Section: Otorhinolaryngology

Original Research Article

A COMPARATIVE STUDY ON OUTCOME OF PATIENTS UNDERGOING MICRODEBRIDER ASSISTED (FUNCTIONAL) ENDOSCOPIC SINUS SURGERY(FESS) VERSUS CONVENTIONAL (FUNCTIONAL) ENDOSCOPIC SINUS SURGERY (FESS) FOR CHRONIC RHINOSINUSITIS WITH SINONASAL POLYPOSIS

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Abstract

Background: Nasal polyposis affects 1-4% of the population and often requires functional endoscopic sinus surgery (FESS). Microdebrider-assisted FESS offers precise, bloodless surgery but requires anatomical expertise to minimise complications. This study aimed to compare the outcomes of patients with chronic rhinosinusitis with nasal polyps who underwent microdebrider-assisted FESS and conventional FESS. **Materials and Methods:** This prospective randomised comparative study included 80 patients visiting the ENT OPD at K.A.P. Viswanatham, Government Medical College and Hospital, from March 2021 to August 2022. The patients were randomised into microdebrider and conventional FESS groups. Preoperative assessments included VAS scoring, endoscopic grading, and CT-based Lund-Mackay staging. Surgery was performed under general anaesthesia, with intraoperative parameters recorded, followed by endoscopic evaluations and Lund-Kennedy scoring over six months. **Result:** The microdebrider group had a significantly shorter operative time (90.35 vs. 122.17 min, p=0.001) and better surgical field visibility (31 vs. 1 in grade 2, p=0.001). Synechiae formation was absent in the microdebrider group but was present in 14 patients in the conventional group (p=0.016). Polyp recurrence was lower in the microdebrider group (1 vs. 7, p=0.025). Postoperative VAS scores at 3 and 6 months were significantly lower in the microdebrider group (3.3±1.637 vs. 6.1±7.103, p=0.001; 1.98±1.234 vs. 4.48±1.413, p=0.001). Nasal block was also lower at 6 months (1.04±0.58 vs. 2.06±0.816). Postoperative oedema (100%) and scarring (3 in each group) were similar. **Conclusion:** The microdebrider-assisted approach improves surgical precision, reduces operative time, and enhances recovery with lower scarring and synechiae. It provides better symptom relief, making it an efficient option for managing rhinosinusitis with polyposis.

INTRODUCTION

Nasal polyposis is a unique component of the inflammatory response affecting the nasal and paranasal sinus mucosa. It usually affects 1-4% of the population and is frequently observed in practice. When medical management fails to resolve the condition, surgery is required to attain satisfactory ventilation and drainage of the impaired sinuses using either a microdebrider or conventional instruments for functional endoscopic sinus surgery (FESS).[1,2] FESS is most appropriately defined as a minimally invasive procedure using an endoscope to re-establish nasociliary clearance of mucus, drainage, and aeration of the sinuses.[3,4]

The introduction of the rigid endoscope for the diagnosis and management of sinonasal disorders has been the most revolutionary advancement in the field of rhinology.[5] Mucosal preservation is indispensable for attaining sinus drainage. When the mucosa is removed, the surgeon should endeavour to reline the mucosal surface of the sinus. Rapid postoperative resumption of the mucociliary function is contingent on ciliary regeneration and reducing the amount of bone exposed via the surgical procedure due to radical excision of the mucosa.[6,7]

Powered sinus instruments were introduced into FESS practice some time ago with the development of the microdebrider. Microdebrider-assisted FESS is precise, with a relatively bloodless field, although the meticulousness of surgery is dependent on the surgeon's precise knowledge of anatomy, as there is a high risk for major complications with the imprecise or erroneous use of the microdebrider in FESS.[8]

Aim

This study aimed to compare the outcomes of patients with chronic rhinosinusitis with nasal polyposis who underwent microdebrider-assisted FESS versus conventional FESS.

MATERIALS AND METHODS

This prospective randomised comparative study included 80 patients visiting the ENT OPD at K.A.P. Viswanatham, Government Medical College and Hospital, from March 2021 to August 2022. The Institutional Ethics Committee approved the study before its initiation, and informed consent was obtained from all the patients.

Inclusion Criteria

Patients aged 20–60 years presenting with chronic rhinosinusitis with sinonasal polyposis, who were medically fit and willing to undergo surgery, were included.

Exclusion Criteria

Patients aged below 20 years, medically unfit with comorbidities, pregnant or lactating, who did not give consent for the study and periodical follow-up, who were not able to tolerate general anaesthesia due to medical circumstances, and who had chronic rhinosinusitis without nasal polyposis were excluded.

