13.02 $\pm$ 2.24	11.81 $\pm$ 2.41		$\leq$ 0.001
Hospital stays (hours)	6.91 $\pm$ 0.91	7.05 $\pm$ 0.93	7.01 $\pm$ 0.89		0.85
Bleeding Loss (ml)	42.81 $\pm$ 13.51	30.13 $\pm$ 4.91	6.12 $\pm$ 1.3		$\leq$ 0.001

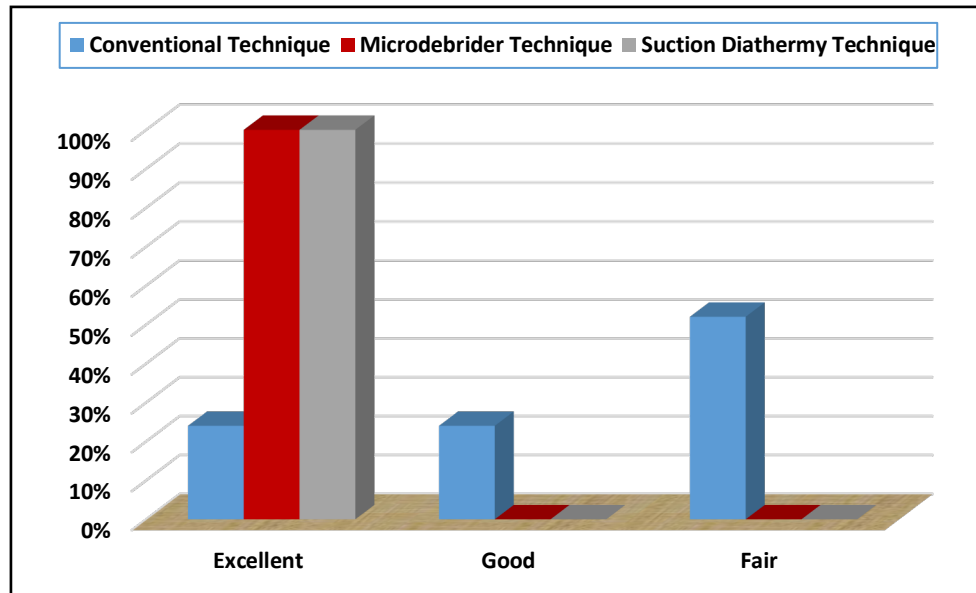
This table illustrated that, there was a statistically insignificant variance among examined groups with

regard to hospital stays, whereas a statistically significant variance has been observed among examined groups with regard to operative time, and bleeding loss.

**Figure 4:** Outcome between studied groups.**Table 4:** Distribution of complete removal between studied groups.

Mean $\pm$ SD	Conventional Technique N=25	Microdebrider Technique N=25	Suction Technique N=25	Diathermy	P value
Excellent	6 (24%)	25 (100%)	25 (100%)		$\leq$ 0.001
Good	6 (24%)	0 (0%)	0 (0%)		
Fair	13 (52%)	0 (0%)	0 (0%)		

This table illustrates that, a statistically significant variance has been observed among examined groups with regard to complete removal.



**Figure 5:** Distribution of complete removal between studied groups

### Discussion

The current research illustrated that, there was a statistically insignificant variance between the 3 examined groups with regard to age ( $p = 0.58$ ) and gender ( $p = 0.22$ ). In agreement with the current findings,[13] who presented a comparative study about Adenoidectomy by different techniques, revealed that there was a statistically insignificant variance between Conventional, Microdebrider and Suction Diathermy Techniques regarding age ( $p= 0.11$ ) and gender ( $p=0.13$ )[14],who aimed to perform comparative research on adenoidectomy utilizing various methods such as conventional microdebrider, suction diathermy, and coblation, found a statistically insignificant differences among the Conventional, Microdebrider, and Suction Diathermy Techniques concerning age and gender ( $p$ -value above 0.05).

The reported results illustrated that, a statistically significant variance has been observed between the 3 examined groups with regard to intraoperative complication (Mucosal laceration on vomer Mucosal laceration on the tours and no complications), ( $P=0.003$ ). Similarly, the current study agreed with [13]. Who aimed to provide comparative research of adenoidectomy through electrocautery with suction diathermy, conventional and microdebrider methods as they

demonstrated that a statistically significant variance has been observed between Conventional, Microdebrider and Suction Diathermy Techniques with regard to intraoperative complication (Mucosal laceration on vomer Mucosal laceration on the tours and no complications), ( $p=0.047$ ).

In contrast,[14] whose randomized prospective research was conducted on eighty cases with nasal occlusion and was planned for adenoidectomy as they reported that there was a statistically insignificant variance between Conventional, Microdebrider and Suction Diathermy Techniques with regard to intraoperative complication (Injury to torus) ( $p>0.05$ ).

