DISSERTATION ON

"COMPREHENSIVE STUDY OF MICRODEBRIDER IN ENDOSCOPIC SINUS SURGERY"

Submitted in partial fulfillment of the requirements for

M.S DEGREE BRANCH-IV OTORHINOLARYNGOLOGY

of

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CERTIFICATE

This is to certify that this dissertation **"COMPREHENSIVE STUDY OF MICRODEBRIDER IN ENDOSCOPIC SINUS SURGERY"** submitted by **Dr. S. MOHANA KARTHIKEYAN,** appearing for M.S. ENT. Branch IV Degree examination in March 2010 is a bonafide record of work done by him under my direct guidance and supervision in partial fulfillment of regulations of the Tamil Nadu Dr. M.G.R. Medical University, Chennai. I forward this to the Tamil Nadu Dr. M.G.R. Medical University, Chennai, Tamilnadu, India.

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CONTENTS

INTRODUCTION

Endoscopes have markedly improved visualization for sinus surgery, but expanding concepts of FESS have outplaced available operative instrumentation. The surgical techniques are continually improving, but the basic concepts of the newer instruments have changed very little. With currently available FESS instruments, surgeons often find that they do little short of the precise and delicate surgery demanded by the functional approach. Consequently, the goals of meticulous cutting, a near bloodless field, unimpaired vision, and continuous removal of resected tissue remains elusive. The instruments used so

Far tend to strip the mucosa from the underlying bone. This approach predisposes to increased bleeding, which is the archenemy of the surgeon, because it leads to decreased visibility, the cornerstone of complications. The lack of continuous suction at the operative site is a technical limitation that compounds the stress for the surgeon and increases the inherent risk for the patient. Attention was therefore directed towards laser. However enthusiasm for the laser in endoscopic sinus surgery has waned due to increased post op scaring and necrosis. The microdebrider facilitates preservation of mucosa and vital structures by resecting only diseased, obstructive tissue with very limited blood loss. Simultaneous continuous suction at the operative site is a marked benefit of this instrument, which helps to overcome the well recognized problem of blood pooling that increases the potential for operative morbidity.

AIMS and OBJECTIVES

The comprehensive study on endoscopic sinus surgery using microdebrider is to Evaluate

1. ***The blood loss*** in endoscopic sinus surgery using microdebrider.
2. ***The visibility*** of field during the surgical procedure.
3. ***The duration*** of the surgery.
4. ***The post operative healing*** after the procedure.

REVIEW OF LITERATURE

Anatomy of nose and paranasal sinuses

There are four paired sinuses, three turbinates, and three meati.

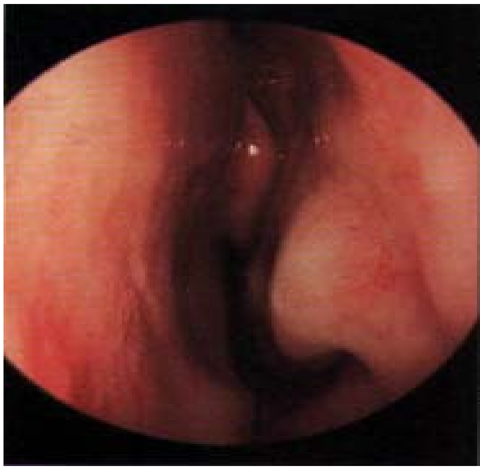
Maxillary sinus

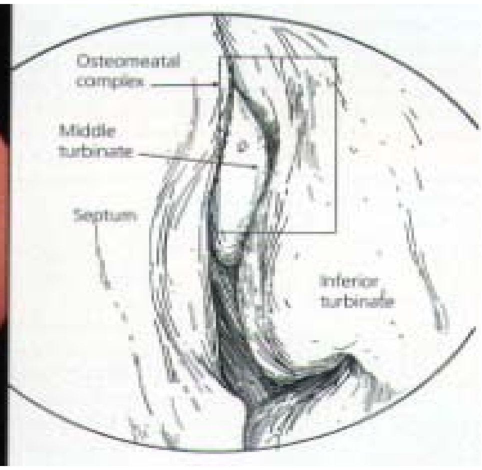
This is the largest sinus which is present at birth, reaches adult size at the age of 9years. The floor of maxillary sinus is over maxillary dentition, often thin and dehiscent over tooth roots. Infra orbital nerve runs along the roof, often dehiscent. Sinus ostium is located anteriorly in the middle meatus. Accessory ostia is usually situated more posterior and if present its, a sign of chronic disease.

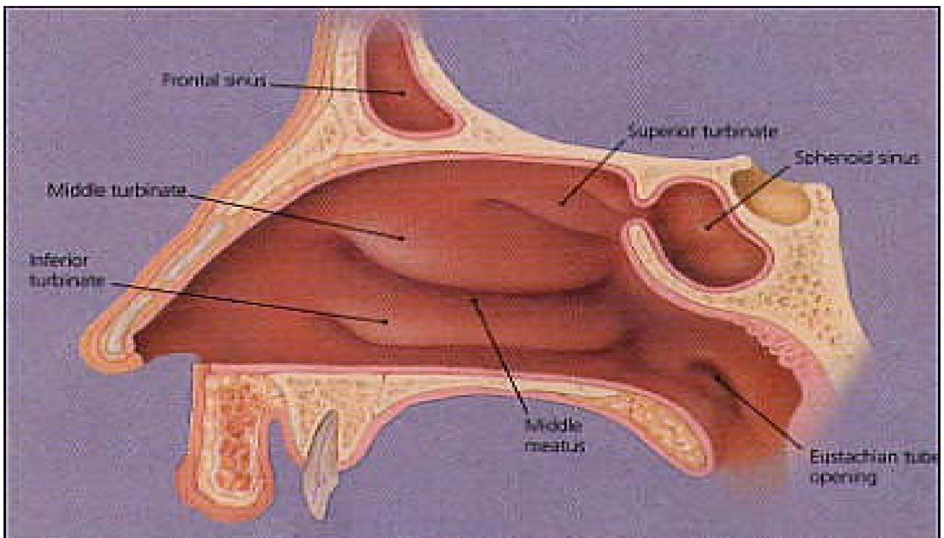
Frontal sinus

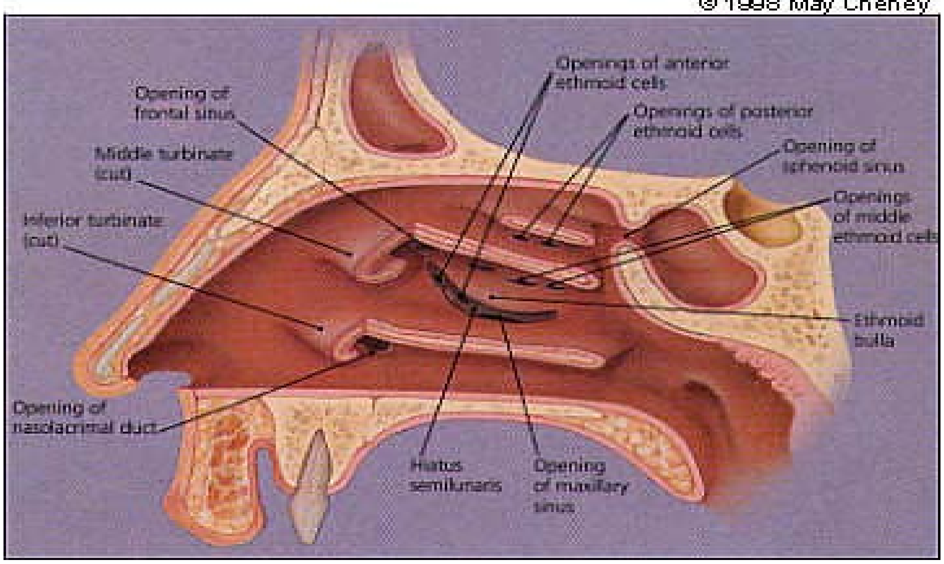
At birth, the frontal sinus is rudimentary and has little clinical significance. After the age of 6 to 8 years, the sinus becomes more pronounced as a result of its higher rate of growth in comparison with the surrounding frontal bone[18]. Growth is usually completed by ages 12 to 14 years in women and 16 to 18 years in men[19]. Four percent to fifteen percent of the population have been reported to have aplasia of one or even both frontal sinuses. The frontal sinus in adults averages

OSTEOMEATAL COMPLEX









28mm in height, 24mm in width, and 20 mm in depth, with the actual size and shape varying widely between individuals. The two sinuses are usually unequal in size and are separated by an inter sinus septum. Thick and frequently incomplete intra sinus septae can be found in the normal sinuses. In fact, the absence of the intra sinus septae and of the scalloped border on plain films has been associated with chronic infection and bone destruction within the frontal sinus.

Ethmoid sinus

Ethmoid sinus is present at birth and attains adult size by the age of twelve years. It is separated by the ground (basal) lamella into anterior and posterior ethmoids. It drains into middle and superior meati respectively.

Sphenoid sinus

Sphenoid sinus is situated within the body of sphenoid bone. It opens into the

Spheno ethmoidal recess which lies superior and posterior to superior turbinate about 1.5 cm above the sinus floor. Pituitary gland lies superior to the sinus and optic nerve and carotid artery lie laterally.

HISTOLOGY

Mucosa of nose and paranasal sinuses is lined by ciliated columnar epithelial cells.

FUNCTIONS OF NOSE

Humidification, filtering, and temperature regulation are important functions of the nose and paranasal sinuses. The nose and paranasal sinuses are connected through the various sinus ostia and are lined with ciliated stratified columnar epithelium, containing goblet cells. Regulation of intranasal pressure, increasing surface area for olfaction, lightening the skull, resonance, absorbing shock and contribution to facial growth are other important functions of nose.

PATHOGENESIS OF SINONASAL POLYPOSIS

Nasal polyps represent edematous semi translucent masses in the nose and paranasal sinuses. Several hypotheses regarding the underlying mechanisms includes chronic infection, aspirin intolerance, alteration in aerodynamics with trapping of pollutants, epithelial disruptions, epithelial cell defects/gene deletions (CFTR gene), and inhalant or food allergies. Histologically polyps are characterised by edema or fibrosis, reduced vascularisation, reduced number of glands and nerve endings in the presence of often damaged epithelium. In the majority of nasal polyps, eosinophils comprise more than 60% of the cell population. Besides eosinophils, mast cells and activated T cells are also increased. An increased production of cytokines/chemokines like granulocyte/macrophage colony-stimulating factor, IL-5, RANTES and eotaxin contribute to eosinophil migration and survival. Increased levels of IL-8 can induce neutrophil infiltration.

MUCOSAL BLANKET

Two layers

Superficial layer

Sol layer

Function

Superficial layer traps bacteria and particulate matter. Enzymes, antibodies, immune cells are seen in this mucosal blanket.

HISTORY

In 1929 Mosher[1] wrote if ethmoids were placed in any other part of the body it would be an insignificant and harmless collection of bony cells. In 1921 Lynch[2] claimed 100% cure rate with ***external frontoethmoidectomy***.

Mosher pointed out the difficulty of opening the frontal sinus through an external approach.

In 1951 ***Van Alyea***[3] advocated conservative surgery of the sinuses emphasizing the preservation of functioning structures.

The basic concept of nasal endoscopy emerged in 1880's when ***Zaufal*** was using an endoscope for examination of Eustachian tube orifices.

The true precursor to the contemporary endoscope was developed by ***Hirschman***[4] in 1903. He used a 4 mm diameter endoscope to examine the middle meatus and maxillary antrum.

In 1950's ***Von Riccabona*** and ***Nehls***[5] in Europe utilized Hopkins Rod Endoscope which had a improved resolution, large field of vision and accurate color. In 1985, the functional endoscopic sinus surgery originally coined by Kennedy[6] began to draw attention to the potential for re-establishing sinus drainage and mucosal recovery.

