ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 08 | August - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

COMPARATIVE STUDY OF POWERED INSTRUMENTS VERSUS CONVENTIONAL METHODS OF FUNCTIONAL ENDOSCOPIC SINUS SURGERY IN PATIENTS WITH CHRONIC RHINOSINUSITIS

ENT

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ABSTRACT

Introduction: Chronic Rhinosinusitis is a prevalent inflammatory condition of the paranasal sinuses lasting more than 12 weeks. It significantly impacting patients quality of life. Endoscopic sinus surgery aims to restore normal sinus drainage and function. It is the preferred surgical approach due to its minimal invasive nature, reduced postoperative morbidity and fast recovery time. It provides better visualization of sinus anatomy, leading to precise tissue removal and improved preservation of mucosa. A microdebrider is a powered surgical instrument widely used in functional endoscopic sinus surgery and other sinonasal disease, which has a precise tissue removal, suction and simultaneously clearing debris and blood. **Objectives:** To compare powered instruments assisted endoscopic sinus surgery versus conventional methods of endoscopic sinus surgery in patients with Chronic Rhinosinusitis. **Methods:** 60 patients diagnosed with CRS refractive to medical treatment was randomly assigned for Group A and Group B with 30 patients each. Group A underwent conventional method and group B underwent powered instruments assisted endoscopic sinus surgery. Surgical time was measured and recorded in minutes. LUND-KENNEDY nasal endoscopy scoring system was used for post operative outcome assessment of complications. **Results:** Microdebrider assisted endoscopic sinus surgery showed significant results at 7 days and 4 weeks of postoperative evaluation by VAS score and L-K endoscopic scoring system. Blood loss during surgery and surgical field assessment showed significant results in microdebrider assisted ESS. However, postoperative outcome at 6 months, showed that there was complete resolution of symptoms and no recurrence. **Conclusion:** Powered endoscopic sinus surgery offers a better therapeutic approach for patients with Chronic Rhinosinusitis when compared to endoscopic surgery with conventional methods. It provides minimal mucosal injury and a bloodless dry operative field with better visualization for a more precise less traumatic procedure with minimal intraoperative complications and shorter operative time. Postoperatively, patients have less incidence of synechiae, with a tendency for a faster healing.

KEYWORDS

Chronic Rhinosinusitis, functional endoscopic sinus surgery, conventional sinus surgery, Diagnostic nasal endoscopy.

INTRODUCTION

Chronic Rhinosinusitis (CRS) is a common and burdensome condition that affects millions of people worldwide, with a significant impact on quality of life. [1] The classification of CRS is into two distinct phenotypes - CRSwNPs (with nasal polyps) and CRSsNPs (without nasal polyps), which is based on endoscopic findings. It has important implications for diagnosis and treatment. The development of CRS is influenced by a complex interplay of factors, including viral illnesses, allergic rhinitis, immunodeficiency, ciliary dyskinesia, and exposure to environmental pollutants. Furthermore, cysteinyl leukotriene imbalance has also been implicated in the pathogenesis of CRS. A comprehensive understanding of these contributing factors is essential for developing effective treatment strategies and improving patient outcomes. [2]

The treatment of acute and chronic Rhinosinusitis, with or without nasal polyps, is multifaceted and involves a range of pharmacological and non-pharmacological interventions. Nasal saline lavage is a simple yet effective measure that can help reduce inflammation and promote drainage. Antibiotics, either topical or systemic, may be prescribed to target bacterial infections, while corticosteroids can help alleviate inflammation and swelling. Leukotriene modifiers, decongestants, and mucolytic agents can also be used to manage symptoms and improve nasal function. In cases where allergies play a role, antihistamines may be beneficial. Additionally, IgE monoclonal antibodies have emerged as a promising treatment option for specific cases. A comprehensive treatment plan, tailored to the individual's needs and medical history, is essential for effective management of Rhinosinusitis. [2]

