CLINICAL OUTCOME IN PATIENTS WITH SINONASAL DISEASE AFTER MICRODEBRIDER ASSISTED ENDOSCOPIC SINUS SURGERY-A ONE YEAR OBSERVATIONAL STUDY.

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LIST OF ABBREVIATIONS

CRS	Chronic Rhino Sinusitis
ARS	Acute Rhino Sinusitis
FESS	Functional Endoscopic Sinus Surgery
ESS	Endoscopic Sinus Surgery
IT	Inferior Turbinate
MT	Middle Turbinate
ST	Superior Turbinate
SS	Sphenoid Sinus
CT	Computed Tomography
CFTR	Cystic Fibrosis Transmembrane Conductance Regulator Gene
AMP	Adenosine Monophosphate
URTI	Upper Respiratory Tract Infection
NO	Nitric Oxide
NP	Nasopharynx
MRI	Magnetic Resonance Imaging
NPC	Nasopharyngeal Carcinomas

RCT	Randomised Control Trial
VAS	Visual Analogue Scoring
JNA	Juvenile Nasopharyngeal Angiofibroma
EP	EthmoidalPolyposis
FRS	Fungal Rhinosinusitis
SNM	Sino Nasal Mass
PNS	ParanasalSinus

ABSTRACT

Background: The sinonasal diseases are a wide range of pathology which includes inflammatory and infective conditions such as chronic rhinosinusitis, antrochoanal polyp, ethmoidal polyposis with or without sinusitis, benign conditions like inverted papilloma, juvenile nasopharyngeal angiofibroma, mucocele of paranasal sinuses etc.

Functional endoscopic sinus surgery (FESS) is the main stay of treatment after a failed medical management. Surgery helps in restoring the nasal mucosal function and re-establishes sinus ventilation and mucociliary clearance. Microdebrider is a modern multipurpose instrument which is electrically driven with a shaver and a suction. With the suction, tissue is sucked on one side and as the blade rotates the tissue is shredded between the cannulas making it more advantage over conventional instruments used in endoscopic sinus surgery.

Objective: The study aims to assess the clinical outcome in sinonasal disease patients after microdebrider assisted surgery.

This is an observational study done in a tertiay care hospital in Belagavi.

Materials and Methods: This is an observational study and was carried out among patients with symptoms suggestive of sinonasal diseases willing to undergo microdebrider assisted surgery in ENT & HNS department, KAHER Belgaum, for a period of 1year from January 2019 to December 2019. Total of 40 patients were included in the study. All patients underwent microdebrider assisted functional endoscopic sinus surgery. A subjective visual analogue scoring and lundkennedy endoscopic scoring was assessed preoperatively and post operatively after 6 weeks.

Result:40 patients were studied. 22 were male and 18 were female. The mean age was found to be 37 years. All the patients were subjected to microdebrider in ESS.All patients showed significant statistical improvement in lundmackay scoring system by visual analogue scores postoperatively. Patients in ethmoidal polyposis group showed better improvement when compared to other diseases taken into consideration. Also improvement was noted in the lundkennedy endoscopic scoring postoperatively. Patients in chronic rhinosinusitis and ethmoidal group both showed significant improvement postoperatively.

Conclusion: Microdebrider offers a better therapeutic approach for patients with sinonasal diseases when compared to endoscopic surgery with the conventional instruments. The advantage of using microdebrider in ESS remains to be proper removal of the pathology, good surgical field and better post operative outcome.

Key Words: Microdebrider, Sinonasaldisease , Endoscopic sinus surgery

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INTRODUCTION

The nose and the paranasal sinuses acts as a host for lot of conditions and diseases together called as sino nasal diseases. The broad spectrum of sinonasal pathology includes conditions such as chronic rhino sinusitis, antrochoanal polyp, ethmoidal polyposis with or without sinusitis, benign conditions like inverted papilloma, juvenile nasopharyngeal angiofibroma, mucocele of paranasal sinuses etc.[1]

Chronic rhinosinusitisis an inflammation of mucous membrane of nose and sinuses existing for greater than twelve weeks.[2] It has an lifetime prevalence of ~15% making it an extremely common condition and is estimated that about 134 million Indians suffer from CRS.[3] Sinonasal polyps are edematous prolapsed mucosa of nose and paranasalsinuses having a prevelance of 4%.[4]

Surgery for sinonasal disease is effective after failed medical therapy. Earlier to 1980s, open approaches were used. “Functional endoscopic sinus surgery (FESS)”is now the standard treatment.Better absorption of medications and re-establishment of natural pathway of drainage remains to be the main aim of FESS.[5]

The conventional instruments used in Endoscopic Sinus Surgery by their punching, tearing and stripping action creates a blood filled surgical field with no mucosal preservation and scarring. Visibility of the operating area is key to the safety of the FESS procedure, which can be compromised by bleeding. Bleeding can lead to difficulty in recognising important anatomic landmarks and structures. It can cause intraoperative complications, prolong the operating time and may result in incomplete surgery.[4, 6]

Microdebrider is a modern multipurpose instrument which is electrically driven with a shaver and a suction. With the suction, tissue is sucked on one side and as the blade rotates the tissue is shredded between the cannulas.

Greatest advantage in using the microdebrider as the primary instrument in ESS is that, with a single instrument multiple functions can be achieved,thereby providing advantage of limited working area in narrow nasal cavities having proximity to skull base. Constant clearing of blood ,tissue and bone fragments due to continuous integrated suction gives a proper visualization of the operative field thereby obviating the necessary to move in and out of the surgical field thereby reducing the loss of time that occurs by switching different instrument.[7]

In the previous studies clinical outcome after microdebrider assisted surgery have not been assessed separately. In general microdebrider is considered safe for sinus surgery. So the present study aims to find out the clinical outcome in sinonasal disease patients after microdebrider assisted surgery.

OBJECTIVE

The study aims to assess the clinical outcome in patients with sinonasal disease after microdebrider assisted surgery.

REVIEW OF LITERATURE:

ANATOMY OF LATERAL WALL OF NOSE.[8,9,10]

The nose is a structure extending from the external nares to the posterior choanae. The parts of nasal cavity include septum, roof, floor and lateral wall. The Concha(inferior), palatine bone, nasal bone maxilla, ethmoid and lacrimal along with sphenoid(medial part of pterygoid) forms the lateral wall making it uneven.

In the area of the nostril anteriorly, laterally vestibule made of skin and hair. Posterior to the vestibule is the atrium lined by nasal mucosa. Behind the atrium are turbinates, overlying the respective meatii. Turbinates are three in number which includes inferior, middle and superior. Rarely anatomical presence of supreme turbinate is noted.

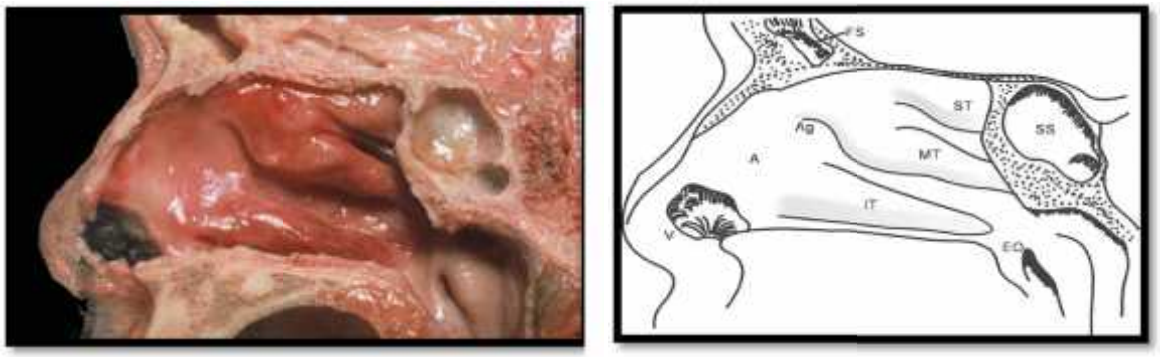


Figure 1: Diagram showing lateral wall of nose showing turbinates and meatus. "IT- inferior turbinate, MT- middle turbinate, ST- Superior turbinate, SS – sphenoid sinus".[8]

INFERIOR TURBINATE – it is an individual bone with irregular surface having perforations.Mucoperiosteumgets anchored to the grooved vascular channels.

Maxillary process of bone articulates with the maxillary hiatus and also with palatine, lacrimal, ethmoid bones. This completes the medical wall of nasolacrimal duct.

INFERIOR MEATUS – It is lateral to inferior turbinate. It runs through whole of the cavity making it largest and is place where nasolacrimal duct opens anteriorly.

MIDDLE TURBINATE -Its a convoluted structure bending in different planes. Classified as three parts, depending on its attachment and the orientation in the three dimensional space.

Attachments :

• The anterior one-third – lamina cribrosa in sagittal plane

• The middle one-third – orbital lamina of ethmoid bone in the coronal plane.

• The posterior third- papyracea lamina and palatine bone extending upto roof of the posterior choanae in the horizontal plane

MIDDLE MEATUS – It is lateral to the middle turbinate forming a part of lateral wall. The sinuses empty here, namely frontal, maxillary and ethmoidal.

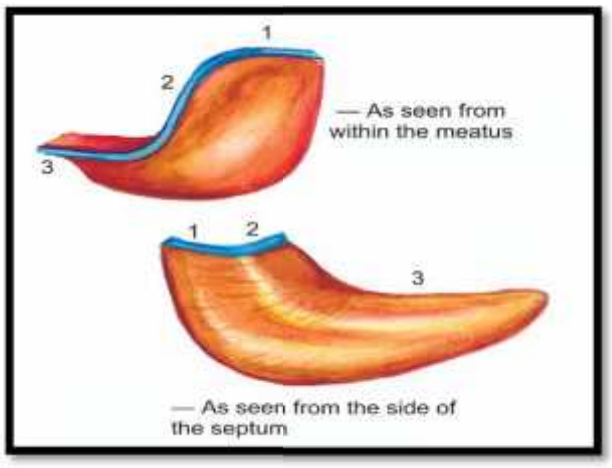


Figure 2- Diagram showing Attachments of middle turbinate (1) lamina cribrosa and frontonasal process of the maxilla, (2) lamina papyracea, (3) perpendicular plate of palatine. [8]

UNCINATE PROCESS- Thin sagitally oriented hook like structure running in anteroposterior and posteroinferior direction. Anteriorly attached to lacrimal bone, and inferior turbinate inferiorly. Superiorly attached to ethmoidal sinus roof or lamina papyracea making the attachment highly variable.

HIATUS SEMILUNARIS AND INFUNDIBULUM- The hiatus semilunaris is situated between ethmoidal bulla and uncinate process and is two dimensional. Ethmoidal infundibulum belonging to the ethmoidalis anterior is a three dimensional space originates from the middle meatus by passing through the hiatus semilunaris. It is surrounded laterally by lamina papyraceaand maxillary nasal process and medially by uncinate process.

OSTIOMEATAL COMPLEX: It is made of middle meatus with the anterior air cells. Normal sinus functions because of this and disease here will hinder the normal process resulting in derangement of sinus function. The area is surrounded lamina papyracea laterally middle turbinate medially and superiorly and posteriorly by basal

lamella. Its open anteriorly and inferiorly. It is divided into two by some authors as posterior and anterior.

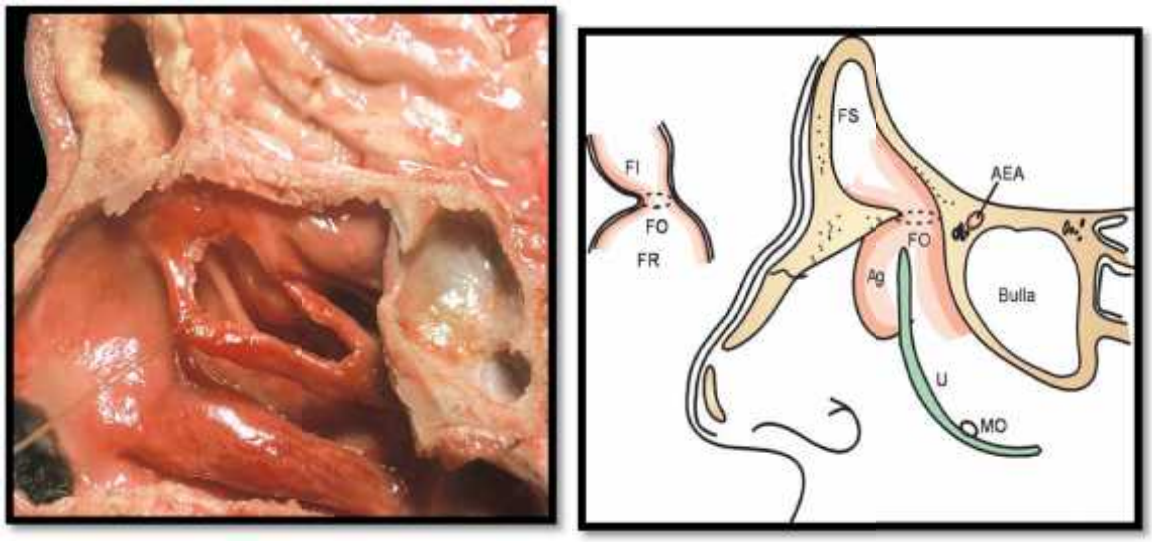


Figure 3- Diagram showing the osteomeatal unit. [8]

SUPERIOR MEATUS- This meatus is related to the superior turbinate. Ethmoid cells belonging to posterior group open here. Supreme turbinate is described above the superior meatus.

SPHENOETHMOIDAL RECESS- Medial side of superior turbinate is sphenoethmoidal recess and ostium of sphenoidal sinus is located.

ANATOMY OF PARANASAL SINUSES.[9,10]

The paranasal sinuses are present on either side of the nasal cavity and lies near vital structures. The sinuses are maxillary, frontal and ethmoids which are paired and sphenoid which is a single sinus.

MAXILLARY SINUS:

Itspyramidal in shape situated in maxilla.Largest sinus group which appears by 7-10 weeks. Boundaries are orbits floor in superior, inferiorly maxillary alveolar process, laterally zygomatic process and posteriorly is the infra temporal and pterygo palatine fossa.The main ostium of maxillary sinus is on medial wall and drains through hiatus semilunaris. Once anterior ethmoids are cleared basal lamella is visualised. The anterior ethmoids empty into middle meatus. Behaviour of posterior ethmoids is significant in FESS. Onodi cell sometimes pushes the sphenoid sinus which in turn leads to optic nerve been surrounded by Onodi cell.