DIAGNOSTIC NASAL ENDOSCOPY

Nasal endoscopy performed for the purpose of diagnosis as originally described by ***Kennedy*** [7] is of crucial importance to the discipline of endoscopic sinus surgery. The technique developed to examine the lateral wall of the nose involves three passes of the endoscope in the decongested and anesthetized nasal cavity. A 4mm **30 degree scope** is typically used, but a 2.7mm scope is employed for narrower noses and tight middle meatus. Different angled scopes are available for unique situations. In all passes, the examiner notes the appearance of the mucosa. The colour should be defined as pale or hyperemic and the tissue as edematous or hypertrophic. The presence of polyps or pus should be noted. The quantity and the quality of the mucus should be documented as thick or thin and clear or opaque. ***Discolored mucus*** is suggestive of active infection and tenacious brown mucus should be documented as thick or thin and clear or opaque. Discolored mucus is suggestive of active infection and tenacious brown mucus of allergic fungal disease. The examiner should search for contributing anatomic abnormalities, such as turbinate septal contact, massive concha bullosa, a medially rotated uncinate, or evidence of past disease, such as with accessory maxillary ostia. If pus is seen in the middle meatus, endoscopically directed cultures can be obtained using a micro cotton-tip applicator and antibiotics chosen based on the organism and its sensitivity.

The first pass of the scope is along the nasal floor and into the nasopharynx, allowing for careful examination of the overall nasal anatomy the inferior meatus, and turbinate. Mucus trailing into the nasopharynx is followed for evidence of origin.

A second pass is made between the middle and inferior turbinates, examining the inferior portion of the middle meatus and the fontanelles for evidence of bulging or accessory maxillary ostia. The pass is continued by rolling the scope medially into the sphenoethmoidal recess, examining the sphenoid sinus ostium.

The third pass is made as the scope is withdrawn. The structures of the middle meatus are mixed in greater detail by rolling the scope laterally, examining the infundibulum, uncinate, and the ethmoidal bulla.

Clearly, nasal endoscopy allows the physician to see subtle changes not readily identified on anterior rhinoscopy. Indeed, use of the rigid intranasal endoscope has identified nasal pathology in almost 40% of patients with normal findings on traditional rhinologic examination.

Excellent **postoperative care** is essential to a good outcome of endoscopic sinus surgery. Endoscopy permits the identification and lysis of synechial bands, the correction of early stenosis of sphenoid, maxillary, and frontal ostia, and the removal of devitalized flecks of bone. Such areas of residual osteitis may become foci for chronic infection and ultimate surgical failure. Aggressive postoperative debridement is therefore performed.

IMAGING IN NOSE AND PARANASAL SINUSES

XRAY -PNS

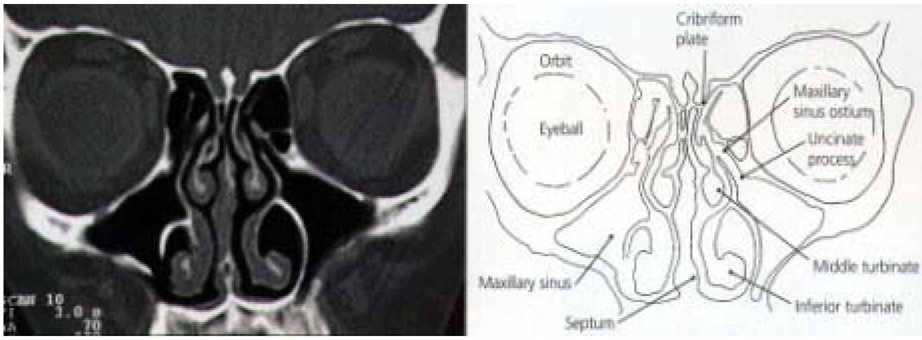
Plain film radiography of the sinuses has received much attention. Sinus films are predictive of maxillary sinusitis and are helpful in diagnosing frontal and sphenoid sinusitis[20]. They are less reliable in depicting films are less specific and sensitive in depicting the extent of sinus abnormalities[21]. One series concluded that ***sinus radiographs*** were not reliable enough to be an integral part of the clinical decision process. The utilization of plain films of the sinuses has been reduced by medical cost containment concerns, replacement by superior techniques, and by clear weaknesses of the modality[22]. Patients with suspected acute sinusitis undergo a thorough history and physical examination, occasionally including a nasal endoscopic examination, and the clinical decision to treat or not to treat is made[23]. If uncertainity about the diagnosis remains, a limited plain films examination may provide some additional information with the limitations described previously. Such patients are a small subset of those presenting to an otolaryngologist with sinus complaints. A single ***Waters view*** of the paranasal sinuses may suffice[24]. However even a limited CT examination will provide superior diagnostic efficacy. In patients with suspected orbital or intracranial complications of acute sinus disease, CT and MR imaging examinations are mandated. The patient population with chronic or recurrent sinus symptomatology or with significant sinonasal polyposis will simply not benefit from plain film examination.[25]

COMPUTED TOMOGRAPHY

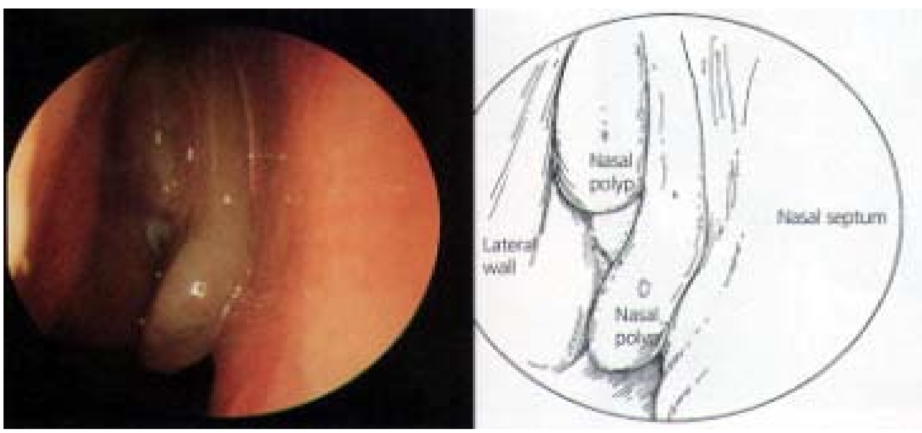
In the patient group, the imaging study of choice continues to be sinus CT. When FESS is being considered as a therapeutic option, the advances in imaging have a major impact on sinus surgery. With the early development of endoscopic surgical techniques, fine-cut CT as pioneered by ***Zinreich*** was recognized as necessary to identify disease in areas not accessible to the endoscope and to provide a precise evaluation of the relevant anatomy[27].

CT scans of the sinuses should be performed 4 to 6 weeks from the initiation of medical therapy. Although 3mm coronal images are most helpful to the surgeon for anatomic evaluation, the axial scan provides complementary information in certain situations, particularly in the region of the frontal recess and sphenoid sinus.

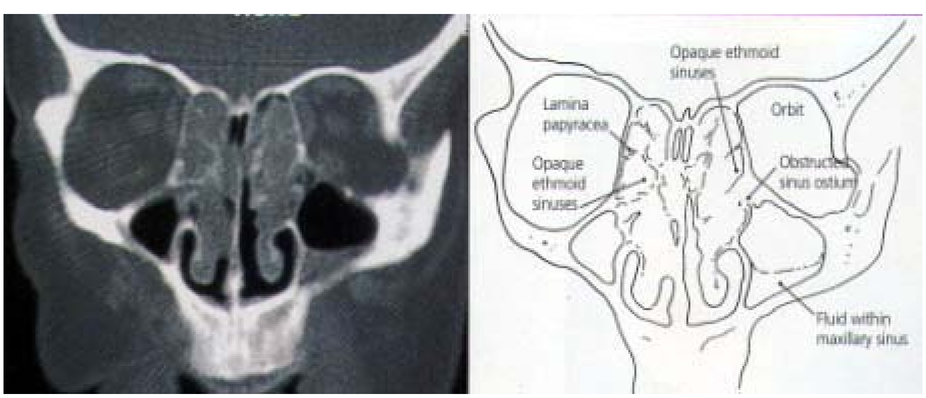
COMPUTED TOMOGRAPHY



POLYPS IN MIDDLE MEATUS



COMPUTED TOMOGRAPHY OF ETHMOID POLYPOSIS



Preoperatively, ***several anatomic features*** are examined on CT. The slope, shape, and symmetry of the fovea ethmoidalis and cribriform are assessed, and the integrity of the skull base and medial orbital wall is examined. The shape, rotation, and development of the uncinate process with respect to the medial orbital wall and the infundibulum are noted, as is the relative height of the posterior ethmoids to the roof of the maxillary sinus. The presence of ***anatomic variants*** such as ***Haller cells***, concha bullosa or lamellar cells and ***sphenoethmoid (Onodi) cells*** containing potentially dehiscent optic nerve is noted. The inter sinus septation of the sphenoid and its relationship to the carotid artery is examined.

MAGNETIC RESONANCE IMAGING

Additional imaging techniques utilized in a selective fashion have added to our ability to expand the indications for endoscopic approaches beyond inflammatory disease to benign tumors of the nose and sinuses, including inverted papilloma, benign tumors of the anterior skull base such as mucoceles, fibro-osseus lesions, meningiomas, and encephaloceles. MR imaging is strongly recommended when an area of opacification abusts a skull base erosion to differentiate sinus disease from meningoencephalocele. In patients with neoplasia, MR imaging is helpful in differentiating tumor from retained sinus secretions and enables more precise mapping to tumor extent with lateral sphenoid extension, ***MR angiography*** is recommended to assess the relationship of the mass with the carotid artery.

Interventional radiology is imperative when vascular lesions such as juvenile angiofibromas are resected endoscopically. Embolization should be performed the day before surgical resection. If it is performed more than 24 hours before surgery, collaterals may have an opportunity to form if it is performed less than 24 hours before surgery delayed neurologic deficits may be masked by general anesthesia.

DIAGNOSTIC TOOLS

The ability to depict the normal anatomy of the paranasal sinuses has received the most attention in recent years with the development and wide acceptance of Functional Endoscopic Sinus Surgery (FESS). The endoscopic sinus surgeon needs a road map to perform sinus surgery with maximal effectiveness and safety. CT, in combination with endoscopy, is the ***most effective*** method of diagnosing surgical disease[26]. It should be performed in line with the current imaging paradigm, namely in the direct coronal plane and utilizing a high resolution technique.

RECENT ADVANCES IN ENDOSCOPIC SINUS SURGERY

Suction cautery was developed to reduce the blood loss and to improve the visualization of field. It simultaneously sucks the blood and cauterize the field. Thru cutting instrumentation is a significant breakthrough in endoscopic sinus surgery. The goal of this new instrumentation is to remove completely the disease, at the same time an intact mucosally lined cavity should be left.

Lasers like KTP,Nd:YAG, and holmium:YAG lasers were used in sinus surgery. KTP lasers offers good coagulation, however its inability to ablate non pigmented tissues such as bone and polyps limits its applicability. Nd:YAG lasers has deep tissue penetration and has resulted in complications. The holmium:YAG lasers provides excellent bone ablation[8]. However its slow tissue removal and thermal damage has waned its usage.

MICRODEBRIDERS

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 leaving 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.

