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THE CLINICAL STUDY OF ROLE OF POWERED INSTRUMENTS IN NASAL POLYPOSIS

Dr. C.Chandrika Senior Resident, Dept of Otorhinolaryngology, Kurnool Medical College, Kurnool.

Dr. G.Siva Prasad* Asst Prof, Dept of Otorhinolaryngology, Kurnool Medical College, Kurnool.*Corresponding Author

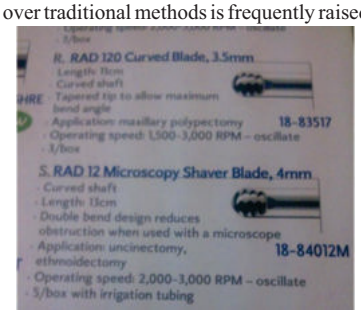
Dr. K.kishore Asst Prof, Dept of Otorhinolaryngology, Kurnool Medical College, Kurnool.

ABSTRACT Sino-nasal polyposis is an inflammatory disease of nose and paranasal sinuses associated with chronic disease of the upper respiratory tract with varied etiology. It shows certain features like nasal discharge, nasal obstruction, reduction in sense of smell, infection, and impaired quality of life. Introduction of Endoscopy has enhanced the diagnosis and management of nasal polyps. The first line of approach is medical management. Those who are not responding to conservative management, a definitive surgery is essential to achieve sufficient ventilation and drainage of the affected sinuses by using either powered instruments (microdebrider, coablator) for functional endoscopic sinus surgery (FESS). The present study was undertaken to study the role of powered instruments in the surgical management of sino-nasal polyps at GGH Hospital, KMC, Kurnool. **MATERIALS AND METHODS:** Thirty patients with sino-nasal polyposis who failed conservative therapy were included in the study. A subjective visual analogue scale (VAS), endoscopic examination, and coronal CT were done preoperatively. Intraoperatively, the operative time, the surgical conditions and degrees of dryness of the operative field were rated and recorded. Postoperatively patients were followed up for a period of 6 months and VAS, polyp grades, the number of endoscopic debridement were recorded. **RESULTS:** With the use of powered instruments (microdebrider and coablator), patients experienced a significant improvement in the VAS and in objective parameters including polyp grading with statistically significant symptom improvemt in microdebrider and coablator at 3 months. The operative time as well as the surgical conditions and dryness of the operative field score were significantly better in the powered group. There was a tendency for improvement in the number of endoscopic debridement in powered group reaching statistical significance. **CONCLUSION:** Powered endoscopic sinus surgery offers a better therapeutic approach for patients with sinonasal polyposis. It provides a bloodless dry operative field with better visualization for a more precise, less traumatic procedure with minimal intraoperative complications and shorter operative time.

KEYWORDS : Microdebrider ; Nasal polyps ; Endoscopic sinus surgery

INTRODUCTION :

Persistant nasal bloackage along with inflammation and irritation of nose and the paranasal sinuses are seen in sinonasal polyposis. The prevalence rate of nasal polyposis is around 2%, and it rises with age,reaching a peak at the age of 60.Nasal Polyposis has been linked to a variety of systemic and respiratory Illnesses, including Cystic fibrosis, Rhinitis, and Asthma, both with and without Aspirin sensitivity. Hirschman4 developed the genuine forerunner to the modern endoscope in 1903. He examined middle meatus and the maxillary antrum with a 4 mm diameter endoscope. In Europe in the 1950s, Von Riccabona and Nehls5 used Hopkins Rod endoscopes, which had better resolution, a larger field of view, and true colour. Kennedy6 created the term "functional endoscopic sinus surgery" in 1985 to describe the possibility of re establishing sinus outflow and mucosal recovery.There was no reaction to medical treatment in this case.Steroids used orally or intranasally have been demonstrated to reduce polyp size, improve symptoms, and lower recurrence rates after surgery.In moderate to severe cases, short-acting steroids may be utilised. It enables the capacity of polyps to generate a quick decrease in polyp size. To obtain access to the polypoid tissue, intranasal steroids were used. For patients with sino-nasal polyposis who are not responding to medical treatment and have frequent relapses, surgery is a typical choice. Traditional polypectomy and functional polypectomy are two surgical options. Messerklinger's sinus surgery with endoscope (FESS) is a classic procedure. The sinus surgeon with endoscope needs a road map to perform sinus surgery with maximal effectiveness and safety. CT, in combination with endoscopy, is the best method of diagnosing surgical disease[26]. The goal of this procedure is to remove pathologic tissues from the sinuses and restore mucociliary clearance and sinus airflow without causing any injury to normal nasal physiology or anatomy.After the endoscope was introduced into surgical practise, the limitation of just having one hand available to perform all other activities became apparent.The use of powered sinus instruments improved the quality of the surgery. With the invention of the microdebrider, surgery has become more easier. Microdebrider provides a number of benefits, including making dissection faster, practically bloodless, and safe, as well as allowing for rapid tissue repair without hurting normal mucosa.Endoscopic surgery for sinonasal polyposis is difficult because it results in greater operative bleeding, which necessitates frequent lens cleaning, a lack of exact tissue removal, and raised risk of complications such as intra-cranical or optical due to limited visibility.The parts of microdebriders like shaver and suction at the terminal end, gives the benefits of debriding polypoidal tissue from the pathological site without frequent removal of instrument, sucking blood at surgical area, non-stop shaving of polypoidal tissue, better visualization with precise, and also with lesser interruptions during surgery.When powered instruments are introduced, it challenges the technology to give a major benefit in methodology over traditional methods is frequently raised.