ETHMOID SINUS

It's a cavity gathering with ethmoid bone present from birth. Frontal bone and lamina cribriosa's forms the roof which is called "fovea ethmoidalis and it slops posterior. The area where the frontalis and lamina cribriosa meets is fragile region. The lateral wall lies in relation to papyracea lamina of orbit. Ethmoids are separated into two groups namely - posterior and anterior.The volume is around fifteen ml. The basal lamella is posterior to anterior ethmoids.

SPHENOID SINUS:

It lies within the sphenoidal bone which starts apperaring on 3rdintrauterine month and minimally develops till three years. Sphenoid sinus is highly pneumatized and extend laterally.Intersinus septum splits it into twoostiumwhich are usually seen in sphenoethmoidalrecesss. Two bulges are formed by optic nerve and carotid artery on lateral wall of the sinus and it should be kept in mind while operating.

FRONTAL RECESS AND SINUS:

It is present in frontal bone starts developing from 4thfoetal month and completed by 20 years. It drains through the nasofrontal duct into ostiomeatal unit. It is shaped like a funnel. The frontal sinus drainage has three segments namely the "frontal infundibulum, frontal ostium and frontal recess". Based onuncinate's position, the frontal recess will lead directly to ethmoidal infundibulum or into middle meatus. Frontal secretions empty into middle meatus.

SINONASAL DISEASE

Nose and the paranasal sinuses acts as a host for lot of conditions and diseases together called as sino nasal diseases with varying pathology be it inflammation or neoplasms.

CHRONIC RHINOSINUSITIS

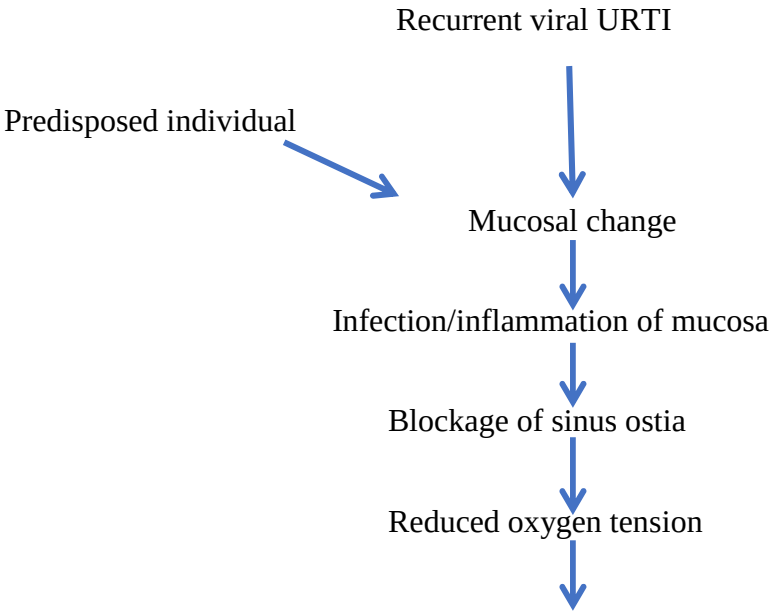
Chronic rhinosinusitis is inflammation of mucous membrane of nose and sinus lasting more than 12 weeks. Rhinosinusitis can then be further defined based on duration of symptoms: acute being less than 12 weeks duration and chronic being greater. Characteristic symptoms are described in Table1

Clinical definition of rhinosinusitis.[11]

Diagnostic criteria for rhinosinusitis	Symptoms should be correlated by either endoscopic and/or radiological findings
Primary symptoms (requires at least one to be present, but if both present it is sufficient to make diagnosis on the basis of symptoms)	Nasal blockage/obstruction/ congestion Nasal discharge (anterior/posterior)
Additional symptoms (may also be present and at least one is needed if only one of the primary symptoms is present)	Facial pain/pressure Olfactory dysfunction Hyposmia/anosmia
Duration	>10 days, <3 months = acute>3 months = chronic
Endoscopy (*any of these*)	Nasal polyps Mucopurulent discharge (middle meatus) Obstruction in middle meatus
CT scan findings(*as well as or instead of* endoscopic *findings*)	Mucosal changes within the ostiomeatal complex and/or sinuses

PATHOPHYSIOLOGY:

Normal mucociliary function, patent osteomeatal unit and normal secretionsare required for normal functioning of sinuses. Defect in anyone of these factors, predispose to sinus infection.



Alteratedmucociliary transport fluid transudation in the sinuses.[12]

In cases of CRS there will be predominant eosinophilic infiltration and production of eosinophil attracting chemokines due to various cytokines. Interleukins 4 and 5 helps in proliferation and promoting life time of eosinophils. Eosinophilic degranulation release various enzymes which destruct the epithelium leading to disruption the barrier and mucociliary function resulting in fungal and bacterial colonization in the sinus cavity. Epithelial damage causes changes in the mucous and endothelial permeability, irritates sensory nerve endings causing pain via reflex pathways. Corticosteroids can helps to put a hold to inflammation by transcripting all these cytokines at nuclear level.[13]

BACTERIA IN CRS

Acute and chronic sinusitis differ in microbiology. There is predominance of streptococcus pneumonia and hemophilus influenza noted in ARS while in CRS is due to its multiple associated/etiological factor making it difficult to identify the associated organism. 55% percent shows predominance of Staphylococcus species in

which 20% was Staphylococcus aureus. Some studies showed the presence of Enterobacteriaceaea, anaerobes, gram negative bacteria and fungi.[12]

FUNGI IN CRS.[14]

It is defined as an allergy to fungus in an immunocompetent patient.

Diagnostic criteria:

- Serologically confirmed Type 1 hypersensitivity
- Polyposis nasi
- CT sign
- Positive culture or stain
- Asthma
- Fungal elements with eosinophilic mucus and no invasion of tissue
- Characteristic bone erosion in radiology
- Charcot- Leyden crystals
- Eosinophilia in peripheral smear

ALLERGY AND CRS.[12, 15]

Proposed mechanisms for the role of allergy in cases of CRS:

1. Release of histamines and other mediators of inflammation as a result of antigen and antibody reactions.
2. Nasal allergen exposure results in eosinophilic influx and inflammation of tissue
3. Production of IgE to pathogens present in sinuses

Histamines and other inflammatory mediators increase vascular permeability, destabiliselysosomal membranes and results in inflammation. These inflammation leads to mucosal swelling and oedema leading to obstruction of sinus ostia. It can be associated with secondary infections.

CLINICAL FEATURE

In 1997, Task Force criteria of Rhinosinusitis of "American Academy of otolaryngology-Head and Neck Surgery" developed criteria for identifying CRS with 6 major and 6 minor symptoms.[12,13]

MAJOR SYMPTOMS	MINOR SYMPTOMS
• Pain/pressure of face	• Headache
• Congestion/fullness of face	• Pyrexia
• Obstruction/blocking of nose	• Halitosis
• Nasal discharge	• Fatigue
• Hyposmia /anosmia	• Dental pain
• Purulence on nasal examination	• Cough
• Pyrexia (in ARS only)	• Ear pain/pressure /fullness

2 major symptoms or 1 major with 1 minor symptom are necessary for confirmation of CRS.In 2007, American Academy of Otolaryngology- published revised guidelines to diagnose CRS in which minor and major symptom categorises were simplified. Twelve weeks or longer of 2 / > of following signs and symptoms[16, 17]

- Mucopurulent drainage (anterior, posterior or both)
- Nasal obstruction (congestion)
- Pain/ fullness/ pressure over face

- Reduced perception of smell

Objectively documentation of inflammation by 1/>of the following findings (as proposed by sinus allergy health partnership –SAHP in 2002) [16, 17, 18]

- The ethmoidal region or meatus of middle having purulent mucus or oedema
- Nasal polyps in the middle meatus/nasal cavity
- Radiologically(CT) which shows sinus inflammation.

NASAL POLYP

Nasal polypi are oedematous hypertrophied prolapsed mucosa with a multifactorial etiology. The cause either being infections, inflammation, anatomic or genetic changes. The final outcome of inflammation chronically is always polyp in every case.

ALLERGY:

Allergy as cause has been implicated due to reasons like eosinophilia, association with asthma and findings mimicking allergic symptoms and signs. Allergens in respiratory allergy contributes due to chronic inflammation of the nasal mucosa. Evidences indicates that polyps are associated more with non-atopy.[19, 20]

MUCOSA ALLERGY:

Non- atopy is usually IgEregulated with 19% having no allergy in system. [21]Although nasal polyposis is found to be associated. Entire respiratory tract is filled with eosinophils.

PHENOMENON OFBERNOUILLI:

The phenomenon occurs because of reduction in pressure in constricted area. Due to pressure decrease, inflamed mucosa of nose prolapse which results in the formation of polyp. Nasal valve region does not follow this phenomenon.[22]

BERNSTEIN THEORY:

According to this theory, following a viral infection or secondary to air flow turbulance inflammatory changes occur in sinus mucosa or lateral wall of nose. Polyp arises due to distruption of integrity of sodium channels at luminal surface of epithelial cell resulting in increased Na+ intake leading to H2O2retensionleading to polyposis. [23]

RUPTURE OF EPITHELIUM THEORY:

Due to allergy and infection epithelium ruptures which leads to prolapse forming polyp. These epithelium which is ruptured is enlarged by venous drainage obstruction or gravity. Electron microscopy however showed that the epithelium of polyp was intact.[24]

IMBALANCEOF VASOMOTOR FUNCTION

According to this, polpy formation is not due to allergy/atopy. Prior to occurrence of polypthere is rhinitis. Polyposis has a limited blood supply and nerve innervations.[25]Thereforeraise in vascular permeability results in edema and polyp.

OTHER CAUSES OF POLYP FORMATION

Nasal polypi have been found with few syndromes/conditions like

- "Aspirin intolerance" ("samter's triad characterised by rhinitis and asthma attack by aspirin/anti-inflammatory drug")[25]
- Cystic fibrosis- mutation in CFTR gene results in absence of cyclic AMP regulated sodium channel. This abnormal sodium channel regulation results in increased sodium absorption leading to water retension and polyp formation.[26,27]
- Primary ciliary dyskinesia characterised by situsinvertus, chronic rhinosinusitis and bronchiectasis. [28]
- Churg Strauss syndrome which is systemic vasculitis is found to be in association with rhinitis of allergic origin and polyposis.[29]
- "Young syndrome"characterised by sinusitis, polyp, bronchiectasia, azoospermia and recurrent URTI

NITRIC OXIDE(NO)

NO synthases is present in the respiratory epithelium. Activity against bacteria and ciliabeating control is provided by them. It also causeschannelling of cells of inflammation and halts eosinophilic apoptosis. Therefore there is a disturbance in the extracellular matrix, and extravascular leakage with edema formation.[30]

INFECTION

Infection leads to polyp formation. Following infection by Staphylococcus aureus, Streptococcus pneumonia or Pseudomonas aeruginosa or Bacteroidesfragilis, epithelial distruption with granulation tissue occurs resulting in polyp formation.[31]

THE MICROENVIRONMENTAL THEORY:

The cells in the polyp produce inflammatory cytokines which causes upregulation of receptors in vascular epithelium and integrins. Eosinophils migrate to polyp which releases mediators which inturn release basic granule protein which has effect on ion influx and mucus production leading to edema and nasal polyp.[32]

FUNGUS ASSOCIATION

Fungal organism which are ubiquitous in habitant when inhaled are trapped in the nasal mucus resulting in clustering of eosinophils around the fungal elements. In this process, secondary mucosal inflammation occurs from the toxic mediators that are released. A study stated specimens of both normal and CRS patient gave fungal growth which implies these areas are colonized by common fungal organism.[33]

MASSES OF NASAL CAVITY NASO PHARYNX AND SINUSES

Man had been inflicted from ages by the pathological swellings in the nose, sinuses and nasopharynx (NP). Advance imaging technology using MRI helps in diagnosis as symptoms remain the same. Histopathology distinguishes the neoplastic from the non - neoplastic swelling in the clinical set up. Nasal polyp, rhinoscleroma, fungal lesion, tuberculous lesions, fibrous dysplasia, cyst, nasal glioma and cement-ossifying fibrousare the common lesions of nose in decreasing incidence in chart.[34] Mucormycosis, Wegner's granulomatosis or fungal disease in immune suppressed patients are non- neoplastic clinically aggressive lesions of the nasopharynx compared to clinically less aggressive lesions like adenoiditis.[35]

Tumors of these regions are a heterogeneous group as they provide relatively great amount of morbidity and require more frequent admission to hospital in reality[36]. It presents a complexity of problems found in few places elsewhere in the human body.

The treatment plan is very difficult considering the closeness of olfactory organs and the brain. Usual incubation period for definitive diagnosis is usually 6 month from the onset of the disease. It usually affects adults in second and third decade with male predominance and most common site is nose. Ash et al in his study showed that hemangioma of nasal septum were classified as pseudotumors in spite of its recurrence.[37] Nasal obstruction, Epistaxis, nasal mass and discharge are the commonest presenting complaints.[38] Squamous and inverted papillomas are the commonest among benign epithelial tumors compared to Angiofibroma which is most common non- epithelial variety. Non -epithelial benign tumors are more in incidence than epithelial variety. Very less percentage of nasal masses are malignant. Rhino sinusitis is the usually onset symptom which makes a delay of 5 to 6 months in making the definitive diagnosis. Due to the delay in diagnosis complications like bone erosions and sensory nerve deficits usually occur which leads to extension in to the orbit and infratemporal fossa having profound implications for treatment and the likely outcome.[39] These malignancies account for 3% of upper aero digestive tract malignancies, with very little arising from nasal cavity.

Benign tumors of the nasopharynx are rare. Benign tumor like conditions such as adenoids, thornwaldt's cysts of the pharyngeal bursa, choanal polyps and mucosal cysts are common compared to hemangioma and teratoma.in nasopharynxangiofibroma is the most common tumor in benign forms. Juvenile angiofibroma accounting for 0.5 with male predominance.[40] Squamous cell carcinomas lymphomas, miscellaneous groups comprising of Adenocarcinoma, plasma cell myelomas, cylindromas, melanomas, sarcomas are the malignant tumors of nasopharynx. Nasopharyngeal carcinomas (NPCs), are the most common neoplasms of the nasopharynx.