When medical treatment fails to provide adequate relief for patients with Rhinosinusitis, endoscopic sinus surgery (ESS) becomes a valuable treatment option. Functional Endoscopic Sinus Surgery (FESS) is a surgical approach that aims to restore the normal physiological function of the paranasal sinuses. By re-establishing the natural pattern of ventilation and mucociliary clearance, FESS can help alleviate symptoms and improve quality of life. The primary objectives of FESS are to remove irreversibly diseased mucosa and bone, preserve normal tissue and anatomical structures and judiciously widen the true natural ostia of the sinuses to improve drainage and ventilation. By achieving these objectives, FESS can help reduce inflammation, promote healing, and improve sinus function. As an adjunct to medical therapy, FESS offers a comprehensive treatment approach for patients with Rhinosinusitis. [3]

Conventional endoscopic sinus surgery techniques can be limited by the damage caused to normal mucosa, resulting in increased bleeding, decreased visibility, and a higher risk of complications. Traditional instruments, although designed with suction capabilities, are often cumbersome and prone to clogging, which can further compromise the surgical field. Microdebriders, on the other hand, offer a more advanced and precise approach to endoscopic sinus surgery. By integrating suction at the surgical site, microdebriders enable the efficient removal of polyps and diseased tissue while maintaining a clear visual field. The continuous suction of blood and debris significantly improves visualization, allowing surgeons to perform more precise dissections and reduce the risk of complications. The advantages of microdebriders include improved visualization and precision, reduced bleeding and trauma to normal tissue, enhanced control and accuracy during surgery and minimized risk of complications and improved outcomes. By utilizing microdebriders, surgeons can optimize the outcomes of endoscopic sinus surgery and provide patients with more effective and safer treatment options. [4] Hence, we decided to compare the conventional methods of FESS versus Powered instruments like microdebrider assisted endoscopic sinus surgery in patients with CRS.

METHODS

On approval from the institutional ethics committee the study was conducted among 60 patients of either sex in age group of >18 years with symptoms of Chronic Rhinosinusitis admitted in ENT department. This Prospective, comparative study, recruited patients under strict inclusion and exclusion criteria. Clinical signs and symptoms of chronic Rhinosinusitis, failure to medical treatment or contraindications to medical treatment, characteristic changes in preoperative CT of paranasal sinus cases were included in the study. While the patients with a history of bleeding disorder, genetic disorder, immune compromised, revision of endoscopic sinus surgery, papilloma tumors, sinonasal mass, cystic fibrosis, primary ciliary dysfunction cases were excluded from the study.

The study patients were randomly divided into 2 groups of 30 each. Group A patients underwent conventional method of endoscopic sinus surgery, while group B 30 patients underwent powered instruments assisted endoscopic sinus surgery. Surgical time was measured and recorded in minutes. Intraoperative blood loss was evaluated using BOEZAART-VANDERMERWE GRADING SYSTEM. Surgical field quality was well assessed. Postoperative outcomes were obtained via answers to a survey administered to the patient. The pain was assessed using visual analog scale (VAS) subjective improvement (0-

10) and categorized as mild (0-3), moderate (4-6), severe (7-10). The ends were labelled as the extremes (no pain and pain as bad as it could be). The patient was asked to put a mark on the line indicating their pain. This also included a combination of the Wong-Baker Face pain scale. LUND-KENNEDY nasal endoscopy scoring system was used for post operative outcome assessment at 7th day, after 4 weeks and at 3rd month post operatively.

The data was entered into Microsoft excel sheet and analysed. All statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY). Categorical variables were expressed in frequencies and percentages, while continuous variables were summarized using means and standard deviations. The normality of continuous data was assessed using the Shapiro-Wilk test. Depending on the distribution of data, appropriate inferential tests were applied. Comparison of continuous variables such as operative time, blood loss and Visual Analogue Scale (VAS) scores between the two groups (conventional and microdebrider-assisted) was performed using the independent t-test. Repeated Measures ANOVA was employed to evaluate intragroup changes over time. The Chi-square test or Fisher's exact test was used for categorical variables such as surgical field quality, BOEZAART-VANDERMERWE bleeding grades, and LUND KENNEDY nasal endoscopy scores. A p-value less than 0.05 was considered statistically significant.

