

Comparative Study of Adenotonsillectomy using Conventional instruments versus Powered instruments in tertiary care hospital of Garhwal region : Retrospective study

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ABSTRACTS: AIMS & OBJECTIVES: To compare intraoperative & postoperative outcome of Conventional instruments adenotonsillectomy and powered instruments adenotonsillectomy and to determine whether there is a significant difference between the two methods. **METHODS:** A comparative study of 60 patients undergoing adenotonsillectomy was conducted. The study assessed the results of two procedures in terms of intraoperative duration, intra and post-operative bleeding, resumption to normal activity, postoperative pain assessment & complication. The parameters were statistically compared between the two groups. **RESULTS:** 60 patients who underwent surgery (30 for Conventional instruments and 30 for powered instruments adenotonsillectomy) , The mean blood loss was around 16.67 ml in the powered instrument adenotonsillectomy group and 58.67 ml in the conventional method adenotonsillectomy group. The average duration of surgery in the conventional adenotonsillectomy group was 45.28 minutes(40.04 minutes tonsillectomy & 5.24 minutes adenoidectomy) as against 44.42 minutes in the powered instruments adenotonsillectomy group (28.86 minutes tonsillectomy & 15.56 minutes adenoidectomy). The mean pain scores at 6hrs ,24 hr 48 hr & 3-6 days post-surgery were low in powered instruments group. Powered instruments procedure had a quicker return to normal diet with a mean duration of 2.67 days which was significant than the conventional method (mean-4.16 days). **CONCLUSION:** The reduction of intraoperative blood loss in powered instruments adenotonsillectomy was obvious and reduction of the postoperative pain and early return to normal diet were statistically significant.

KEYWORDS: Adenotonsillectomy, Coblation procedure, powered instruments, Conventional procedure.

INTRODUCTION: The palatine tonsils & adenoids form a part of Waldeyer's Ring which guard the oropharyngeal inlet. Its role in immunity is negligible as compared to its morbidity when they become the focus of recurrent infections. The earliest description of tonsillectomy appears in the medical encyclopedia of Cornelius Celsus in AD 30.[1] There are various

modalities to perform surgery diathermy, laser, harmonic scalpel, radiofrequency , cryosurgery coblation,microdebrider . Coblation technology has recently surfaced as a potentially appealing technology for adenotonsillectomy. Coblation is a contracted word for controlled ablation. Coblation method uses radiofrequency energy to ionize NaCl in a saline medium, producing ionized saline layer. It creates temperature of 40°-70° C and shallow depth of injury 50- 150 µm.(2,3) The Microdebrider is a powered rotary shaving device with continuous suction .(4,5) Adenotonsillectomy produces an open wound that heals by secondary intention. Adenotonsillectomy, the surgical removal of the adenoids and/or tonsils, is a common procedure, done in cases of chronic adenotonsillitis. The decision to perform an adenotonsillectomy is based on several criteria that consider the patient's clinical presentation, symptoms, and overall health. Key criteria include: Recurrent Tonsillitis: Frequent episodes of acute tonsillitis (e.g., 7 or more episodes in a year, or 5 or more episodes per year for 2 years), Chronic Tonsillitis, Persistent sore throat, difficulty swallowing, or bad breath despite appropriate antibiotic therapy. Adenoid facies, Difficulty Breathing or Swallowing, Significant airway obstruction or swallowing difficulties due to enlarged tonsils or adenoids, Recurrent or Chronic Ear Infections, Recurrent ear infections or fluid accumulation in the middle ear (otitis media) associated with adenoid hypertrophy, particularly if other treatments have failed, Poor Growth or Weight Gain, Failure to thrive or inadequate weight gain in children due to difficulty in eating or sleeping caused by enlarged tonsils or adenoids.

Aim: To compare intraoperative & postoperative outcome of Conventional instruments adenotonsillectomy and powered instruments adenotonsillectomy.