HISTORY OF MICRODEBRIDERS

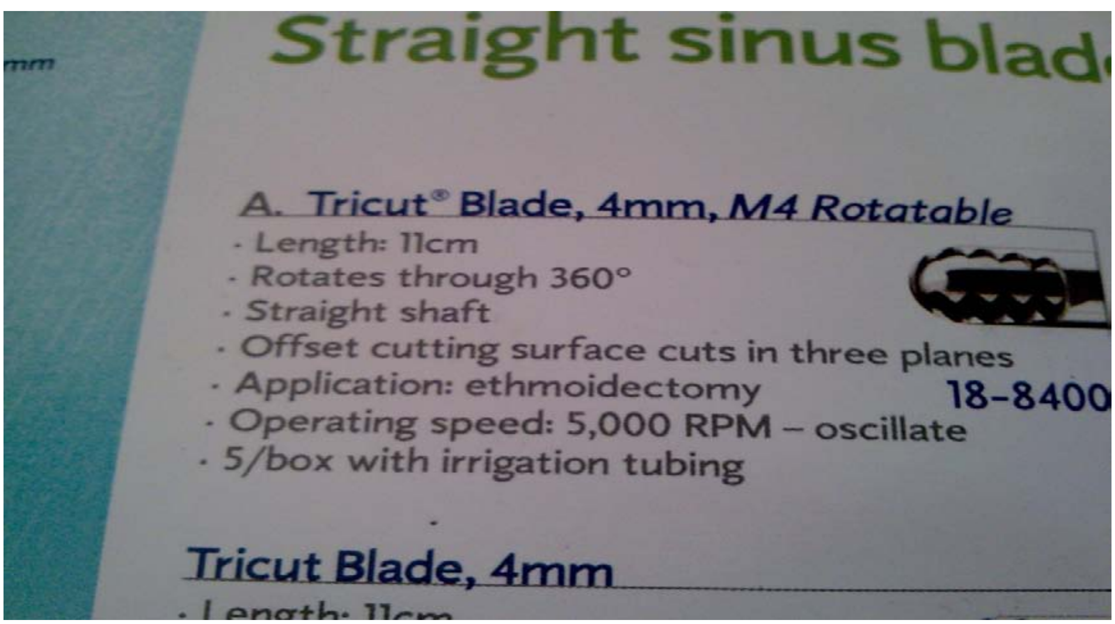
Contemporary soft tissue shaving systems have been developed based on the technology of several devices used in the 1960's and early 1970's. The devices were used by the ***House group*** in the early 1970s for morselizing tissue associated with acoustic neuroma and are still described in otologic texts[9]. The original patent was held by ***Jack Urban*** (filed March 6, 1969, under the name ***vacuum rotatory*** dissector. In the late 1970s, orthopedic surgeons developed a system that became widely used in arthroscopy and was based on similar principles. ***Setliff*** is credited with the introduction in 1994 of soft tissue shavers for use in Functional Endoscopic Sinus surgery[10].

MECHANICS OF MICRODEBRIDER

The soft tissue cannulas of currently used systems have a blunt tip and a lateral port. An oscillating or rotating inner cannula with a similar lateral port cuts and

MICRODEBRIDER

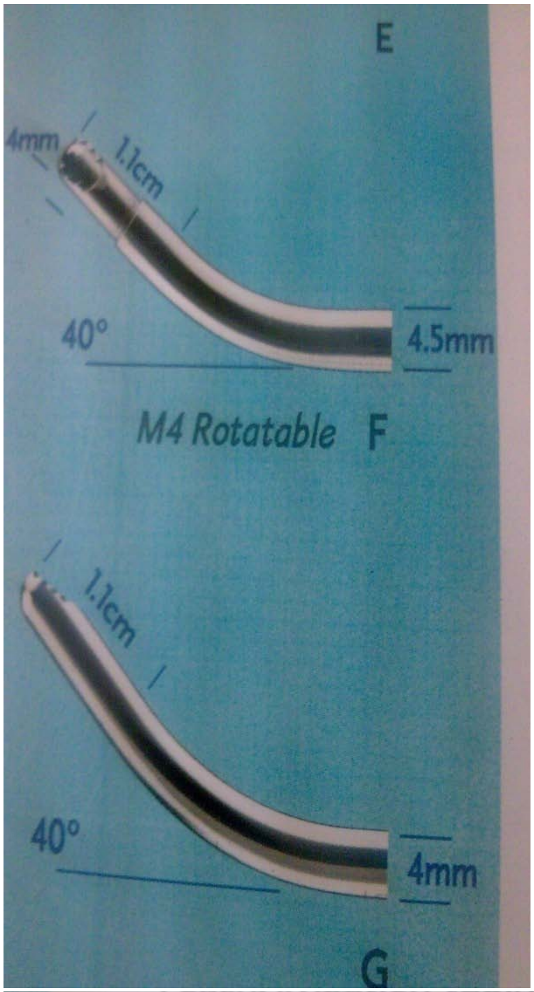
DIFFERENT BLADES OF MICRODEBRIDER



extracts soft tissue as it is suctioned through the ***side port*** of the cannula. The proximal and distal edges of the aperture are smooth. The lateral aspects of the aperture are straight edged or serrated. The sharp inner blade cuts against the sharp outer blade and extracts soft tissue as it is suctioned into the side port. The inner blade can oscillate or can rotate in forward or reverse.

The soft tissue shavers are available in various ***shapes and sizes***. Generally, surgeons select a size between 3.5 and 5.5mm in diameter. The 3.5mm blade takes smaller bites and is preferred by many surgeons, others prefer the larger shavers, citing an analogous use of the largest possible bur in mastoid surgery as the safest and most efficacious approach[11].

Soft tissue shavers rely on shear and suction to resect soft tissue. The suction draws the tissue into the window of the shaver. The inner tube oscillates, and the outer tube is stationary. ***Shear forces*** can be classified in two basic types. Shearing of soft tissue generally requires opposed cutting surfaces, whereas bony tissue possesses sufficient rigidity to be resected by a single edge. Soft tissue can be cut by a single edged blade of sufficient sharpness at commonly used rotational speeds, but this tends to be somewhat less effective than a two edged blade.



. Serrated Blade, 4mm, *M4 Rotatable*

Length: 11cm
Rotates through 360°
Straight shaft
Application: ethmoidectomy
Operating speed: 5,000 RPM – oscillate 18-84
1 each with irrigation tubing

Curved sinus blades

A. RAD® 12 Curved Blade, 4mm,
M4 Rotatable

- Length: 11cm
- Straightshot® M4 rotates blade tip 360° without shaft rotation
- Curved shaft
- Offset cutting surface cuts in three planes
- Application: uncinectomy, ethmoidectomy
- Operating speed: 5,000 RPM – oscillate

18-84012HR

D. RAD 12 Curved Blade, 3.5mm,
Key Rotatable

- Length: 11cm
- Key rotates blade tip 360° without shaft rotation
- Curved shaft
- Offset cutting surface cuts in three planes
- Application: uncinectomy, ethmoidectomy
- Operating speed: 3,000 RPM – oscillate
- 3/box, irrigation tubing separate
- *For use with Straightshot Magnum® II*

18-8351

The configurations of inner and outer blade cutting windows are designed to exercise tissue in pieces that will be small enough to flow through the inside diameter of the inner tube suction line to the suction apparatus. The size of the tissue bite can be affected by the mouth size opening as well as by the ***speed*** of the rotation of the inner blade in relation to the outer stationary blade.

From a technical standpoint, several factors can affect the ***performance*** of the shavers[12]. The actual clearance or fit between the inner and outer tube assembly must be close (0.05mm) and is critical to obtaining a clean cut. The window configuration may have smooth edges or serrations on the inner or outer window openings. This is sometimes referred to as the edge form. ***Serrations*** tend to be more effective and aggressive at gripping soft tissue (Somewhat analogous to the canine teeth of a carnivore), whereas ***continuous edges*** are less aggressive and are more effective at shearing hard tissue (like bone), provided the edges are sufficiently sharp. A blade with serrations on the inner and outer tube is essentially a pure soft tissue cutter. Blades with only continuous edges are less effective on soft tissue unless the edges are sufficiently sharp.

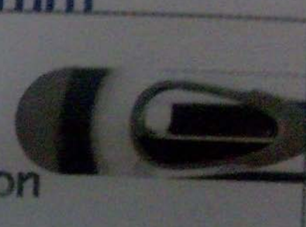
The ***angle*** of the outer window to the inner window will produce either a guillotine or scissors type of cut. Most of the currently used sinus and arthroscopic

G. Silver Bullet® Blade, 4mm, *M4 Rotatable*

- Length: 11cm
- Rotates through 360°
- Straight shaft
- Application: ethmoidectomy
- Operating speed: 5,000 RPM – oscillate
- 1 each with irrigation tubing
- Developed in conjunction with Rodney Lusk, MD

18-84005H

Inferior Turbinate Blade, 2.9mm



- Length: 11cm
- Straight shaft with elevator
- Application: submucosal resection of inferior turbinate
- Operating speed: 60-3,000 RPM – oscillate
- 5/box with irrigation tubing
- Developed in conjunction with Laurence O'Halloran, MD

18-82940

blades have a scissors type action (inclined outer window with a straight inner window), and the aggressiveness is controlled by incorporating smooth or serrated edges. ***Guillotine cutting*** is less efficient than scissors cutting. That is, a scissors cut distributes the load overtime because there is a traveling plane of resection. Therefore, less force is required at any point in time to achieve the cut than in the less force is required at any point in time to achieve the cut than in the guillotine approach, in which all of the tissue must be cut at the same time, which requires more force. ***Scissors cutting*** allows pinpoint cutting. A given shear stress is required to cut a particular tissue. Shear stress (pressure) is the force per area. As the area is less at a pinpoint, the force that is required is also less. In a guillotine approach, a larger area of tissue is approached at once, thus more force is required.

The ***rotational speed*** of the inner blade window affects the duration of opening and allows the tissue to be drawn into the cutting area. Oscillation typically yields a better cutting and faster removal of soft tissue than does rotation and minimizes pulling. At a given torque or leverage, a constant inherent to the motor, smaller diameter blades are more aggressive than larger diameter blades. The console and handpiece motor provide the same motor torque to all blade sizes (i.e, 500 rpm describes the action of the blade powered by the particular handpiece motor). Torque is equal to the force times the length of the lever arm over which

K. RAD® 60 Curved Blade, 4mm, M4 Rotatab

- Length: 11cm
- Straightshot® M4 rotates blade tip 360° without shaft rotation
- Curved shaft
- Offset cutting surface cuts in three planes
- Application: frontal sinus surgery
- Operating speed: 5,000 RPM – oscillate
- 5/box

18-84

. RAD 60 Curved Blade, 4mm

- ength: 11cm
- urved shaft
- ffset cutting surface cuts in hree planes
- pplication: frontal sinus surgery
- perating speed: 5,000 RPM – oscillate
- /box

18-

the force is applied, in this case, the radius of rotation of the inner cannula. Therefore, the following equation applies.

Force = torque / radius = torque / diameter/2 = 2 (torque)/diameter

The larger the diameter, the less force that is applied at a given point.

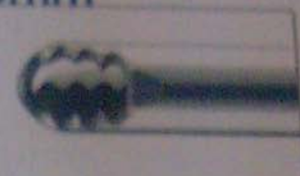
This may explain why some surgeons find relatively higher speeds preferable for the larger blades. Increasing the speed provides more torque an more force to achieve a cut, but at a given diameter, less tissue can be suctioned into the port as the speed increases. Ultimately, the surgeon adjusts the parameters that he or she controls (cannula size and rotational speed) and balances these factors to find a degree of aggressiveness and cutting ability that is comfortable.

MODIFICATIONS

With a knowledge of the various technical aspects affecting the function of soft tissue shavers, specific modifications can be made to tailor the blades for specific uses. ***Gross, Becker***[13] and 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

- Operating speed: 2,000-3,000 RPM – oscillate
- 3/box

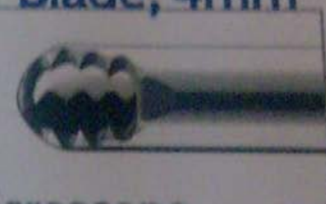
R. RAD 120 Curved Blade, 3.5mm



- Length: 11cm
- Curved shaft
- Tapered tip to allow maximum bend angle
- Application: maxillary polypectomy
- Operating speed: 1,500-3,000 RPM – oscillate
- 3/box

18-83517

S. RAD 12 Microscopy Shaver Blade, 4mm



- Curved shaft
- Length: 13cm
- Double bend design reduces obstruction when used with a microscope
- Application: uncinectomy, ethmoidectomy
- Operating speed: 2,000-3,000 RPM – oscillate
- 5/box with irrigation tubing

18-84012M

T. RAD 40 Microscopy Shaver Blade, 4mm

- Curved shaft
- Length: 14cm
- Double bend design reduces obstruction when used with a microscope
- Application: frontal sinus surgery
- Operating speed: 2,000-3,000 RPM – oscillate
- 3/box without irrigation tubing

18-84006M

capitalizing on the differences between fat and other soft tissues. Fat generally has a lower shear strength than muscle and other soft tissue that is, it is relatively pliable and easily cut in comparison with muscle and dermis. Therefore, by decreasing the efficiency of the soft tissue shaver (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. The ***outer edge*** was ***dulled***, but the ***inner recessed edge*** was additionally sharpened to maintain adequate soft tissue shear cutting ability.

