A Comparison of Microdebrider Assisted Endoscopic Sinus Surgery and Conventional Endoscopic Sinus Surgery for Nasal Polypi

Rohit Singh · Produl Hazarika · Dipak Ranjan Nayak ·
R. Balakrishnan · Navneeta Gangwar · Manali Hazarika

Received: 21 February 2010 / Accepted: 9 November 2011 / Published online: 30 November 2011
© Association of Otolaryngologists of India 2011

Abstract Nasal polyposis is often encountered in rhinology practice. Those who fail conservative management, a definitive surgery is essential to achieve sufficient ventilation and drainage of the affected sinuses by using either microdebrider or conventional instruments for functional endoscopic sinus surgery (FESS). A prospective study was conducted on 40 cases of nasal polypi in a tertiary care hospital. 20 cases were operated by conventional endoscopic instruments and 20 using the microdebrider. The study aimed at comparing the intra operative (blood loss, duration of surgery) and post operative results (crusting, scarring, discharge, symptoms, recurrence) between the two groups using Lund–Mackay scoring system and the data was statistically analysed. There was no statistically significant difference in surgical outcome for patients when either conventional endoscopic instruments or microdebrider was used. However, there was a significant symptomatic improvement in cases undergoing microdebrider FESS. Microdebrider assisted polypectomy is precise, relatively bloodless surgery though the precision depends on the surgeon’s anatomical knowledge and operative skills. Study substantiates that these instruments are helpful but not a prerequisite for successful outcomes in FESS. The study re-emphasises the utility of the microdebrider to young learning FESS surgeons.

Keywords Microdebrider · Nasal polypi · Endoscopic sinus surgery

Introduction

Nasal polyposis usually affects 1–4% of the population. Functional endoscopic sinus surgery (FESS) has been used for more than 20 years in the treatment of sinus diseases. Kennedy coined the term in 1985 [1]. Definitions of FESS vary, but may be defined as a minimally invasive technique, using an endoscope to restore nasociliary clearance of mucous, drainage and aeration of the sinuses [2]. The introduction of the rigid endoscope for the diagnosis and surgical management of sinonasal disorders is the single greatest advance in rhinology to date. Endoscopy provided improved visualisation of the sinonasal anatomy and pioneered the way for sinus surgery to safety beyond the nasal cavity and paranasal sinuses [3]. To obtain drainage of the sinuses, mucosal preservation is essential, or, when removed, expedient relining of the mucosal surface of the sinus should be the aim. Quick post operative recovery of mucociliary function depends on ciliary regeneration, limiting the amount of base bone exposed during the surgical procedure by radical removal of the mucosa [4]. The technical development started as long back as 1879 when Nitze developed small cystoscope which was subsequently used by Hirschman in 1901 for visualisation of the maxillary sinus via an oro-antral fistula [5]. After endoscope came in routine use for surgeries, the limitation of only one hand being available to do all other tasks was felt. A logical development from this reality was a need for a surgical instrument that could perform a variety of tasks at once. Powered sinus instruments entered the landscape several decades ago, with the introduction of the microdebrider.

R. Singh · P. Hazarika · D. R. Nayak · R. Balakrishnan ·
N. Gangwar · M. Hazarika
Department of Otolaryngology and Head and Neck Surgery,
Kasturba Medical College, Manipal University,
Manipal 576104, Karnataka, India

R. Singh (✉)
Department of ENT–HNS, Kasturba Medical College,
Manipal University, Manipal 576104, Karnataka, India
e-mail: rohit.singh.dr@gmail.com

The original design for what we now know as the microdebrider was patented by Urban in 1969 as a “vacuum rotary dissector”. It was used by the House group in 1970 for morselizing acoustic neuromas, and then for arthroscopy. These devices were introduced for nasal surgery in 1994 by Setliff and Parsons [6]. This study was designed to evaluate the use of the microdebrider as an innovation in endoscopic endonasal surgery compared with conventional instruments. The study aims at emphasising the utility of the microdebrider to young learning FESS surgeons.