Objectives : To understand & compare the intraoperative & postoperative outcome of both methods , postoperative morbidity and stay in hospital.

To assess the role of surgical techniques in performing adenotonsillectomy.

Material & Methods : Retrospective Observational Study in ENT department , HNB base hospital , Srikot , Garhwal. 12 month study from June 2025 to May 2026 with regular follow up of 1 month & 3 month. Patient fulfilling the inclusion criteria irrespective of gender , All cases have been operated by same surgeon.

Inclusion Criteria : Patients from all age groups who:

- Were diagnosed with adenotonsillar hypertrophy or recurrent and/or chronic tonsillitis
- Had recurrent throat infections, mouth breathing , or significant tonsillar enlargement causing dysphagia or other issues
- Patients who had not responded to or have failed conservative management strategies, such as antibiotic therapy, supportive care, and other non-surgical interventions.
- Were generally healthy individuals without significant comorbidities that could affect the surgery or recovery, such as severe systemic disease eg.hypertension, diabetes, bleeding disorders

Exclusion Criteria:

- **Severe Comorbidities:** Presence of significant systemic or congenital disorders that could complicate surgery or affect recovery (e.g., severe heart disease, uncontrolled diabetes).
- **Recent Infections:** Active upper respiratory infections or other illnesses that might interfere with the healing process or the study's outcomes.
- **Bleeding Disorders:** History of bleeding disorders or anticoagulant therapy that could increase the risk of intraoperative or postoperative bleeding.
- **Previous Tonsil Surgery:** History of previous adenotonsillectomy or other throat surgeries that could impact the study's results or complicate the procedure.
- **Anatomical Variations:** Significant anatomical abnormalities that would make either surgical method unsuitable or would affect the study's comparison.
- **Allergic Reactions:** Known severe allergic reactions to anesthesia or medications

Statistical method

When comparing intraoperative & postoperative outcome in conventional versus power methods for performing adenotonsillectomy, several statistical measures employed to assess the effectiveness and safety of each method. Here are some key statistics and metrics to consider:

- **Operative Time:** Measure the average duration of surgery for both methods. Statistical tests such as t-tests or ANOVA used to compare mean times.
- **Intraoperative Blood Loss:** Assess the average volume of blood lost during the procedure. Done by visual estimation and measuring collections in suction devices. Use statistical tests to compare blood loss between the methods.
- **Postoperative Pain Levels:** Evaluate pain levels using standardised scales (e.g., visual analog scale) and compare the average pain scores using t-tests or non-parametric tests.
- **Complication Rates:** Compare the incidence of complications (e.g., bleeding, infection) between the methods. Chi-square tests or Fisher's exact tests can be used for categorical outcomes.
- **Recovery Time:** Measure the time taken for patients to return to normal activities or the time to complete healing. Statistical comparisons can be made using t-tests or Kaplan-Meier survival analysis.

Conventional method

Tonsillectomy:

Dissection: scalpel or surgical scissors used to make an incision around the tonsil capsule and the tonsil is dissected from the surrounding tissue.

Hemostasis: sutures are used to ensure that all blood vessels are adequately ligated and gauze swabs are used to control bleeding.

Adenoidectomy:

Dissection: blind procedure done by using a curette or suction device to remove the adenoid tissue from the nasopharyngeal wall.

Hemostasis: by using suction

Powered instruments:

Tonsillectomy: Dissection: tonsillectomy done using coblator in which the wand applies radiofrequency energy to a conductive saline solution, creating a focused, high-energy plasma field. This plasma gently breaks molecular bonds, essentially dissolving the tonsil tissue molecule by molecule.

Hemostasis: The device is also designed to instantly coagulate blood vessels, making the procedure nearly bloodless .

Adenoidectomy:

Dissection: powered instrument such as those using coblators & microdebriders ; to remove adenoids using a powered, rotating cutting tool called a microdebrider. This tool has a tiny blade that shaves away and vacuums up tissue at the same time. adenoidectomy done via using endoscope through nose having advantage of performing surgery under direct visualization leading to precise surgery & decreasing chances of complications.