Table 1: Boezaart-Vandermerwe Grading System

Grade	BOEZAART-VANDERMERWE GRADING SYSTEM
0	No bleeding
1	Slight bleeding – no suctioning required
2	Slight bleeding – occasional suctioning required
3	Slight bleeding -frequent suctioning required, bleeding threatens surgical field a few seconds after suction removed.
4	Moderate bleeding -frequent suctioning required, bleeding threatens surgical field directly after suction removed.
5	Severe bleeding – constant suctioning required, bleeding appears faster than can be removed by suction . surgical field severely threatened and surgery not possible.

Table 2 : Lund -Kennedy Nasal Endoscopy Scoring System

- Presence of polyp – (0,1,2)

0-Absence of polyps;1-polyps in middle meatus only; 2-polyps beyond middle meatus but not blocking the nose completely.

- Edema (0,1,2)

Edema: 0-absent; 1-mild to moderate; 2-moderate to severe.

- Discharge (0,1,2)

Discharge: 0-no discharge; 1-clear, thin discharge; 2-thick, purulent discharge

- Scaring (0,1,2)

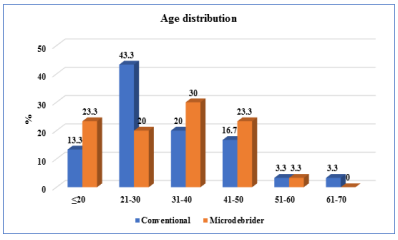
Scaring: 0-absent, 1-mild, 2- severe.

- Crusting (0,1,2)

Crusting: 0-absent, 1- mild, 2-severe.

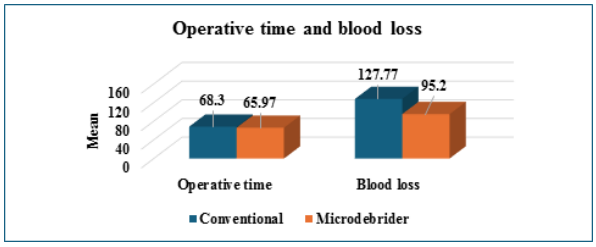
RESULTS

The age distribution of patients in both conventional and microdebrider groups was evaluated and compared. In the conventional group, the majority of patients (43.3%) were in the age group of 21–30 years. In contrast, in the microdebrider group, the highest proportion of patients (30%) belonged to the 31–40 age group. The mean age of patients in the conventional group was 32.83 ± 11.95 years, while in the microdebrider group, it was 32.34 ± 10.59 years. There was no significant difference between the two groups regarding age distribution (t = 1.66; p = 0.869), indicating that the two groups were comparable in age. [Graph 1] The gender distribution among the study groups was analyzed to ensure comparability. Although there was a slight predominance of males in the conventional group and females in the microdebrider group, this difference was not statistically significant.



Graph 1: Age distribution (Years)

The comparison of intraoperative variables, like operative time and blood loss, between the conventional and microdebrider groups was analysed. The mean operative time in the conventional group was 68.30 ± 11.44 minutes, whereas it was slightly lower in the microdebrider group at 65.97 ± 9.14 minutes. However, this difference was not statistically significant (t = 0.873; p = 0.386), suggesting a similar duration of surgery in both techniques. While, the mean intraoperative blood loss showed a marked difference between the groups. Patients in the conventional group had significantly higher blood loss, with a mean of 127.77 ± 41.24 ml compared to 95.20 ± 18.93 ml in the microdebrider group. This difference was statistically significant (t = 3.931; p = 0.001), indicating that powered instruments resulted in better intraoperative haemostasis and reduced blood loss. [Graph 2]



Graph 2: Operative time and blood loss

The estimated intraoperative blood loss was further categorized using the BOEZAART-VANDERMERWE Grading System. In the conventional group, 43.3% experienced slight bleeding requiring occasional suctioning (Grade 2), 46.7% had slight bleeding requiring frequent suctioning that threatened the surgical field shortly after suction removal (Grade 3), and 10% of patients experienced moderate bleeding requiring frequent suctioning with an immediate threat to the surgical field (Grade 4). In the microdebrider group, 66.7% patients had Grade 2 bleeding, 33.3% patients had Grade 3 bleeding, and none had Grade 4 bleeding. Although more patients in the microdebrider group had better bleeding grades, the difference did not reach statistical significance (Chi-square value = 5.152; p = 0.076). Nonetheless, this trend supports the observation of reduced blood loss with powered instrumentation.

