

Original Research Article

Visual analogue score and endoscopic domain analysis to assess the outcome of microdebrider in sinonasal diseases

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ABSTRACT

Background: The use of microdebrider in various sinonasal diseases have been sparingly understood. The present study aims to find out the effectiveness of a microdebrider in different sinonasal diseases by using each domain of visual analogue scale (VAS) and confirming the findings by diagnostic nasal endoscopy.

Methods: A prospective observational study was done among patients with sinonasal disease between January 2019 to March 2020 in our tertiary care hospital. A subjective visual analogue scale (VAS) was completed by every patient for all domains according to Lund and Mackay symptom scoring system. Using Lund Kennedy scoring, polyp, edema and discharge were assessed preoperatively. Patients were followed up for 1 week, 6 weeks and 3 months. At 3 months both VAS and Lund Kennedy scoring was done. Post operatively scarring and crusting were assessed separately.

Results: There was a significant improvement in domains post operatively in all the diseases considered ($p=0.001$). In Lund Kennedy endoscopic scoring system there was significant improvement in all the domain that was taken into consideration ($p=0.001$). Inter-disease domain comparison was also made.

Conclusions: The study substantiates the use of microdebrider in various sinonasal disease. Microdebrider being a modern multipurpose instrument plays a significant role in complete clearance of the disease with good postoperative outcome.

Keywords: Microdebrider, Visual analogue scale, Endoscopic sinus surgery

INTRODUCTION

Surgery for sinonasal disease is effective after failed medical therapy. Sinus surgery has evolved over the past few decades to a safer and more effective treatment modality. Before the 1980s, sinus surgery was mainly performed with open approaches using skin incisions for access. Functional endoscopic sinus surgery (FESS) is now the standard of care for most cases of surgical sinus disease.¹

Surgery for sinonasal diseases is a challenge to the endoscopic surgeon due to increased risk of bleeding, lack

of precise tissue removal and increased risk of complications like orbital or intracranial injury due to decreased visibility.^{2,3}

Microdebrider is an advancement in ESS which is an electrically powered instrument used in endoscopic sinus surgery which simultaneously suctions and shreds the tissue between the blades. There are various advantages of using a microdebrider. It makes dissection faster, almost bloodless and safe, allows rapid healing of tissue without harming normal mucosal and to its continuous suctioning at surgical site it provides improved visualisation, precision and less frequent interruptions during surgery.⁴

There are studies regarding the use of microdebrider in nasal polyposis and chronic rhinosinusitis that have been mentioned in the literature. However, the use of microdebrider in various sino-nasal pathologies in terms of completion of disease clearance and the post-operative healing in the sinuses has been sparingly understood. The present study aims to find out the effectiveness of a microdebrider in different sinonasal diseases by using each domain of visual analogue scale (VAS) and confirming the findings by diagnostic nasal endoscopy (DNE).

METHODS

Study design

A prospective observational study was done among patients with sinonasal disease between January 2019 to March 2020 in our tertiary care hospital. All patients between 16-60 years of age who had sinonasal diseases after a failed medical treatment willing to undergo surgery were included in the study. Patients with previous history of sinonasal surgeries and not willing to undergo surgeries were excluded. All patients were subjected to computed tomography (CT) evaluation of the para nasal sinuses.

A subjective visual analogue scale (VAS) was completed by every patient for nasal blockage or congestion, nasal discharge, olfactory disturbance, facial pain or pressure, headache and overall discomfort according to Lund and Mackay symptom scoring system. Complete nasal examination including diagnostic nasal endoscopy was done in all the cases. Using Lund Kennedy scoring, polyp, edema and discharge was assessed preoperatively.

Total of 40 patients with various sinonasal diseases were included. There were 19 cases with unilateral and 21 cases

with bilateral pathology, thus 61 operative sides were considered. Out of 40 patients, 15 were operated in local anaesthesia and remaining 25 who were not cooperative were operated under general anaesthesia. All patients underwent Functional Endoscopic Sinus Surgery (FESS) using microdebrider. Post operatively after obtaining the histopathological confirmation of the pathology, they were started on saline nasal wash and steroid nasal sprays as per the nature of the pathology. For fungal infections, Amphotericin B injection was given till two successive KOH (potassium hydroxide) mounts of the nasal cavity crusts were reported negative for fungal elements on serial debridement.

Patients were followed up for 1 week, 6 weeks and 3 months. At 3 months both VAS and Lund Kennedy scoring was done. Post operatively scarring and crusting were assessed separately.