Hemostasis: coblator coagulate blood vessels & control bleeding.

RESULTS

The age group in study which contains maximum patients is from 5 to 20 years. As far as sex is concerned, 35 patients were males and 25 patients were females. In this study, age distribution suggests that children have more problems related to tonsil and adenoid than adults.

TABLE :1**Age & sex distribution**

Age (in years)	Total no.of patients	Male (%)	Female (%)
<10	20	12	8
10-20	18	10	8
20-30	10	6	4
30-40	7	4	3
>40	5	3	2

An incidence of symptoms related to Adenotonsillitis was noted in both the groups. Around 31 patients presented with mouth breathing/ snoring with an incidence of 52% mostly seen in grade II/III adenoid hypertrophy. Difficulty in breathing was observed in only 4 patients (6.66%) which was found only in grade III/IV tonsillar hypertrophy. Otalgia (referred), hearing complaints were present in only 4 patients(6%), Difficulty in swallowing was seen in 41.66% of patients.

Time taken for surgery

Time taken for the surgery was calculated by time from putting an incision on the tonsils to the achievement of haemostasis. Operation time was measured separately for adenoidectomy and tonsillectomy for both the procedures. Time for tonsillectomy was measured from incision on anterior pillar to the achievement of hemostasis was recorded. The average duration of surgery in the conventional adenotonsillectomy group was 45.28 minutes(40.04 minutes tonsillectomy & 5.24 minutes adenoidectomy) as against 44.42 minutes in the powered instruments adenotonsillectomy group (28.86 minutes tonsillectomy & 15.56 minutes adenoidectomy). The p- value was found to be less than 0.0001 which makes the difference statistically significant.