CLASSIFICATION OF MASSES IN SINONASAL CAVITY AND NASOPHARYNX

Non neoplastic lesions of this area are classified into granulomatous and non-granulomatous lesion, while non-neoplastic lesions ofnasopharynx are classified into congenital and acquired lesion. Tumors of nose andparanasal sinuses are classified together as benign, intermediate and malignant tumor. For tumors of nasopharynx classification is mainly based upon origin of tumouri;e epithelial or non-epithelial.

TABLE 2: NON NEOPLASTIC LESION OF NOSE, PARANASAL SINUSES AND NASOPHARYNX[34,41]

Nose and paranasal sinuses	Nasopharynx
Non granulomatous lesions	**Congenital**
Nasal polyp	Trans-sphenoidal Meningoencephalocoeles
Cysts	Rathke's pouch remnant
Fibrous dysplasia	Congenital glioma
Nasal glioma	Branchial cyst
Granulomatous lesions	**Acquired**
Scleroma	Adenoids
Syphilitic lesion	Thornwaldt's cyst
Tuberculous lesion	Retention cysts
Lupus vulgaris	
Leprosy	
Rhinosporidiosis	
Mucormycosis and other fungal lesions	
Sarcoidosis and Wegner's granulomatosis	
Lethal midline Granulomas	

TABLE 3: CLASSIFICATION OF SINONASAL TUMORS[42]

Benign	Intermediate	Malignant
Osteoma	Inverted papilloma	Squamous cell carcinoma
Papilloma	Squamous cell papilloma	Basal cell carcinoma
Chondroma	Haemangiopericytoma	Minor salivary gland tumors
Schwannoma	Meningiomas	Sarcoma
Fibrous dysplasia	Oncocytoma	Malignant melanoma
Ossifying fibroma		Esthesioneuroblastoma
Haemangioma		Lymphoreticular neoplasm
Leiomyoma		Adenocarcinoma
		Undifferentiated carcinoma
		Malignant fibrous dysplasia
		Malignant neurogenous tumors

TABLE 4: CLASSIFICATION OF NASOPHARYNGEAL TUMOR[41]

Epithelial tumors	Non epithelial tumors
a) Benign	**a) Soft tissue tumors**
Papilloma	Angiofibroma
pleomorphic adenoma	Haemangioma
Ectopic pituitary adenoma	Haemangiopericytoma
Oncocytoma	Neurilemmoma
Basal cell adenoma	Neurofibroma
b) Malignant	Paraganglioma
Nasopharyngeal carcinoma	Fibrosarcoma
Papillary Adenocarcinoma	Angiosarcoma
Adenoid cystic carcinoma	Rhabdomyosarcomas
Adenocarcinoma	Kaposi's sarcoma
Mucoepidermoid carcinoma	malignant nerve sheath tumor
Polymorphous	Synovial sarcoma
Low grade adenocarcinoms	**b) Tumors of bone and cartilage**
	c) Lymphoma
	Malignant lymphoma N
	Extra-medullary plasmacytomas
	Midline malignant reticulosis
	Histiocytic lymphoma
	Hodgkin's disease
	Non hodgkin's lymphoma

DIAGNOSIS

"ANTERIOR RHINOSCOPY"

The initial step in examination sinonasal diseases is anterior rhinoscopy.

"DIAGNOSTIC NASAL ENDOSCOPY"

"First pass"- It is through floor and to nasopharynx. It allows examination of inferior turbinate and the meatus

"Second pass"– Between the inferior and middle turbinates it is done for examining middle meatus, accessory ostia. Medially rolling of scope helps in visualising the sphenoethmoidal recess and to visualiseostium of sphenoid sinus.

"Third pass"-Scope is withdrawn to make the third pass. This provides examination of infundibulum, ethmoidal bulla and uncinate.[8]

COMPUTED TOMOGRAPHY

After 4 to 6 weeks of medical treatment computed tomography of sinuses must be done.the most helpful cut for anatomical evaluation to a surgeon is 3mm coronal images. Axial scans give additional informations like sphenoid and frontal recess area. Preoperatively proper inspection of anatomical features is examined using a CT.[43]

MEDICAL MANAGEMENT

Medical management aims reducing signs and symptoms, improving the way of life and preventing recurrence or progression of disease. Various modalities of medical management as been proposed which includes the following. Antibiotics play an important role in the medical management. Both aerobic and anerobic organisms are

targeted. They can be used both orally and topically. Topical formulations have more enhanced drug delivery system to the mucosa limiting the systemic side effect whereas oral antibiotics reduce the virulence of the bacteria thereby inhibiting toxin production and biofilm destruction.Corticosteroids are main stay of treatment for CRS and nasal polyp. They reduce the eosinophil life span and trigerring the anti-inflammatory effect. In case of polyp systemic steroids reduce the polyp size. Other modalities include decongestants, antifungals and antihistamines. [44,45,46]

SURGICAL MANAGEMET

Endoscopic sinus surgery was designed initially for treatment of polyps and rhinosinusitis. Later it has been extended to several other conditions

Sinus surgery endoscopically is the surgery recommended that involves anterior to posterior approach designed to achieve functional intact sinus with minimal surgical intervention necessary. The main aim of this procedure is to eliminate the disease in the sinus region to promote normal physiology by a conservative procedure thereby the name 'functional'.[43,47]

The keystone of this technique is to perform endoscopically minimal procedure as well as to preserve mucosa.[48] FESS requires careful attention for preservation of mucosa during surgery and post operative follow-up is required. Serious complications of ESS are rare but counselling should be done.[49,50]

POWERED INSTRUMENTS

Non powered instruments were holding an indomitable place in rhinological surgeries. But now with improvement in medical technology, powered instruments have started changing the trend and is becoming really popular when compared to forceps and curettes.

MICRODEBRIDER

Urban in 1969 patented the microdebrider. He called it the "Vacuum rotatory dissector" which was used for neuroma of 8th nerve removal in 1970's. Setliff and Parsons started using this equipment for nasal surgeries and with further innovations added to it the microdebriders evolved. The originally had shaver system with continuous suction with inner cannula, oscillating and rotating. The trapped tissue by suction is shredded off by the rotating blade. Size of the tissue is proportional in inverse to rotating speed of the blades. Side portal performs continuous irrigation which prevents the tissue bites from blocking the suction.

Figure 4.Microdebrider equipment with the main unit,foot control and hand piece

Figure 5.Microdebrider equipment with the main unit

Debrider blades: Blades are disposable with various configurations having straight or serrated edges with the former being less traumatic, having more tissue sparing compared to the later. Guillotine or scissors can be used for cutting Apertures of the two cannulas run parallel to one another hence it shears off the entire bit of tissue in debrider blades with a guillotine cutting mechanism. Soft tissue resection can be performed 5000rpm and offers better efficiency of the soft tissue resection performed. Bony structures drilling as in endoscopic dacrocystorhinostomy, reduction of bony septal spur etc. higher speed using 15000rpm can be used. Drilling bony structures using a microdebrider is long compared to mastoid micro drills as speed is very low. To suit the various angulations of resection inside the nasal cavity pre bent blades at different angles have been innovated.

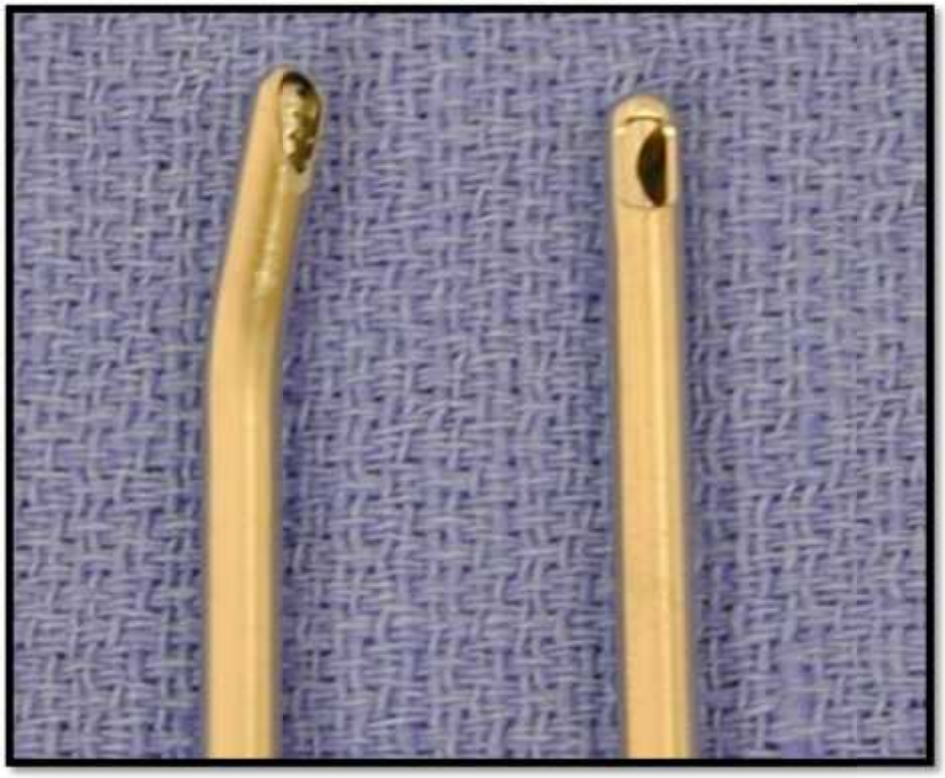


Fig 6: Two basic microdebrider blades

Special microdebrider blades

Tonsillectomy blades: Extracapsular tonsillectomy can be performed using this. They function as guillotine with blades that are wide having low angles and size of 4mm in diameter.

Adenoidectomy blades: Curvature of these blades mimic the nose and so used for nasal cavities by introducing them.

Turbinectomy blades: Used in performing inferior turbinectomy, they prevent mucosal damage when dissecting vascular tissue and hence minimize the complication of inferior turbinate osteitis. They measure 2-2.8mm in diameter.

Role of Debriders in operating field clearance:

The modern debriders are helpful in clearing the blood obstructing the visibility of the operating field. They help in this process via cauterization of blood via bipolar cautery attached at the ends with insulation covering the electrodes. Three power settings can be used to cauterize the bleeding ranging from 0 to 40 watts. The main drawback is, the zone of bipolar cautery is too small.

Microdebrider drills:

Drill helps in drilling ethmoidal bones even though Microdebrider is not suited for small bones. Endoscopic dacrocystorhinostomy procedures uses these. Diamond drill bites are better than normal burrs, speed is usually determined by the groove numbers present. The number of grooves is proportionate inverse to the speed of drilling. The only drawback is poor control

Limitations of microdebriders*:*

1. Slow rotation rates compared to microdrills.

2. Less tactile feedback when compared to conventional instruments.

3. Learning skill required to use in confined space to avoid damage to surrounding vital structures.

4. Increased cost during initial set up and procurement of blades.[51-54]According to a study conducted by BindiaGhera et al, microdebriders are effective than conventional technique due to less bleeding(relatively bloodless) and less surgical time, better postoperative scores.[4]

According to a study conducted by BindiaGhera et al, microdebriders are effective than conventional technique due to less bleeding(relatively bloodless) and less surgical time, better postoperative scores.[4]

In a study conducted by Krouse et al, microdebrider demonstrated faster healing, decreased bleeding and ostialreocclusion when compared to standard techniques.[54]

In a RCT, comparing microdebrider with conventional instruments comprising of 24 patients, no significant advantage was noted with microdebrider compared to conventional instruments.[55]

Singh R et al in their study found no statistically significance in surgical outcome for patients when microdebrider was compared with conventional instruments but symptomatically improved in patients for whom microdebrider was used.[56]

Mohankarthikeyenet all in his study concluded that microdebrider offers profound advantage over the use of standard techniques with regards to decreased bleeding, safety and improved result.[57]

According to a study conducted by Joseph et al, there was rapid mucosal healing, and decreased scarring after microdebrider surgery.[58]

Nishanth Kumar and Raj Sindwaniin 2012 did a restrospective study on 80 patients of CRS with polyposis and found that use of bipolar microdebrider reduces bleeding and procedure time during nasal polyp surgery.[59]

Shama et al in their study found that the use of microdebrider compared to conventional instruments in ESS helped in total disease clearance, smoother operative procedure and good healing postoperatively in nasal polyps.[60]

MATERIALS AND METHODS

The study was carried out among patients with symptoms suggestive of sinonasal diseases willing to undergo microdebrider assisted surgery in ENT & HNS department, KAHER Belgaum, for a period of 1year

Study Design : Observational study

Study Period: 1year [January 2019- December 2019]

Sample Size: All patients undergoing microdebrider surgeries were included based on inclusion and exclusion criteria.

n= 40

Ethical Clearance– Obtained

SELECTION CRITERIA

Inclusion Criteria:

1. Patients who did not respond to conservative treatment and willing to undergo CT scan for evaluation and undergo surgical treatment
2. Clinically and radiologically suggested sinonasal diseases.

Exclusion criteria:

1. Patients with history of previous nasal surgery or sinus surgery.
2. Patients diagnosed or suspected of diseases like cystic fibrosis, primary ciliary dyskinesia, ciliary motility disorders, immunodeficiency.