The best soft tissue shaver for use in sinus surgery is not clear. Currently available shavers function admirably, however as shaver of varying inherent aggressiveness become available, surgeons may find that they prefer a particular shaver over another. The surgeon may also adjust the speed of a particular shaver to change its aggressiveness. May has stated one disadvantage of the shavers is that the feel of ***palpation*** one gets with a conventional instrument is lost. Smaller, lighter instrumentation is designed to return this important feedback to the surgeon.

Because soft-tissue shavers were designed for use in a fluid environment (arthroscopic surgery, inside a joint capsule), ***clogging*** has been a problem. Efforts to solve this problem have included interventions by the operating surgeon, including intermittently suctioning fluid (saline through the shaver during surgery,

POWER DRILL

which often requires frequent and brief interruptions. Other surgeons have used larger cannulas which decreases clogging dramatically.

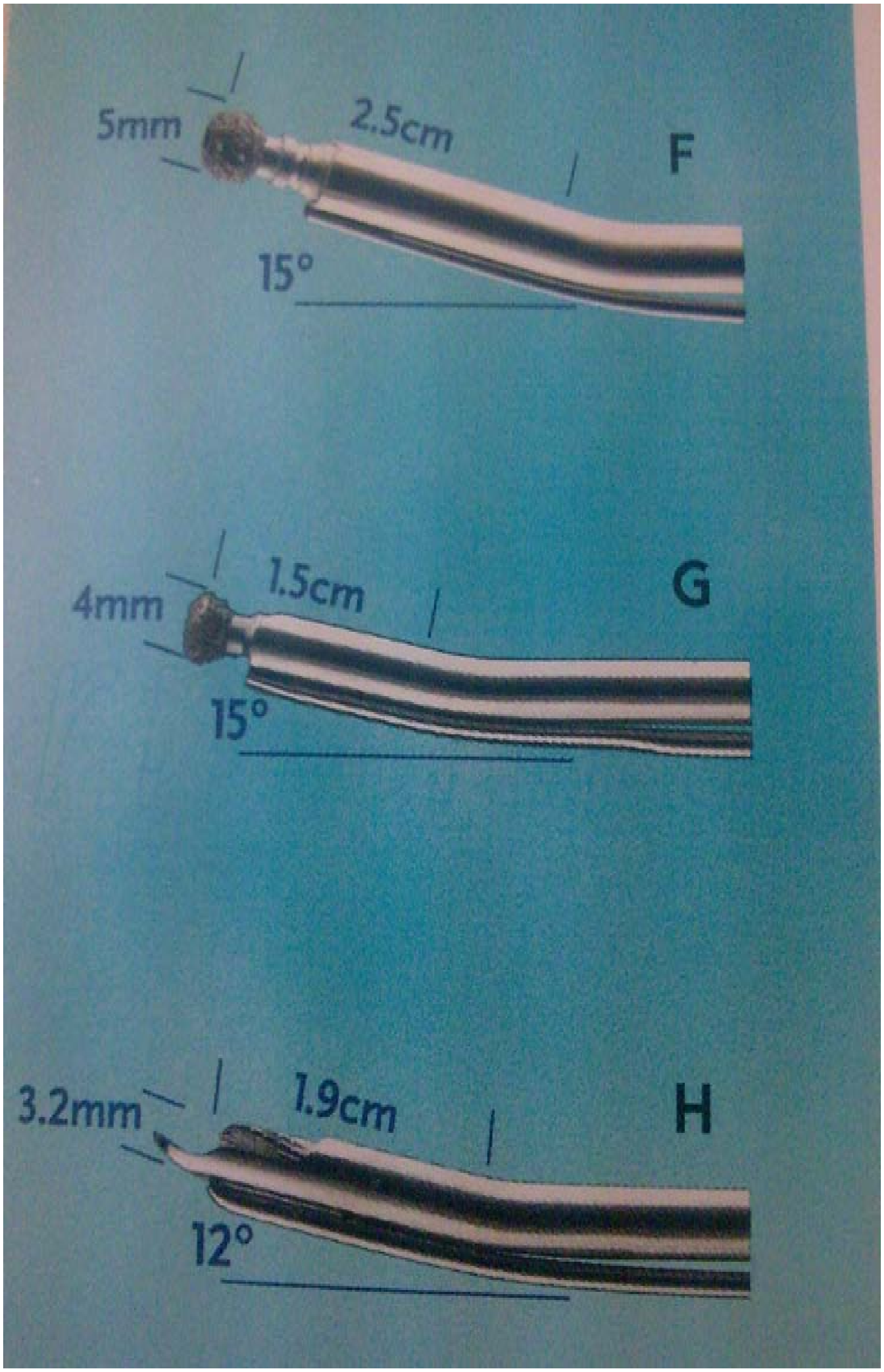
Instrument manufacturers have responded to the problem of clogging by developing ***self-irrigating handpieces*** which seem effective in their various forms. Other design changes currently under development may decrease the problem.

BENDABILITY

Malleable and prebent soft-tissue shavers have application in selected surgical circumstances. ***Prebent blades*** have a fixed angle of bend at a fixed distance from the distal end of the blade. ***Malleable blades*** offer the surgeon the opportunity to modify the bend of the blade at the surgical site. The engineering principles behind the prebent and malleable blades are essentially the same.

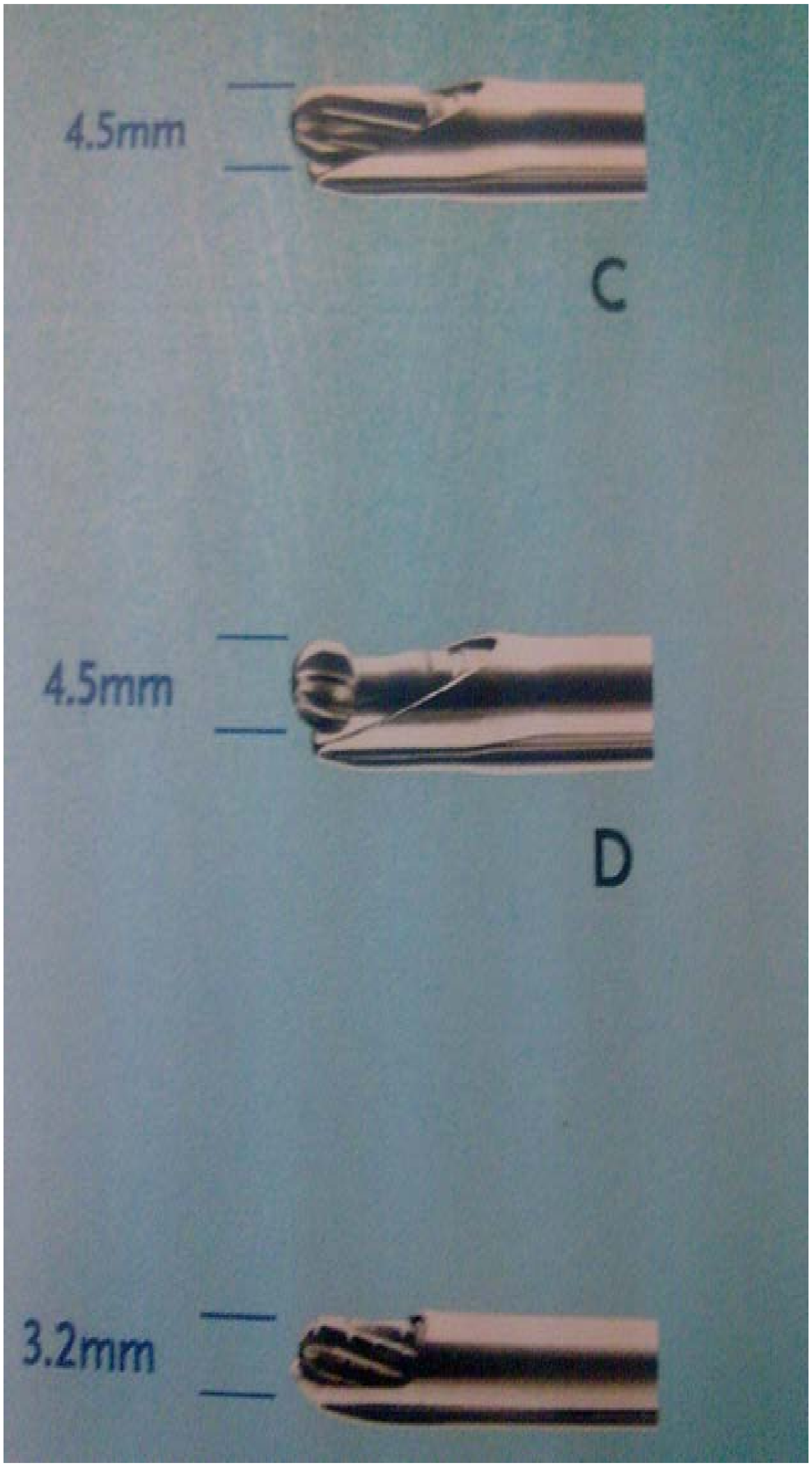
Blades with a bend in them may have an increased tendency for clogging. The ability to remove and then reinsert the inner cannula facilitates the unclogging of a bent soft tissue shaver.

Blade heating may occur in some malleable or prebent blades because of frictional heat between the inner and outer cannula in the bend area. With irrigated blades, the heat is removed from the area by the irrigating fluids. Without irrigation, the blade heating may cause thermal damage to susceptible mucosa. Decreased clogging may be another advantage of irrigated blades in this setting.


5mm
2.5cm
F
15°
4mm
1.5cm
G
15°
3.2mm
1.9cm
H
12°

Technically, the outer cannula has a bend in it that is created either by the manufacturer or perioperatively or intraoperatively by the surgeon. This is a plastic deformation, meaning that the blade does not return to a straight configuration after the bending stress is released. The inner cannula must be constructed to conform with this bend with an elastic deformation, which is a bend that results in the cannula or tube returning to its original shape after the ending stress is released.

The inner cannula or tube must therefore possess the properties of being able to bend elastically to conform to the outer cannula while being able to withstand the motor torque during operation. Polymeric tubing with high strength and high flexibility (the two occur uncommonly in the same material) provides the physical properties necessary to create such an inner cannula and seems to be the most appropriate material at this time. Advantages include an ability to bend the cannula at a wide range of points along its length. Bending of up to 30 degrees is achievable.


4.5mm
C
4.5mm
D
3.2mm

TECHNIQUE

MAXILLARY SINUSOTOMY

If the maxillary ostium is judged to be inadequate or if there is disease within the maxillary sinus, the ostium can easily be enlarged into an antrostomy with the shaver. First, a mucosal edge must be created so that the shaver tip can engage. The ***natural ostium*** is enlarged in a posteroinferior direction. An ideal tool for this is a ball tip probe with a sharp edge on the outer surface of the curve of the probe tip . The ostium is engaged with the probe, and the sharp edge is used to incise the mucosa of the ostium in a posteroinferior direction. The shaver tip is then used to engage the mucosal edge and enlarge the antrostomy posteriorly and inferiorly. Little mucosal stripping occurs with this technique, and the antrostomy heals rapidly.

ETHMOID SINUSOTOMY

The shaver is the preferred instrument for ***ethmoidectomy***. A single instrument can be used to perform anterior or complete ethmoidectomy quickly, clearly, safely without stripping mucosa that should be saved. The blood loss using the instrument for ethmoidectomy is minimal. The ethmoid ***bulla*** is penetrated with the shaver tip. Then, the bulla mucosal edge is engaged with the shaver cutting tip, precisely resecting ethmoid mucosa and bony lamellae. The posterior ethmoid is entered through the basal lamella, and complete ethmoidectomy can be performed quickly and safely with preservation of mucosa at the periphery of the dissection. ***Safe ethmoidectomy*** can be performed with this instrument because the field is bloodless, because the instrument has benign contours with a blunt tip and cutting action at the side port rather than at the tip, and because the instrument is used parallel to the skull base and ***lamina papyracea***. With the 4.2mm shaver tip, bony ethmoid lamellae can be removed easily with little clogging of the instrument. As is true in any ethmoidal procedure, care should be taken to avoid lateral dissection in the posterior ethmoid to avoid injury to the optic nerve. The goal of achieving a mucosal lined ethmoid cavity with minimal bone exposure is easily attainable with this precision instrument.