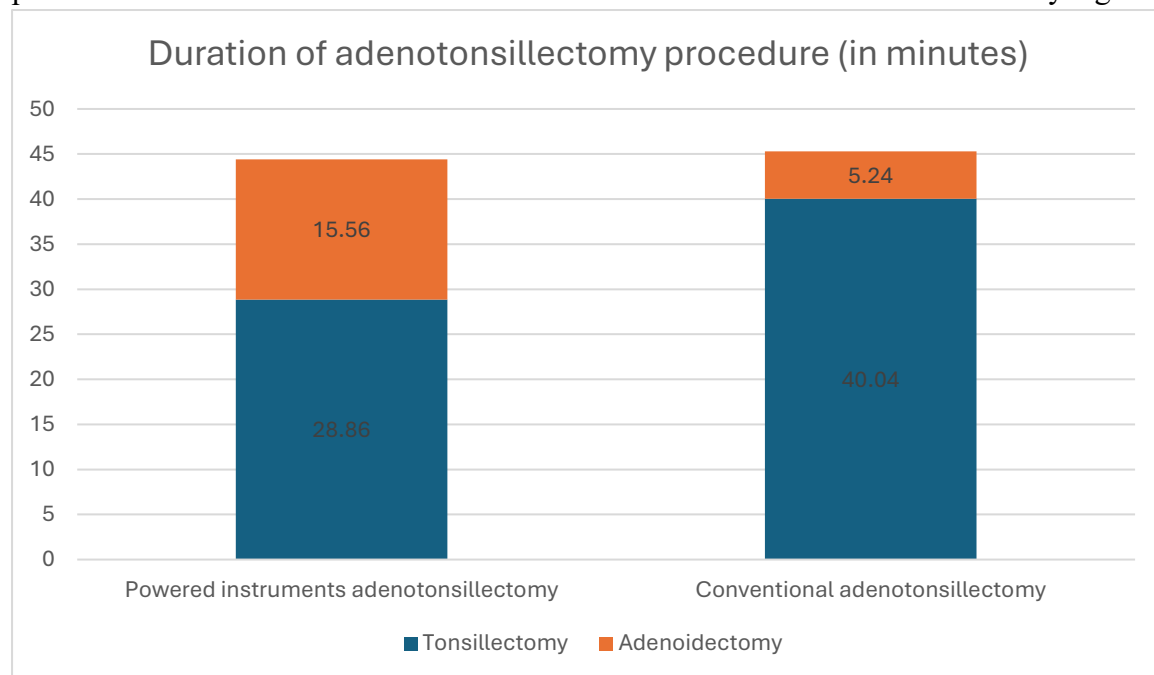


FIGURE :1

Intraoperative blood loss

The operating nurse recorded the intraoperative time and blood loss based on the amount in the suction canister and the soaked gauze pieces & cotton balls at the end of each procedure. A

standard size gauze measuring 10x6cm was taken (5ml for wet gauze and 10ml for dry one).
Medications

Estimated blood loss was calculated using following method

Number of cotton balls used =a

Approximate amount of blood a cotton ball had=2.5 ml

Amount of blood in cotton balls(c) =2.5×(a)

No of gauze used =b

Approximate amount of blood a gauze had=10 ml

Amount of blood in gauzes (d)=10×(b)

Quantity of blood in cotton balls & gauze (A)=(c+d)