Methodology:

- Established cases of sinonasal diseases such as chronic rhinosinusitis, antrochoanal polyp, ethmoidal polyposis with or without sinusitis, turbinate resection surgeries, other benign conditions like inverted papilloma, mucocele of paranasal sinuses etc, who had failed medical therapy with antibiotics, antihistaminics, saline nasal drops, topical and oral steroids as indicated will be included in the study
- A subjective evaluation of their symptoms will be done using the Lund and Mackay symptom staging system score by visual analogue scoring method with values 0-10
- Along with anterior rhinoscopy, endoscopic evaluation will be performed. Findings will be noted according to recommendation given by "Lund and Kennady"
- Visual analogue scoring (VAS) and endoscopic scoring will be assessed and compared preoperatively and postoperatively after 6weeks
- Postoperatively patient will be followed up at 1 week,6weeks

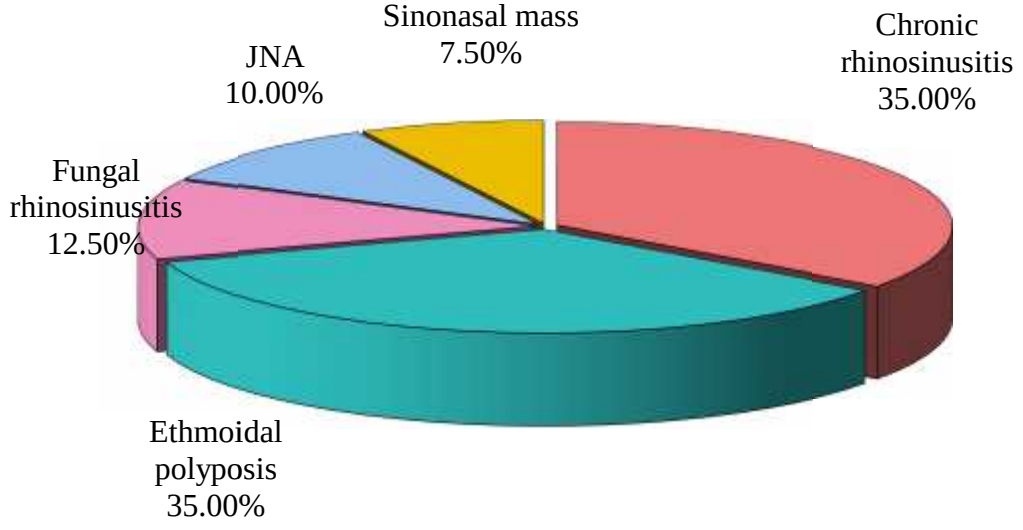
RESULTS

Total 40 patients were evaluated. Table 5 and graph 1 shows the distribution patternof the sinonasal diseases.Out of 40 patients analysed in our study majority of patients were diagnosed with Chronic Rhinosinusitis and Ethmoidal Polyposis with each group contributing 35 percent each respectively. The rest 30 percent patients had the diagnosis of Fungal Rhinosinusitis, JNA and Sinonasal mass attributing 12.5%, 10% and 7.5% respectively.

Table 5. Distribution pattern of sinonasal diseases

Diagnosis	No of patients	% of patients
Chronic rhinosinusitis	14	35.00
Ethmoidal polyposis	14	35.00
Fungal rhinosinusitis	5	12.50
JNA	4	10.00
Sinonasal mass	3	7.50
Total	40	100.00

Graph 1: Diagnosis wise distribution of patients



GENDER WISE DISTRIBUTION OF PATIENTS

Table 6 and graph 2 showspatients distribution according to gender. As shown in the table the male to female in our study was 1.2:1 showing a male preponderance of sinonasaldisease

Table 6: Gender wise distribution of patients

Gender	No of patients	% of patients
Male	22	55.00
Female	18	45.00
Total	40	100.00

Graph 2: Gender wise distribution of patients

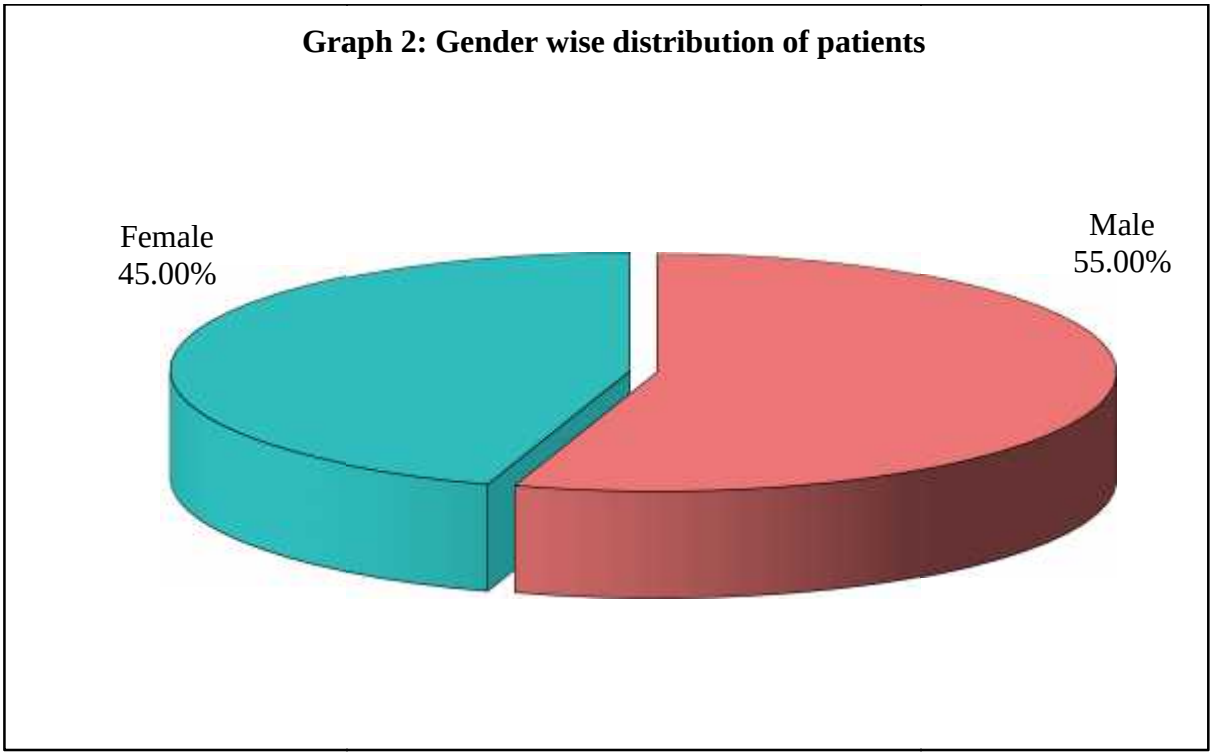
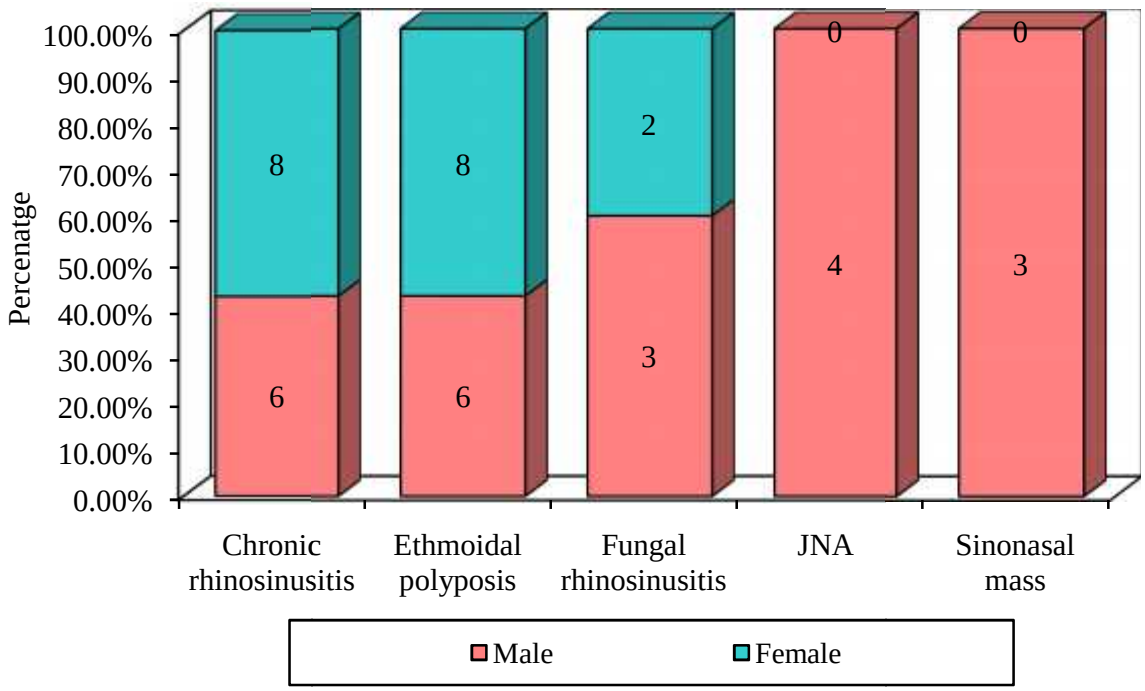


Table 7: Comparison of five diagnosis by gender

Diagnosis	Male	%	Female	%	Total	%
Chronic rhinosinusitis	6	42.86	8	57.14	14	35.00
Ethmoidal polyposis	6	42.86	8	57.14	14	35.00
Fungal rhinosinusitis	3	60.00	2	40.00	5	12.50
JNA	4	100.00	0	0.00	4	10.00
Sinonasal mass	3	100.00	0	0.00	3	7.50
Total	22	55.00	18	45.00	40	100.00

Graph 3:Comparison of five diagnosis by gender



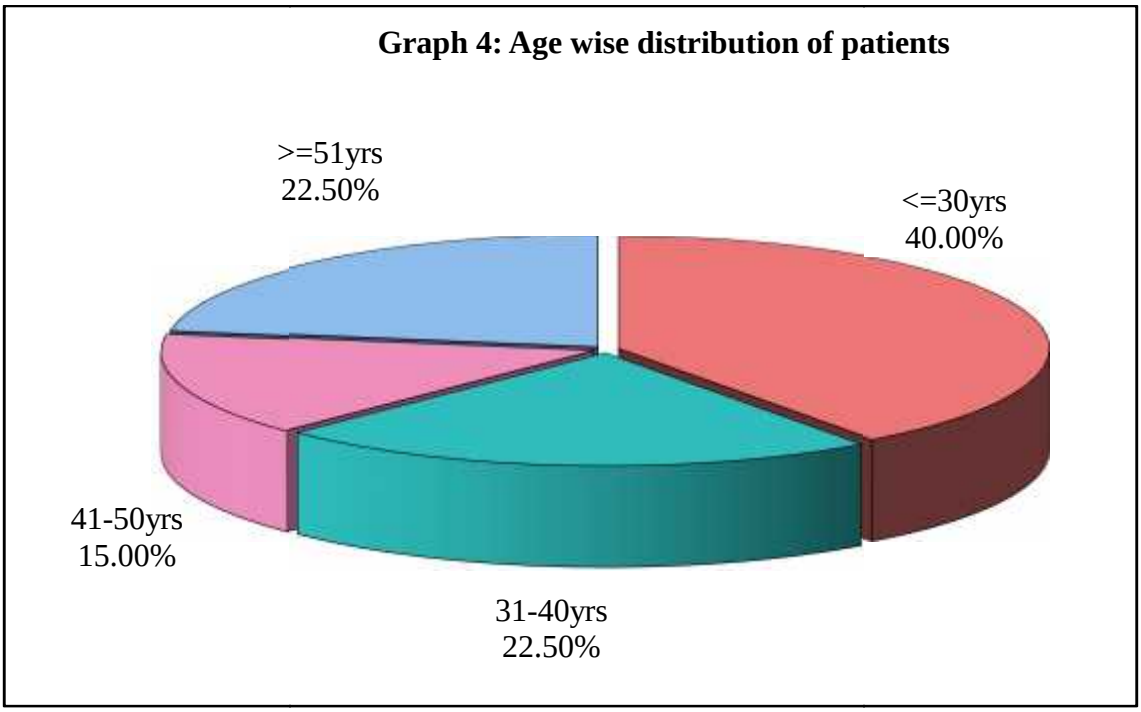
Out of 40 patients, 55 percent of the disease population were males compared to 45 percent who were females. Gender wise distribution was done among the different sinonasal diseases and it was noted. In chronic rhinosinusitis group out of 14 patients, 8 were female and 6 were male contributing 57.1 percent and 42.8 percent respectively to the disease population. In Ethmoidal polyposis group out of 14 patients, 6 were male and 8 were female contributing 42.8 percent and 57.1 percent respectively to the disease population. In Fungal Rhinosinusitis group out of 5 patients, 3 were male and 2 were female contributing 60 percent and 40 percent respectively to the disease population. In JNA group out 4 patients, all were male contributing 100 percent to the disease population. In Sinonasal mass group out of 3 patients, all were male contributing 100 percent to the disease population. (Table 7)

AGE DISTRIBUTION OF PATIENTS

Table 8 : Patient distribution according to age

Age groups	No of patients	% of patients
<=30yrs	16	40.00
31-40yrs	9	22.50
41-50yrs	6	15.00
>=51yrs	9	22.50
Total	40	100.00
Mean age	37.45	
SD age	14.65	

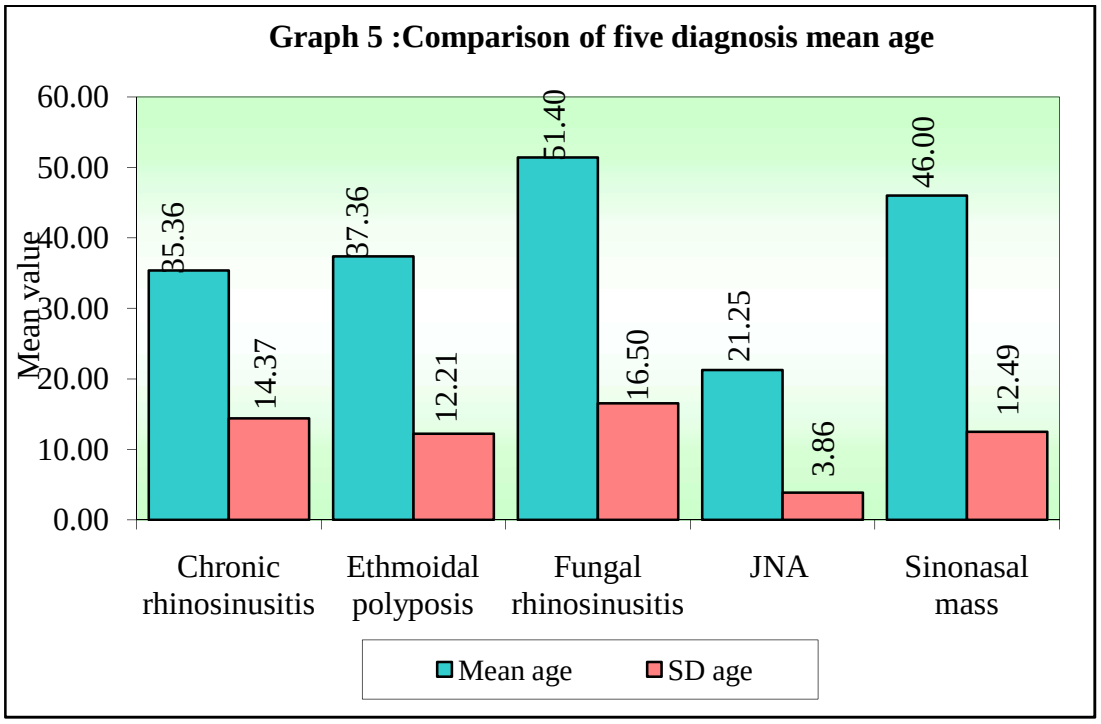
Graph 4: Age wise distribution of patients



According to Table 8 and Graph 4 out of 40 patients enrolled in our study 16 patients (40%) belong to age group of below 30 years when compared to 9 patients (22.5 %) belonging to 3rd decade, 6 patients (15 %) belonging to 4th decade, 9 patients (22.5%) belonging to 5th decade respectively.

