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FACTORS CONTRIBUTING FOR THE BEST OUTCOME OF FUNCTIONAL ENDOSCOPIC SINUS SURGERY

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Abstract

Objective: To study the **factors** contributing for the best outcome of functional endoscopic sinus surgery

Design: Prospective case series

Setting: Academic tertiary medical centre

Patients: 100 cases with chronic sinonasal inflammatory diseases who underwent functional endoscopic sinus surgery were studied

Main outcome measures: Subjective and objective endoscopic evaluation of postoperative improvement

Results: Local anaesthesia is comfortable and cost effective for most (71%) of the patients with minimal intraoperative bleeding. Intraoperative mucosal injury led to stenosed maxillary sinus ostia in 2% of the patients and postoperative nasal synechae in 13% patients. Co morbid Bronchial asthma (2% of recurrence) and allergic risk factor (4% of recurrence) are the major factors contributing for postoperative recurrence. Preoperative oral and local steroids for 15% of the patients with bilateral sinonasal polyposis helped intraoperatively to reduce the size of the polypi, better delineation of anatomy and reduced intraoperative bleeding. Postoperative nasal saline douching and Saline spray were found to be equally effective in reducing nasal crusts formation

Conclusion: With best anatomic knowledge, cadaveric dissection training, preoperative medical management as required, customized mucosal preservation surgical technique and postoperative care, the best outcome of FESS can be achieved.

Key words- FESS; best outcome; contributing factors.

INTRODUCTION

Functional Endoscopic Sinus Surgery (FESS), with the endoscopes introduced in 1980s has gained significant notoriety in the treatment of chronic inflammatory sinus disease.

Functional Endoscopic Sinus Surgery offers surgery tailored to the disease of each individual in order to restore sinus function through preservation of normal sinus anatomy.

To achieve the best outcome of such revolutionizing FESS a multifactorial approach is needed which includes patients' relevant important histories, associated ailments, clinical examination, preoperative diagnostic nasal endoscopy, CT scans- paranasal sinuses , medical treatment, adequate preoperative local preparation, a good anaesthesia ,appropriate instruments and set up ,apt surgical techniques, trained skill and post operative follow up.

In this study, an attempt is made to study the importance of preoperative assessment of the patients posted for FESS, intraoperative surgical techniques and postoperative follow up which leads to the best outcome of FESS

MATERIALS AND METHODS

The present study was conducted at Government Rajaji Hospital, Madurai for a period of one year from October 2009 to September 2010. Approval for doing the study was obtained from Government Rajaji hospital, Madurai ethical committee on September 28, 2009.

A total of 100 patients who underwent functional endoscopic sinus surgery for chronic sinonasal inflammatory diseases were evaluated using a standard proforma.

Inclusion criteria:

1. Chronic rhino sinusitis
2. Acute recurrent sinusitis
3. Chronic rhinosinusitis with polyp
4. Allergic Fungal rhino sinusitis
5. Fungal ball
6. Allergic rhino sinusitis
- 7.

Exclusion Criteria:

1. Impending cranial complications
(eg. Meningitis, Brain abscess, cavernous sinus thrombosis)
2. Orbital complications with blindness, visual field restriction.
3. Coarse post inflammatory bony stenosis of frontal sinus ostium.

Investigations:

The following investigations were done for all the 100 patients under study.

- a) Blood Haemoglobin, Total Count, Differential Count, Bleeding Time, Clotting Time, Platelet Count, Blood Grouping and Typing, Blood sugar, urea ,serum creatinine, Urine for albumin, sugar, deposits, ECG in all leads, X ray chest were done.
- b) Diagnostic Nasal endoscopy
- c) Computerised tomogram of nose and paranasal sinuses
- d) Histopathological study for fungal diseases

Treatment plan Adopted:

1. Thorough clinical, endoscopic and radiological evaluation.
2. Control of local and systemic predisposing factors.
3. Adequate preoperative preparation

4. Appropriate surgical technique customized for individual patients.
5. Post operative care
6. Follow up with endoscopic examination and cleaning.