Amount of fluid (blood & known quantity of saline)collected in suction bottle=e

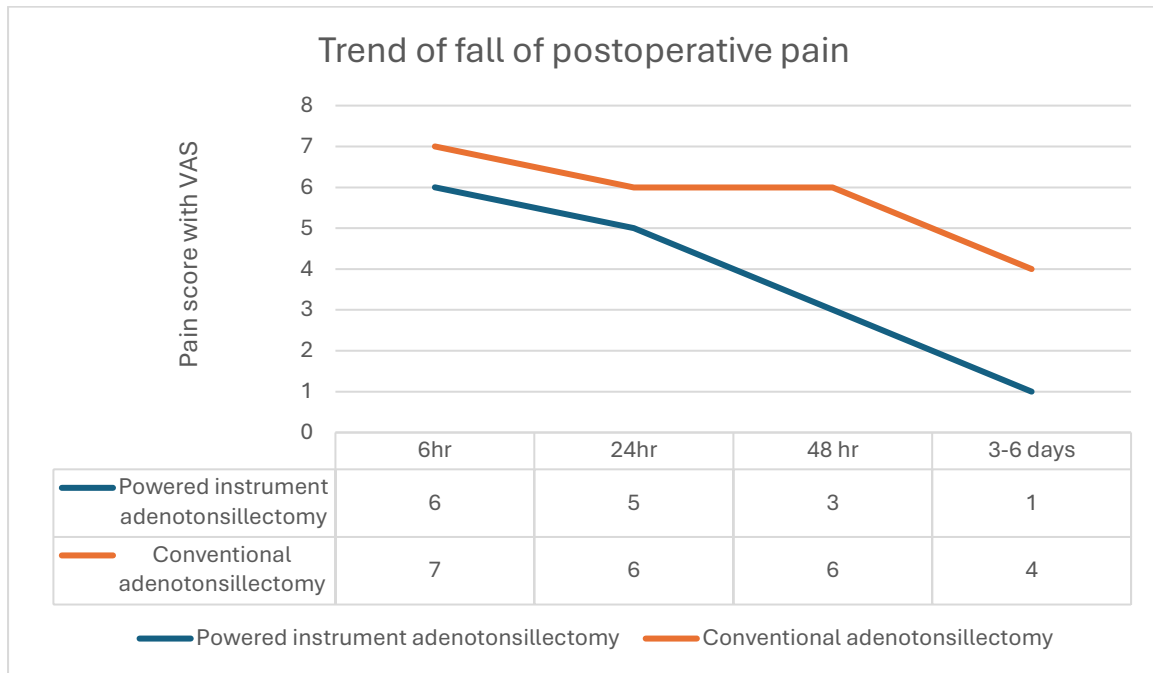
Amount of saline used =f

Quantity of blood in suction bottle (B)=e-f

Total quantity of blood lost(estimated blood loss)=A+B

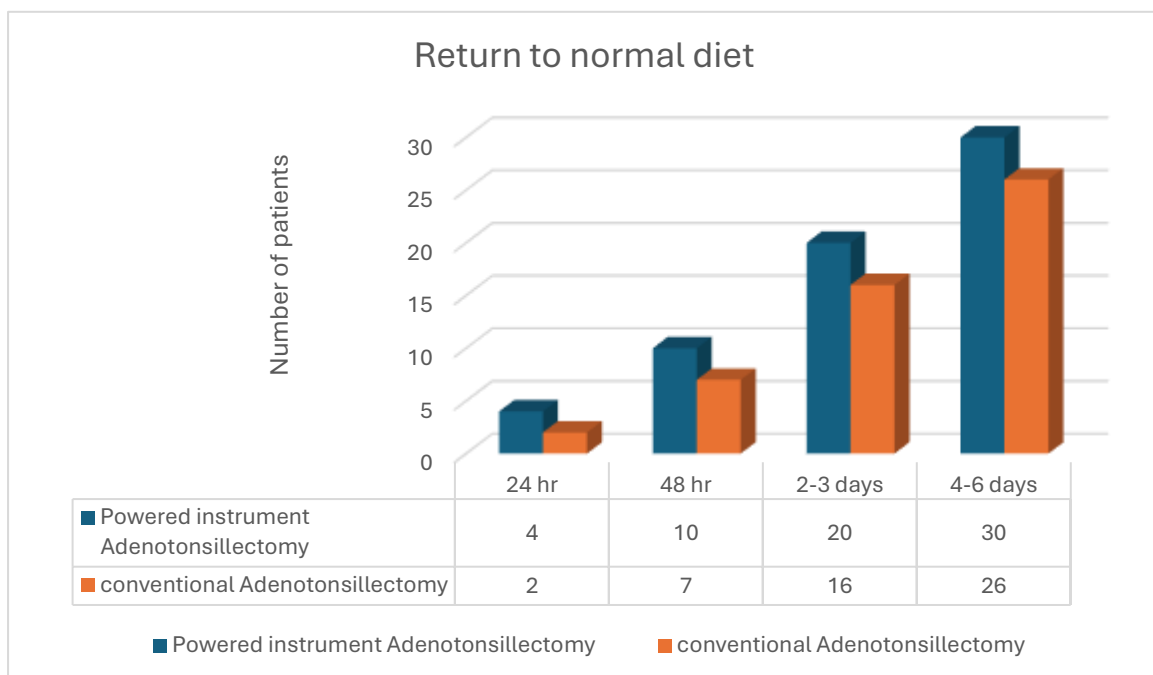
The amount of blood loss ranged from 10-25 ml in the powered instrument adenotonsillectomy cases and 40 ml -100 ml in the conventional method adenotonsillectomy cases. The mean blood loss was 16.67 ml in the powered instrument adenotonsillectomy group and 58.67 ml in the conventional method adenotonsillectomy group. The difference was proven to be statistically significant using the independent t-test.

Postoperative pain : The postoperative pain was registered after 6hrs of surgery, then 24hrs, 48 hrs & 3-6 days after the surgery. A 10 point Visual Analog Scale was used and all the three observations were measured and a mean derived and recorded.

**FIGURE :2**

Complication Patients were examined for postoperative complications during post-surgical visits: primary hemorrhage, secondary hemorrhage . Postoperative hemorrhage was seen in 1 case(1.6%); which was in the conventional adenotonsillectomy group.

Recovery time: Patients evaluated for return to normal diet at 24 hr,48 hr,2-3 days and 4-6 days. Patients with powered instruments adenotonsillectomy had early recovery compared to conventional method adenotonsillectomy.

