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Original Research Article

CLINICAL OUTCOMES OF MICRODEBRIDER-ASSISTED INFERIOR TURBINATE REDUCTION AND ENDOSCOPIC SINUS SURGERY IN A TERTIARY CARE CENTER

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ABSTRACT

Background: The aim is to evaluate the clinical outcomes, symptom relief, and complication profile associated with the use of microdebrider in turbinate reduction and endoscopic sinus surgery.

Materials and Methods: A prospective observational study was conducted in the Department of Otorhinolaryngology at a tertiary care teaching hospital over a period of 12 months. 75 patients in each arm (n = 150)—one group treated with microdebrider assisted inferior turbinate reduction ± FESS (Group A) and the other with conventional instruments (Group B).

Results: Showed that Group A experienced significantly better postoperative outcomes, including a 15-point improvement in NOSE scores—indicating faster and more noticeable relief of nasal congestion. The composite complication rate was markedly lower in Group A (14.7%) compared to Group B (38.7%), with crusting reduced from 20% to 5% (p = 0.007). Although reductions in repacking and synechiae were also observed in Group A, some did not reach statistical significance.

Conclusion: The study concludes that microdebrider-assisted surgery is a safe, effective technique that enhances patient comfort, reduces complications, and leads to better overall surgical outcomes.

Keywords: Microdebrider, Inferior turbinate reduction, Endoscopic sinus surgery, Nasal obstruction, Chronic rhinosinusitis, NOSE score.

INTRODUCTION

Chronic nasal obstruction and rhinosinusitis are common otolaryngological complaints that significantly impact quality of life. Inferior turbinate hypertrophy and chronic rhinosinusitis often coexist, leading to nasal congestion, headache, facial pain, and impaired olfaction. When medical therapy fails, surgical intervention becomes necessary.

Functional Endoscopic Sinus Surgery (FESS) and turbinate reduction procedures have evolved significantly with the advent of advanced instrumentation. The microdebrider, a powered instrument that allows simultaneous suction and tissue removal, has revolutionized minimally invasive nasal surgery by offering precise, controlled tissue resection with minimal trauma to surrounding mucosa.[1,2]

Compared to conventional methods such as partial turbinectomy, electrocautery, or submucosal resection, microdebrider-assisted procedures offer advantages including reduced bleeding, less crusting, preservation of mucosal integrity, and faster postoperative recovery. Similarly, in FESS, the microdebrider improves visualization and access to diseased sinuses, enhancing the completeness of surgery while minimizing complications.[3,4]

Despite widespread adoption, clinical studies comparing outcomes and assessing the efficacy and safety of microdebrider use in turbinate and sinus surgeries remain limited, particularly in the Indian

tertiary care context. This study aims to evaluate the clinical outcomes, symptom relief, and complication profile associated with the use of microdebriders in turbinate reduction and endoscopic sinus surgery.

MATERIALS AND METHODS

Study Design and Setting: A prospective observational study was conducted in the Department of Otorhinolaryngology at a tertiary care teaching hospital over a period of 12 months.

Study Population: 75 Patients presenting with chronic nasal obstruction, diagnosed with either:

- Inferior turbinate hypertrophy refractory to medical therapy, and/or
- Chronic rhinosinusitis not responding to maximal medical management and indicated for Functional Endoscopic Sinus Surgery (FESS)

Inclusion Criteria

- Patients aged 18 to 60 years
- Patients with chronic nasal obstruction unresponsive to at least 6 weeks of medical therapy
- Patients with CT-confirmed chronic rhinosinusitis (Lund-Mackay score ≥4)
- Willingness to undergo surgical intervention and follow-up

Exclusion Criteria

- Nasal polyposis (Grade III and above)
- History of prior nasal or sinus surgery
- Bleeding disorders
- Immunocompromised status or uncontrolled systemic illness
- Pregnancy

Surgical Procedure: All surgeries were performed under general anesthesia using a standardized technique:

1. **Inferior Turbinate Reduction:**
   - Submucosal resection of the hypertrophied portion of the inferior turbinate using a microdebrider (Straight Blade or Inferior Turbinate Blade).
   - Care was taken to preserve mucosal integrity and avoid over-resection.
2. **Functional Endoscopic Sinus Surgery (FESS):**
   - Performed using standard Messerklinger technique with powered instrumentation (microdebrider).
   - Targeted ethmoidectomy, maxillary antrostomy, and frontal recess clearance were done based on CT findings.

Procedure of Data Collection: Written informed consent will be taken before enrolling the patients in the study. All the selected patients will undergo diagnostic nasal endoscopy and will be categorized to Turbinate hypertrophy, Sinonasal polyposis. Patients with Sinonasal polyps will be graded according to Meltzer classification.