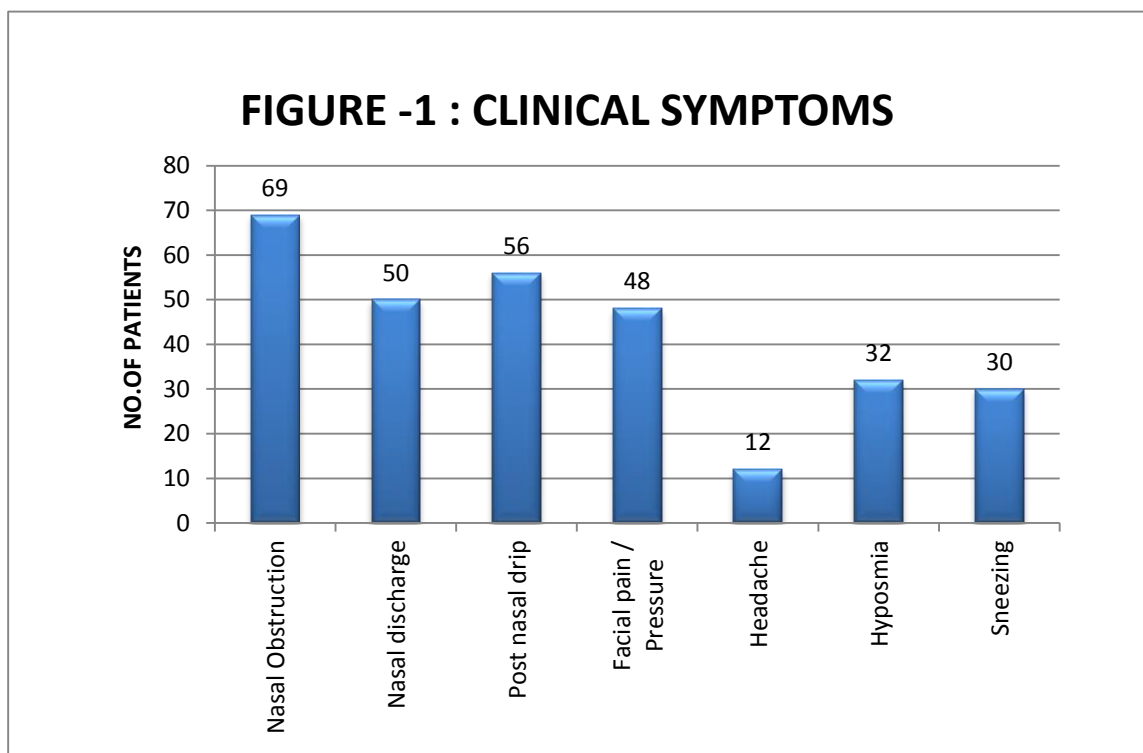
All the data were recorded and analyzed.

RESULTS:

A total of 100 patients were included in this study. The present study shows a male preponderance numbering 62 out of 100 cases (62%) and females 38 out of 100 cases (38%). The male and female ratio is 1.6 : 1. The age ranged from 8 – 74 years in males with mean age 32.4 and 13-61 years in females with mean age 28.9. The overall range including males and females is 8-74 years with mean 31 years. The majority of cases in our study were between the age group 20-40 years. They constituted more than 50% of the total number of cases.

The present study shows (FIGURE -1) that the most common symptom is nasal obstruction found in 69% of the cases. The next most common symptoms were postnasal drip in 56% of the cases, nasal discharge in 50% of the cases, facial pain / pressure in 48% of the cases. Smell disturbances were found in 32% of the patients. 30% of the patients had allergic symptoms. Francis, Stiliano, Kountakis (2007) in their study [4] showed nasal obstruction 84%, post nasal

drip 82% and facial congestion 79% were the most common symptoms among the patients undergoing functional endoscopic sinus surgery.