Table 9: Comparison of five diagnosis mean age by one way ANOVA

Diagnosis	Mean age	SD age
Chronic rhinosinusitis	35.36	14.37
Ethmoidal polyposis	37.36	12.21
Fungal rhinosinusitis	51.40	16.50
JNA	21.25	3.86
Sinonasal mass	46.00	12.49
Total	37.45	14.65
F-value	3.3225	
p-value	0.0208*	

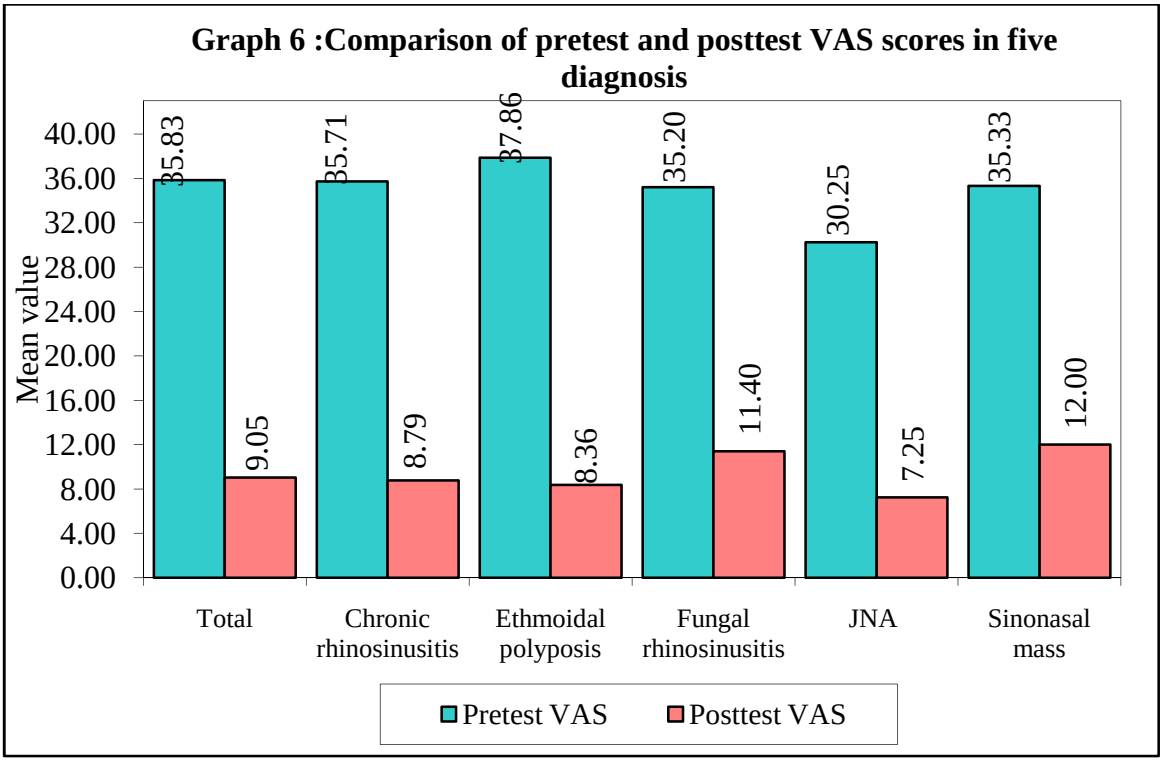


On analyzing the distribution of age of sinonasal disease, we found out that mean age of sinonasal disease was 37 years with JNA in the younger age mainly among second decade with 21 years as mean age. Fungal rhinosinusitis and sinonasal mass were seen in patients with mean age being 51 years and 46 years respectively. CRS and EP groups mainly had patients belonging to their 3rd decade. (Table 9 and Graph 5)

VISUAL ANALOGUE SCORE (VAS)

Table 10: Comparison of pre test and post test VAS scores in five diagnosis by Wilcoxon matched pairs test

Samples	Time	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Z-value	p-value
Total	Pretest	35.83	5.36					
	Posttest	9.05	2.40	26.78	5.04	74.74	5.5109	0.0001*
Chronic rhinosinusitis	Pretest	35.71	6.09					
	Posttest	8.79	2.52	26.93	5.06	75.40	3.2958	0.0010*
Ethmoidal polyposis	Pretest	37.86	4.54					
	Posttest	8.36	1.98	29.50	4.16	77.92	3.2958	0.0010*
Fungal rhinosinusitis	Pretest	35.20	2.28					
	Posttest	11.40	1.14	23.80	3.27	67.61	2.0226	0.0431*
JNA	Pretest	30.25	6.55					
	Posttest	7.25	1.26	23.00	6.68	76.03	1.8257	0.0679
Sinonasal mass	Pretest	35.33	4.16					
	Posttest	12.00	1.73	23.33	2.52	66.04	1.6036	0.1088



In our study we noted that microdebrider assisted FESS showed significant improvement in VAS scores in patients in CRS group, EP group, FRS group with a P value of 0.01, 0.01 and 0.04 respectively. No significant statistical improvement ($p>0.05$) with respect in JNA and Sinonasal mass group (Table 10 and Graph 6)

Table 11: Pair wise comparisons of five diagnosis with pretest and posttest VAS scores by Mann-Whitney U test

Diagnosis	Pretest VAS	Posttest VAS	Difference
Chronic rhinosinusitisvsEthmoidal polyposis	p=0.3121	p=0.6459	p=0.2413
Chronic rhinosinusitisvs Fungal rhinosinusitis	p=0.8896	p=0.0206*	p=0.2472
Chronic rhinosinusitisvs JNA	p=0.0893	p=0.1112	p=0.2025
Chronic rhinosinusitisvsSinonasal mass	p=0.8501	p=0.0376*	p=0.3135
Ethmoidal polyposis vs Fungal rhinosinusitis	p=0.1155	p=0.0047*	p=0.0095*
Ethmoidal polyposis vs JNA	p=0.0631	p=0.2025	p=0.0998
Ethmoidal polyposis vsSinonasal mass	p=0.3447	p=0.0117*	p=0.0275*
Fungal rhinosinusitisvs JNA	p=0.2207	p=0.0143*	p=0.3272
Fungal rhinosinusitisvsSinonasal mass	p=0.7656	p=0.6547	p=0.8815
JNA vsSinonasal mass	p=0.2159	p=0.0339*	p=0.2889

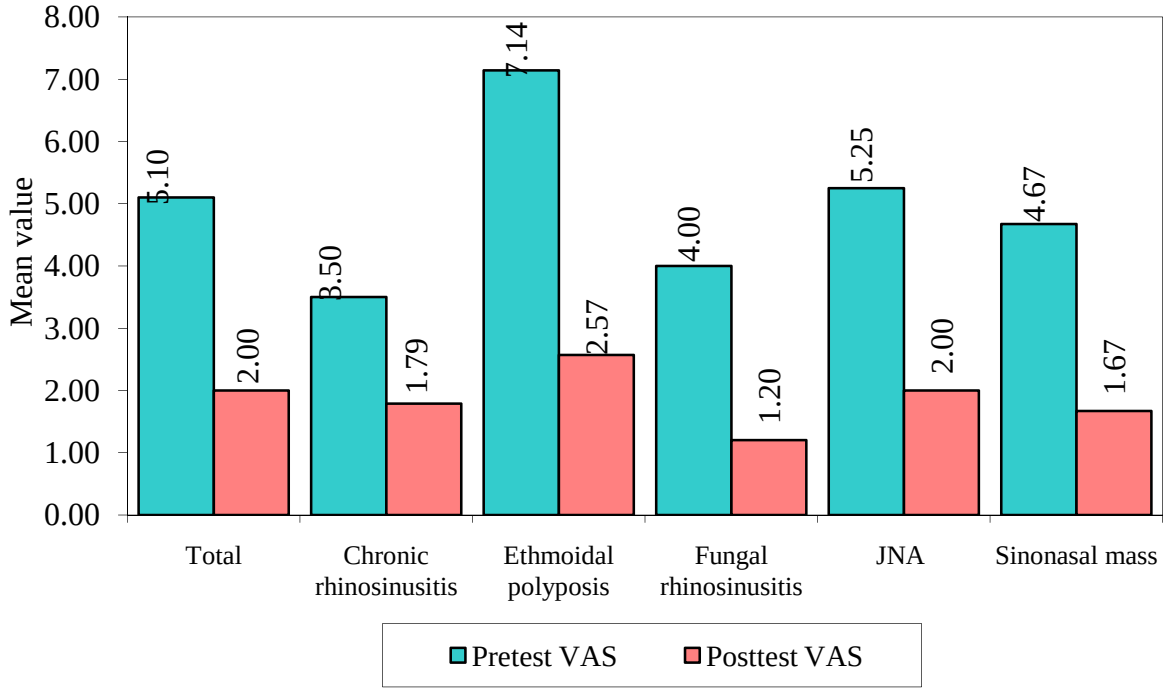
As per analysis (Table 11) it was noted that microdebrider treatment had statistical improvement (P = 0.009) in VAS scores in treatment of EP when compared to FRS. There was also significant improvement (p=0.02) in VAS scores in EP treatment when compared to SNM. Comparison in patients who underwent microdebrider treatment for sinonasal diseases did not show significant difference among any other disease per se treated.

LUND -KENNEDY ENDOSCOPIC SCORES

Table 12: Comparison of pretest and posttest LUND -KENNEDY scores in five diagnosis by Wilcoxon matched pairs test

Samples	Time	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Z-value	p-value
Total	Pretest	5.10	2.17					
	Posttest	2.00	0.82	3.10	1.69	60.78	5.4424	0.0001*
Chronic rhinosinusitis	Pretest	3.50	1.56					
	Posttest	1.79	0.80	1.71	1.20	48.98	3.1798	0.0015*
Ethmoidal polyposis	Pretest	7.14	1.61					
	Posttest	2.57	0.65	4.57	1.40	64.00	3.2858	0.0010*
Fungal rhinosinusitis	Pretest	4.00	1.73					
	Posttest	1.20	0.45	2.80	1.30	70.00	2.0224	0.0431*
JNA	Pretest	5.25	0.96					
	Posttest	2.00	0.00	3.25	0.96	61.90	1.8250	0.0679
Sinonasal mass	Pretest	4.67	1.15					
	Posttest	1.67	1.15	3.00	--	64.29	1.6035	0.1088

Graph 7 :Comparison of pretest and posttest LUND -KENNEDY scores in five diagnosis



In our study we noted Microdebrider treatment showed significant improvement in LUND scores in patients in CRS group, EP group, FRS group with a P value of 0.01, 0.01 and 0.04 respectively. No significant statistical improvement ($p>0.05$) with respect in JNA and Sinonasal mass group(Table 12 and Graph 7)

Table 13: Pair wise comparisons of five diagnosis with pretest and posttest LUND -KENNEDY scores by Mann-Whitney U test

Diagnosis	Pretest LUND - KENNEDY	Posttest LUND - KENNEDY	Difference
Chronic rhinosinusitisvsEthmoidal polyposis	p=0.0001*	p=0.0203*	p=0.0001*
Chronic rhinosinusitisvs Fungal rhinosinusitis	p=0.5786	p=0.1795	p=0.0710
Chronic rhinosinusitisvs JNA	p=0.0495*	p=0.5240	p=0.0337*
Chronic rhinosinusitisvsSinonasal mass	p=0.1859	p=0.7528	p=0.0376*
Ethmoidal polyposis vs Fungal rhinosinusitis	p=0.0109*	p=0.0035*	p=0.0332*
Ethmoidal polyposis vs JNA	p=0.0295*	p=0.1371	p=0.0998
Ethmoidal polyposis vsSinonasal mass	p=0.0322*	p=0.1658	p=0.0588
Fungal rhinosinusitisvs JNA	p=0.1779	p=0.0500*	p=0.4624
Fungal rhinosinusitisvsSinonasal mass	p=0.2967	p=0.6547	p=0.3711
JNA vsSinonasal mass	p=0.4795	p=0.4795	p=0.5959

In Table 13 microdebrider treatment shows statistical improvement (P = 0.03) in LUND scores in treatment of EP when compared to FRS. There was also significant improvement ($p<0.05$) in LUND scores of CRS treatment when compared to EP, JN and SNM. Comparison in patients who underwent microdebrider treatment for Sinonasal diseases did not show significant difference among any other disease per se treated.

DISCUSSION

The sinonasal pathology is a wide variety of pathology which includes inflammatory and infective conditions such as chronic rhinosinusitis, antrochoanal polyp, ethmoidal polyposis with or without sinusitis, benign conditions like inverted papilloma, juvenile nasopharyngeal angiofibroma, mucocele of paranasal sinuses etc.[1]

Surgery for sinonasal disease is effective after failed medical therapy. Better absorption of medications and re-establishment of natural pathway of drainage remains to be the main aim of surgery.[5]

Microdebrider is a modern multipurpose instrument which is electrically driven with a shaver and a suction. With the suction, tissue is sucked on one side and as the blade rotates the tissue which is shredded between the cannulas.[7]

This study was done in ENT and HNS department, J.N.M.C and KAHER from January 2019 to December 2019. The objective was to find clinical outcome in patients with sinonasal disease after microdebrider assisted surgery.

The discussion was done under the following headings

1. **Sex ratio**

In our study out of 40 patients of the total sinonasal disease observed, 55% were male and 45% were female patients. On further subdividing the sinonasal disease following observation were made.

Among 14 patients who had chronic rhinosinusitis, 8 were female and 6 were males contributing 57.1 percent and 42.8 percent respectively. A study conducted by Mohammed Ali Homood (2017)[61] showed M:F of 2.4 : 1 while in another study

conducted by Netkovski J et al(2006)[62] had 46 female patients and 34 male patients showing female preponderance. Several studies on gender distribution on CRS patients showed several variations with few showing male preponderance and some female.

On analyzing 14 patients who had polyposis ,8 were female and 6 were males give more female preponderance in our study. According to a study conducted by Bettega et al(2007) [63] men are affected more with polyps (41.66%).