Methods: Patients were started on medical treatment with systemic steroids for 2 weeks and topical nasal steroids for one month. Patients in whom disease persisted after medical therapy were equally randomised into two groups: microdebrider and conventional endoscopic sinus surgery, with 40 patients in each group. A visual analogue scale (VAS) was used for every patient to assess the severity and impact of symptoms for nasal discharge, olfactory disturbance, nasal blockage, headache, and facial pain. The VAS ranged from 0 cm for symptoms that were not troublesome at all to 10 cm for the worst imaginable level.

Before the procedure, the patients underwent anterior rhinoscopy and other outpatient department (OPD) assessments, along with the necessary blood investigations. CT scans of the paranasal sinuses were performed, and MRI was used when necessary. Diagnostic nasal endoscopy was performed, a detailed history was obtained, and a thorough clinical examination of the patient was performed. The collected data were entered into a specially designed case record form. Patients were assessed for the suitability of general anaesthesia. During surgery, various parameters, including procedure duration, were recorded. Strict aseptic precautions were observed, and prophylactic antibiotics were administered half an hour prior before the surgery. Preoperative oral/topical steroids were administered to all patients, with careful attention paid to glycaemic control.

Diagnostic nasal endoscopy and grading of sinonasal polyps with CRS

Nasal examination, including diagnostic nasal endoscopy, was performed in all cases and graded based on polyp invasion (Stages 1-3). The Mackay and Lund endoscopic scores were used to assess nasal polyps. A preoperative CT scan of the paranasal sinuses was performed, and the Lund-Mackay staging system was used for radiological grading.

Operative Procedure: Position of the patient: The patient was placed in the reverse Trendelenburg position with the head in the median position and towels folded around the upper half of the face covering the eyes.

Nasal Packing: Preoperatively, nasal packing was performed using gauze impregnated with 2% Xylocaine and 1:100,000 adrenaline solution. Infiltration with 2% Xylocaine and 1:100,000 adrenaline was performed on the mucosa over the uncinate process, guided endoscopically using a 2 mL syringe with a 26-gauge Luer lock needle. An endoscopic approach was used for the surgery. The endoscope was introduced into the nasal cavity, and any difficulties encountered during insertion or any obstruction to vision were noted. The patients underwent operative procedures under general anaesthesia.

Microdebrider group: A microdebrider (Medtronics and Karl Storz) was used for surgery. Polypectomy, uncinectomy, middle meatal antrostomy, anterior and posterior ethmoidectomy, sphenoidotomy, and frontal recess clearance were performed according to the extent of the disease. Cutting blades were set in the oscillation mode at 4000–9000 rpm. The extent of the procedure was determined based on the CT findings.

Conventional group: In the conventional method, the Messerklinger method described by Stammberger was performed using conventional endoscopic sinus surgery instruments. Microdebrider assistance was not used in this group. The operative time was estimated from the insertion of the vasoconstrictor nasal pack at the beginning of the surgery to the insertion of the medicated nasal pack. Surgical field visibility was graded using the Boezaart-Vandermerwe grading system.

Postoperative Care: The nasal pack was removed the day after the surgery. Intravenous antibiotics were administered during the surgery, followed by oral antibiotics for one week. Douching with nasal saline and topical steroid spray was used until the nasal mucosa healed. Diagnostic nasal endoscopy was performed at regular intervals, and findings were noted. Postoperative follow-up was performed a week after discharge and then monthly for six months. Postoperative follow-up was performed on days 1,3, 10, 17, and 24 after surgery. The VAS was

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analysed at 3 and 6 months, and the values were entered. The level of scarring, crusting, recurrence, and synechiae was documented at each visit using the Lund-Kennedy postoperative scoring system.

Statistical Analysis: Data are presented as mean, standard deviation, frequency, and percentage. Continuable variables were compared using the independent-sample t-test. Categorical variables were compared using Pearson's chi-square test. Significance was defined as P values less than 0.05 using a two-tailed test. Data analysis was performed using IBM SPSS version 21.0.

RESULTS

The highest proportion of patients, 31 (38%) were in the 21-30 age group, followed by 19 (24%) in the 41-50 age group. No patients belonged to the 13-20 age group. 55% of the patients were female, while 45% were male, indicating a slight female predominance. Regarding the stage of nasal polyps, 65% of the patients had stage 3 polyps, whereas 35% had stage 2.