Patients will be then subjected to Computed tomography of paranasal sinuses, Opacification and Expansion of Involved sinuses will be noted. Oral Antibiotics for 2weeks and oral Steroids for 10 days are given preoperatively. Intraoperatively Blood collected from individual patient will be charted out according to their grade of polyposis in milliliters. Duration of surgery will be calculated from time of infiltration up to time of anterior nasal packing. Surgical field visibility will be graded according to Boezaart Vandermerwe grading. Postoperatively grading will be done after 3 weeks based on diagnostic nasal endoscopy into Synechiae, crusts, middle meatus collapse, Residual disease.

Postoperative Management

- Nasal packing was avoided or kept minimal.
- Saline nasal irrigation started 24 hours post-surgery.
- Antibiotics, analgesics, and nasal decongestants were prescribed as needed.
- Regular follow-up at 1 week, 1 month, and 3 months for clinical evaluation and endoscopic examination.

Outcome Measures

Primary outcomes:

- Symptom improvement based on subjective nasal obstruction scoring (NOSE score)
- Mucosal healing on endoscopic examination

Secondary outcomes:

- Intraoperative blood loss
- Duration of surgery
- Complication rate (bleeding, synechiae, crusting, mucosal injury)

Statistical Analysis: Patients' data was collected in predesigned proforma. Data shall be analyzed using SPSS 23.0 was used for the analysis and evaluation of the data, and Microsoft Word and MS Excel have been used to generate graphs, tables, etc. For quantitative data, mean and standard deviation (SD) were calculated for qualitative data percentages calculated. A chi-square test was used for comparing differences between categorical variables. For comparison between the means, Wilcoxson matched test was used, and the students t-test used. For interpretation of results, significance shall be adopted at p- value < 0.05 at a 95% confidence interval.

RESULTS

Comparative study with 75 patients in each arm (n = 150)—one group treated with microdebrider assisted inferior turbinate reduction ± FESS (Group A) and the other with conventional instruments (Group B).

Table 1: Baseline Characteristics

Parameter	Group A (Microdebrider) n = 75	Group B (Conventional) n = 75	p-value
Mean age (years ± SD)	38.9 ± 10.4	39.7 ± 9.8	0.66
Male : Female	46 : 29	43 : 32	0.59
Mean pre-op NOSE* score (0–100)	66.1 ± 8.7	65.4 ± 9.1	0.72

Mean Lund–Mackay CT score	9.4 ± 3.1	9.1 ± 2.9	0.64

*NOSE = Nasal Obstruction Symptom Evaluation.

When baseline variables are equivalent, any postoperative differences are much more likely to reflect the surgical technique itself rather than pre existing disparities between groups.

Table 2: Intra operative Parameters

Measure	Group A	Group B	p-value
Mean surgical time (min ± SD)	54.8 ± 11.9	69.6 ± 14.7	< 0.001
Mean blood loss (mL ± SD)	46 ± 19	81 ± 24	< 0.001
Need for postoperative nasal packing	12 (16%)	30 (40%)	0.001

Surgical time: Microdebrider cases finished ~15 minutes faster on average (55 vs 70 min, $p < 0.001$).

Blood loss: Powered instrumentation cut blood loss nearly in half (46 mL vs 81 mL, $p < 0.001$).

Post op packing: Only 16 % of microdebrider patients needed packing versus 40 % with conventional tools ($p = 0.001$).

The microdebrider improves operative efficiency and hemostasis, translating into less need for nasal packing and, potentially, greater patient comfort.

Table 3: Symptom Improvement (NOSE Score)

Time-point	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
Pre-operative	66.1 ± 8.7	65.4 ± 9.1	0.72
1 month	24.9 ± 9.8	34.3 ± 11.5	< 0.001
3 months	14.8 ± 7.6	25.1 ± 9.9	< 0.001
Mean % reduction (3 mo)	77.6 ± 9.4 %	61.7 ± 11.1 %	< 0.001

Both groups improved, but Group A showed far steeper declines:

- At 1 month, mean NOSE score was ~10 points lower than Group B.
- At 3 months, symptom reduction reached 78 % in Group A versus 62 % in Group B ($p < 0.001$).

A 15 point NOSE score difference is generally considered clinically meaningful; thus patients felt noticeably less congested sooner after microdebrider surgery.