30% of the patients in the present study had allergic symptoms. Gutman, Torres (2004) [6] showed that out of 48 patients with chronic rhinosinusitis under study, 57.4% had a positive allergy test. This score is more than that of present study as early exposure of multiple allergens in our country tend to develop adaptive immunity and reduces the allergic sensitization. 2% patients in the present study had asthma. None of them were aspirin takers. In the present study

7 %patients were diabetics and 13% patients were hypertensives. All were taken up for surgery with strict glyceemic control and blood pressure control. 21% patients were chronic smokers and were strictly advised abstinence from smoking one week prior to surgery.

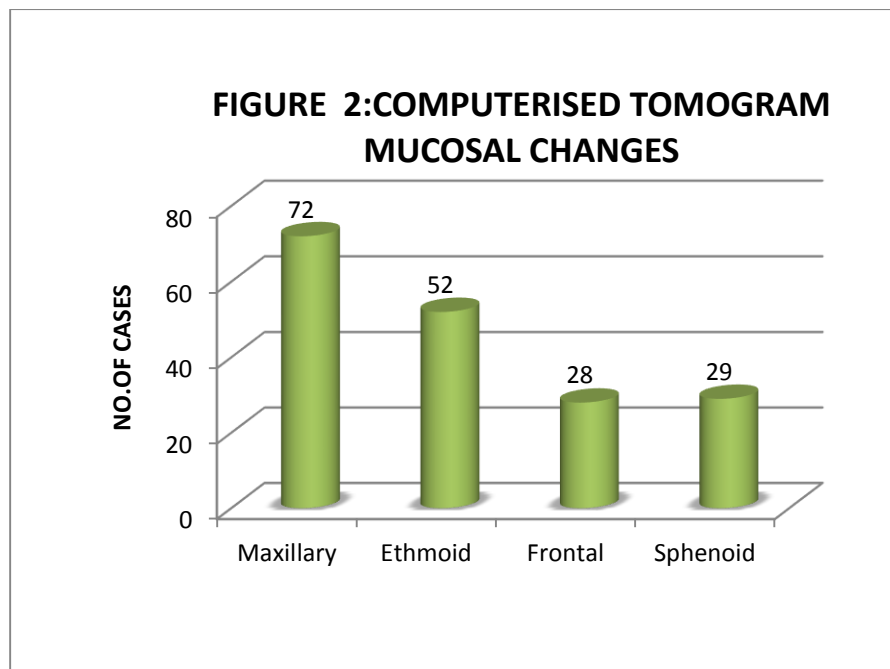
In this study (table-1) 60% patients had septal deviation. 27% patients had bilateral ethmoidal polposis and10% patients with antro choanal polyp,58% patients had accessory ostium in the posterior fontanelle,

Gray LP (1978)[2] studied 2112 adults skulls of different ethnic groups and found 37% deviated septum and 42% kinked. This compares favorably with the present study with 60% deviated septum.