Out of 5 patients who had fungal sinusitis 3 were male and 2 were female. In JNA group out of 4 patients, all were male. In Sinonasal mass group out of 3 patients, all were male

2.Age distribution

The mean age group among the sinonasal group was observed to be 37.45 years with youngest being 13 years and oldest being 60 years.

On analysis of each subgroup of diseases following observations were made.

In the CRS group the mean age of presentation was 35.36 years. In a study conducted by Shivakumar K L et al(2015)[64] and Lt Col S Nair et al(2010)[65] the mean age was found to be 37.4 and 33.5 years. Study done by Ajay Kamble et al(2017)[66] showed a mean age of 33.44 years while another study done by S.H.Talib et al(2002)[67] showed a mean age of 32.78 years. So from above studies it can be found the CRS most commonly occurs in third decade consistent with our study.

When analyzing the polyposis group the mean age was observed to be 37.36 years. According to study by Bettega S et al (2007) [63] polyps are more common in elderly over age group of 50 and less commonly affects children and young people.

In the Fungal rhinosinusitis group the mean age was around 51.40 years and in sinonasal mass the mean age was around 46.00 years

Among the JNA group more predominance was seen in the younger age mainly all cases in the 2nd decade with mean age of 21 years consistent with the typical presentation in adolescence male.

3. VAS comparison pre-operative and post-operative

A mean total pretest VAS score of 35.83 was noted preoperatively among all the sinonasal disease which improved to 9.05 post operatively with a significant p value. On individual analysis significant improvement in VAS scores in patients in CRS group, EP group, FRS group with a P value of 0.01, 0.01 and 0.04 respectively were noted. No improvement ($p>0.05$) with respect in JNA and Sinonasal mass group was noted.

Further inter group comparison was made where in improvement was noted ($P = 0.009$) in VAS scores in treatment of EP when compared to FRS. There was also significant improvement ($p=0.02$) in VAS scores in EP when compared to SNM. Comparison in patients who underwent microdebrider treatment for Sinonasal diseases did not show significant difference among any other disease per se treated.

In a study conducted by Shama et al (2019)[60]significant VAS score improvement was noted post operatively in powered instrument comparatively to regular instruments in treating sinonasal polyposis.

Ceylan et al (2007) [68] in their study ,the pre and postoperative scores on health related quality of life using microdebrider in treating polyps were compared by paired-t test, both groups showed statistically significant difference ($p<0.05$).

4. Pre and postoperative comparison of Lund kennedy score

A mean total pretest Lund kennedy endoscopic score of 5.10 was noted preoperatively among all the sinonasal disease which improved to 2.0 post operatively with a significant p value. As per analysis between the sinonasal disease it was noted that microdebrider treatment had better improvement (P = 0.03) in LUND scores in treatment of EP when compared to FRS. There was also significant improvement ($p<0.05$) in LUND scores in treating CRS when compared to EP, JN and SNM. Comparison in patients who underwent microdebrider treatment for sinonasal diseases did not show significant difference among any other disease per se treated.

In post operative outcome considerations were taken in terms of crusting and synechia formation.

One of the most important complications following surgery is formation of synechiae with 6 to 27% chances. During the healing mucosa which is denuded come in contact and synechiae is formed. Synechiae is formed due to trauma by the backbiter and/or by stripping of the mucosa. A microdebrider offers minimal tissue trauma and preserve normal mucosa thereby avoiding execessive scarring. Stankiewicz(1987) reported 6.7% of 90 patients having synechiae.[69,70]

Good results were obtained by most of the authors after using microdebrider for treating polyps.Setliff and Parsons (1994)[71]first to reported that precise removal of polyp and mucosa which was diseased was done by the soft tissue shaver in ESS. It was reported, in their series of 345 patients less blood loss, fast healing time, and decreased synechiae formation and trauma to MT.

Bernstein et al (1998) [72] in their study conducted on 40 patients of ESS with microdebrider concluded rapid healing of mucosal, less crusting, and minimal synechiae.

Krouse and Christmas (1996) [54] in a comparative study on powered instruments in ESS found nil synechiae in the powered instrument group, whereas four cases in the conventional group.

Saafan et al (2012) [73] noted that there was a tendency for improvement in the number of endoscopic debridement and time to mucosalization in powered group when compared to conventional instruments group, but this did not reach statistical significance. The incidence of postoperative synechiae was significantly lower in powered endoscopic group.

Selivanova et al (2003) [55] concluded no statistical improvement in outcome for patients when using either conventional instruments or mechanical debriders.

Sauer et al (2007) [74]noted that in both microdebrider and conventional methods there was improvement in symptoms and visibilehealing ,but were not significantly different. In this study of ESS , the microdebrider did not offer major advantages compared to the standard.

The safety of microdebrider use raises concern because of the proximity to skull base and orbit. Bhatti et al (2001) [75] have observed ocular injury in two cases because of strong suction pressure orbital fat /extra ocular muscles might be pulled through small defect in papyrecea.

Ecevit et al (2008) [76]reported a cerebrospinal fistula as one of the complications. The complication rates were found to be 11.8%(minor) and 0.5% (major).

The suction-irrigation drill, bone-cutting ultrasonic aspirator and coblator are the present innovations in powered instrumentation. Main drawback remains to be the higher cost but its ability to accomplish multiple functions remains to be the major advantage.[77]

A variety of specialty blades are also available each having its own operative limitation.[7]

Complication rates can be lowered when there is proper knowledge about the endoscopic anatomy, a better surgical experience and a bloodless operative field.[76]

CONCLUSION

- 40 patients of sinonasal disease has been studied. Out of which 14 patients (35%) had Chronic Rhinosinusitis, 14 patients (35%) had Ethmoidal Polyposis, 5 patients(12.5%) had Fungal Rhinosinusitis, 4 patients (10%) had JNA, and 3 patients(7.5%) had Sinonasal mass.
- The mean age of 37 years was noted in patients suffering from sinonasaldisease.
- A varied gender distribution with female preponderance was noted in chronic rhinosinusitis and ethmoidal polyposis group while male preponderance was noted in fungal rhinosinusitis, JNA and sinonasal mass group.
- Significant improvement was seen in the visual analogue scoring after surgery. There was evidence of a statistical significance(p=0.0001) in VAS postoperatively after using microdebrider.
- Using Lund kennedy endoscopic scoring system, a statistically significant improvement(p=0.0001)was noted postoperatively
- Among the sinonasal disease in our study, the nasal polyp group showed a significant improvement postoperatively in terms of both visual analogue scoring and lundkennedy endoscopic scoring.
- Since the number of cases insinonasal mass and JNA group were less, for further scope of this study, use of microdebrider in these disease should be done more in further studies.
- The use of microdebrider in endoscopic sinus surgery has the advantage of complete clearance of disease, smoother intra operative course and better post operative healing.

SUMMARY

The study was done in the Department of ENT and HNS, Jawaharlal Nehru Medical College and KAHER from January 2019 to December 2019. The objective was to assess the clinical outcome in patients with sinonasal disease after microdebrider assisted surgery.

We studied 40 cases of sinonasal disease and evaluated the surgical outcome using visual analogue scoring and lundkennedy endoscopic scoring pre operatively and post operatively after 6 weeks. The age group of patients with sinonasal disease included were between 16-60 years of age with mean age of 37 years. All the patients were subjected to microdebrider assisted FESS.

All patients showed significant statistical improvement in lundmackay scoring system by visual analogue scores postoperatively. Patients in ethmoidal polyposis group showed better improvement when compared to other diseases taken into consideration.

Also improvement was noted in the lundkennedy endoscopic scoring postoperatively. Patients in chronic rhinosinusitis and ethmoidal group both showed significant improvement postoperatively.

The use of microdebrider in endoscopic sinus surgery has the advantage of complete clearance of disease, smoother intra operative course and better post operative healing.

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ANNEXURE I

INFORMED CONSENT

Title: Clinical Outcome In Patients With Sinonasal Disease After Microdebrider Assisted Endoscopic Sinus Surgery. A One Year Observational Study InKLE s Dr. PrabhakarKore Hospital, Belagavi

Investigator:DR. _____. (M.S. E.N.T), JNMC, Belgaum

Under The Guidance Of:DR_____, M.S.ENT, PhD, Professor and HOD, Dept. of ENT & HNS

Objective:A study**:** Clinical Outcome In Patients With Sinonasal Disease AfterMicrodebrider Assisted Endoscopic Sinus Surgery. A One Year Observational Study In Kles Dr. PrabhakarKore Hospital, BelagaviAt Dr. PrabhakarKore Charitable Hospital And Medical Research Centre, Belgaum Is Being Conducted By Dr. _____, Post Graduate In E N T And Head & Neck Surgery At J.N. Medical College Belgaum, Karnataka, Under The Guidance Of Dr. _____Professor And Hod, Dept. Of Ent And Head & Neck Surgery, J. N. Medical College, Belgaum, Under Kle University, Belgaum.

We request you to participate in this study as you are eligible to be included. During the study you will be asked questions regarding your present and past medical history and you will be required to answer to the best of your knowledge.

Your participation in this study is voluntary. Your decision whether or not to participate in the study will not affect your relationship with J.N.M.C. Even if you decide to participate, you are free to withdraw at any point of time.

Purpose of study: The aim of the study is to find out the clinical outcome in patients with sinonasal disease after microdebrider assisted surgery by using visual analogue scoring and endoscopic scoring preoperatively and postoperatively after 6weeks. This will help to evaluate the success of microdebrider assisted endoscopic sinus surgery for sinonasal disease

Explanation Of Procedure-

Procedure involved: If you agree to participate in this study, the relevant data will be collected as per the proforma and the final diagnosis will be confirmed.

After getting inducted in the study, you will be evaluated with a symptom score that would be calculated using a standard staging system following which he/she will be subjected to a diagnostic nasal endoscopy using a 0 degree nasal endoscope under local anesthesia .Routine blood investigations and C T scan prior to surgery will be done. At the 6 weeks follow up subjective assessment of the patients symptoms using the same standard staging system and diagnostic nasal endoscopy would be repeated.

Benefits: Patient will not be eligible for any kind of monetary benefits or free services by virtue of your participation in the study.

Risks: - Minimal discomfort during endoscopic examination

Withdrawal: Participation in this study is voluntary. If you don't wish to participate in this study; you will not lose benefits to which you are entitled. After starting the study, at any time during the study if you feel to withdraw from the study, you are free to do so.

Privacy and Confidentiality: Your identity will not be revealed. All Information will be collected and coded, so that no one will know your identity.

Cost of Participation: The cost of the treatment will be borne by the participant and not by the researcher. Diagnostic Nasal Endoscopy would be done at no extra cost as a part of the study.

Payment of Participation: No incentive will be paid to you for participating in this study.

Alternatives: In case you opt out of the study, it will not affect your relationship with K L E S Dr. PrabhakarKore Hospital.

Institutional /Sponsors Policy: In the event of any drug reaction or injury during endoscopy, related to this study, no reimbursement or compensation will be given by law. However, treatment will be made available at KLES Hospital & MRC, Belgaum. If you face any untoward event, you may contact – Dr. _____ at Department of E N T and Head & Neck surgery, KLE'S Hospital& MRC, Phone. No._____; Dr._____Professor and H O D at Department of E N T, Head & Neck Surgery, K L E S Hospital & M R C, Phone. No_____

Queries & Contact Details: If you have any questions about this study, you can contact Dr.Roopa M Bellad, Professor, Department of Paediatrics and Chairman, Jawaharlal Nehru Medical College Institutional Ethics Committee on human subjects' research on mobile no. 9448113403

Legal Rights: By signing this consent form, you are not waiving any of your legal rights.

Publication Rights: The result of this study will be used for teaching and medical publication; however the patient's identity will be kept confidential.

Consent Statement: "I volunteer and consent to participate in this study. I have read the content or it has been read to me in the language I can understand. This study has been fully explained to me and I may ask any questions at any time."

1. Participant's name :

   Signature/thumb print:

2. Investigator's name:

   Signature:

3. Witness's name:

   Signature:

4. Name of legally authorized representative:

   Signature:

Date:

Place:

Consent Statement to Participate In a Research Study

I, Mr./Mrs./Miss._____voluntarily agree to take part in this study, by signing this consent form I am not giving up my legal rights. I may withdraw at any time. I am signing after having read, or been read to me in the vernacular language including risks and the benefits and having all queries cleared.

Signature of the study patient_____

Name of Study patient_____

Name and Signature of Witness_____

Name and signature of investigator_____

DATE:_____ PLACE: _____

ASSENT STATEMENT TO PARTICIPATE IN A RESEARCH STUDY

I,Mr./Mrs.._____ Parent/Guardian of _____ voluntarily agree to let my child/ ward participate in this study, by signing this consent form I am not giving up my legal rights. I may withdraw my child at any time from the study. I am signing after having read, or been read to me in the vernacular language including risks and the benefits and having all queries cleared.