MATERIALS AND METHODS:

The clinical study was conducted in Government General Hospital, Kurnool Medical College, Kurnool during the period between July 2019 to September 2021 were included in the study, which consists of 30 cases. This study included with patients having sinonasal polyposis whom do not got relieved with medication. All patients were followed up clinically for a period of 6 months postoperatively.

INCLUSION CRITERIA:

1. Age group above 12years and below 50 years.
2. Patients receiving microdebrider-assisted sinus surgery with endoscopy for Sinonasal Polyposis

EXCLUSION CRITERIA :

1. Age below 12 years and above 50 years.
2. Patient not willing for the study
3. Nasal endoscopic surgeries for pathologies like skull base lesions, pituitary surgeries and chronic dacryocystitis and tumors.

RESULTS:

SEX RATIO

In this study THIRTY patients were taken up for surgery out of which 18patients were males and 12 were females. The percentage of male patients in our study is about 60%. The percentage of female patients in this study is about 40%.

GENDER	NO. OF PATIENTS	PERCENTAGE
MALE	18	60%
FEMALE	12	40%

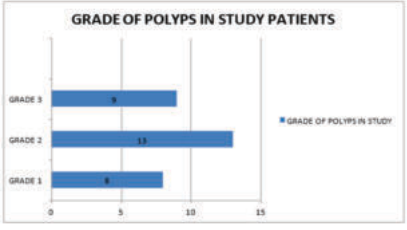
GRADING OF POLYPS

Out of 30 patients in the study, 8 had Grade 1 polyps, 13 had Grade 2 polyps and 9 had Grade 3 polyps.

FIGURE 1: GRADE 2- Multiple polyps occupying middle meatus not crossing inferior border of middle turbinate

ENDOSCOPIC NASAL POLYPS SCORE (Meltzer et al, 2006):

Score of polyps	Polyp size
0	No polyps
1	Small polyps in middle meatus that do not extend to the inferior border of the middle turbinate
2	Polyps extending past the middle turbinate's lower border
3	Large polyps that approach the inferior turbinate's lower border or polyps that are medial to the middle turbinate.
4	Large polyps obstructing the inferior nasal cavity completely.



PEROPERATIVE BLOOD LOSS

Out of 30 patients, 8 had 120ml of blood loss, 7 had 100 ml of blood loss, 6 had 110 ml of blood loss, another 5 had 130 ml of blood loss, 4 had 140 ml of blood loss. In this study, it is found that most of the patients had blood loss around 100-140ml. the average blood loss was found to be 123ml

BLOOD LOSS IN ml	NO. OF PATIENTS	TOTAL
100	7	700
110	6	660
120	8	960
130	5	650
140	4	560
NET TOTAL	30	3530ml

AVERAGE: 122.83ml

TIME DURATION:

MINUTES	NO. OF PATIENTS	TOTAL
50	3	150min
60	5	180min
70	6	420min
80	8	640min
90	4	360min
100	2	220min
110	0	0
120	1	120min
130	0	0
140	1	140min
NET TOTAL	30	2230min
NET TIME	77min	1Hr 17min

PEROPERATIVE VISIBILITY OF SURGICAL FIELD:

In 30 patients study, the per-operative visibility was graded according to BOEZAART VANDERMERWE grading. Of the 30 patients, 18 patients (80%) were operated with a field visibility of Grade 2, eight patients (13.3%) were operated with a field visibility of Grade 1, four (6.7%) were operated with Grade 3 visibility and no case had Grade 4 visibility.