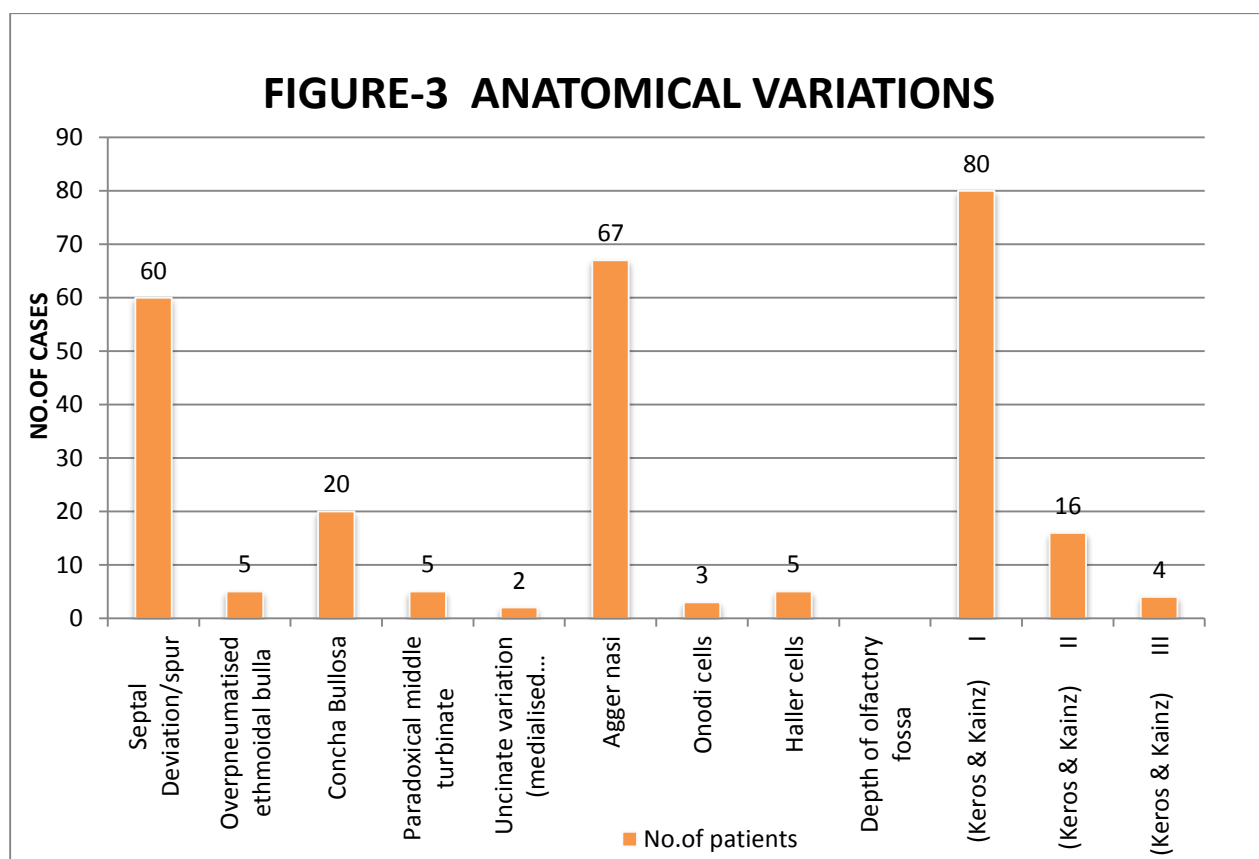
Table 1	Nasal endoscopy	Percentage
Septum	Midline	40
	Deviated septum / spur	60
Nasal polyp	Bilateral multiple	27
	Unilateral single	10
Nasal discharge	Thin mucoid	30
	Mucoid / mucopurulent	15
	Mucopurulent with fungal mucin	5
Nasal mucosa	Edematous	28
	Congested	42
	Pale	30
Accessory ostium		58
Turbinates hypertrophy		32

The mucosal changes noted in the CT for 100 patients (FIGURE-2) were either mucosal thickening or collections or opacification of the polypi. 72% patients showed mucosal changes in the maxillary sinus. 52 %patients had ethmoid sinus involved. 28% patients had frontal sinus involvement and 29 % patients had sphenoid sinus involvement.

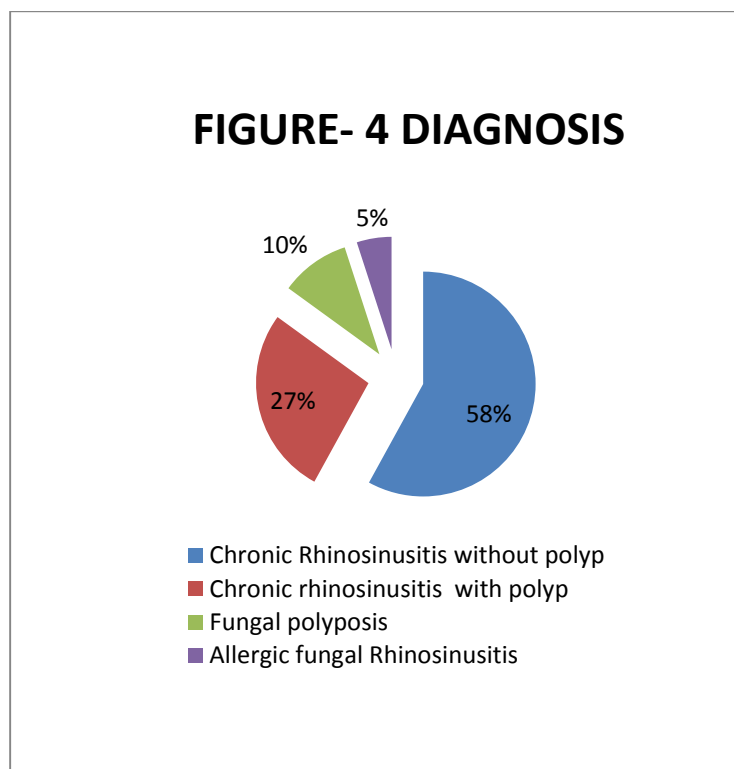
Smith, Brindley (1993) [14] showed that more than 70% of the patients under study had maxillary and ethmoidal sinuses involvement in CT. This correlates well with the previous study.