Materials and Methods

A prospective study was conducted on 40 patients with bilateral nasal polypi at our tertiary care hospital between 2005 and 2008.

Inclusion criteria for cases in the study were:

- (1) All unoperated cases of bilateral nasal polypi presenting with nose block, nasal discharge and sneezing were included in the study. Modified Lund–Mackay scoring system was used for assessing patient symptoms using visual analogue scores (VAS) and total score of greater than or equal to 20 was selected as a case for study.
- Visual analogue scores (VAS) ranges from 0 to 10 where 0 = no symptoms and 10 = great severity of symptoms. (Table 1) Only those patients who prioritized their three worst symptoms as nasal obstruction, nasal discharge and sneezing were included in the study. The symptom score was evaluated pre and post operatively at 6 months.
- (2) CT scan of cases showing Lund–Mackay total score of equal to or more than 8 on each side were included in the study (Table 2) [7].
- (3) All cases had normal coagulation profile.
- (4) All cases had a high absolute eosinophil count (800–1,500 range) and were treated with Tab. Albendazole 1 HS and DEC 100 mg thrice daily for 3 weeks prior to surgery.

Preoperatively repeat absolute eosinophil count was normal in all cases. Fluticasone nasal spray two puffs once daily was also started 3 weeks prior to surgery.

Table 1 Shows Modified Lund–Mackay scoring system used for assessing patient symptoms using visual analogue scores (VAS) [7]

Symptom	Pre operative	After 6 months
Nasal blockage		
Nasal discharge		
Sneezing		

Table 2 Shows CT scan grading of the disease done using Lund–Mackay scoring system for radiological grading of sinus system

Sinus system	Left	Right
Maxillary (0,1,2)		
Anterior ethmoid (0,1,2)		
Posterior ethmoid (0,1,2)		
Sphenoid (0,1,2)		
Frontal (0,1,2)		
Ostiomeatal complex (0,2)*		
Total score		

For all systems except the Ostiomeatal complex 0 = no abnormalities, 1 = partial opacification, 2 = total opacification. * For the Ostiomeatal complex, 0 = not occluded, 2 = occluded.

All cases were operated under general anaesthesia by the same surgeon. Twenty patients underwent endoscopic polypectomy with conventional instruments (Standard Group) and 20 patients underwent microdebrider assisted endoscopic polypectomy (Microdebrider Group). Uncinectomy, Middle meatus antrostomy, anterior and posterior ethmoidectomy was done in all the cases. All polypoidal tissue resected was sent for histopathological examination.

Intra-operatively the duration of the surgery (from the start of surgery to nasal packing) and the amount of blood loss (purely based on collection of blood in the suction apparatus) was noted.

Post-operatively patients were discharged on the 2nd day and started on normal saline nasal douches and asked to continue steroid nasal spray. Cases were reviewed after 1 week and endoscopic cleaning was performed. Patients were closely followed up to 6th month to specifically look for recurrence of polyps, discharge, scarring, crusting and symptomatic improvement using the Lund–Mackay scoring system [7] (Table 3).

In order to avoid bias, all cases in the study were followed up and scored by the principal investigator. Results obtained were tabulated in two groups and statistically analysed using Paired *t* test Table 4.

Exclusion criteria: Cases with active infection, bleeding disorders, recurrent ethmoidal polypi with history of previous surgery were not included in the study.

Result

The male to female ratio in our study was 3:1 (30 males and 10 females). Age distribution of the patients ranged from 25 to 77 years.

The amount of intraoperative bleeding in the microdebrider group was 181 ml, compared with 225 ml in the standard group.