SPHENOID SINUSOTOMY

The sphenoid sinus can be entered with the soft tissue shaver either through the posterior ethmoid or transnasally through the anterior face. When proceeding through the posterior ethmoid system, the sphenoid sinus can be approached through the medial inferior portion of these sinuses. When proceeding in this direction, the superior turbinate is seen as a ridge along the face of the sphenoid. The ridge can be fractured medially with the shaver, exposing the ***sphenoid ostium***.The ostium can then be enlarged circumferentially with the shaver. Blindly placing any instrument deep within the sphenoid sinus should be avoided because of the risk for injury to the optic nerve or internal carotid artery.

FRONTAL SINUSOTOMY

The frontal recess can be approached with the shaver after the removal of superior uncinate process. The shaver or microdebrider permits precise, quick, and nearly bloodless polypectomy without the need for preoperative steroids. This often can be performed in the office setting, which may be preferred in certain clinical or economic circumstances.

The most dramatic advantage has been with regard to nasal polyps. Traditionally, ***nasal polyp surgery*** has been performed with manual instruments that work by avulsion of the polyps. This causes tearing of the tissue which can include adjacent normal mucosa. As a result, the field may be obscured by blood, thereby increasing, the risk for damaging importance structures such as the middle turbinate, lamina papyracea, and cribriform plate. For these reasons, it is not uncommon for the surgeon to abort the procedure before all of the polyps have been removed. These patients often require nasal packing for at least 24 hours. In contrast, the soft-tissue shaver allows ***excellent visualization*** of the anatomy while the polyps are removed in a precise and time efficient manner. Because the oscillating blade is guarded, important structures are less likely to be damaged.

The ***continuous suction*** allows relatively uninterrupted dissection in a clear field. Packing is usually not required. Overall, a more complete removal is possible with less bleeding. ***In children*** who require Functional Endoscopic Sinus Surgery for chronic sinusitis who do not have significant polyps, the powered instruments are also advantageous. Many of these children have underlying allergies, immune deficiency, or ciliary dyskinesia. Surgery is performed in the routine manner.

An incision for uncinectomy is made in a routine manner with the sickle knife. After the uncinectomy is complete with straight forceps, the shaver can be used in an oscillation mode with an appropriate size cannula to atraumatically remove redundant diseased mucosa to reduce the possibility of later adhesions in the middle meatus and ostiomeatal complex. If a large swollen middle turbinate exists that blocks access to the middle meatus, the shaver can be used to reduce the turbinate. This is especially useful when it involves redundant soft tissue. If a concha bullosa obstructs the middle meatus, a lateral turbinectomy may be performed with manual instruments as well as the shaver to clean up the edges, again to prevent future synechiae. The guarded configuration of the shaver allows ***clear access*** and delicate surgery in tight anatomic spaces without risk to adjacent areas. The blunt guard may be pressed against the middle turbinate to medialize it while the oscillating blade removes diseased mucosa in the ethmoid cavity or the ostiomeatal complex. There is not risk of damaging the middle turbinate mucosa unless the aperture is intentionally turned and placed on the middle turbinate.

The anterior ethmoidectomy proceeds with identification of the ethmoid bulla. The bulla is entered inferiorly and medially with care taken not to violate the lamina papyracea. Bony structures such as the lamina papyracea and the ethmoid roof are clearly delineated and preserved.The remainder of the anterior ethmoidectomy may be performed with the shaver. The ethmoid cells are easily opened with the tip of the cannula while diseased mucosa is accurately removed by the oscillating blade in the lateral aperture. Pediatric forceps may need to be used to remove bony fragments that are not suctioned into the lateral aperture.The shaver makes this talk easier, whereas a grasping forceps might cause inadvertent denuding of uninvolved mucosa.The goal is removal of diseased tissue, maintenance of normal tissue, opening of the ostiomeatal complex, aeration of the sinuses, and restoration of normal physiology.

The vertical portion of the basal lamella should be clearly identified, especially with the use of the shaver, which can clean the area of soft tissue until the bony anatomy is delineated. A ***posterior ethmoidectomy*** is performed if disease is present.

To find the ***maxillary sinus ostium***, a switch is made to the 30-degree endoscope. It is prefered to enlarge the ostium three to five times the normal size using a back-biting forceps anteriorly and a Gruenwald forceps posteriorly. In the patient with ciliary dyskinesia, we create a mega antrostomy. These children rely on dependent drainage rather than ciliary action. Therefore, the opening is enlarged further inferiorly, often requiring removal of a portion of inferior turbinate and making the antrostomy flush with the floor of the nasal cavity. The shaver is useful for cleaning up the soft tissue from all the edges, decreasing the chances of scarring later obstructing the antrostomy.

The 30-degree endoscope is also used to examine the area of the frontal recess. The frontal recess is approached only when clinically indicated. The area can easily be cleared of polypoid mucus using the shaver. The action of the shaver seems desirable, as the goal is to cause the least trauma possible because scarring can easily obstruct the frontal recess.

At the end of the procedure, irrigation is used to clear any debris or clots. If significant polypoid disease or synechiae were addressed, ***triamcinolone acetonide*** suspension is injected at the bases to produce a long acting anti inflammatory effect. Usually, pledgets soaked in topical 4% lidocaine and 0.75% phenylephrine are placed into the nose at the end of the procedure. These are removed approximately 45 minutes later in the recovery room. Long term packing or splints in the middle meatus are rarely necessary.

Cystic fibrosis is an autosomal recessive disorder with a gene frequency of 1 in 25. It represents the most common life threatening generic trait in the Caucasian population. Cystic fibrosis is characterized by malabsorption, pancreatic insufficiency, chronic pulmonary disease, and elevated sweat chloride. Because there is a strong relationship among cystic fibrosis, nasal polyposis, and sinus disease, any child found to have nasal polyps should have a sweat chloride test to rule out cystic fibrosis.

These patients are generally thought to have an ***increased anesthetic risk***, mainly due to their chronic pulmonary disease. Therefore, surgery should be completed in these patients without too much bleeding or wasting too much time. ***A simple polypectomy*** may be performed expediently but is associated with an 87% recurrence rate. Recurrence rates of 10% and 45% have been reported when ethmoidectomy is added. The newest approaches with nasal endoscopes and powered shaver should bring the recurrence rates down even further. The shaver allows remarkable efficiency in the resection of polypoid disease in these patients. The real time suction gives an ***unobscured operating field***, making it possible to proceed with the procedure in an uninterrupted fashion. This, in turn, allows more complete resection in less time and therefore less bleeding. Because packing is usually not required and the shaving action is less traumatic and more precise, the patient is more comfortable overall. These advantages theoretically lead to a safer procedure and decreased recurrences for patients.

OTHER USES

Optic nerve decompression, which is controversial is performed primarily for the treatment of traumatic indirect optic nerve injury, which is defined to be a traumatic loss of vision which occurs without external or initial ophthalmoscopic evidence of injury to the eye or its nerve[16]. This definition includes fractures of the optic canal with impingement of bony spicules on the optic nerve.

Endoscopic optic nerve decompression and orbital decompression are approaches which can be used for the treatment of ***traumatic optic neuropathy*** and ***Graves ophthalmopathy***[17] following the principles of previously described transethmoid procedures.

Orbital decompression can be a straightforward procedure enhanced by the use of powered instrumentation. Key points are to avoid obstruction of the frontal recess, to create a very large maxillary antrostomy, and to decompress inferiorly to the infraorbital nerve, anteriorly to the lacrimal bone, and posteriorly to the sphenoid sinus. Complications are rare.

Adequate exposure of the ***intracanalicular portion*** of the optic nerve is gained, and optic nerve decompression can be performed at the segment where injury to the nerve is believed to occur. The endoscopic approach avoids the need for external incisions or a craniotomy. It is especially suited for patients who are medically unstable or who do not have any associated intracranial pathology. Careful patient selection, appropriate preoperative work-up, and extensive familiarity with the extracranial course of the optic nerve, internal carotid artery, and structural variations of ethmoid and sphenoid sinuses are necessary to optimize the surgical management of the patients.

MATERIALS AND METHODS

Patients diagnosed to have Sinonasal Polyposis in Upgraded Institute of Otorhinolaryngology of Government General Hospital , Madras Medical College, Chennai between July 2007-September 2009 were included in the study, which consists of 60 cases.

INCLUSION CRITERIA

1. Age group above 12years and below 60 years.
2. Patients undergoing Endoscopic Sinus Surgery for Sinonasal Polyposis.

EXCLUSION CRITERIA

1. Age below 12 years and above 60 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.

DIAGNOSTIC NASAL ENDOSCOPY & GRADING OF SINONASAL POLYPS

The patients underwent Diagnostic Nasal Endoscopy. Using ***30 degree*** Hopkins Rod Endoscope 1st pass, 2nd pass and 3rd pass was done.Middle meatus was examined in all patients and the polyps were graded according to the following classification.

O	No polyps present
I	Polyps confined to middle meatus
II	Polyps beyond middle meatus (reaching inferior turbinate or medial to middle turbinate)
III	Polyps almost or completely obstructing nasal cavity

Associated septal deviations, turbinate hypertrophy, position of uncinate process, sphenoethmoidal recess and nasopharynx were examined.Accessibility to the ***middle meatus*** was also assessed.

COMPUTED TOMOGRAPHY OF THE PARANASAL SINUSES

In the study of 60 patients who were found to have nasal polyps in DNE, were subjected to CT PNS and the opacification and expansion of involved sinuses were noted. The normal anatomical landmarks and variant anatomy to aid in the diagnosis of pathologic changes were noted. The level of skull base, cribriform plate, lamina papyracea, lacrimal duct, carotid artery and optic nerve anatomy were noted.

PREOPERATIVE PREPARATION

In this study, 52 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 60 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 visbility was graded accordingly:

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 can 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 post-operative 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

OBSERVATION

SEX RATIO

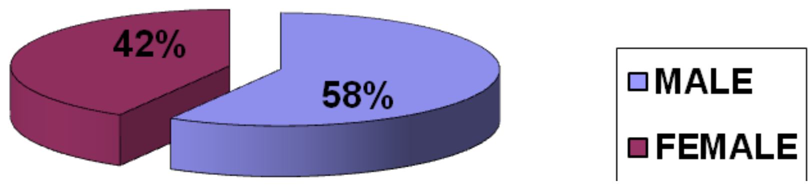
In this study sixty patients were taken up for surgery out of which 35 patients were males and 25 were females. The percentage of male patients in our study is about 58%. The percentage of female patients in this study is about 42%.