Statistical analysis: The data were statistically analysed by applying nonparametric tests i.e. Mann-Whitney U-test was used between the groups at pre and post-test. The Wilcoxon matched pairs test by ranks was used to assess the difference between pre and post op for every parameter. This was statistically analysed with Statistical Package for Social Sciences (SPSS) version 20.00 software. The statistical significance was set at statistical level of significance ($p < 0.05$).

RESULTS

Among the 40 patients studied, five diseases were included which were chronic rhinosinusitis, ethmoidal polyposis, fungal rhinosinusitis, JNA and sinonasal masses. (Figure 1, 2). The mean age group was noted to be around 37.45 years.

Table 1: Comparison of pre-operative and post-operative total VAS and its components scores by wilcoxon matched pairs test.

Parameters	Treatment time	Mean	SD	% of change	P value
Total VAS	Pre operative	35.83	5.36		
	Post operative	9.05	2.40	74.74	<0.001
Facial pain	Pre operative	6.28	2.26		
	Post operative	1.48	0.78	76.49	<0.001
Head ache	Pre operative	6.13	2.33		
	Post operative	1.38	0.67	77.55	<0.001
Nasal obstruction	Pre operative	7.23	1.94		
	Post operative	1.40	0.67	80.62	<0.001
Nasal discharge	Pre operative	6.10	2.06		
	Post operative	1.18	0.68	80.74	<0.001
Olfactory disturbance	Pre operative	2.98	2.42		
	Post operative	1.15	1.14	61.34	<0.001
Overall discharge	Pre operative	7.13	1.40		
	Post operative	2.48	0.99	65.26	<0.001

Table 2: Comparison of pre operative and post operative total Lund Kennedy and its components scores by Wilcoxon matched pairs test.

Parameters	Treatment time	Mean	SD	% of change	P-value
Overall score	Pre operative	5.00	2.24		
	Post operative	2.08	0.76	58.50	<0.001
Polyp left	Pre operative	0.85	0.95		
	Post operative	0.00	0.00	100.00	<0.001
Polyp right	Pre operative	0.78	0.95		
	Post operative	0.03	0.16	96.77	<0.001
Edema left	Pre operative	0.55	0.60		
	Post operative	0.13	0.33	77.27	<0.001
Edema right	Pre operative	0.53	0.60		
	Post operative	0.10	0.30	80.95	<0.001
Discharge left	Pre operative	1.20	0.69		
	Post operative	0.08	0.27	93.75	<0.001
Discharge right	Pre operative	1.43	1.28		
	Post operative	0.08	0.27	94.74	<0.001

Table 3: Pair wise comparison of diagnosis with pre operative and post operative VAS and its component scores by Mann-Whitney U test.

Parameters	Time	Ethmoidal polyposis versus chronic rhinosinusitis	Ethmoidal polyposis versus Fungal rhinosinusitis	Chronic rhinosinusitis versus fungal rhinosinusitis
Total VAS	Pre operative	p=0.3121	p=0.1155	p=0.8896
	Post operative	p=0.6459	p=0.0109*	p=0.0332*
Facial pain	Pre operative	p=0.5201	p=0.7812	p=0.8170
	Post operative	p=0.1827	p=0.2666	p=0.9262
Head ache	Pre operative	p=0.0536	p=0.1649	p=0.6770
	Post operative	p=0.0229*	p=0.0417*	p=0.6106
Nasal obstruction	Pre operative	p=0.0094*	p=0.0417*	p=0.4047
	Post operative	p=0.0731	p=0.8531	p=0.2288
Nasal discharge	Pre operative	p=0.5503	p=0.3545	p=0.7111
	Post operative	p=0.6133	p=0.1949	p=0.0786
Olfactory disturbance	Pre operative	p=0.0082*	p=0.5786	p=0.0465*
	Post operative	p=0.2507	p=0.1266	p=0.0296*
Overall disturbance	Pre operative	p=0.6792	p=0.8170	p=0.9631
	Post operative	p=0.2064	p=0.9262	p=0.4589

Table 4: Pair wise comparison of diagnosis with pre operative and post operative Lund Kennedy and its component scores by Mann-Whitney U test.