The Surgical field quality was assessed on a three-point scale as healthy, inflamed/erythematous, and severely inflamed/friable. In the conventional group, 26.7% patients had a healthy surgical field, while 63.3% had an inflamed/erythematous field, and 10% patients had severely inflamed/friable mucosa. In contrast, in the microdebrider group, 60% patients had a healthy surgical field, and 40% patients had inflamed mucosa, with no cases of severely inflamed/friable mucosa. The difference between the groups was statistically significant (Chi-square value = 8.427; p = 0.015), indicating that using microdebrider significantly improved the surgical field quality during the procedure.

The postoperative symptom scores between the conventional and microdebrider groups were assessed using the Visual Analogue Scale (VAS) at three-time points: 7th day, 4 weeks, and at 3 months post operatively. The symptoms evaluated included nasal blockage, headache, facial pain, olfactory loss, nasal discharge/postnasal drip, and overall discomfort.

For nasal blockage, patients in the conventional group had a higher mean VAS score of 5.73 ± 1.36 at 7th day postoperatively, compared to 4.67 ± 0.71 in the microdebrider group. At 4 weeks, scores reduced to 2.43 ± 0.56 and 1.60 ± 0.62, respectively. By 3 months, both groups showed complete relief. The difference in nasal blockage scores was statistically significant at 7th day and 4 weeks (p = 0.001), indicating faster symptomatic improvement in the microdebrider group. For headache, the conventional group reported higher scores at 7th day (3.23 ± 0.86) and 4 weeks (1.07 ± 0.25), compared to the microdebrider group (1.97 ± 0.77 and 0.37 ± 0.49, respectively). The differences at both time points were statistically significant (p = 0.001). Both groups reported no headache symptoms at 3 months. With respect to the facial pain, scores at 7th day was 1.67 ± 0.71 in the conventional group and 1.17 ± 0.38 in the microdebrider group, showing a statistically significant difference (p = 0.001). However, by 4 weeks and 3 months, no facial pain was reported in either group.

The conventional group had a mean score of 1.17 ± 0.59 for olfactory loss at 7 days, whereas the microdebrider group reported a lower mean score of 0.57 ± 0.63. The difference was statistically significant (p = 0.001), highlighting better preservation or faster recovery of olfactory function in the microdebrider group. At 4 weeks and 3 months, no olfactory loss was reported in either group. With respect to the nasal discharge/postnasal drip, the conventional group had higher scores at both 7th day (2.67 ± 0.99) and 4 weeks (0.50 ± 0.63), compared to that of microdebrider group (1.53 ± 0.57 and 0.0 ± 0.0, respectively), with both differences being statistically significant (p = 0.001). Neither group reported any discharge at 3 months. There was no statistical significant difference between the groups at any time for overall discomfort. The scores at 7th day were 2.30 ± 0.87 in the conventional group and 2.20 ± 0.61 in the microdebrider group (p = 0.610). At 4 weeks, the scores were minimal and statistically insignificant (0.07 ± 0.25 vs. 0.0 ± 0.0; p = 0.155). By 3 months, both groups reported complete relief. Overall, patients who underwent microdebrider-assisted surgery experienced faster symptomatic relief across most parameters than those treated with conventional techniques, especially during the early postoperative period. [table 3]