Darwish focused on injury to torus and other different complications from those of the current study, which may have limited their ability to detect statistically significant differences, also they also included coblation technique in comparison with the 3 studied technique of the present work which may affect the  $p$  values.

Regarding outcomes, there was a statistically insignificant variance between the 3 examined groups with regard to hospital stays, whereas there was statistically significant variance between the 3 examined groups regarding operative time, and bleeding loss. The mean operative time was ( $9.8 \pm 1.33$ ) minutes for the Conventional Technique, ( $13.02 \pm 2.24$ ) minutes for the Microdebrider Technique, and ( $11.81 \pm 2.41$ ) minutes for the Suction Diathermy



Technique ( $p \leq 0.001$ ). The mean hospital stay was ( $6.91 \pm 0.91$ ) hours for the Conventional group, ( $7.05 \pm 0.93$ ) hours for the Microdebrider group, and  $7.01 \pm 0.89$  hours for the Suction Diathermy group ( $p = 0.85$ ), indicating no significant difference. The mean bleeding loss was ( $42.81 \pm 13.51$ ) ml for the Conventional Technique, ( $30.13 \pm 4.91$ ) ml for the Microdebrider, and ( $6.12 \pm 1.3$ ) ml for the Suction Diathermy ( $p \leq 0.001$ )[13]. conducted a randomized prospective study involving 60 pediatric cases, revealing that the mean blood loss using the suction diathermy method was 5.56 milliliter, compared to 43.45 milliliter for the conventional technique and 31.90 milliliter for the microdebrider technique, with these differences achieving high statistical significance. Additionally, there was a highly significant statistical distinction in operative time between the conventional and microdebrider techniques ( $p$ -value under 0.001). However, a statistically insignificant variance has been observed in hospital stays among the Conventional, Microdebrider, and Suction Diathermy Techniques, with means of  $6.75 \pm 0.851$  hours,  $6.85 \pm 0.875$  hours, and  $6.80 \pm 0.834$  hours correspondingly ( $p=0.93$ ).

As well,[14] revealed that a statistically significant variance has been observed between Conventional, Microdebrider and Suction Diathermy Techniques with regard to operative time and bleeding loss ( $p < 0.05$ ). They indicated that the mean operative time was ( $11.1 \pm 1.6$ ) min in Conventional group, ( $14.61 \pm 2.89$ ) in Microdebrider group and ( $16.03 \pm 0.54$ ) min in Suction diathermy group and the mean blood loss was ( $31.09 \pm 9.86$ ) ml in Conventional group, ( $16.5 \pm 3.39$ ) ml in Microdebrider group and ( $5.89 \pm 1$ ) ml in Suction diathermy group.

The current investigation illustrated that, a statistically significant variance has been observed between the 3 studied groups with regard to complete removal. Both Microdebrider and Suction Diathermy techniques are more effective than the Conventional Technique in achieving complete adenoid removal.

. (13) concluded that suction diathermy adenoidectomy is the preferred technique for minimizing intraoperative blood loss in comparison with two other methods. It additionally provides comparable visibility of the surgical field and completeness of resection to the microdebrider method. When availability and cost are considered, suction diathermy may become the gold standard for adenoidectomy. The conventional method, while being the

**Conflicts of interest:** The authors declare that they have no Conflicts of interest related to this

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least expensive, simplest, and most accessible, has disadvantages such as hemorrhage, trauma, and incomplete resection. They stated a statistically significant distinction in the complete removal of adenoid tissue between the conventional and microdebrider methods ( $p$ -value: 0.02), as well as between the conventional and suction diathermy methods ( $p$ -value  $< 0.03$ ).

Suction Diathermy and Microdebrider are better than the Conventional Technique for complete adenoid removal.

Similarly[14]. Who concluded that the conventional technique is easy and cost-effective but susceptible to complications as residual tissue and hemorrhage, additionally Suction diathermy is superior for loss in blood, whereas the microdebrider method has the lowest complications following the operation, they revealed that Among the studied techniques, the microdebrider method was the most effective in achieving complete removal of adenoid tissue.

## Conclusion

The Suction Diathermy Technique proved to be the safest and most effective, with no complications, minimal bleeding, and complete removal. The Microdebrider Technique also showed good outcomes but had a longer operative time. The Conventional Technique had more complications, higher blood loss, and lower removal success.

## Limitations

This study has several limitations. The relatively small sample size (75 patients) and single-center design may limit the generalizability of the findings. The short follow-up period of 3 months restricts the assessment of long-term outcomes such as adenoid regrowth and late complications. In addition, the lack of blinding may have introduced assessment bias, particularly in evaluating surgical outcomes. The results may also be influenced by surgeon experience and technique preference, as operator dependency was not controlled. Furthermore, the study focused mainly on intraoperative and early postoperative outcomes without evaluating important factors such as postoperative pain, quality of life, cost-effectiveness, and parental satisfaction. Finally, other modern techniques such as coblation were not included, limiting the comprehensiveness of the comparison.



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