Parameters	Time	Ethmoidal polyposis versus chronic rhinosinusitis	Ethmoidal polyposis versus fungal rhinosinusitis	Chronic rhinosinusitis versus fungal rhinosinusitis
Overall Lund	Pre operative	p=0.0002*	p=0.0161*	p=0.2114
	Post operative	p=0.0326*	p=0.0332*	p=0.7459
Polyp left	Pre operative	p=0.0001*	p=0.0012*	p=0.8170
	Post operative	p=1.0000	p=1.0000	p=1.0000
Polyp right	Pre operative	p=0.0001*	p=0.0012*	p=1.0000
	Post operative	p=1.0000	p=1.0000	p=1.0000
Edema left	Pre operative	p=0.8904	p=0.2666	p=0.2666
	Post operative	p=0.7477	p=0.8531	p=0.6770
Edema right	Pre operative	p=0.5201	p=0.5786	p=0.9262
	Post operative	p=0.5201	p=0.4875	p=0.8170

Continued.

Parameters	Time	Ethmoidal polyposis versus chronic rhinosinusitis	Ethmoidal polyposis versus fungal rhinosinusitis	Chronic rhinosinusitis versus fungal rhinosinusitis
Discharge left	Pre operative	p=0.8542	p=0.0332	p=0.0710
	Post operative	p=0.7477	p=0.2870	p=0.1949
Discharge right	Pre operative	p=0.7477	p=0.8170	p=1.0000
	Post operative	p=0.7477	p=0.6434	p=0.8170

In Lund Mackay symptomatic scoring a total of 7 domains were considered pre and post operatively. There was a significant improvement in all the domains post operatively in all the diseases considered. (p=0.001) (Table 1). In Lund Kennedy endoscopic scoring system there was significant improvement in all the domain that was taken into consideration. (p=0.00) (Table 2). Post operatively scarring and crusting were noted separately.

Symptoms score

Facial pain

Post operatively 76.49% patients showed significant improvement with respect to facial pain (Table 1). The result was statistically significant (<0.001).

Head ache

Post operatively 77.55% patients showed significant improvement with respect to headache (Table 1). The result was statistically significant (<0.001).

Nasal obstruction

Post operatively 80.62% patients showed significant improvement with respect to nasal obstruction (Table 1). The result was statistically significant (<0.001).

Nasal discharge

Post operatively 80.74% patients showed significant improvement with respect to nasal discharge (Table 1). The result was statistically significant (<0.001).

Olfactory disturbance

Post operatively 61.34% patients showed significant improvement with respect to olfactory disturbance (Table 1). The result was statistically significant (<0.001).

Overall discomfort

Post operatively 65.26% patients showed significant improvement with respect to overall discomfort (Table 1). The result was statistically significant (<0.001).

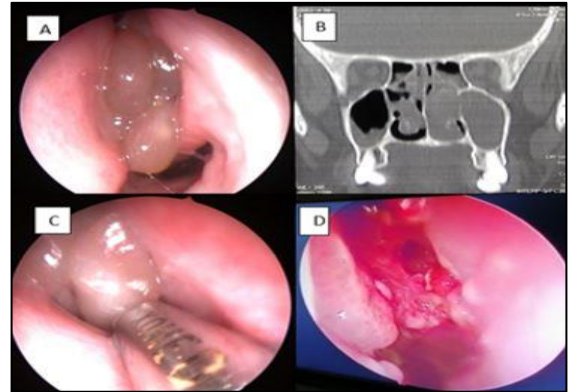


Figure 1: (A) DNE image of left nasal cavity showing multiple polyps in the middle meatus. (B) CT PNS coronal view showing homogenous opacity in left maxillary sinus and nasal cavity. (C) Intra-operative endoscopic image showing microdebrider assisted polypectomy. (D) Post-operative 6 weeks endoscopic image of cleared polypoidal mass.

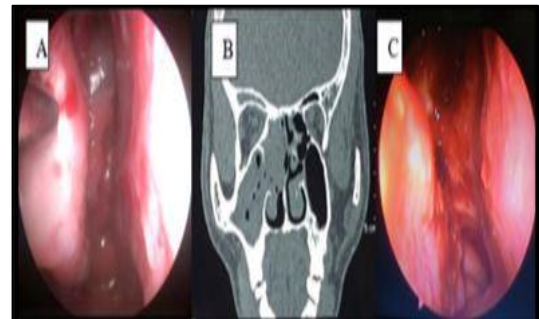


Figure 2: (A) DNE image of right nasal cavity showing sinonasal mass in the middle meatus. (B) CT PNS coronal view showing homogenous opacity in right maxillary sinus and nasal cavity. Post-operative 6 weeks endoscopic image of cleared sinonasal mass.