PEROPERATIVE FIELD VISIBILITY:

GRADES	NO. OF PATIENTS	PERCENTAGE
GRADE 1	8	26.6%
GRADE 2	18	60%
GRADE 3	4	13.3%
GRADE 4	0	0
GRADE 5	0	0

POST OPERATIVE HEALING:

In this study of 30 patients, 14 patients (46.6%) had Grade A post-operative healing. About 11 patients (36.6%) had Grade B post-operative healing. About 5 patients (16.6%) had Grade C post-operative healing.

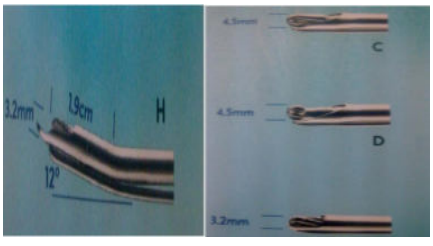
POST-OP GRADING:

GRADE	NO. OF PATIENTS	PERCENTAGE
A	14	46.6%
B	11	36.6%
C	5	16.6%

Grade A- Crusts alone seen
Grade B – Synechiae and crusts seen
Grade C – Middle meatal collapse seen
Grade D – Residual disease

FIGURE : GRADE A- Crusts alone seen

DISCUSSION: Powered instrumentation using microdebriders offers a significant advancement for surgeon in faster than lasers for tissue removal and avoids the problem of thermal damage. Newer developments including irrigation and angled cutters have improved their utility. Oscillation of blade is accompanied by continous suction through a hollow shaft removing debris and blood from the operating field. The sharp cutting blade permits precise cutting of polyps and mucosa while leaving15 adjacent tissue intact. The most significant advantage of microdebrider is its continuous suction and ability to maintain a bloodless field. This improves visualization and potential safety during the procedure particularly in the setting of massive nasal polyposis. This study reviews some of the technical engineering aspects of the soft tissue shavers and bone cutting drills. An improving understanding of these principles may allow the practicing surgeon to optimize the desired aggressiveness and precision of the instrument in his or her hands. The House group used these devices in the early 1970s for dividing the tissue associated with vestibular schwannoma and are still described in otologic texts9. Setliff is credited with the introduction in 1994 of soft tissue shavers for use in FESS[10].



MODIFICATIONS :
Gross, Becker13 their colleagues described a soft tissue shaver redesigned for the excision of fat. In designing the liposhaver, measures were taken to make it a relatively less efficient soft tissue cutter in the hope of capitalizing on the differences between fat and other soft tissues. by decreasing the efficiency of the shaver of soft tissue (employing a straight edge form, a guillotine cut, and a single edge cut), it was hoped that the liposhaver would preferentially cut fat but be less efficient at cutting muscle and other soft tissue.

PREOPERATIVE PREPARATION -
In this study, 30 patients were given oral antibiotics for a course of two weeks. Patients were also treated with course of oral steroids of 30 mg prednisolone for 10 days pre-operatively. Appropriate informed written consent was obtained prior to surgery from all 30 patients in the study.

ASSESSMENT OF BLOOD LOSS DURING SURGERY -
The blood collected in suction apparatus was measured. Then the amount of saline irrigation used was measured and it was subtracted from the blood collected in suction. The blood collected from individual patients was charted out according to their grade of polyposis in milliliters.

DURATION OF SURGERY
The duration of surgery was calculated after intubation from the time of infiltration upto the time of anterior nasal packing.

PER-OPERATIVE FIELD VISIBILITY
The surgical field visibility should be good in during endoscopic nasal polypectomy. With the use of microdebrider, the surgical field visibility was good in most of the patients. Even grade 3 polyposis had good visibility

POST-OPERATIVE HEALING:
The most important factors in achieving good functional results are scar prevention and avoiding middle meatus collapse. Mucous membrane preservation and postoperative fibrin clot debridement are extremely important aspects of scar prevention. Excessive mucous membrane removal creates major problems. Healing by secondary intention occurs with granulation tissue and therefore scar development. There is decreased cilia count and decreased function of the regenerated mucous membrane. As in frequently recognized problem is stimulation of osteoneogenesis by denuding bone. Middle meatus blood clot and damaged mucous membrane are primary problems that need to be addressed. The clotted blood may adhere to damaged mucous membrane and can produce middle meatal scarring. Because fibrin clot can progress to granulation tissue and then scar, it is important to perform postoperative endoscopic debridement in the office. This removes as much clot as possible before it becomes organized. Middle meatus collapse is a disaster. It prevents inspection of the frontal, ethmoid, and maxillary sinuses, may obstruct them, and causes recurrent or persistent disease. The cause of middle meatus collapse is a weak end middle turbinate. The middle meatus can appear completely normal if we keep middle turbinate in proper position at 3 weeks and totally collapsed at 6 weeks. Middle turbinate fracture and removal of too much middle turbinate basal lamella posteriorly result in the collapse.