GENDER	NO.OF.PATIENT	PERCENTAGE
MALE	35	58
FEMALE	25	42

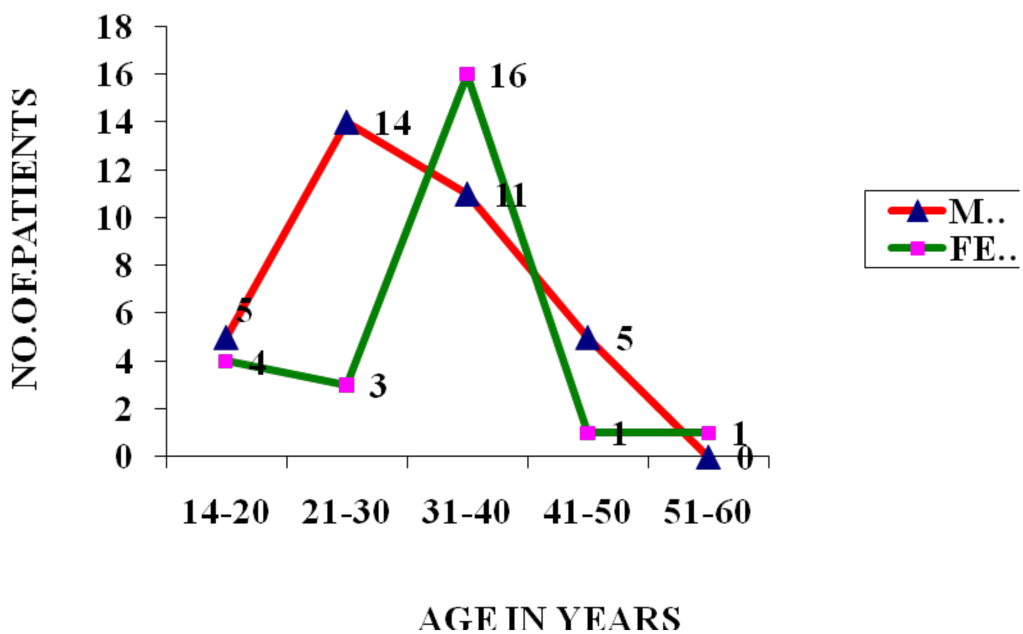
AGE DISTRIBUTION

The age distribution in this study is between 14 years and 60 years. In the age group of 14-20 years there are 9 patients out of whom 5 are males and 4 are females. This age group comprises 15% of the study population. In the age group of 21-30 years there are 17 patients out of whom 14 are males and 3 are females. This age group comprises 28% of the study population. In the age group of 31-40 years there are 27 patients out of whom 11 are males and 16 are females. This age

SEX RATIO



AGE DISTRIBUTION



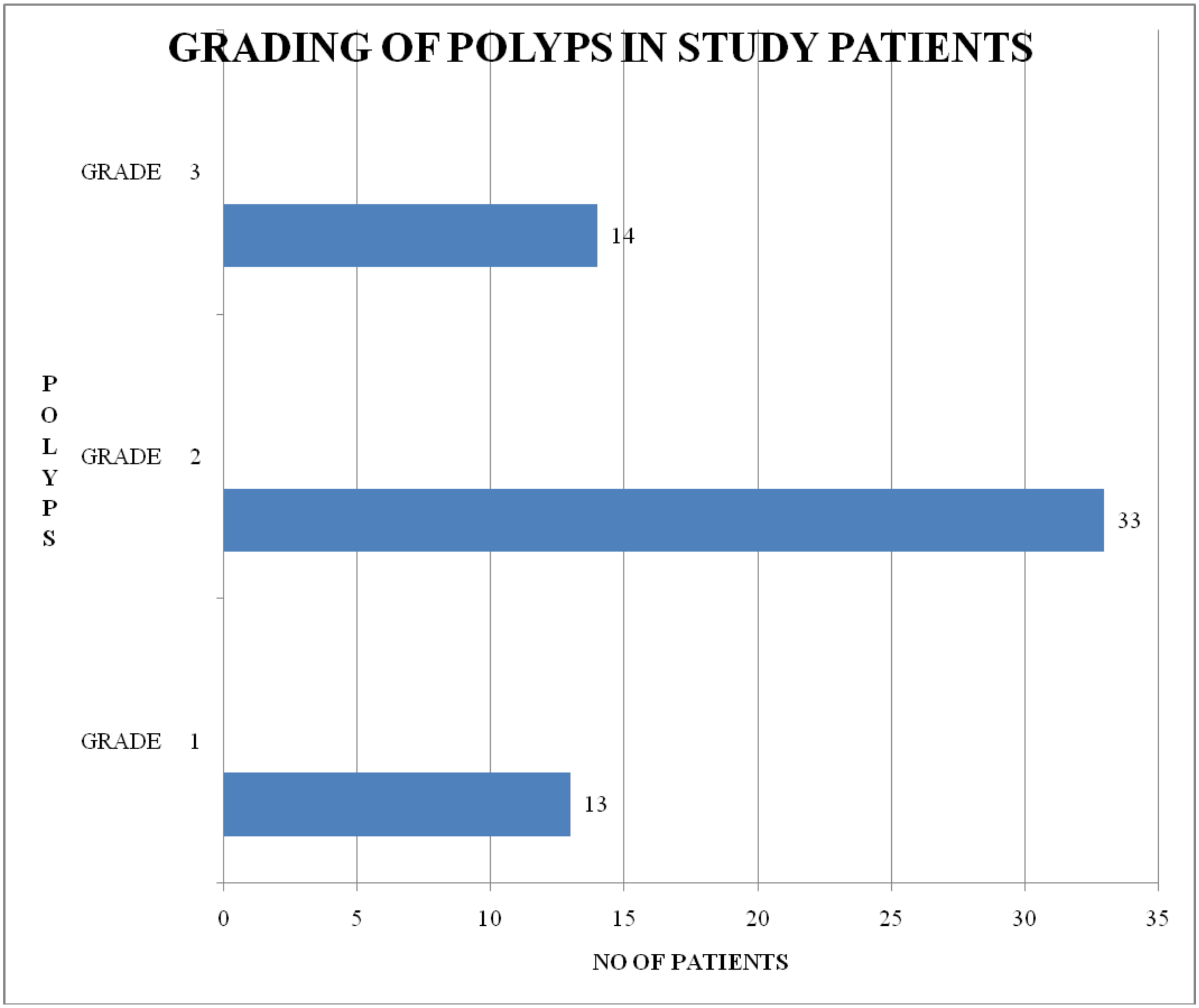
group comprises 45% of the study population. In the age group of 41-50 years there are 6 patients out of whom 5 are males and 1 female. This age group comprises 10% of the study population. In the age group of 51-60 years there is only one patient who is a female comprising 2% of study population.

AGE DISTRIBUTION

AGE	MALE	FEMALE	TOTAL	PERCENTAGE
14-20	5	4	9	15
21-30	14	3	17	28
31-40	11	16	27	45
41-50	5	1	6	10
51-60	0	1	1	2

GRADING OF POLYPS

Out of 60 patients in the study, 13 had Grade 1 polyps, 33 had Grade 2 polyps and 14 had Grade 3 polyps.



GRADING OF POLYPS IN STUDY PATIENTS
POLYPS
GRADE 3
14
GRADE 2
33
GRADE 1
13
0
5
10
15
20
25
30
35
NO OF PATIENTS

PEROPERATIVE BLOOD LOSS

Out of 60 patients, 13 had 120ml of blood loss, 10 had 100 ml of blood loss, 9 had 110 ml of blood loss, 8 had 130 ml of blood loss, 6 had 140 ml of blood loss, 4 had 150 ml of blood loss, 3 had 80 ml of blood loss, 2 had 90 ml of blood loss, 2 had 180 ml of blood loss and 2 more had 200 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.

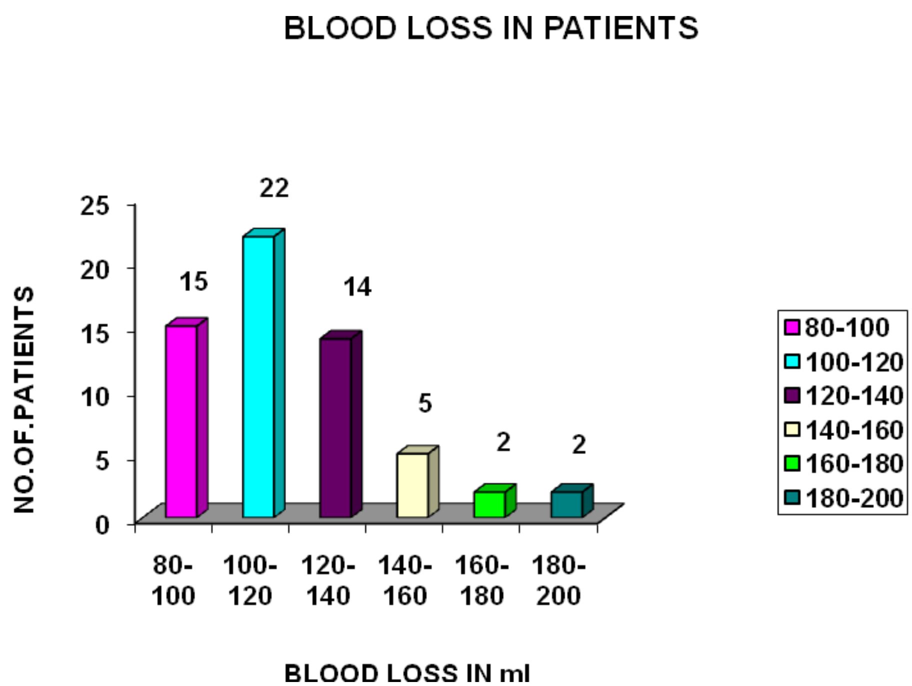
BLOOD LOSS IN ml	NO.OF. PATIENT	TOTAL
80	3	240
90	2	180
100	10	1000
110	9	990
120	13	1560
130	8	1040
140	6	840
150	4	600
160	1	160

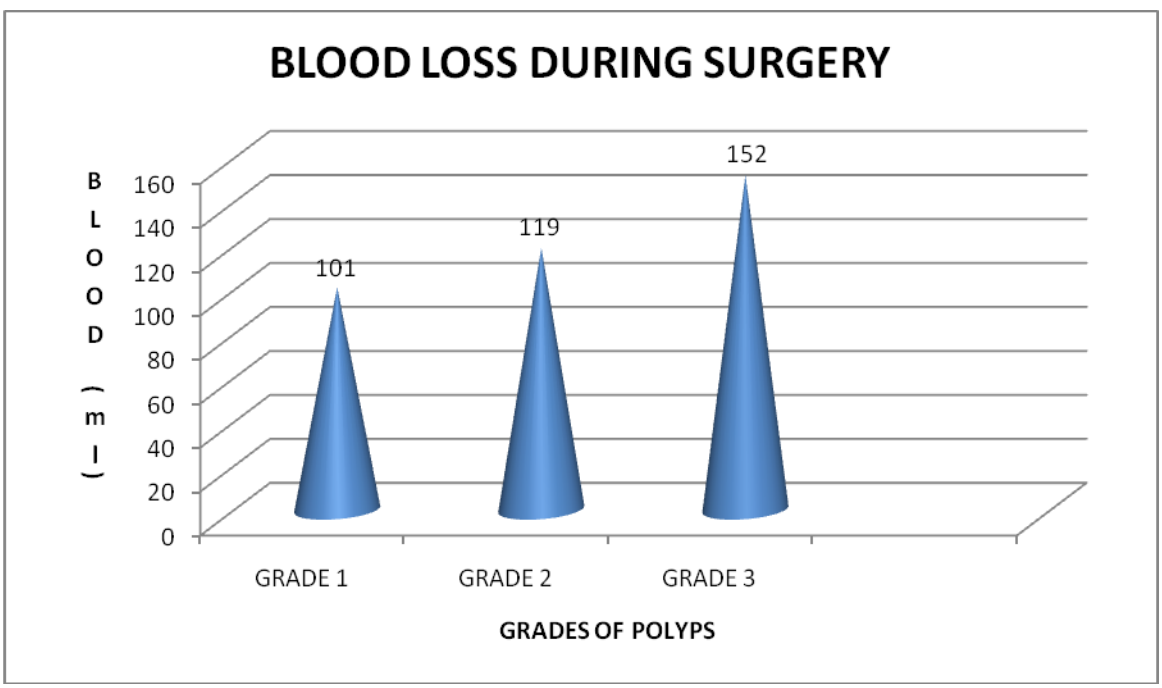
170	0	0
180	2	360
190	0	0
200	2	400
NET TOTAL	**60**	**7370**

AVERAGE **122.83ml**

Of the 13 patients with Grade 1 polyps the average blood loss was found to be 100.8 ml. Of the 33 patients with Grade 2 polyps the average blood loss was found to be 119 ml. Of the 14 patients with Grade 3 polyps the average blood loss was found to be 152 ml.

The average blood loss for the 8 patients who had no pre-operative preparation was only 126 ml.