In terms of blood loss, the most frequent grade was grade 3 (44%), followed by grade 4 (28%). No patient experienced grade 1 blood loss. Postoperative oedema was present in all patients 80 (100%) and classified as grade 1. Postoperative discharge was observed in 77 (97%) patients, all of whom were classified as grade 1. Among the symptoms, nasal blockage had the highest severity score (8.4±0.756), followed by headache and facial pain (7.12±1.365) [Table 1].

Table 1: Demographic and clinical characteristics.

		Frequency (%)
Age in years	13-20	0 (0%)
	21-30	31 (38%)
	31-40	14 (17%)
	41-50	19 (24%)
	51-60	16 (21%)
Gender	Male	36 (45%)
	Female	44 (55%)
Stage of nasal polyp	Stage 2	28 (35%)
	Stage 3	52 (65%)
Grade of blood loss	Grade 1	0 (0%)
	Grade 2	16 (20%)
	Grade 3	35 (44%)
	Grade 4	22 (28%)
	Grade 5	7 (8%)
Postoperative oedema	Grade 0	0 (0%)
	Grade 1	80 (100%)
Postoperative discharge	Grade 0	0 (0%)
	Grade 1	77 (97%)
VAS score (Mean)	Headache and facial pain	7.12±1.365
	Nasal block	8.4±0.756

The maxillary sinus was the most affected, with most patients (56) in grade 2 and 24 in grade 1. The anterior ethmoidal sinus showed a gradual increase in severity, with 14 patients in grade 0, 28 in grade 1, and 38 in grade 2. The posterior ethmoidal sinus presented a relatively even distribution across all grades, with 24 patients in grade 0, 32 in grade 1, and 24 in grade 2.

The sphenoid sinus also showed a notable number of patients in grades 1 and 2, with 28 in grade 0, 30 in grade 1, and 22 in grade 2, respectively. The frontal sinus appeared to be the least affected, with 29, 32, and 19 patients falling into grades 0, 1, and only 19 into grade 2, indicating milder involvement than the other sinuses [Table 2].

Table 2: Grading of sinus involvement

Name of the sinus	Grade		
	0	1	2
Maxillary	0	24	56
Anterior ethmoidal	14	28	38
Posterior ethmoidal	24	32	24
Sphenoid	28	30	22
Frontal	29	32	19

The majority of patients who underwent surgery had an operative duration of 80-90 minutes (20 patients), exclusively in the microdebrider group, followed by 91-100 minutes (17 patients). The conventional group had longer surgical durations, with 13 patients in the 121–130-minute range. The mean duration of surgery was significantly shorter in the microdebrider group (90.35 min) than in the conventional surgery group (122.17 min) (p=0.001). Postoperative crusting was observed in all patients (40 in each group). Postoperative scarring was present in three patients in each group, whereas 37 patients in each group had no

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scarring (p=0.552), indicating no significant difference.

Synechiae formation was completely absent in the microdebrider group, whereas 14 patients in the conventional group developed synechiae (p=0.016), showing a significantly lower incidence of synechiae with the microdebrider technique. Recurrence of nasal polyps was observed in only 1 patient in the microdebrider group compared to 7 patients in the conventional group (p=0.025), indicating a significantly lower recurrence rate with the microdebrider technique. Surgical field visibility was better with the microdebrider, as 31 patients had grade 2 visibility compared to only 1 patient in the conventional group, with a significant difference (p=0.001) [Table 3].

Table 3: Comparison of surgical outcomes between the groups

		Type of surgery		P value
		Microdebrider	Conventional	
Duration of surgery in minutes	80-90	20	0	-
	91-100	17	0	
	101-110	3	6	
	111-120	0	12	
	121-130	0	13	
	131-140	0	9	
Time for surgery in minutes (Mean)		90.35	122.17	0.001
Post-operative crusting	Absent	0	0	-
	Present	40	40	
Post-operative scarring	Present	3	3	0.552
	Absent	37	37	
Synechiae	Absent	40	26	0.016
	Present	0	14	
Recurrence of polyp	Absent	39	33	0.025
	Present	1	7	
Surgical field visibility	Grade 2	31	1	0.001
	Grade 3	7	15	
	Grade 4	2	17	
	Grade 5	0	7	

At three months postoperatively, the mean VAS score was higher in the conventional group (6.1±7.103) than in the microdebrider group (3.3±1.637), with a significant difference (p=0.001). By six months postoperatively, the VAS score further decreased in both groups but remained higher in the conventional group (4.48±1.413) than in the microdebrider group (1.98±1.234), with a significant (p=0.001).