Signature of the parent/ guardian/legally authorized representative_____

Name of Study patient _____

Sign of the Patient:_____

Relationship with the patient_____

Name and Signature of Witness_____

Name and signature of investigator_____

DATE:_____ PLACE: _____

ANNEXURE – II - PROFORMA

S.No-

PROFORMA FOR DATA COLLECTION

NAME - **AGE -**

OP/IP NO - **MOBILE -**

ADDRESS - **CONSULTANT -**

DOA - **DOD -**

SURGERY - **DAY OF SURGERY -**

CHIEF COMPLAINTS

HISTORY OF PRESENTING ILLNESS

PAST HISTORY

FAMILY HISTORY

PERSONAL HISTORY

EXAMINATION

GENERAL EXAMINATION

Vital signs:

Blood Pressure

Pulse

Respiratory Rate

Pallor

Icterus

Clubbing

Cyanosis

Lymphadenopathy

Oedema

ENT EXAMINATION:-

NOSE:-ROOT

BRIDGE

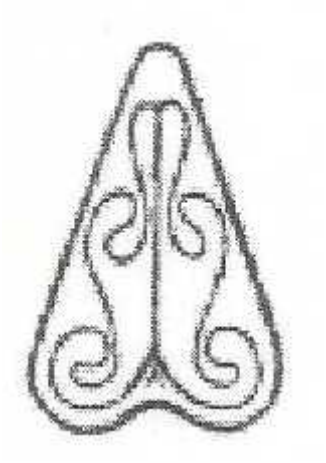
DORSUM

ALA

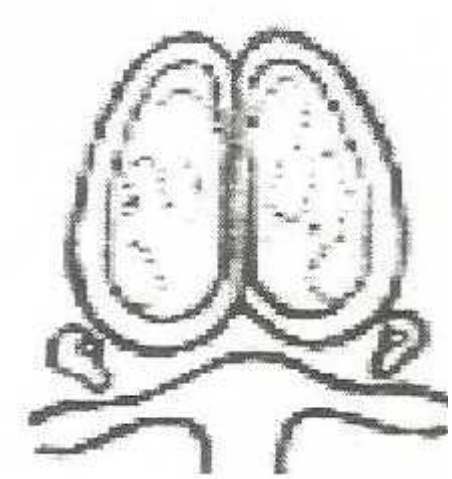
COLUMELLA

TIP

ANTERIOR RHINOSCOPY



COLD SPATULA TEST



POSTERIOR RHINOSCOPY

PNS TENDERNESSRIGHT LEFT

MAXILLARY

FRONTAL

ANT. ETHMOID

EAR EXAMINATION:

ORAL CAVITY AND OROPHARYNX:

4. NECK EXAMINATION

DIAGNOSIS:

ROUTINE TESTS:

CBC

SERUM UREA:

SERUM CREATININE:

HIV:

HBSAG:

BLEEDING TIME:

CLOTTING TIME:

THE LUND AND MACKAY STAGING SYSTEM: SYMPTOM SCORE

Symptom (score by visual analogue method) PreoperativePostoperative(6weeks)

1. Facial pain/pressure (1-10)
5. 2.Headache (1-10)
2. Nasal blockage/congestion (1-10)
3. Nasal discharge (1-10)
4. Olfactory disturbance (1-10)
5. Overall discomfort (1-10)
6. 7.Total points each visit

0=symptom not present

1-10=degree of symptom severity with 10 indicating greatest severity

Ref:Lund VJ, Mackay IS.Staging in Rhinosinusitis. Rhinology 1993;31:183-4

ENDOSCOPIC APPEARANCES (ADAPTED FROM LUND KENNEDY – VISUAL PATHOLOGICAL STATES WITHIN THE NOSE AND PARANASAL SINUSES)

Characteristic	Preoperative	Postoperative(6weeks)
Polyp, left		
Polyp, right		
Edema, left		
Edema, right		
Discharge, left		
Discharge, right		
Scarring, left*		
Scarring, right*		
Crusting, left*		
Crusting, right*		
Total points		

Scoring: For polyps: 0 = absence of polyps, 1 = polyps in middle meatus only, 2 = polyps beyond middle meatus. For edema, scarring, and crusting: 0 = absent, 1 = mild, 2 = severe. For discharge: 0 = no discharge, I = clear, thin discharge, 2 = thick, purulent discharge.

*Postoperative scores to be used for outcome assessment only

ANNEXURE - III- ETHICAL CLEARANCE CERTIFICATE

K.L.E. ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Deemed – to- be- University)
Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)
JAWAHARLAL NEHRU MEDICAL COLLEGE,
NEHRU NAGAR, BELAGAVI-590010 (KARNATAKA-INDIA)
Website: http//www.jnmc.edu
E-Mail : dome@jnmc.edu
Phone: (+ 91-(0)831 Office : 2472550
Principal: 2471701
Fax No. +91 (0)831 – 2470759

Ref: MDC/DOME/42 **Date: 24/11/2018**

To,

PG student in Otorhinolaryngology,
J.N.Medical College,
BELAGAVI.

Sub: Institutional Ethical Clearance for the study

With reference to the above, we wish to inform you that your proposed research project titled **"CLINICAL OUTCOME IN PATIENTS WITH SINONASAL DISEASE AFTER MICRODEBRIDER ASSISTED ENDOSCOPIC SINUS SURGERY. A ONE YEAR OBSERVATIONAL STUDY",** is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee on Human Subjects Research.

(Dr. Arathi Darshan)
Member Secretary
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

(Dr. Roopa M Bellad)
Chairman,
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

ANNEXURE – IV - PHOTOGRAPHS

PRE OPERATIVE IMAGES

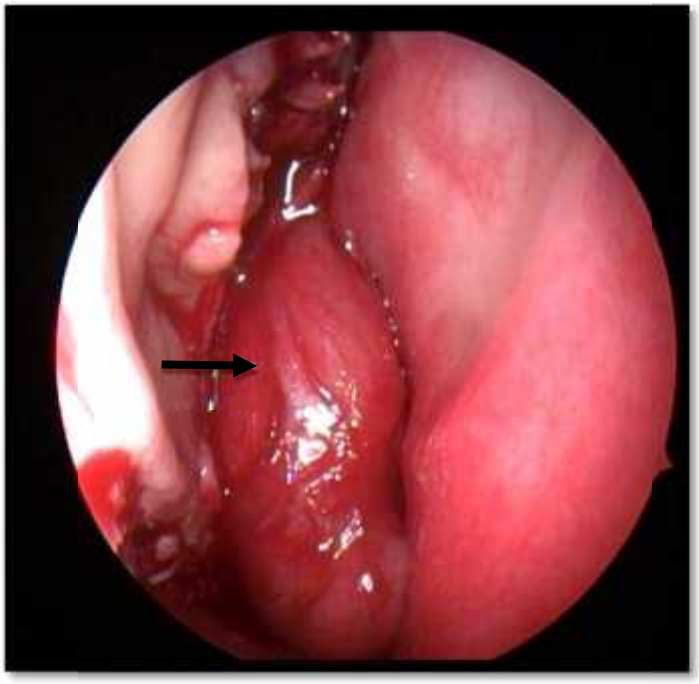


Image 1 : DNE image of right nasal cavity showing sinonasal mass (JNA)

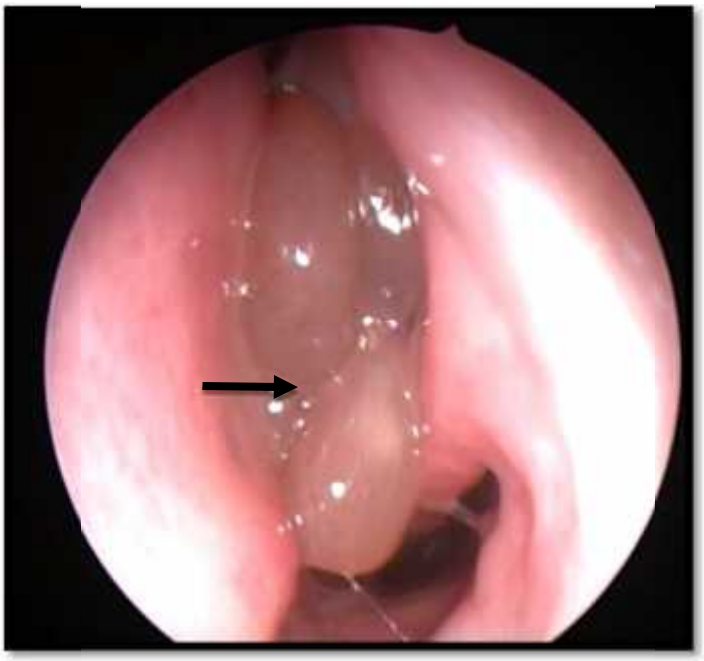


Image 2: DNE image of left nasal cavity showing multiple polyps in the middle meatus

PRE OPERATIVE IMAGES

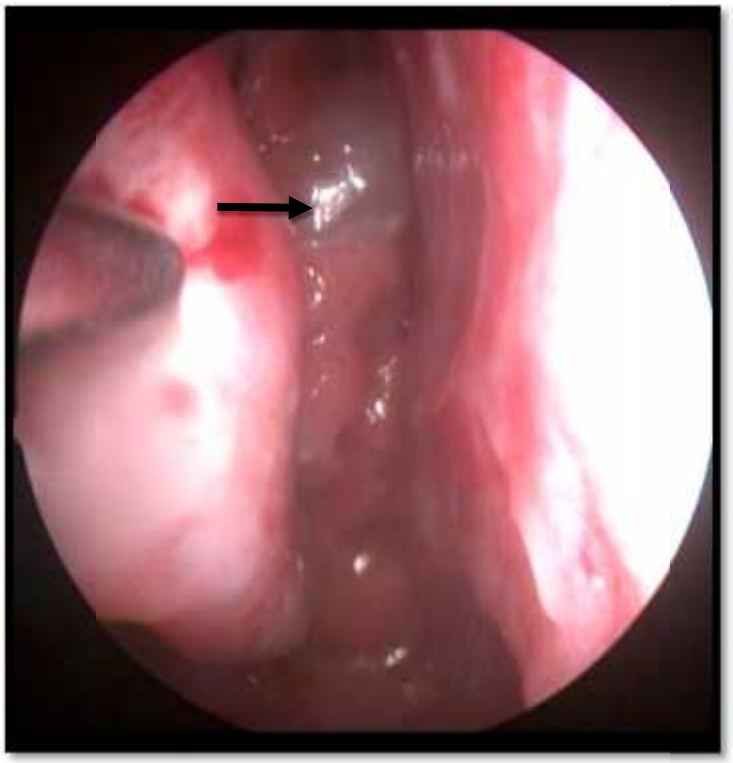


Image 3:DNE of right nasal cavity showing sinonasal mass (inverted papilloma) in the middle meatus region

PRE OPERATIVE CT SCAN

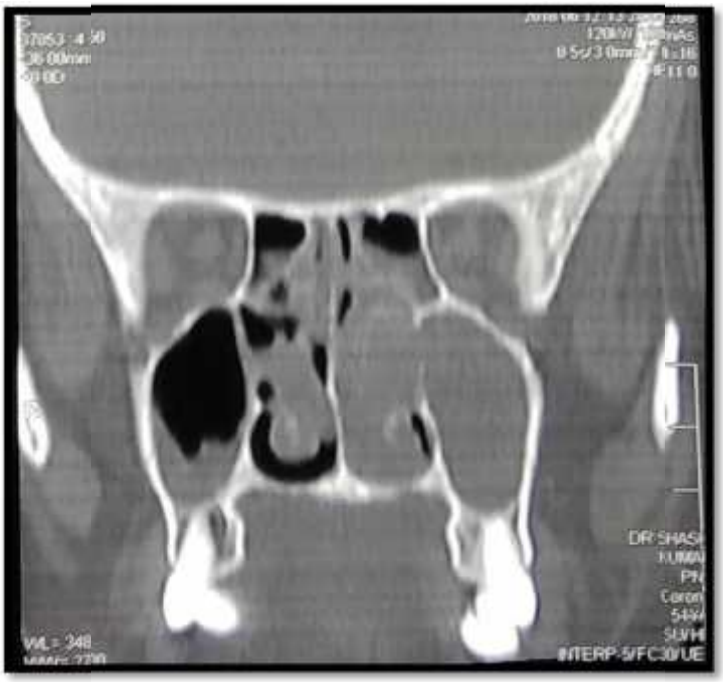


Image 4 : CT PNS coronal view showing homogenous opacity in left maxillary sinus and nasal cavity (polyp)

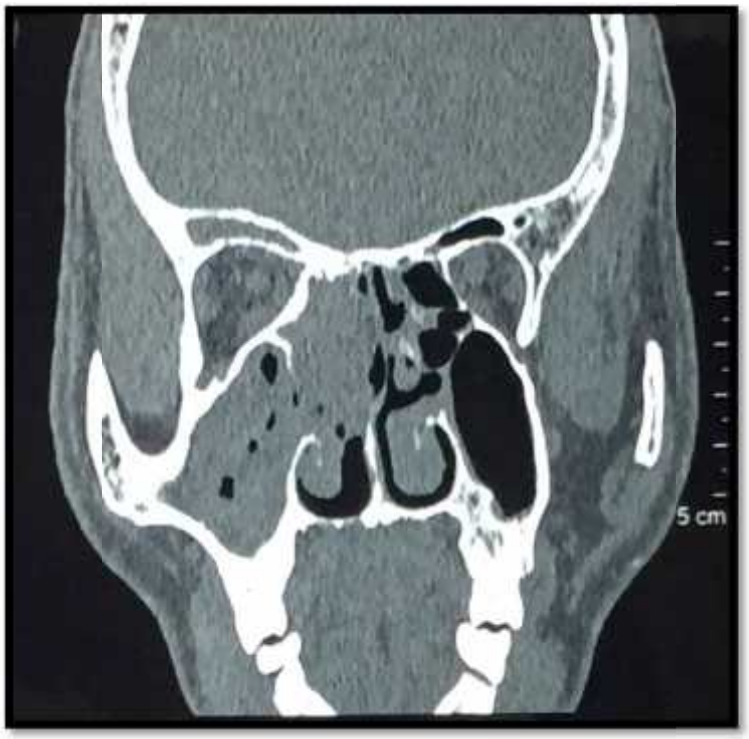


Image 5 : CT PNS coronal view showing homogenous opacity in right maxillary sinus and nasal cavity (mass)

INTRA OPERATIVE IMAGES

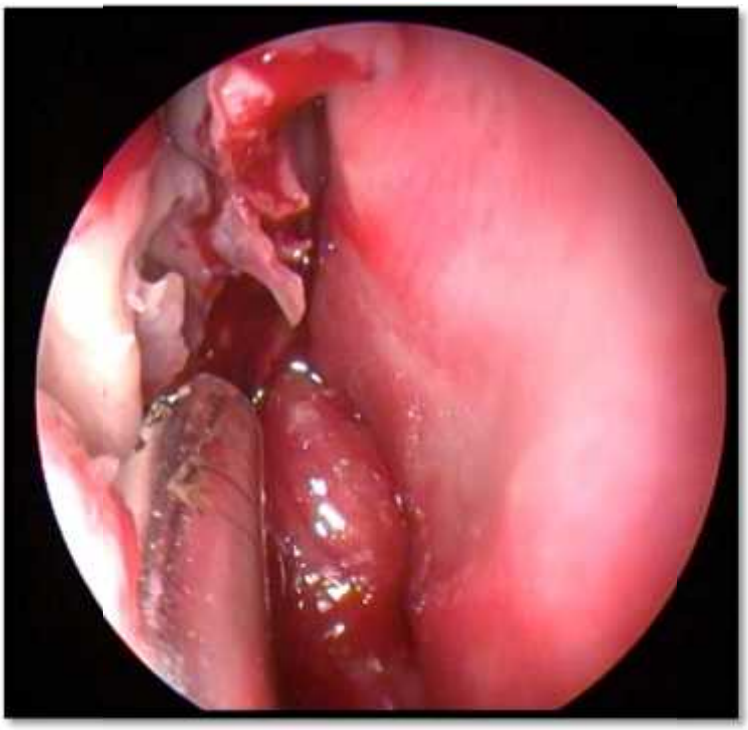


Image 6 : Intraoperative endoscopic image showing microdebrider assisted clearance of disease