BLOOD LOSS IN PATIENTS
NO.OF.PATIENTS
25
20
15
10
5
0
15
22
14
5
2
2
80-100
100-120
120-140
140-160
160-180
180-200
BLOOD LOSS IN ml
80-100
100-120
120-140
140-160
160-180
180-200


BLOOD LOSS DURING SURGERY
BLOOD (ml)
160
140
120
100
80
60
40
20
0
101
119
152
GRADE 1
GRADE 2
GRADE 3
GRADES OF POLYPS

GRADES of polyps	AVERAGE BLOOD LOSS IN [ml]
I	100.8
II	119
III	152

DURATION OF SURGERY

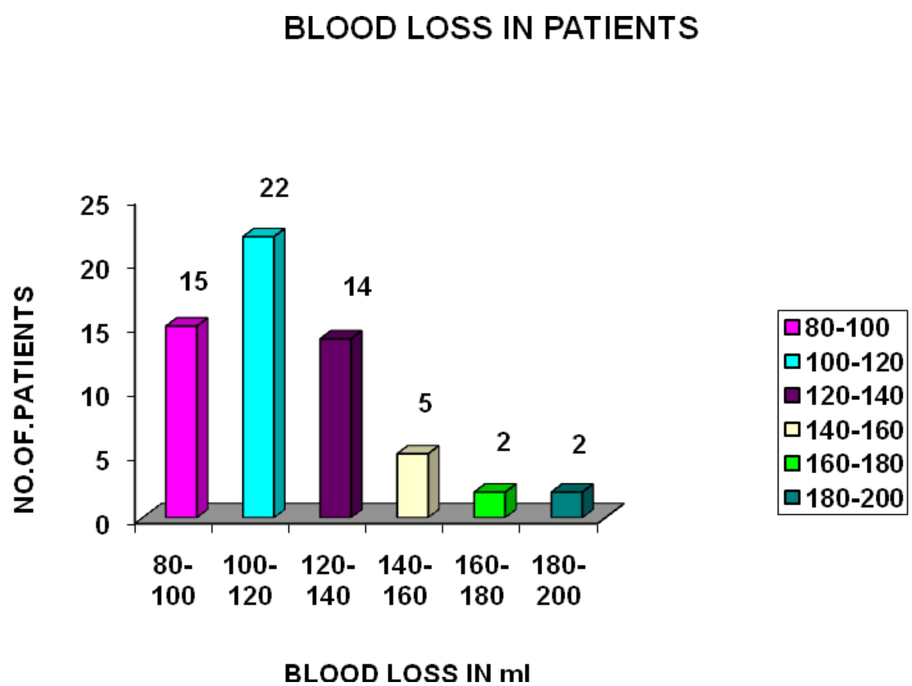
Of the 60 patients in this study, 15 patients were operated in a time period of 80 minutes, 14 were operated in 70 minutes, 11 were operated in 60 minutes, 10 were operated in 90 minutes, 4 were operated in 50 minutes, 2 were operated in 100 minutes, and 2 in 120 minutes, 1 operated in 120 minutes, and another one in 140 minutes. The average duration of surgery in 60 patients was 77 minutes.

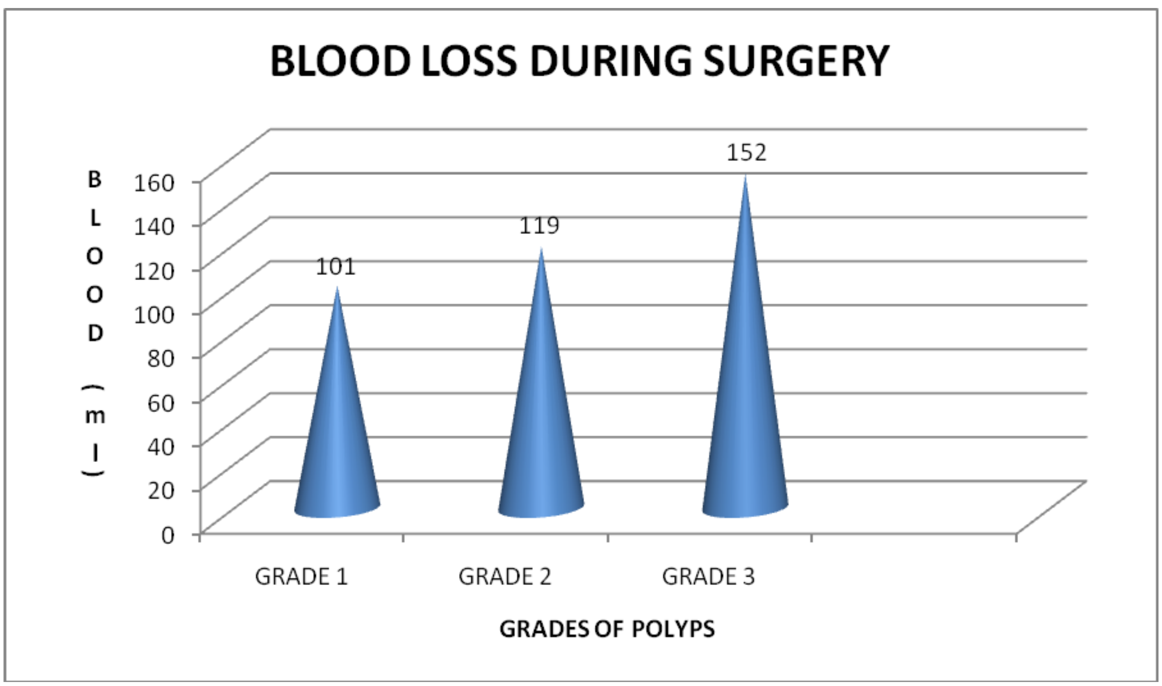
Of the 13 patients with Grade 1 polyps, the average time required for surgery was 59 minutes. Of the 33 patients with Grade 2 polyps the average time required for surgery was 75 minutes. Of the 14 patients with Grade 3 polyps the average time required for surgery was 99 minutes. The average duration of surgery for the 8 patients without pre-operative preparation was 76 minutes.

GRADEs Of polyps	AVERAGE TIME DURATION OF SURGERY
I	59 mins
II	75 mins
III	99 mins

TIME DURATION

MINUTES	NO.OF. PATIENT	TOTAL
50	4	200
60	11	660
70	14	980
80	15	1200
90	10	900
100	2	200
110	1	110
120	2	240
130	0	0
140	1	140
NET TOTAL	**60**	**4630**
NET TIME	**77 MIN**	**1 HR 17 MIN**


BLOOD LOSS IN PATIENTS
NO.OF.PATIENTS
25
20
15
10
5
0
15
22
14
5
2
2
80-100
100-120
120-140
140-160
160-180
180-200
BLOOD LOSS IN ml


BLOOD LOSS DURING SURGERY
BLOOD (ml)
160
140
120
100
80
60
40
20
0
101
119
152
GRADE 1
GRADE 2
GRADE 3
GRADES OF POLYPS

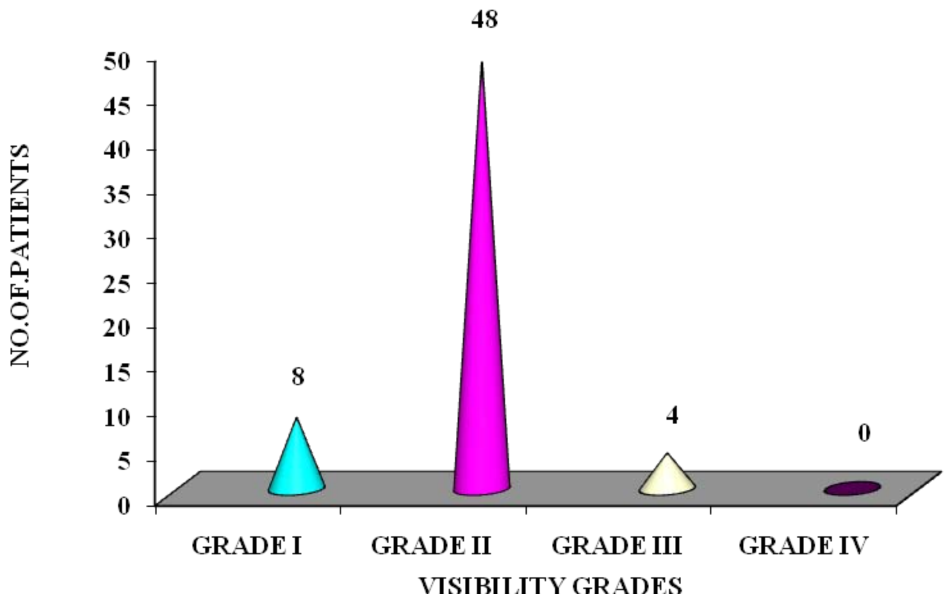
PEROPERATIVE VISIBILITY OF SURGICAL FIELD

In this study of 60 patients, the per operative visibility was graded according to *BOEZAART VANDERMERWE* grading. Of the 60 patients, 48 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. Of the 8 patients who were not prepared pre-operatively, 7 had Grade 2 field visibility during surgery and 1 had Grade 1 visibility.

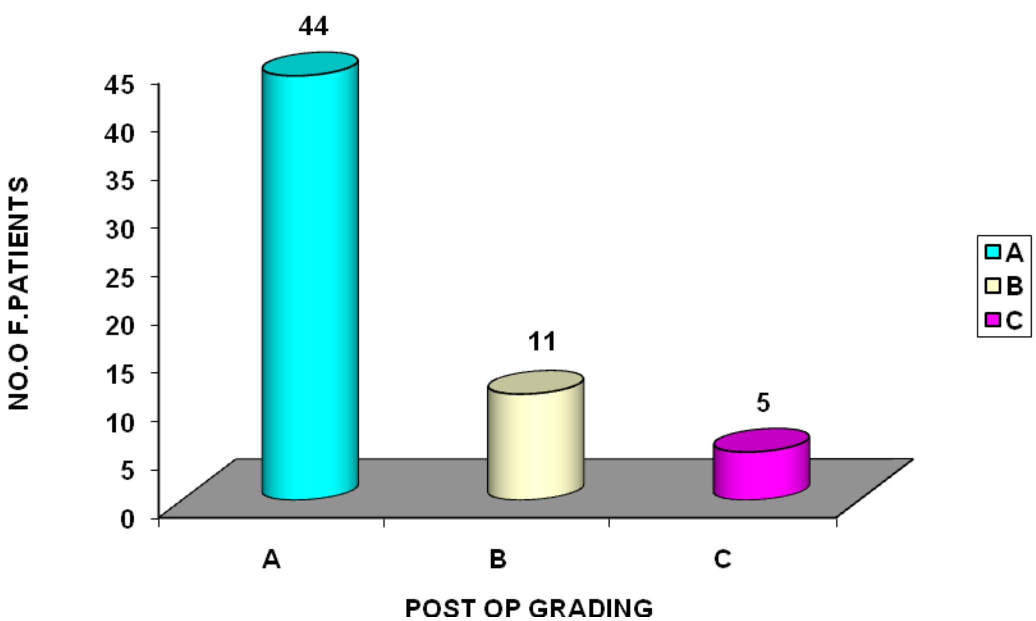
PEROPERATIVE FIELD VISIBILITY

GRADES	**NO.OF.PATIENT**	**PERCENTAGE**
GRADE I	8	13.33
GRADE II	48	80
GRADE III	4	6.66
GRADE IV	0	0
GRADE V	0	0

PEROPERATIVE VISIBILITY



POST OP GRADE



POST OPERATIVE HEALING

In this study of 60 patients, 44 patients (73.3%) had Grade A post-operative healing. About 11 patients (18.4%) had Grade B post-operative healing. About 5 patients (8.3%) had Grade C post-operative healing.

Of the 8 patients who were not prepared pre-operatively 3 had Grade A post-operative healing, 4 had Grade B and only 1 had Grade C post-operative healing.

POST OP GRADING

GRADE	NO.OF.PATIENT	PERCENTAGE
A	44	74
B	11	18
C	5	8

DISCUSSION

PARAMETERS

Preoperative preparation

Duration of surgery

Per operative bleeding

Visibility of field during surgery

Post operative complications

Preoperative preparation

Prior to elective surgery for inflammatory disease, infection should be minimized, if possible to reduce intraoperative bleeding. In severe disease this may require a culture directed antibiotic course of 2 weeks. Patients with polyposis are best treated with a course of oral steroids. This reduces the mucosal bleeding.In this study of about 60 patients 8 were admitted one day prior to surgery since they were from faraway places. In those 8 patients no preoperative medications were given but there was no significant change was found in relation to blood loss and visibility during surgery. Duration of surgery was also not altered in those 8 cases compared to the cases who had preoperative preparation.