Lund Kennedy score

Polyp

Post operatively 96.77% and 100% patients showed significant improvement with respect to polyps/mass in right and left nasal cavity respectively (Table 2). The result was statistically significant (<0.001).

Edema

Post operatively 80.95% and 77.27% of patients showed significant improvement with respect to edema on right and left side respectively (Table 2). The result was statistically significant (<0.001).

Discharge

Post operatively 94.74% and 93.75% of patients showed significant improvement with respect to discharge on right and left side respectively (Table 2). The result was statistically significant (<0.001).

DISCUSSION

Endoscopic sinus surgery was designed initially for treatment of polyps and rhinosinusitis. Later it has been extended to several other conditions.^{1,2} The major improvement in endoscopic techniques are aimed at the concept of limited resection while maximally preserving normal mucosa, to create adequate ventilation combined with optimal mucociliary clearance. It is important to reduce the mucosal damage and preserve normal mucosa during surgical procedure to avoid excessive scarring, synechiae formation and associated complications.³

Numerous advantages of microdebriders over traditional techniques have been cited, including reduced operative time, decreased intra-operative and post-operative bleeding, improved visualisation and precision for tissue removal, decreased traumatisation to tissue with mucosal preservation, decreased crusting and synechiae formation, reduced ostial re-occlusion, and overall faster mucosal healing.^{4,5} There are no studies done on different sinonasal diseases and comparison of outcome among individual pathologies.

In the present study pre-operative visual analogue score showed a higher mean scale for symptoms of nasal obstruction (7.23) followed by overall discomfort (7.13) with a mean score lowest for olfactory disturbance. Irrespective of the disease, all sinonasal pathologies symptoms improved significantly with $p < 0.001$ in all domains post operatively.

An inter disease comparison was done among bilateral polyposis, chronic rhinosinusitis and fungal rhinosinusitis as the number of cases were considerably high in these groups (Table 3, 4). Headache was significantly improved in ethmoidal polyposis group when compared to CRS and FRS ($p=0.0417$). Possible reasons for reduction in headache in polyposis could be due to relief of physical obstruction in nasal cavity particularly in polyposis where as in case of CRS and FRS it's the mucosal pathology which is being cleared.

Olfactory disturbance was significantly improved in CRS when compared to FRS. ($p=0.0296$).

In Lund Kennedy endoscopic scoring system there was significant improvement in all the domain that was taken

into consideration. Inter-disease comparison did not show any significant improvement.

Sauer et al noted that both microdebrider and conventional methods resulted in symptom improvement and in endoscopically visible healing over time, but no significant difference was found between the two techniques. In endoscopic evaluation, only the total score at 3 weeks after surgery was significantly better in the microdebrider group. No significant difference was found at any other time point.⁶

Nishanth Kumar and Raj Sindwani did a retrospective study on 80 patients of CRS with polyposis and found that use of bipolar microdebrider reduces bleeding and procedure time during nasal polyp surgery.⁷

Post operatively scarring was noted in 22 percent among all the diseases whereas crusting was seen in among 67 percent in the initial 6 week follow up which reduced to 15 percent in subsequent 12 week follow up.

Scarring following surgery from microdebrider has been noted to be minimal. This is due to the decreased traumatisation to tissue with mucosal preservation thereby resulting in overall faster mucosal healing. This advantage of minimal tissue handling will be a major advantage in using the microdebrider in skull base surgeries thereby reducing minimal scarring.

Bernstein et al in their study of 40 cases of endoscopic sinus surgery performed with the microdebrider reported rapid mucosal healing, minimal crust formation, and a low incidence of synechiae formation.⁸

The limitation of microdebriders are higher cost and learning skill required to use in confined space to avoid damage to surrounding vital structures. However, the advantages are more when compared to the conventional instruments. Recent advances in microdebrider technology now permit 360 degrees blade rotation, continuous tracking of the instrument using surgical navigation, and the ability to control bleeding with bipolar energy. A variety of speciality blades are also available, each attempting to address a specific operative limitation encountered during endoscopic surgery.⁹

CONCLUSION

The study substantiates the use of microdebrider in various sinonasal disease. A significant improvement was noted in using microdebrider in Endoscopic sinus surgery. The use of microdebrider in various diseases have been sparingly done in previous studies. Therefore, the present study emphasis to use microdebrider in various sinonasal diseases.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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