The various anatomical variations noted in 100 patients (FIGURE-3) under study were septal deviation (60%), overpneumatized ethmoidal bulla (5%) Concha bullosa (20%), Paradoxical middle turbinate (5%). Uncinate variation – medialised uncinate (2%), Agger nasi (67%). Onodi cell (3%), Haller cells (5%).

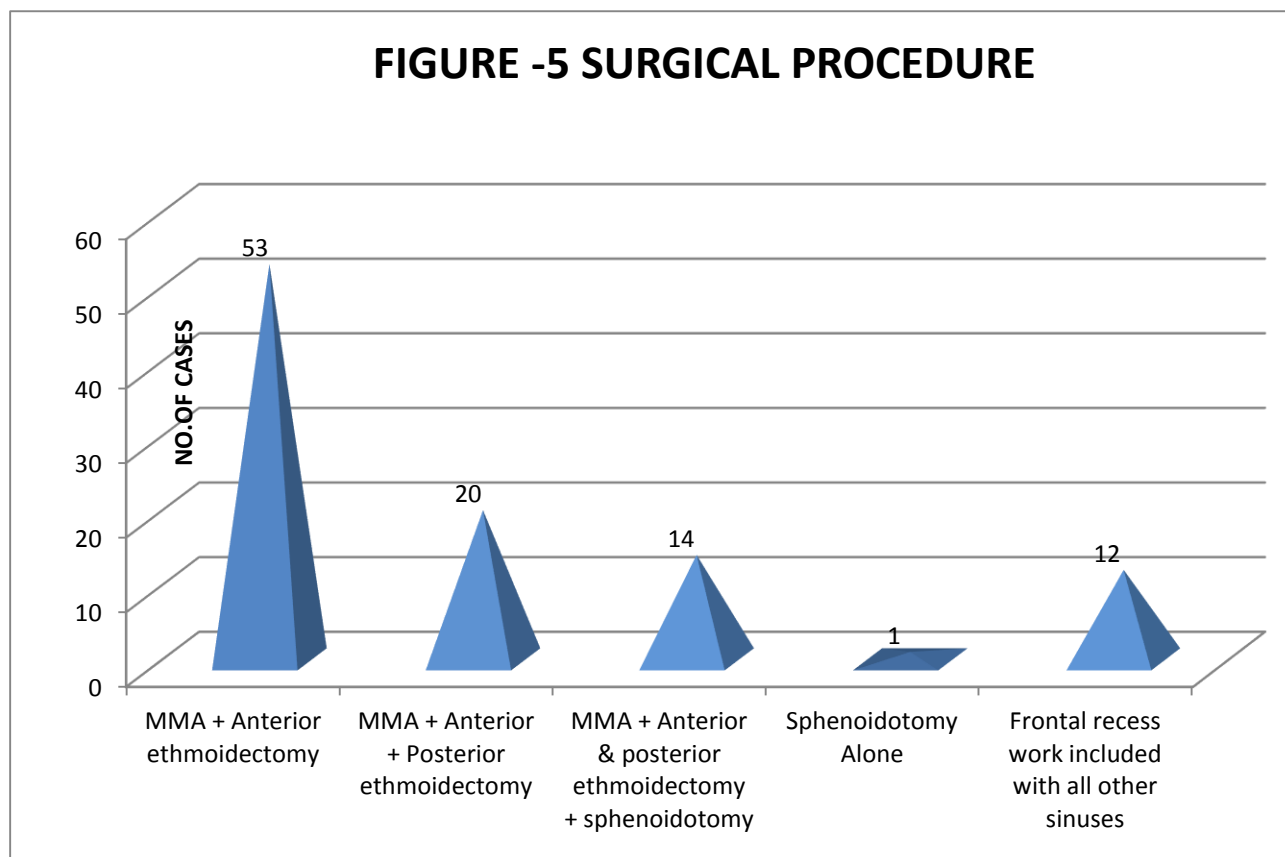


Out of 100 cases of chronic sinonasal inflammatory disease, 58 %patients were diagnosed as chronic rhinosinusitis without polyp, 27% patients as chronicrhinosinusitis with polyp, 10% patients with fungal sinusitis-mycetoma, 5% patients with Allergic fungal rhinosinusitis.(FIGURE 4)



Most of the cases 71% in the present study were operated under local anaesthesia ,and found local anaesthesia, (Total intravenous anaesthesia) is ideal for most of the surgeons except for surgeons preferences and patients preferences for general anaesthesia.

All the patients were customized individually (FIGURE -5) for their disease extent and involvement. Mucosal preservation technique by anterior to posterior dissection (Messerklinger technique) was followed in all patients.



Maxillary sinus, and anterior ethmoids were commonly involved and operated in this study.

40% of the patients in the present study had postoperative merocel nasal packing for a minimum period of 48 hours. The response was good compared with the medicated anterior nasal packing with ribbon gauze (60%). Less postoperative mucosal edema and faster recovery was noted with merocel packing. All the patients under study were prescribed systemic antibiotics, analgesics, local decongestants and systemic antihistamines for 7-10 days postoperatively and advised steam inhalation. Nasal saline douching was advised for 45 % patients and rest of the patients were prescribed saline spray. Both the groups reported equally lesser incidence of nasal crusts formation and better symptomatic score. 