Microdebrider is advantageous in this sense that preoperative preparation is not mandatory as done in polypectomy with conventional instruments.

Duration of surgery usually done by conventional methods takes about almost 3 hours and above due to poor visualization and bleeding and repeated suctioning. In this study the advantage of microdebrider is studied in relation to duration of surgery.

DURATION OF SURGERY

Duration of surgery was significantly reduced in our study group. In our study the maximum time taken for the procedure was only 2 hours. Average time duration was about 1 hour and 17 minutes. Even in cases of Grade 3 polyposis , the average duration of surgery was 99 minutes. microdebrider is advantageous in reducing the duration of surgery and in turn the duration of anesthesia. Excessive bleeding during surgery is one of the complications in conventional polypectomy. Using microdebrider in endoscopic sinus surgery has significantly reduced the blood loss during the surgery.

PER-OPERATIVE VISIBILITY

The surgical field visibility should be good in during endoscopic nasal

Polypectomy.

With the help 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 may lead to recurrent or persistent disease. The cause of middle meatus collapse is a weak end middle turbinate. The middle meatus can appear completely normal with the 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 this study of 60 patients, most of the people had good post-operative healing. In most of the cases there was no synechiae or crusts. In almost all cases in the study, there was no middle meatal collapse.

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-workers[14] 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 increased surgical precision of powered shavers can thus be expected tio lead to improved functional results. Krouse and Christmas[15] compared the results using the standard FESS technique and powered shavers.

Significantly decreased blood loss, reduced ***synechiae*** formation, a reduced ostial occlusion rate, and faster healing occurred in the shaver group. In our studt group also the postoperative mucosal preservation was good.

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 the office setting. When patients have not had the financial means to permit admission to the surgical suite, the author has on occasion performed polypectomy and limited sinus procedures with this instrumentation in the office with gratifying results.

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 presesvation*** 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 sinusdiseases 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 60 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 whether we are addressing 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. The use of powered instrumentation is no substitution for the careful approach of an experienced sinus surgeon. However, it can provide the surgeon with the means to perform more precise and efficient surgery.

PROFORMA

Name :

Age & Sex :

Occupation :

OP / IP No :

History :

Complaints

1.
2.
3.
4.
5.

H/o Allergy

Food / Inhalant

Seasonal / Perennial

Past History:

1. Hypertension
2. Diabetes Mellitus
3. Bronchial Asthma
4. Bleeding disorders

Treatment History:

1. Antibiotics
2. Anti Histamines
3. Steroids – Systemic / Intra nasal
4. Decongestants – Systemic / Topical
5. Aspirin / NSAIDs & others

H/o previous surgery / Anaesthesia

Clinical Examination:

Nose:

1. Anterior Rhinoscopy
2. Posterior Rhinoscopy
3. Para Nasal Sinus Tenderness
4. Cold Spatula Test

Ear :

Throat :

INVESTIGATIONS

Pre Operative Diagnostic Nasal Endoscopy:

CHARACTERISTIC	Right	Left
I PASS		
II PASS		
III PASS		
POLYPS GRADES		

[a] 0 = Absence of polyps; 1 = polyps in middle meatus only;
2 = polyps beyond middle meatus but not blocking the nose completely;
3 = polyps completely obstructing the nose

CT Scan – Para Nasal Sinuses

Lund-MacKay scoring system: CT scoring system

SINUS SYSTEM	RIGHT	LEFT
Maxillary (0,1,2)		
Anterior ethmoids (0,1,2)		
Posterior ethmoids (0,1,2)		
Sphenoid (0,1,2)		
Frontal (0,1,2)		
Ostiomeatal complex (0 or 2 only)*		
Total points		

0 = no abnormalities; 1 = partial opacification; 2 = total opacification
*0 = not occluded, 2= occluded

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MASTER CHART

S. no	***Name***	***age***	***sex***	IP NO	***Poly p grade***	***Pre-op***	Duration	Bleeding in ml	***VISIBILITY***	***POST OP GRADE***
1	SURYAPRAKASH	22	M	46038/07	I	+	1 H	120	II	A
2	KANGARAJ	25	M	48906/07	II	+	1 H 10m	110	II	A
3	KINGSLY	28	M	52600/07	II	+	1 H	100	II	A
4	SURESH	28	M	59508/07	II	+	1 H 20m	140	II	A
5	SASIKAR	27	M	65671/07	I	+	50m	100	I	B
6	PERUMAL	22	M	75884/07	II	+	1H 20m	130	II	A
7	UDAYAKUMAR	27	M	53616/07	I	+	1H 10m	120	II	A
8	SOMSEKAR	29	M	61038/07	II	+	1H 30m	110	II	A
9	MUTHU	29	M	72994/07	II	--	1H 20m	140	II	A
10	PRABU	28	M	81277/07	III	+	1H 30m	150	II	A
11	RAVI	38	M	70208/07	II	+	1H 10m	110	II	A
12	SAMPATH	34	M	54196/07	III	+	1H 40m	150	II	A
13	MAHADEVAN	38	M	68021/07	II	+	1H 30m	120	II	A
14	SUBRAMANI	35	M	71526/07	II	+	1H 20m	100	II	A
15	MANI	49	M	80555/07	II	+	1H 10m	130	II	A

16	DHARAN	16	M	69768/07	II	+	1H	100	II	B
17	HARICHANDRAN	50	M	69718/07	II	+	1H 20m	120	II	A
18	RAMESH	25	M	13357/08	III	+	1H 30m	110	II	A
19	HARISH	23	M	39242/08	II	--	1H 10m	120	II	B
20	PARTHASARATHY	28	M	28690/08	III	+	1H 40m	180	II	C
21	RAVICHANDRAN	37	M	2735/08	II	--	1H	100	II	A
22	PRABUKUMAR	35	M	5607/08	I	+	1H	90	I	B
23	SHANKAR	40	M	7500/08	II	+	1H 10m	110	II	A
24	ARUNACHALAM	34	M	37712/08	III	+	1H 20m	120	II	A
25	GANESAN	36	M	5845/08	III	+	1H 30m	140	II	A
26	GOVINDARAJ	41	M	55490/08	III	+	1H 50m	200	III	A
27	SAMPATH	35	M	28110/08	II	--	1H 20m	150	II	C
28	ARUMUGAM	48	M	3614/08	I	--	1H	100	I	B
29	KUMAR	45	M	35526/08	I	+	50m	80	I	A
30	NAGARAJ	19	M	7153/08	II	+	1H 10m	120	II	A
31	PUNIAMURTHI	20	M	8345/08	II	+	1H 30m	150	II	A
32	PRABAKAR	19	M	16689/08	III	+	1H 20m	130	II	B
33	DILIP	16	M	5609/08	I	+	1H	110	II	A
34	ARULDAS	35	M	31973/09	II	--	1H 20m	130	II	A
35	SARAVANAN	26	M	43809/09	III	+	2H	160	III	C
36	THAVAMAN	37	F	64653/0	II	+	1H	110	II	A

	I			7			10m			
37	BEENA	37	F	81270/07	II	+	1H	100	II	A
38	EGATHAMAL	39	F	84776/07	II	+	1H 20m	110	II	A
39	VASUGI	40	F	81858/07	II	+	1H 10m	120	II	A
40	SUSEELA	39	F	13328/08	II	+	1H 20m	110	II	A
41	JAYALAKSHMI	34	F	9473/08	I	+	50m	80	I	A
42	LAKSHMI	34	F	13343/08	III	--	1H 30m	130	II	B
43	VIJAYA	31	F	15132/08	II	+	1H 30m	140	II	A
44	MAHADEVI	38	F	54400/08	II	+	1H 1Om	120	II	C
45	MAHALAKSHMI	32	F	50526/08	III	+	2H	180	III	A
46	RAJAMAL	38	F	41020/08	I	+	1H	100	I	B
47	LADUPA	35	F	23524/08	II	+	1H 20m	130	II	A
48	MALARVIZHI	38	F	20643/08	II	+	1H 20m	120	II	A
49	JANAKI	40	F	4575/08	I	+	1H 10m	100	II	A
50	SARALA	20	F	13380/08	I	+	50m	90	I	A
51	NIRMALA	18	F	35541/08	III	+	1H 30m	140	II	B
52	RATNAMAL	30	F	38787/08	I	+	1H	120	II	A
53	AJIRA	24	F	28483/08	II	+	1H 20m	130	II	A
54	VASANTHAMAL	55	F	13347/08	II	+	1H 10m	120	II	C
55	SELVI	45	F	29843/08	III	--	1H 30m	140	II	B

56	SUSHEELA	35	F	36786/09	I	+	1H 10m	100	II	A
57	SHANTHI	38	F	28268/09	III	+	2H 20m	200	III	A
58	SERMAKALA	20	F	54638/09	II	+	1H	80	I	A
59	BHAGAWATHI	15	F	38263/09	II	+	1H 10m	130	II	B
60	VIMALA	30	F	47131/O9	II	+	1H 20m	120	II	A

ABBREVIATIONS FOR MASTER CHART

Preop + Preoperative preparation done

Preop - Preoperative preparation not done

H - Hours

M - Minutes

PATIENT CONSENT FORM

Study Detail: Comprehensive Study of Microdebrider in Endoscopic Sinus Surgery

Study Centre : Upgraded Institute of Otorhinolaryngology,
Madras Medical College & Government General Hospital, Chennai -3
Institute of Child health, Egmore, Chennai 600 008.

Patient Name :

Patient Age :

Identification Number :

Patient may tic (✓) these boxes

I confirm that I have understood the purpose of procedure for the above Study. I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction. ☐

I understand that my participation in the study is voluntary and that I am free to withdraw at anytime without giving any reason, without my legal rights being effected. ☐

I understand that Investigator, Regulatory authorities and the Ethics committee will not need my permission to look at my health records both in respect to the current study and any further research that may be conducted in relation to it, even if withdraw fro the study. I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from the study. ☐

I agree to take part in the above study and to comply with the instructions given during the study and faithfully co operative with the study team and to immediately inform the study staff if I suffer from any deterioration in my health or well being or any unexpected or unusual symptoms, ☐

I hereby con sent to participate in this study. ☐

I hereby give permission to undergo complete clinical examination and diagnostic tests including hematological, biochemical, radiological tests. ☐

Signature/Thumb Impression: Place Date
Patient Name and Address:

Signature of the Investigator: Place Date
Study Investigator's Name:

INSTITUTIONAL ETHICAL COMMITTEE
MADRAS MEDICAL COLLEGE,CHENNAI-600 003.

Telephone : 25363970

Fax :044 – 253-5115
:044 25363970

L.Dis.No. 14597 /MES/ /EthicsDean/MMC/2009 Dated .09.2009

Till of the work : "Comprehensive study of microdebrider in endoscopic sinus surgery".
Principal Investigator : Dr. S. Mohana Karthikeyan. P.G. M.S (ENT)
Department : Madras medical college, Ch-3

The request for an approval from the Institutional Ethical Committee(IEC) was considered on the IEC meeting held on 23rd September 2009 at 2.00P.M. in Madras Medical College, Deans, Chamber, Chennai-3. / Pharmacology seminar hall. Madras medical college Ch-3

The members of the Committee, the Secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The principal investigator and their term are directed to adhere the guidelines given below:

1. You should get detailed informed consent from the patients/participants and maintain confidentiality.
2. You should carry out the work without detrimental to regular activities as well as without extra expenditure to the Institution or Government.
3. You should inform the IEC in case of any change of study procedure, site and investigation or guide.
4. You should not deviate form the area of the work for which I applied for ethical clearnance.
5. You should inform the IEC immediately, in case of any adverse events or serious adverse reactions.
6. You should abide to the rules and regulations of the institution(s).
7. You should complete the work within the specific period and if any extension of time is required, you should apply for permission again and do the work.
8. You should submit the summary of the work to the ethical committee on completion of the work.
9. You should not claim funds from the Institution while doing the work or on completion.
10. You should understand that the members of IEC have the right to monitor the work with prior intimation.

SECRETARY	CHAIRMAN	DEAN
IEC, MMC,CHENNAI	IEC MMC CHENNAI	MADRAS MEDICAL COLLEGE CHENNAI