**FIGURE :3**

Powered instruments & Conventional instruments Adenotonsillectomy :

Powered methods for adenotonsillectomy are more efficient, resulting in a shorter duration of surgery with less intraoperative bleeding due to their precise cutting and hemostatic properties. Enhanced Precision helps in reducing the risk of leaving behind residual tissue and can be particularly beneficial in delicate areas. With powered instruments there is reduced Postoperative Pain ; patients often experience a quicker recovery & lower the risk of complications such as infection and postoperative bleeding compared to conventional techniques.

TABLE:2

Parameters	Powered instrument adenotonsillectomy	Conventional method adenotonsillectomy	P value
Time(mean)	44.42 minutes(28.86 minutes tonsillectomy & 15.56 minutes adenoidectomy)	45.28 minutes(40.04 minutes tonsillectomy & 5.24 minutes adenoidectomy)	<.0001
Intraoperative(mean blood loss)	16.67 ml	58.67 ml	.03
Postoperative pain score at day 3-6 (VAS)	1	4	.01
Recovery(mean duration)	2.67 days	4.16 days	.001
Complication	Nil	1 case(1.67%)	.00

DISCUSSION: In our study, the average duration of surgery in the conventional adenotonsillectomy group was 45.28 minutes(40.04 minutes tonsillectomy & 5.24 minutes adenoidectomy) as against 44.42 minutes in the powered instruments adenotonsillectomy group (28.86 minutes tonsillectomy & 15.56 minutes adenoidectomy). In powered instrument tonsillectomy duration was shorter compared to conventional due to their precise cutting and hemostatic properties. Adenoidectomy duration in powered instrument is longer compared to conventional which is due to precise surgery under direct visualization with using endoscope via nose. The p-value was found to be less than 0.0001 which makes the difference statistically significant. However authors such as Magdy & Shapiro have reported shorter operative times for powered instrument surgery as compared to conventional. Increased operative time in conventional implies more tissue handling, which may result in more postoperative pain.(6,7) The amount of blood loss ranged from 10-25 ml in the powered instrument adenotonsillectomy cases and 40 ml -100 ml in the conventional method adenotonsillectomy cases. The mean blood loss was 16.67 ml in the powered instrument adenotonsillectomy group and 58.67 ml in the conventional method adenotonsillectomy group. The difference was proven to be statistically significant using the independent t-test. Adenotonsillectomy with power instrument had less postoperative pain & quicker return to normal diet & early recovery. A study conducted by Sung Moon et al compared intraoperative bleeding and postoperative clinical outcomes in adolescents and adults following powered instrument adeno tonsillectomies in 80 patients over

16 years of age. The study concluded the amount of blood loss was less in the powered instrument adenotonsillectomy group. (8) In our study Postoperative hemorrhage was seen in 1 case (1.6%); which was in the conventional adenotonsillectomy group. Omraniet al in their study on 47 patients concluded that powered adenotonsillectomy is associated with significantly less intraoperative or postoperative complications and morbidity in comparison with traditional method. (9) Powered methods for adenotonsillectomy, such as those using coblators, or debridors, offer several advantages over conventional techniques. These methods are more efficient, resulting in a shorter duration of surgery & decreases time the patient is under anesthesia. Enhanced Precision helps in reducing the risk of leaving behind residual tissue and can be particularly beneficial in delicate areas. (10) Reduced Postoperative Pain due to less trauma to surrounding tissues & Patients often experience a quicker recovery & less risk of complications such as infection and postoperative bleeding compared to conventional techniques.

CONCLUSION: Adenotonsillectomy is a common surgery in Otolaryngology practice. Adenotonsillectomy with powered instruments have significantly reduced intraoperative blood loss, reduced operative time, less postoperative pain, associated with early recovery of dietary routine & less complication. These factors are appealing to the surgeon and are of importance considering the powered instruments as a suitable alternative method of adenotonsillectomy.

Compliance with Ethical Standards

Conflict of interest The authors of this article declare that he/she has no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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