Table 3: Visual Analogue Scale Score Comparison Between The Groups

AS Score	**Conventional** n(%)	**Microdebrider** n(%)	**t value; p-value**
Nasal blockage			
7 days postoperative	5.73±1.36	4.67±0.71	3.80;0.001*
4 weeks postoperative	2.43±0.56	1.60±0.621	5.42;0.001*
3 months	0.0±0.0	0.0±0.0	0.99
Headache			
7 days postoperative	3.23±0.86	1.97±0.77	6.03;0.001*
4 weeks postoperative	1.07±0.254	0.37±0.49	6.94;0.001*
3 months	0.0±0.0	0.0±0.0	0.99
Facial pain			
7 days postoperative	1.67±0.711	1.17±0.379	3.39;0.001*
4 weeks postoperative	0.0±0.0	0.0±0.0	0.99
3 months	0.0±0.0	0.0±0.0	0.99
Olfactory loss			
7 days postoperative	1.17±0.59	0.57±0.63	3.81;0.001*
4 weeks postoperative	0.0 ± 0.0	0.0±0.0	0.99
3 months	0.0 ± 0.0	0.0±0.0	0.99
Nasal discharge			
7 days postoperative	2.67±0.99	1.53±0.57	5.413;0.001*
4 weeks postoperative	0.50±0.63	0.0±0.0	4.34;0.001*
3 months	0.0±0.0	0.0±0.0	0.99
Overall discomfort			
7 days postoperative	2.30±0.87	2.20±0.61	0.51;0.610
4 weeks postoperative	0.07±0.25	0.0±0.0	1.43;0.155
3 months	0.0±0.0	0.0±0.0	0.99

*Statistically significant (p<0.05); Chi-square test

The postoperative endoscopic findings that was evaluated using the Lund-Kennedy (L-K) Nasal Endoscopy Scoring System, for polyp formation, edema, discharge, scarring, and crusting at three postoperative time points in both the conventional and microdebrider groups. For nasal polyps, no recurrence was observed in either group at any follow-up interval, with all patients consistently scoring 0, indicating complete polyp clearance postoperatively and no group-wise differences (p = 0.99 at all-time points). Edema was present in 50% of patients in the conventional group at 7th postoperative day compared to 26.7% in the microdebrider group. Although a higher proportion of patients in the microdebrider group showed no edema, this difference was not statistically significant (p = 0.110). Notably, edema had completely resolved by 4 weeks and 3 months in both groups.

The nasal discharge, was seen in 86.7% of patients in the conventional group and 80% in the microdebrider group at 7th day post operative. This difference was not statistically significant (p = 0.731). However, at 4 weeks, a significant difference was observed with only 66.7% of patients in the conventional group compared to 100% in the microdebrider group (Chi-square = 12; p = 0.001). By 3 months, the difference in discharge scores between the groups approached significance (p = 0.052), with 83.3% of patients in the conventional group and all patients in the microdebrider group showing complete resolution. Scarring was observed in only one patient (3.3%) in the conventional group at 7th day; none in the microdebrider group showed scarring, though this difference was not statistically significant (p = 0.99). By 4 weeks and 3 months, no scarring was observed in either group. [table 4]

A notable difference was seen in crusting scores, which were significantly better in the microdebrider group. At 7 days, 96.7% of patients in the conventional group exhibited crusting compared to only 60% in the microdebrider group (Chi-square = 11.88; p = 0.001, statistically significant). This trend persisted at 4 weeks, with 40% of conventional group patients still showing crusting compared to only 3.3% in the microdebrider group (Chi-square = 11.88; p = 0.001). By 3 months, crusting had resolved in both groups. Overall, endoscopic evaluation showed superior mucosal healing and fewer postoperative complications in the microdebrider group, especially regarding crusting and nasal discharge, which were significantly lower than those in the conventional group. This further reinforces the advantages of powered instrumentation in enhancing postoperative outcomes.

Table 4: L-K Endoscopy Scoring

	Score	**Conventional** n(%)	**Microdebrider** n(%)	**Chi-square value; p-value**
Polyp				
7 days postoperative	0	30(100)	30(100)	0.99
	1	0	0	
4 weeks postoperative	0	30(100)	30(100)	0.99
	1	0	0	
3 months	0	30(100)	30(100)	0.99
	1	0	0	
Edema				
7 days postoperative	0	15(50)	22(73.3)	3.45; 0.110
	1	15(50)	8(26.7)	
4 weeks postoperative	0	30(100)	30(100)	0.99
	1	0	0	
3 months	0	30(100)	30(100)	0.99
	1	0	0	
Discharge				
7 days postoperative	0	4(13.3)	6(20)	0.48; 0.731
	1	26(86.7)	24(80)	
4 weeks postoperative	0	20(66.7)	30(100)	12; 0.001*
	1	10(33.3)	0	
3 months	0	25(83.3)	30(100)	5.45; 0.052
	1	5(16.7)	0	
Scarring				
7 days postoperative	0	29(96.7)	30(100)	1.01; 0.99
	1	1(3.3)	0	
4 weeks postoperative	0	30(100)	30(100)	0.99
	1	0	0	
3 months	0	30(100)	30(100)	0.99
	1	0	0	
Crusting				
7 days postoperative	0	1(3.3)	12(40)	11.88; 0.001*
	1	29(96.7)	18(60)	
4 weeks postoperative	0	18(60)	29(96.7)	11.88; 0.001*
	1	12(40)	1(3.3)	
3 months	0	30(100)	30(100)	0.99
	1	0	0	