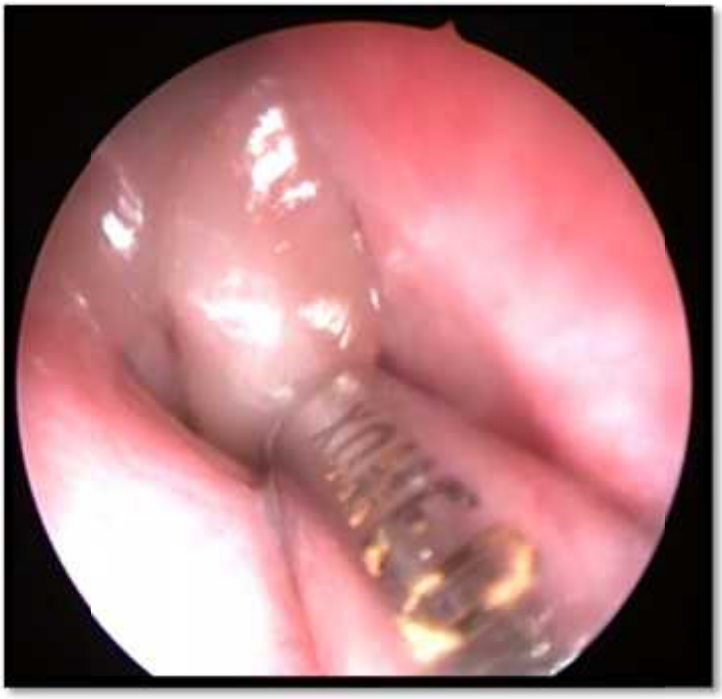


Image 7 : Intraoperative endoscopic image showing microdebrider assisted polypectomy

INTRA OPERATIVE IMAGES

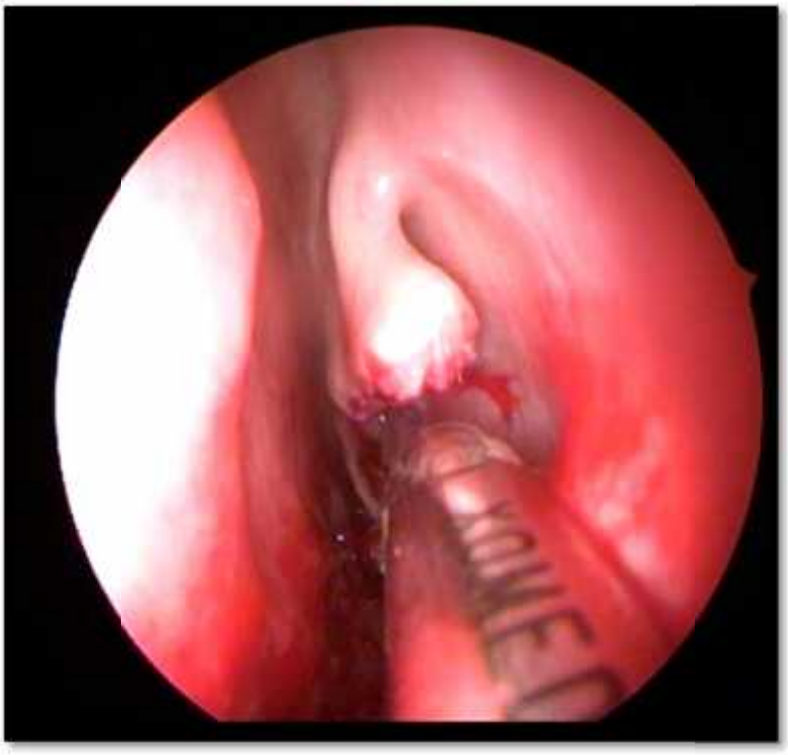


Image 8 : Intraoperative endoscopic image showing microdebrider assisted turbinectomy

POST OPERATIVE IMAGES

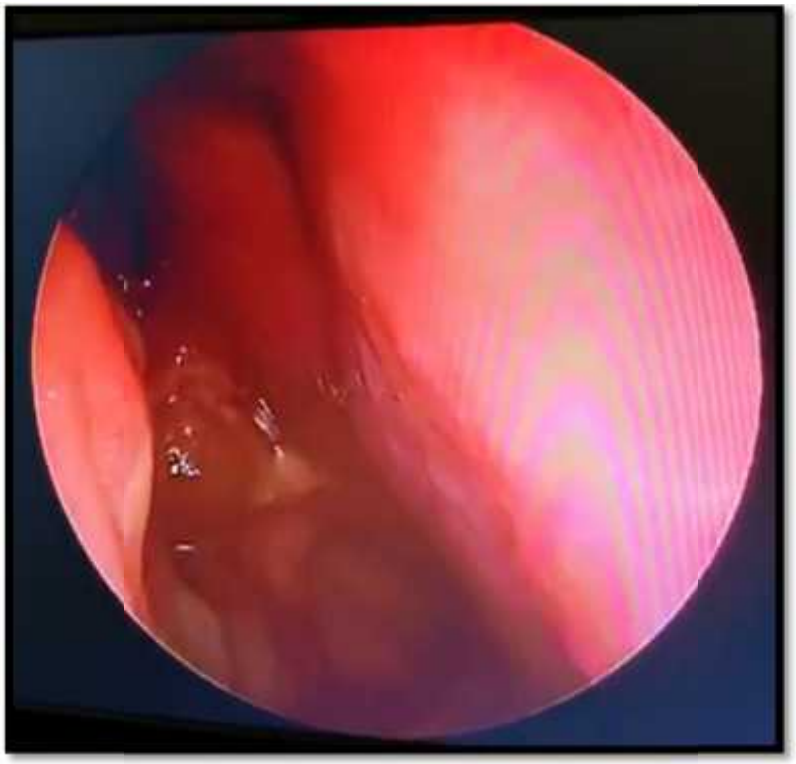


Image 9 :Post operative 6 weeks endoscopic image of cleared sinonasal mass (JNA)

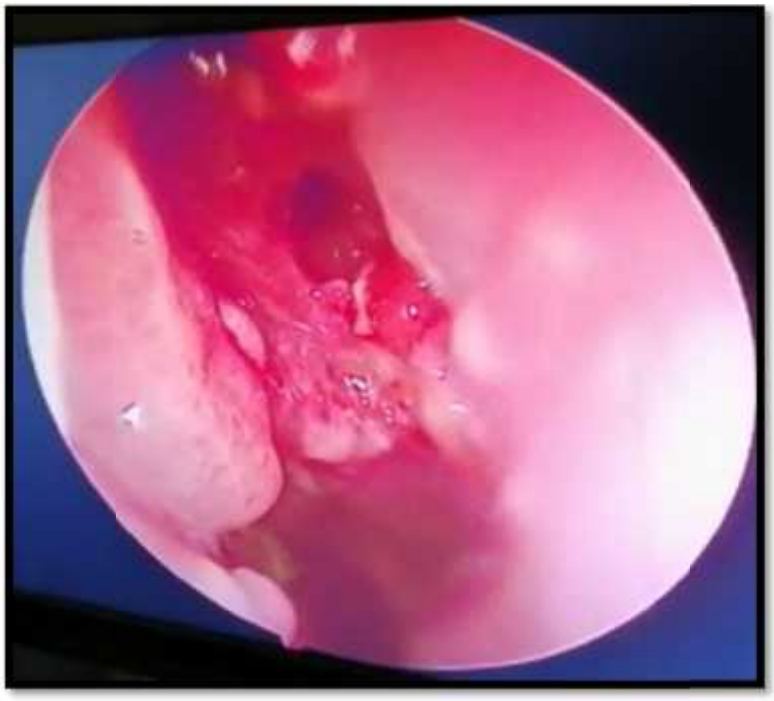


Image 10 :Post operative 6 weeks endoscopic image of cleared polypoidal mass

POST OPERATIVE IMAGES

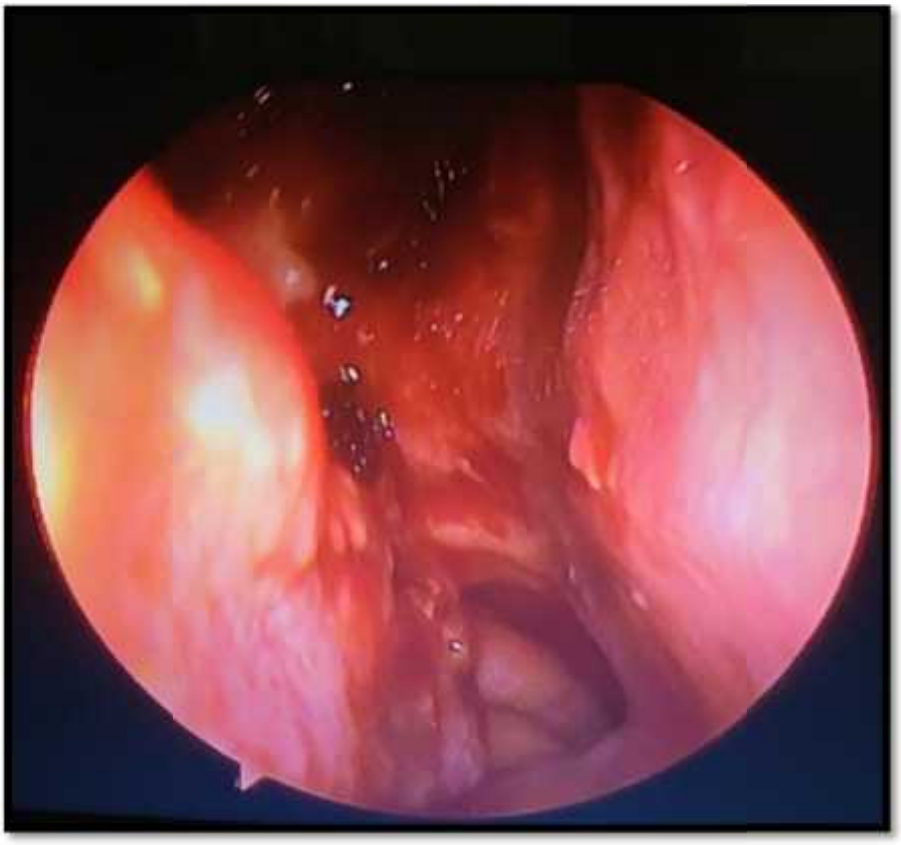


Image 11 :Post operative 6 weeks endoscopic image of cleared sinonasal mass

ANNEXURE – V –KEY TO MASTER CHART

Yrs	Years
JNA	Juvenile Nasopharyngeal Angiofibroma
VAS	Visual Analogue Scoring
M	Male
F	Female
B/L	Bilateral

ANNEXURE – VI – MASTER CHART								
S NO	**IP NO**	**AGE(yrs)**	**SEX**	**DIAGNOSIS**	**VAS SCORE**		**LUND -KENNEDY SCORE**	
					PRE-OP	**POST-OP**	**PRE-OP**	**POST-OP**
1	922765	21	M	JNA	40	7	5	2
2	923267	29	M	B/L ETHMOIDAL POLYPOSIS	36	8	6	2
3	931069	28	F	B/L ETHMOIDAL POLYPOSIS	39	8	7	3
4	920978	30	M	B/L ETHMOIDAL POLYPOSIS	38	7	10	3
5	935889	34	F	CHRONIC RHINOSINUSITIS	32	3	3	1
6	936530	39	M	CHRONIC RHINOSINUSITIS	28	8	4	2
7	937774	51	F	B/L ETHMOIDAL POLYPOSIS	28	4	8	2
8	938914	60	M	B/L ETHMOIDAL POLYPOSIS	36	7	8	2
9	947401	48	F	B/L ETHMOIDAL POLYPOSIS	39	6	6	3
10	947721	13	M	B/L ETHMOIDAL POLYPOSIS	34	10	10	4
11	948776	59	F	CHRONIC RHINOSINUSITIS	32	8	4	2
12	948736	45	F	CHRONIC RHINOSINUSITIS	31	8	6	3
13	948420	16	M	JNA	26	6	4	2
14	950857	37	F	B/L ETHMOIDAL POLYPOSIS	33	9	8	3
15	953870	40	F	CHRONIC RHINOSINUSITIS	44	11	4	3
16	963682	42	M	SINONASAL MASS	32	11	6	3
17	971073	42	F	B/L ETHMOIDAL POLYPOSIS	46	7	7	2
18	972127	25	F	CHRONIC RHINOSINUSITIS	32	9	2	1
19	971725	20	M	CHRONIC RHINOSINUSITIS	46	14	4	2
20	973347	60	M	SINONASAL MASS	40	14	4	1
21	975734	23	M	CHRONIC RHINOSINUSITIS	31	11	3	1
22	974592	65	M	FUNGAL RHINOSINUSITIS	34	11	3	1
23	976285	28	M	B/L ETHMOIDAL POLYPOSIS	36	10	4	2
24	978829	32	M	FUNGAL RHINOSINUSITIS	33	13	3	1
25	985639	17	M	CHRONIC RHINOSINUSITIS	39	9	4	3
26	985661	54	M	CHRONIC RHINOSINUSITIS	40	7	2	2
27	986125	27	F	CHRONIC RHINOSINUSITIS	27	7	2	1
28	986119	55	F	CHRONIC RHINOSINUSITIS	42	10	2	1
29	984563	17	M	CHRONIC RHINOSINUSITIS	40	10	2	1
30	987094	45	F	B/L ETHMOIDAL POLYPOSIS	42	10	6	3
31	987506	47	M	B/L ETHMOIDAL POLYPOSIS	43	11	7	3
32	993708	36	M	SINONASAL MASS	34	11	4	1
33	953216	30	F	B/L ETHMOIDAL POLYPOSIS	40	10	7	2
34	996973	65	F	FUNGAL RHINOSINUSITIS	35	11	4	1
35	985612	35	F	B/L ETHMOIDAL POLYPOSIS	40	10	6	2
36	997183	60	M	FUNGAL RHINOSINUSITIS	35	12	3	1
37	997598	25	M	JNA	27	7	6	2
38	997885	35	F	FUNGAL RHINOSINUSITIS	39	10	7	2
39	998234	23	M	JNA	28	9	6	2
40	998787	40	F	CHRONIC RHINOSINUSITIS	36	8	7	2