Table 3 Shows the worksheet for endoscopic appearance in Modified Lund–Mackay scoring system

Characteristic	Baseline	After 6 months
Polyp, left ^a		
Polyp, right ^a		
Discharge, left ^b		
Discharge, right ^b		
Scarring, left ^c		
Scarring, right ^c		
Crusting, left ^c		
Crusting, right ^c		
Total points		

^a Scoring 0 absence of polyps, 1 polyps in the middle meatus only, 2 polyps beyond middle meatus

^b Scoring 0 no discharge, 1 clear, thin discharge, 2 thick, purulent discharge

^c Scoring 0 absent, 1 mild, 2 severe

Table 4 Depicts the results obtained in the study

	Microdebrider group	Standard group	<i>P</i> value
Duration (Min)	55	64	0.158
Blood loss (ml)	181	225	0.063
Scarring (%)	10	15	0.633
Discharge (%)	55	75	0.185
Crusts (%)	10	15	0.633
Polyp recurrence (%)	25	55	0.053
Symptoms improved (%)	70	25	0.004

The average duration of surgery was 55 min in microdebrider group, compared with 64 min in the standard group.

Scarring and crust formation were 10% each in microdebrider group, compared with 15% each in the standard group. In both the groups, scarring and crusting had an average Lund–Mackay score of 1; when present.

Nasal discharge and polyp recurrence were 55 and 25% in the microdebrider group, compared with 75 and 55% in the standard group, respectively. Commonly seen nasal discharge in both groups; when present scored 1 and the average polyps recurrence, when present also scored 1 in both the groups.

On statistical analysis *P* value was insignificant except for microdebrider group where a statistically significant symptomatic improvement was seen on 6 month follow up (*P* value 0.004).

Discussion

In patients suffering from polyposis who fail conservative management, a definitive surgery is essential to achieve sufficient ventilation and drainage of the affected sinuses. To provide for the drainage of the sinuses, mucosal preservation is essential, or when severely damaged, limited

removal of the pathological changes should be attempted. Ciliated cells usually take 6 months to regenerate [8].

The microdebrider is a cylindrical, electrically powered shaver supplied with continuous suction. It precisely resects tissues minimising inadvertent tissue trauma and stripping. This is paramount in avoiding excessive scarring and resultant post-operative complications. In contrast, the blades forceps traditionally used in endonasal sinus surgery may cause an undue amount of trauma by tearing and stripping normal mucosa and exposing bone [9]. The limitations of microdebrider are that the tactile feedback component is markedly diminished especially during soft tissue removal. The proximity of skull base and orbit have raised concerns about the safety of these tools in endoscopic sinus surgery. Bhatti and colleagues [10] have described two cases of ocular injury. In both cases it was argued that the strong suction of the microdebrider allowed orbital fat or even extra-ocular muscles to be pulled through a relatively small defect in the lamina papyracea. Berenhalz and colleagues [11] described a case of subarachnoid haemorrhage.

Setliff and Parsons (1994) [12], who introduced microdebrider for nasal surgery, observed limited blood loss, accelerated healing time, reduced synechiae formation and decreased middle turbinate trauma. Bernstein et al. (1998) [9] presented 40 cases of endoscopic sinus surgery performed with the microdebrider showing rapid mucosal healing, minimal crust formation and a low incidence of synechiae formation. Kim Dalziel et al. (2006) [2] did a systematic review of endoscopic sinus surgery for nasal polyps and found symptomatic improvement in 78–88% and median recurrence rate of 20%. This data validates the effectiveness of endoscopic sinus surgery. Sauer et al. (2007) [13] presented a double-blind randomised study on 50 patients comparing the microdebrider and standard instruments in endoscopic sinus surgery. Krouse and Christmas (1996) [1] reported a non-randomised non blinded study of 250 patients who underwent microdebrider assisted surgery and compared them with 225 patients who had undergone traditional endoscopic surgery. They found that surgical bleeding was reduced by more than half in the microdebrider group. In our study there was no statistically significant blood loss and operative time difference in both the groups. However in a study by Dokuz Eylul University, Izmir, Turkey (2002) showed that microdebrider is easier and faster way of resecting polyps [14]. Recently Kumar and Sindwani (2009) [15] have demonstrated in a retrospective case control study that bipolar microdebrider significantly reduces intra operative blood loss and operating time in nasal polyp surgery.

Bernstein et al. (1998) and Christmas, Krouse et al. (1996) [1, 9] have shown low incidence of synechiae formation and crusting in microdebrider group. However,

Selivanova et al. (2003) [4] have shown similar incidence of synechia formation in the two groups.