DISCUSSION

Endoscopic sinus surgery (ESS) has become the gold standard for the surgical treatment of sinus disease, offering a minimally invasive approach that combines precision and effectiveness. Under endoscopic guidance, surgeons can meticulously restore ventilation and mucociliary drainage, addressing the underlying causes of sinus pathology while preserving healthy mucosa and normal anatomy. By minimizing tissue trauma and promoting optimal healing, ESS enables patients to recover quickly and experience lasting relief from sinus symptoms. This technique represents a significant advancement in the management of sinus disease, providing a safe and effective solution for patients who have not responded to medical therapy. [5]

The evolution of Endoscopic Sinus Surgery (ESS) techniques has led to the adoption of microdebriders, which are sophisticated, electrically powered instruments featuring small, rotating blades. These

microdebriders facilitate precise and sharp excision of polyps, mucosa, and bone, enabling surgeons to achieve more effective and controlled tissue removal while minimizing trauma to surrounding tissues. The integration of microdebriders into ESS has been associated with several benefits, including improved precision and control during tissue removal, reduced bleeding and trauma to surrounding tissues, enhanced visualization of the surgical site, allowing for more accurate dissection. By leveraging the capabilities of microdebriders, surgeons can optimize outcomes in ESS and provide patients with more effective and safer treatment options. [5,6] According to the epidemiological analysis by Bettiga et al., majority were men in their study which accounted for 41.66%. [7] Another study by Raciborski et al. men were in majority. [8] This report was similar to our study results where we reported with 56.7% and 43.3% males in conventional and microdebrider group respectively.

In our study the difference was not statistically significant with respect to mean operative time. The mean intraoperative blood loss showed a marked difference between the groups. Patients in the conventional group had significantly higher blood loss. This difference was statistically significant indicating that powered instruments resulted in better intraoperative hemostasis and reduced blood loss. A prospective study by Saafan et al. [9] investigated the impact of powered instrumentation on endoscopic sinus surgery (ESS) and found that the use of microdebriders significantly improved both operative times and surgical conditions compared to traditional techniques. This study highlights the benefits of incorporating powered instrumentation into ESS procedures, including enhanced efficiency, precision, and control. The results of this study are consistent with the growing body of evidence supporting the use of powered instrumentation in ESS. By leveraging the advantages of microdebriders and other powered instruments, surgeons can optimize their techniques, reduce operative times, and improve patient outcomes. V.Annamalai et al [10] study reported that the mean time required for surgery was less in the debrider group (90.35 min) than that with conventional methods (122.17 min). The shorter operating time was due to the suction of tissues and blood by the microdebrider concurrently, which offers better visibility when compared to conventional instruments which require a longer time to control bleeding.

In Boezaart-Vandermerwe Grading System, our study had 46.7% with slight bleeding requiring frequent suctioning that threatened the surgical field shortly after suction removal (Grade 3)., more patients and 66.7% had Grade 2 bleeding in the microdebrider group. From this we can infer the observation of reduced blood loss with powered instrumentation. In a study by Christmas et al., [11] on patients who underwent microdebrider assisted surgery and conventional endoscopic method. A blood loss of 19.5ml was seen with debrider method and in conventional method 44.5ml. Thus, bleeding during surgery was decreased in the microdebrider method. R Singh et al.'s study of 40 patients demonstrated the advantages of using microdebriders in endoscopic sinus surgery (ESS) by showing a notable reduction in intraoperative bleeding. The average blood loss in the microdebrider group was 181 ml, compared to 225 ml in the conventional group. This reduction in bleeding can be attributed to the precise and controlled nature of microdebrider instrumentation.[12]