15% patients out of 27% patients with bilateral sinonasal polyposis were prescribed preoperative oral steroid for 7-10 days and steroid nasal spray for 1month. Intraoperatively, the size of the polyps were reduced, better delineation of anatomy and reduced intraoperative bleeding was found in all the 15% patients, compared with the rest of 12% patients with bilateral sinonasal polyposis who were not prescribed preoperative steroid therapy. No patient with diabetes or hypertension were prescribed preoperative oral steroids but used steroid nasal spray for 1 month preoperatively.

All the 27% patients with bilateral sinonasal polyposis, 10% patients with fungal mycetoma and 5% patients with Allergic fungal Rhinosinusitis were advised local steroid nasal spray postoperatively for 6 months. All the operated

patients were prescribed oral steroids for one week. All the patients under study were subjected to regular endoscopic cleaning postoperatively

Table 2-complications following fess	Percentage
Intraoperative haemorrhage	9
Periorbital edema	4
Synechae	13
CSF leak	0
Orbital haematoma	0

9% of the patients with intraoperative haemorrhage, were those taken under general anaesthesia for bilateral sinonasal polyposis (table-2). 4% patients had periorbital edema and 13% patients developed nasal synechae postoperatively. No patient had the complications like csf leak, orbital hematoma, pneumocephalus, nasolacrimal duct injury, meningitis, brain abscess etc.

Table-3 Postoperative follow up

No. of cases	Months of follow up	Recurrence
50	12	5
30	10	1
20	8	0

50 patients were followed for 12 months (**table -3**). Among them 5 patients developed recurrent disease.

2 of them were Asthmatics with bilateral sinonasal polyposis operated, 1 patient was operated for bilateral sinonasal polyposis. 2 patients were found with stenosed maxillary sinus ostia who had intraoperative severe mucosal injury.