Krouse and Christmas (1996) [1] showed an identical percentage of symptom free patients on follow up in both groups. In our study, on a 6 months follow up, 70% of the microdebrider group were symptom free and this data was statistically significant.

Zweig et al. (1996) [16] studied that histopathology of tissue samples removed using microdebrider showed no significant loss of morphologic features and this is consistent with our study too.

Conclusion

The study substantiates the fact that microdebrider assisted polypectomy is precise, relatively bloodless surgery though the precision depends on the surgeon's anatomical knowledge and operative skills. So they are helpful but not a prerequisite for successful outcomes in functional endoscopic sinus surgery. There is significant symptomatic improvement in cases undergoing microdebrider assisted surgery in experienced hands. Finally, microdebrider does not alter the morphologic features of the resected specimen on histopathological analysis. The study re-emphasises the utility of the microdebrider to young learning FESS surgeons.

Acknowledgments Medical students posted in the department of ENT-HNS KMC, Manipal. Harpavan Sandha, Sonali Arora, Vipul Jain, Abhishek Bharadwaj for helping with the review of literature.

Conflict of interest None

References

1. Christmas DA, Krouse JH (1996) Powered instrumentation in functional endoscopic sinus surgery II: a comparative study. *Ear Nose Throat J* 75(1):42–44
2. Dalziel K, Stein K, Round A, Garside R, Royle P (2006) Endoscopic sinus surgery for the excision of nasal polyps: a systematic review of safety and effectiveness. *Am J Rhinol* 20(5):506–519
3. Bruggers S, Sindwani R (2009) Evolving trends in powered endoscopic sinus surgery. *Otolaryngol Clin N Am* 42:789–798
4. Selivanova O, Kuehnemund M, Mann WJ, Amedee RG (2003) Comparison of conventional instruments and mechanical debriders for surgery of patients with chronic sinusitis. *Am J Rhinol* 17(4):197–202
5. Chandra RK, Conley DB, Kern RC (2009) Evolution of the endoscope and endoscopic sinus surgery. *Otolaryngol Clin N Am* 42:747–752
6. Bruggers S, Sindwani R (2009) Innovations in microdebrider technology and design. *Otolaryngol Clin N Am* 42:781–787
7. Lund VJ, Mackay IS (1993) Staging in rhinosinusitis. *Rhinology* 107:183–184
8. Moriyama H, Yanagi K, Ohtori N et al (1996) Healing process of sinus mucosa after endoscopic sinus surgery. *Am J Rhinol* 10:61–66
9. Bernstein JM, Lebowitz RA, Jacobs JB (1998) Initial report on post operative healing after endoscopic sinus surgery with the microdebrider. *Otolaryngol Head Neck Surg* 118(6):800–803
10. Bhatti MT, Gionnoni CM, Raynor E, Monshizadeh R, Levine LM (2001) Ocular motility complications after endoscopic sinus surgery with powered cutting instruments. *Otolaryngol Head Neck Surg* 25:501–509
11. Berenholz L, Kessler A, Sarfaty S et al (1999) Subarachnoid hemorrhage: a complication of endoscopic sinus surgery using powered instrumentation. *Otolaryngol Head Neck Surg* 121:665–667
12. Setliff RC, Parsons DS (1994) The “hammer”: new instrumentation for functional endoscopic sinus surgery. *Am J Rhinol* 8:275–278
13. Sauer M, Lemmens W, Vauterin T et al (2007) Comparing the microdebrider and standard instruments in endoscopic sinus surgery: a double-blind randomized study. *B-ENT* 3:1–7
14. Sutay Semih (2002) Microdebrider and complications in endoscopic surgery for nasal polyposis. *Turkish Archives of Otolaryngology* 40(2):110–114
15. Kumar N, Sindwani R (2009) Bipolar microdebrider reduces operative time and blood loss during nasal polyp surgery. *Laryngoscope* 119:43
16. Zweig JL, Schaitkin BM, Fan CY, Barnes EL (1996) Histopathology of tissue samples removed using the microdebrider technique: implications for endoscopic sinus surgery. *HNO* 44(2):98–100