In 30 patients study, most of the people had good post-operative healing. In most of the cases there was no synechiae. There was no middle meatal collapse in nearly total cases.

BLOOD LOSS DURING SURGERY:
The use of powered soft tissue shavers has minimized the blood loss during surgery. In this study, even the patients who had Grade 3 polyposis had minimal blood loss.

MUCOSAL PRESERVATION:
Moriyama and co-workers14 demonstrated improved functional results in FESS when mucosa was preserved. In areas of mucosal stripping and bone exposure, healing was delayed and eventually resulted in epithelium lacking ciliated cells. In contrast, in areas of mucosal preservation, healing was quicker and resulted in ciliated epithelium. The precise surgery of powered shavers is increased and can be expected to have improved functional results. Krouse and Christmas15 used the usual FESS approach and powered shavers to compare the outcomes. In the shaver group, there was much less blood loss, less synechiae formation, a lower risk of ostial blockage, and faster healing. The postoperative mucosal preservation was also good in our study group.

Another potential advantage of powered shaver instrumentation in the era of managed care is the potential for cost-savings by increased delivery of sinus surgery and polypectomy in daycare setting.

BOEZAART VANDERMERWE Grading
Grade 1 – Cadaveric conditions.
Grade 2 – Field is good with infrequent suction required.
Grade 3 – Field is good only with frequent suctioning
Grade 4 – Field is not visible after removal of suction before the instrument and perform the task.
Grade 5 – Abandoning of surgery The study group was tabled according to their grade of visibility during surgery.

POST-OPERATIVE GRADING –
The study group was given good postoperative care for 3 weeks with antibiotics, nasal saline douching and middle meatal stents. The study group was subjected to post- operative nasal endoscopy after a period of 3 weeks. Synechiae, crusts, middle meatus collapse, residual disease were noted and graded accordingly.

Grade A - Crusts alone seen
Grade B –Synechiae and crusts seen
Grade C – Middle meatal collapse seen
Grade D – Residual disease

CONCLUSION: In this study about the advantages of microdebrider in endoscopic sinus surgery it was found that, the peroperative blood loss was found minimal in this study, even for grade III Polyposis.

The average duration of surgery was less in this study.
The visibility of surgical field was good in the study group.
The postoperative period of the study group was good.
There was a good mucosal preservation after the procedure in the study group.

An understanding of technical aspects of powered instrumentation has led to optimise the choice of practicing surgeon in endoscopic sinus surgery. New understanding of the importance of mucosal preservation combined with new technology in imaging and instrumentation make our ability to deal with sinus diseases in a safer and more effective way. The use of powered soft tissue shavers or microdebriders in endoscopic sinus surgery offers significant advantages over the use of conventional instrumentation. Increased safety, improved results, decreased bleeding are significant advantages by the use of this instrumentation. In this study of 30 patients, it was found that using microdebrider has reduced the blood loss in surgery. It has also improved the surgical field visibility.The duration of surgery was also reduced. The post-operative mucosal healing was good in this study group. In this study, microdebrider had precise, quick and nearly bloodless polypectomy without the need for pre-operative steroids. Unlike conventional, non-powered suction instruments, sinonasal soft tissue shavers have the advantage of evacuating tissue from the surgical site without the need to remove the instrument, providing potentially continuous suction of blood and resected tissue from the field with the opportunity for improved visualization and precision and less frequent interruptions during the procedure. The powered shaver offers significant advantages by virtue of its increased precision and real-time suction which improves visualization and decrease the risk of major complications. The sharp cutting action of the shaver as opposed to the tearing action of conventional instruments decreases operative bleeding and minimizes scarring, adhesions, and healing time by avoiding mucosal stripping. Mucosal preservation is essential to favorable results in FESS. All of the systems use a power source, a handpiece, and disposable sheathed shaving blades. The mechanics of the soft-tissue shavers have been well described. The use of combination of manual instrumentation and powered instrumentation is advocated in most procedures. The soft tissue shaver gives us a

technical advantage for addressing diseases like chronic sinusitis and osteomeatal complex disease, structural abnormalities, nasal polyps, scar tissue, concha bullosa, tumors, choanal atresia, or adenoid tissue extending into the nasal cavity. Biopsy specimens, however, are still best obtained with conventional instruments.

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