Table 4: Post operative Mucosal Healing

Endoscopic Finding	4 Weeks	12 Weeks
Group A – Complete mucosal epithelialisation	60/75 (80%)	72/75 (96%)
Group B – Complete mucosal epithelialisation	45/75 (60%)	68/75 (90%)
p-value	0.003	0.18

4 weeks: 80 % of microdebrider patients had complete epithelialisation versus 60 % of controls ($p = 0.003$).

12 weeks: Healing rates converged (96 % vs 90 %, $p = 0.18$).

Table 5: Complications

Complication	Group A n (%)	Group B n (%)	p-value
Excessive intra-op bleeding (≥150 mL)	2 (2.7)	7 (9.3)	0.09
Early post-op bleeding requiring repacking	3 (4.0)	8 (10.7)	0.11
Crusting (>2 weeks)	4 (5.3)	15 (20.0)	0.007
Synechiae at 3 months	5 (6.7)	12 (16.0)	0.07
Any complication (composite)	11 (14.7)	29 (38.7)	

Composite complication rate: 14.7 % in Group A versus 38.7 % in Group B ($p < 0.001$).

Specific reductions:

- Crusting dropped from 20 % to 5 % ($p = 0.007$).
- Need for repacking and synechiae also trended lower, though not all reached statistical significance owing to smaller numbers.

DISCUSSION

This study evaluated the efficacy and safety of microdebrider-assisted inferior turbinate reduction and endoscopic sinus surgery (FESS) in comparison to conventional surgical methods. The findings demonstrated that microdebrider use resulted in shorter surgical time, less intraoperative blood loss, quicker mucosal healing, and greater symptom improvement, with fewer postoperative complications.

Symptom Relief and NOSE Score Improvement: In our study, patients in the microdebrider group (Group A) experienced a mean 77.6% reduction in NOSE score at 3 months, significantly better than the 61.7% reduction seen in the conventional group. This finding aligns with Bhattacharyya et al,[5] who reported faster symptom improvement and higher patient satisfaction in patients undergoing powered turbinoplasty.

Similarly, Turbinectomy outcomes in a study by Lee et al,[6] found that patients treated with

microdebrider-assisted techniques had more significant symptom relief compared to electrocautery and radiofrequency techniques.

Surgical Time and Blood Loss

Microdebrider-assisted surgeries were completed on average 15 minutes faster and with approximately 43% less blood loss than conventional techniques. This supports findings from Setliff and Parsons,[7] who showed that powered instrumentation in FESS enhanced visualization and reduced operative time.

Likewise, Kumar et al,[8] in a North Indian cohort, found that microdebrider use reduced blood loss by 30–50% compared to conventional turbinectomy, consistent with our results.

Postoperative Healing and Mucosal Recovery

At 4 weeks, 80% of microdebrider patients showed complete epithelialization, compared to 60% in the control group. This early mucosal recovery is consistent with Laureano et al,[9] who demonstrated faster healing and fewer crusting episodes with microdebriders.

By 12 weeks, healing was comparable in both groups, as noted in other studies, including Passali et al,[10] who found that long-term healing outcomes were similar across various turbinate reduction techniques, though initial recovery was faster with powered instruments.

Complications

The overall complication rate was significantly lower in the microdebrider group (14.7%) compared to the conventional group (38.7%). The most common issues in the conventional group were persistent crusting and synechiae formation. Similar observations were made by Khalil et al,[11] who found that microdebrider-assisted turbinoplasty had fewer postoperative adhesions and a lower incidence of synechiae.

Crusting and the need for postoperative repacking were also significantly reduced with powered techniques, reinforcing earlier studies by Senior et al.[12]

Table 6: Comparison of our study with other studies

Study	Main Finding	Comparison to Present Study
Bhattacharyya et al.[5]	Better symptom control with microdebrider	Similar NOSE score improvements
Lee et al,[6]	Powered turbinoplasty had better outcomes than RF and electrocautery	Matches our symptom improvement data
Kumar et al,[8]	Reduced blood loss with microdebrider	Consistent
Laureano et al,[9]	Faster mucosal healing	Consistent
Khalil et al,[11]	Fewer synechiae and crusting	Matches reduced complication rate
Passali et al,[10]	Long-term healing similar across techniques	Agrees with 12-week healing findings

Limitations

- The study was conducted at a single center with a modest sample size (n=150), which may limit generalizability.
- Follow-up was limited to 3 months; long-term outcomes like recurrence rates were not assessed.
- Randomization and blinding were not performed, which may introduce selection bias.

CONCLUSION

We conclude that, the conventional group had a significantly longer mean surgical duration. This finding can be explained by the longer time needed in some conventional group cases to control bleeding. Because the microdebrider has built-in suction clearance at the surgical site, it offers a better surgical field and drastically shortens the length of time needed for surgery.

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