Kumar and Sindwani's study demonstrated the effectiveness of bipolar microdebriders in reducing intraoperative blood loss and surgery duration in patients with nasal polyposis undergoing endoscopic sinus surgery (ESS). The bipolar microdebrider's ability to simultaneously cut and coagulate tissue likely contributed to the significant reduction in bleeding and operative time.[13] Saafan et al.'s prospective study demonstrated that microdebriders significantly reduce operating time in endoscopic sinus surgery (ESS) by allowing for concurrent suction of tissues and blood. This simultaneous suction capability provides a cleaner and more bloodless surgical field, improving visibility and enabling surgeons to work more efficiently. [9]

In our study, Surgical field quality was assessed on a three-point scale and the difference between the groups was statistically significant (Chi-square value = 8.427; p = 0.015), indicating that using microdebrider significantly improved the surgical field quality during the procedure. Bruggers et al,[14] Kennedy et al [15] and Gunkel et al [16] mentioned that the continuous integrated suction provides better visualization of the operative field due to continuous removal of blood, tissue and bone fragments and serves as a significant advantage by eliminating the need to move in and out of the surgical field, increasing the ability to continuously work in that area without loss of time that may occur when switching instruments.

The postoperative symptom scores between the conventional and microdebrider groups assessed using the Visual Analogue Scale (VAS) showed significant difference in nasal blockage, headache, nasal discharge at 7th day and at 4 weeks and facial pain, olfactory loss at 7th day, post operatively. There was no statistically significant difference between the groups at any time for overall discomfort. The intragroup analysis of VAS scores showed a progressive and statistically significant reduction in symptom scores in both groups across all time points, indicating effective symptom resolution postoperatively in both surgical modalities. These results confirm that both surgical techniques effectively reduced postoperative symptoms over time, but the rate of symptom relief was faster and more consistent in the microdebrider-assisted group. Ghera B et al.,[17] results showed symptomatic improvement of nasal obstruction, nasal discharge, sneezing, facial pain/pressure and overall discomfort in microdebrider group compared to conventional group at 3 months and 6 months postoperatively. Similar results have been reported in studies conducted by Magdy et al, [18] Kakkar V et al [19].

Our study evaluated the postoperative endoscopic findings using the Lund-Kennedy (L-K) Nasal Endoscopy Scoring System, and showed no polyp formation in postoperative period. Nasal discharge at 4 weeks had significant different between the groups. Scarring was observed in only one patient in conventional group. Similar studies conducted by Lazar et al [20] noted a synechiae formation in 513 adult patients was 27% and a 20% rate in 260 children. Ghera b et al [17] study results revealed minor complications, like intraoperative bleeding, nasal discharge, crusting and mild scarring in microdebrider group. In conventional group the minor complications included sensation of nasal obstruction at 3 months due to damage. Ephraim et al, [21] reported 1.37% minor and 0.31% major complications in adults .with Microdebrider™.

CONCLUSION

Powered endoscopic sinus surgery represents a paradigm shift in the management of Chronic Rhinosinusitis, leveraging advanced technology to deliver a more precise, less traumatic, and highly effective therapeutic approach that not only minimizes mucosal injury and intraoperative complications but also provides a bloodless dry operative field with unparalleled visualization, thereby facilitating shorter operative times, reducing the incidence of postoperative synechiae, and promoting faster healing rates, with the entire process being intricately dependent on the surgeon's comprehensive anatomical knowledge and honed operative skills.

The findings of our study revealed that although both microdebrider-assisted ESS and standard conventional methods achieved comparable postoperative outcomes at 6 months with complete resolution of symptoms, the microdebrider group demonstrated notable advantages during the early postoperative period, including enhanced endoscopic outcomes and VAS scores at 7 days and 4 weeks, significantly reduced intraoperative blood loss, and improved surgical field assessment, collectively underscoring the benefits of microdebrider-assisted ESS as a superior approach to functional endoscopic sinus surgery.

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