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

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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

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
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 anesthesia. 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.

| Parameters          | Treatment time | Mean  | SD   | % of change | P value |
|---------------------|----------------|-------|------|-------------|---------|
| **Total VAS**       | Pre operative  | 35.83 | 5.36 |             | <0.001  |
|                     | Post operative | 9.05  | 2.40 | 74.74       |         |
| **Facial pain**     | Pre operative  | 6.28  | 2.26 |             | <0.001  |
|                     | Post operative | 1.48  | 0.78 | 76.49       |         |
| **Head ache**       | Pre operative  | 6.13  | 2.33 |             | <0.001  |
|                     | Post operative | 1.38  | 0.67 | 77.55       |         |
| **Nasal obstruction** | Pre operative | 7.23  | 1.94 |             | <0.001  |
|                     | Post operative | 1.40  | 0.67 | 80.62       |         |
| **Nasal discharge** | Pre operative  | 6.10  | 2.06 |             | <0.001  |
|                     | Post operative | 1.18  | 0.68 | 80.74       |         |
| **Olfactory disturbance** | Pre operative | 2.98  | 2.42 |             | <0.001  |
|                     | Post operative | 1.15  | 1.14 | 61.34       |         |
| **Overall discharge** | Pre operative | 7.13  | 1.40 |             | <0.001  |
|                     | Post operative | 2.48  | 0.99 | 65.26       |         |
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   |
| Poly left       | Pre operative  | 0.85    | 0.95  |             |          |
|                 | Post operative | 0.00    | 0.00  | 100.00      | <0.001   |
| Poly right      | Preoperative   | 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                 | 0.3121                                           | 0.1155                                           | 0.8896                                              |
|                                  | Post operative                | 0.6459                                           | 0.0109*                                          | 0.0332*                                             |
| Facial pain                      | Pre operative                 | 0.5201                                           | 0.7812                                           | 0.8170                                              |
|                                  | Post operative                | 0.1827                                           | 0.2666                                           | 0.9262                                              |
| Head ache                        | Pre operative                 | 0.0536                                           | 0.1649                                           | 0.6770                                              |
|                                  | Post operative                | 0.0229*                                          | 0.0417*                                          | 0.6106                                              |
| Nasal obstruction                | Pre operative                 | 0.0094*                                          | 0.0417*                                          | 0.4047                                              |
|                                  | Post operative                | 0.0731                                           | 0.8531                                           | 0.2288                                              |
| Nasal discharge                  | Pre operative                 | 0.5503                                           | 0.3545                                           | 0.7111                                              |
|                                  | Post operative                | 0.6133                                           | 0.1949                                           | 0.0786                                              |
| Olfactory disturbance            | Pre operative                 | 0.0082*                                          | 0.5786                                           | 0.0465*                                             |
|                                  | Post operative                | 0.2507                                           | 0.1266                                           | 0.0296*                                             |
| Overall disturbance              | Pre operative                 | 0.6792                                           | 0.8170                                           | 0.9631                                              |
|                                  | Post operative                | 0.2064                                           | 0.9262                                           | 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                 | 0.0002*                                          | 0.0161*                                          | 0.2114                                              |
|                     | Post operative                | 0.0326*                                          | 0.0332*                                          | 0.7459                                              |
| Polyp left          | Pre operative                 | 0.0001*                                          | 0.0012*                                          | 0.8170                                              |
|                     | Post operative                | 1.0000                                           | 1.0000                                           | 1.0000                                              |
| Polyp right         | Pre operative                 | 0.0001*                                          | 0.0012*                                          | 1.0000                                              |
|                     | Post operative                | 1.0000                                           | 1.0000                                           | 1.0000                                              |
| Edema left          | Pre operative                 | 0.8904                                           | 0.2666                                           | 0.2666                                              |
|                     | Post operative                | 0.7477                                           | 0.8531                                           | 0.6770                                              |
| Edema right         | Pre operative                 | 0.5201                                           | 0.5786                                           | 0.9262                                              |
|                     | Post operative                | 0.5201                                           | 0.4875                                           | 0.8170                                              |

Continued.
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).

**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. 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.

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. 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.

Nishanth Kumar and Raj Sindwaniin 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 polyt surgery.

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.

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.

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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