30 patients were followed for 10 months among them, 1 patient with Allergic fungal rhinosinusitis presented with recurrent disease. 20 patients were followed for 8 months with no recurrence. Co morbid Bronchial asthma (2% of recurrence)

and allergic risk factor (4% of recurrence) are the major factors contributing for postoperative recurrence.

DISCUSSION

For the best outcome of functional endoscopic sinus surgery the contributing factors are grouped as patient factors, causative factors, management factors and surgeon factors.

Patient Factors:

Poor immune status of patients such as uncontrolled Diabetes, Immunodeficiency disorders (HIV, Renal transplant, Bone marrow transplant) lead to poor rate of healing. Occupational exposure of allergens (cotton wool, agricultural products) etc may lead to increased recurrences. Asthmatic patients, are prone for recurrent nasal polyposis. Previous nasal surgeries may have obscured landmarks, adhesions which may decrease the outcome of the revision surgery. Patient with mucociliary dysfunction is more prone for recurrences and poor surgical outcome. Age of the patient is to be considered, as the elderly has poor rate of healing. In paediatric age group chances of injuring vital structures are more common.

Conservative management would be more appropriate in paediatric age unless necessary.

Causative factors:

Genetic factors like cystic fibrosis has more tendency to develop recurrent nasal polyposis in paediatric age group. Allergy, infection, anatomical variations of lateral wall of nose and skull base, environmental factors like exposure to smoke, dust, allergens, chemicals, smoking, snuff usage have their own role in affecting the surgical outcome.

Management factors;

Relevant histories of the patient, clinical examination, endoscopic and radiological diagnosis, histopathological information for required cases helps in assessing thoroughly before the patient is taken up for surgery.

A well equipped theatre setup, appropriate instruments, endoscopes as per the surgeon's requirements is essential.

Adequate preoperative preparation with antibiotics, steroids as required, peroperative local preparation with local anaesthetic and vasoconstrictor packing, preferred anaesthesia for the patient, surgical principles and techniques followed,

customized for every individual is essential for better surgical work. Likewise postoperative management with drugs, douching, steam inhalation, endoscopic cleaning, etc play a vital role for the success of the surgery performed. Adequate counselling is to be given for regular follow up visits and personal care which is vital for a successful outcome of the surgery.

Surgeon factors:

Best anatomical knowledge, cadaveric dissection trainings, assisting and observing several endoscopic surgeries, to start with basic diagnostic nasal endoscopies, then minor sinus works and then to move for advanced surgeries helps the surgeon to provide a successful outcome.

KEY MESSAGES

- ❖ **Preoperative assessment** of the patients by detailed history and clinical examination helps to delineate the predominant symptoms, predisposing factors like allergy, asthma and associated illness like diabetes, hypertension etc, thereby control of which greatly influences the intraoperative work and improves the post operative outcome. . Co morbid Bronchial asthma and allergic risk factor are the major factors contributing for postoperative recurrence

- ❖ **Computerised tomogram and diagnostic nasal endoscopy** are complementary to each other and highly valuable in preoperative evaluation and intraoperative guidance.
- ❖ **Preoperative management** with short course oral steroids 7-10 days and steroid nasal spray for 1 month for sinonasal polyposis with allergy, asthma dramatically reduces the size of nasal polypi and assures a safe surgical access without excessive bleeding intraoperatively.
- ❖ **Local anaesthesia** is comfortable and cost effective for most of the patients with minimal intraoperative bleeding and bloodless surgical field, assures a safe surgical access from injuring vital structures.
- ❖ **Mucosal preservation technique by anterior to posterior dissection** (Messerklinger technique) customized individually for the patients helps to retain the mucociliary function post operatively reducing the chance of stenosis of maxillary sinus ostia and nasal synechae.
- ❖ **Postoperative management** with local steroids reduces the rate of recurrence of nasal polypi. Antibiotics, decongestants, steam inhalation, nasal douching or saline nasal spray and regular endoscopic cleaning on follow up visits significantly improves the functional outcome.

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