At three months, nasal block was more severe in the conventional group (3.12±0.97) than in the microdebrider group (1.02±0.783), and headache and facial pain were also slightly higher in the conventional group (2.98±0.73) than in the microdebrider group (2.28±0.854). By six months postoperatively, there was a further reduction in symptoms, with headache and facial pain scoring 2.42±0.597 in the conventional group and 0.94±0.654 in the microdebrider group. Similarly, nasal block persisted more in the conventional group (2.06±0.816) than in the microdebrider group (1.04±0.58) [Table 4].

Table 4: Postoperative symptom assessment and pain scores

		Type of surgery		P value
		Microdebrider	Conventional	
VAS at 3 months		3.3±1.637	6.1±7.103	0.001
VAS at 6 months		1.98±1.234	4.48±1.413	0.001
3 months post-OP VAS score	Headache and facial pain	2.28±0.854	2.98±0.73	-
	Nasal block	1.02±0.783	3.12±0.97	
6 months post-OP VAS score	Headache and Facial pain	0.94±0.654	2.42±0.597	-
	Nasal block	1.04±0.58	2.06±0.816	

DISCUSSION

In our study, of the 80 patients, 44 (55%) were men and 36 (45%) were women. According to the epidemiological analysis by Raciborski et al., men are more commonly affected by polyps (52%) which is consistent with our study.9 In our study, 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. The prospective study by Saafan et al. also showed that the operative time as well as the surgical conditions were significantly better in the powered group compared to the conventional methods.[10]

In our study, postoperative scarring was observed in 37 (95%) patients and was absent in three patients in both methods. Fourteen (35%) patients who underwent conventional surgery developed postoperative synechiae. Recurrence was observed in eight (10%) patients, of whom seven were in the

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conventional method group. Postoperative oedema (grade 1) and discharge (grade 1) were observed in all patients. Synechiae are formed when there is mucosal contact during healing. Synechiae are common between the lateral nasal wall and middle turbinate. Minimal tissue trauma and avoidance of mucosal damage are important to minimise scarring, which is offered by the microdebrider.

Stankiewicz noted synechiae in 6.7% of his patients.[11] In a study by Gaskins, 40 cases (4.1%) required subsequent revision surgery due to obstructive scarring.[12] Lazar et al. noted a synechiae formation in a total of 513 adult patients 27% and 20% in 260 children.[13] Gaskins reported a scarring incidence of 10.5%, with 4.1% of 970 endoscopic procedures requiring revision surgery because of major scar formation and obstruction.[12] Setliff and Parsons in 345 patients showed and decreased middle turbinate trauma reduced synechiae with the microdebrider method.[14] Bernstein et al. reported that 40 patients who underwent endoscopic sinus surgery with the microdebrider noted a low rate of synechiae formation and rapid mucosal healing.[15]

Christmas and Krouse's study showed that endoscopic sinus surgery with microdebrider observed no synechiae were seen in the debrider method, whereas four patients in the conventional method had synechiae.[16] The microdebrider requires experience and skill. Bhatti et al. described that a microdebrider can cause injury to the lamina papyracea. A small deficiency in the lamina papyracea can pull through the orbital fat or even the extraocular muscles into the microdebrider suction. Few cases in which CSF fistula or subarachnoid haemorrhage have been reported.[17]

Recent developments include the use of collators and suction-irrigation drills. The main disadvantage of the microdebrider is its higher cost; however, its advantage is the capacity to perform many functions, such as suction, irrigation, and removal of bone at a time. The Development of microdebrider machinery permits 360-degree blade rotation, instrument tracking with surgical navigation, and the capability to control bleeding using bipolar energy. Different types of blades are also available, each for a particular operative limitation encountered during FESS.[18]

Complete knowledge of endoscopic paranasal sinus anatomy, a bloodless operating field, observation of colour changes during surgery, and surgical experience are prerequisites for reducing complications. Microdebriders lower the rate of complications, even in high-risk cases such as CRSwNP.

CONCLUSION

Our results demonstrated that the microdebrider-assisted approach offers several advantages, including reduced operative time, improved surgical precision, and better intraoperative visibility with less blood loss than the conventional approach. Postoperatively, patients in the microdebrider group showed a trend toward faster recovery, with lower rates of scarring, crusting, and synechiae formation than those in the conventional group. Both techniques were effective in symptom relief, as assessed by the VAS, with significant improvements in nasal obstruction, headache, and facial pain in both groups. However, the microdebrider-assisted method provided superior mucosal preservation and facilitated a quicker postoperative mucociliary recovery. These findings suggest that microdebrider-assisted FESS may be a more efficient and patient-friendly surgical approach for the management of chronic rhinosinusitis with sinonasal polyposis, although further studies with long-term follow-up are warranted to confirm these benefits.

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