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Original Article

A Study on Effectiveness of Middle Meatalantrostomy in Treatment of Chronic Maxillary Sinusitis

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ABSTRACT

Background: Chronic maxillary sinusitis is an inflammation of the maxillary sinus lasting for more than 12 weeks. It is diagnosed by typical symptoms and/or a computed tomography scan and/or nasoendoscopic changes.
After failure of maximum conservative therapy, functional endoscopic sinus surgery (FESS) aims to restore normal sinus function and ventilation though natural ostia. Traditionally in maxillary sinus surgery, FESS was initiated with the removal of the uncinate combined with middle meatalantrostomy.
Aim: To study the effectiveness of middle meatalantrostomy in the treatment of chronic maxillary sinusitis, with respect to the treatment of nasal discharge, nasal obstruction, facial pain, headache, and olfactory alteration.
Material and Methods: 54 Patients with chronic maxillary rhinosinusitis refractory to medical line of treatment were the study subject. Patients symptom profile, CT PNS, DNE findings preoperatively were documented. All the 54 patients underwent middle meatalantrostomy. Post operatively patients were followed up on day 7, day 30 and day 90. They were assessed for relief in symptoms and DNE on each follow up day.
Results: 54 Patients with chronic maxillary sinusitis were assessed, 90 days after surgery 100% (n=54) of the patients had improvement in symptoms of nasal discharge, headache and olfactory alteration. 98% (n=53) of the patients appreciated improvement in nasal obstruction and facial pain.
Conclusion: Results suggest that middle meatalantrostomy is effective in relieving the symptoms of chronic maxillary sinusitis such as nasal obstruction, nasal discharge, facial pain, headache, and olfactory alteration.

Key Words: *Middle meatalantrostomy, chronic maxillary sinusitis, Symptom profile*

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INTRODUCTION

The term ‘sinusitis’ refers to a group of disorders characterized by inflammation of the mucosa of the paranasal sinuses. Because the inflammation nearly always also involves the nose, it is now generally accepted that ‘rhinosinusitis’ is the preferred term to describe the inflammation of the nose and paranasal sinuses. Rhinosinusitis is the inflammation of the nasal mucosal lining and the affected sinus lining, characterized by the presence of one or more symptoms: nasal blockage, congestion or stuffiness, nasal discharge (anterior and/or posterior), facial pain and/or facial pressure and/or reduced sense of smell. It has a global prevalence of around 10.9% with significant impairment in health related quality of life. The diagnosis is essentially clinical and radiological.

The pioneering work of Prof Walter Messerklinger of Graz, Austria on sinus mucosa and mucociliary transport has brought light into the understanding the pathophysiology of sinus diseases. This can be summarized as below:

1) Most PNS infections spread from nose to sinus.
2) Recurrent sinusitis is secondary to insufficient outflow or obstruction of the natural sinus ostia into the nasalcavity.
3) Sites of obstruction or partial stenosis are the ethmoid infundibulum at the entrance to the maxillary and frontal sinus [1, 2].

Modern endoscopic sinus surgery is arbitrarily divided into Messerklinger and Wigand approaches. The Messerklinger approach (1985) is ideal for patients with anterior ethmoid disease with or without maxillary or frontal sinus disease. Here the approach is from anterior to posterior. It can be extended to the posterior ethmoids, sphenoid and frontal sinus, if necessary. The Wigand approach (1978) is in contrast, ideal for patients with pansinusitis who may not respond to limited surgery. This approach is from posterior to anterior, and routinely involves clearance of all the sinuses [3]. Both techniques are based on the assumption that the sinus mucosa is reversibly diseased and will return to normal once adequate drainage has been established.

The present study is an attempt to assess the efficacy of MMA on the symptom profile of patients with chronic maxillaryrhinosinusitis before and after surgery.

Chronic rhinosinusitis is one of the most frequent diseases encountered in routine ENT practice. The diagnosis of chronic rhinosinusitis is made by a variety of physicians including primary care physicians, general physicians, pediatricians pulmonologists and otolaryngologists. Chronic rhinosinusitis significantly impacts the quality of life by interfering with the general health, vitality and social functioning and cause decrease in productivity in the work force, which is comparable with that observed in patients with coronary heart disease and chronic lung disease.

Chronic rhinosinusitis is one of the commonest conditions for which antibiotics are prescribed. Most cases of chronic rhinosinusitis respond to medical treatment but if no improvement in symptoms is achieved, FESS advocates systematic approach to the surgical treatment of the disease of the nose and sinuses [4, 5].

MATERIALS AND METHODS

Study Design:

This is an interventional study, conducted in the department of Otorhinolaryngology at Vydehi institute of medical sciences, Bengaluru for 18 months. 54 patients undergoing Functional endoscopic sinus surgery with Middle Meatal Antrostomy for chronic maxillary rhinosinusitis who have been refractory to medical treatment of chronic rhinosinusitis.

INCLUSION CRITERIA:

- Patients with chronic maxillary sinusitis.
- Patients above 18 years of age.
- Written informed consent from the patient.

EXCLUSION CRITERIA:

- Patient refusal for the procedure.
- Patients with previous history of nasal surgery.
- Pregnant women and lactating mothers.
- Patients who improved after clinical treatment for chronic rhinosinusitis.

METHODOLOGY

A uniform history was documented for each patient including the location of facial pain and pressure (maxillary, medial canthal, retroorbital or temporal); whether nasal discharge was thick or thin or purulent; the presence of allergic symptoms such as itchy eyes, watery eyes, itchy nose, seasonal variation, presence or absence of nasal obstruction, congestion and anosmia and hyposmia. Previous medical management with antihistamines, decongestants (topical and/ or systemic), antibiotics, or steroids (topical and/ or systemic) was asked.

Detailed clinical examination of the patients was done to note mainly congestion of the nasal mucosa, middle meatal discharge, hypertrophied middle turbinates, septal abnormalities, post nasal drip etc.

All the patients were subjected for diagnostic endoscopy. The evaluation was performed under topical anaesthesia after insertion of cotton pledgets soaked with a combination of 4% xylocaine and 1:30,000 Adrenaline. Examination was performed with 30°-4mm endoscope.

Initially patients were medically managed according to their symptoms and prior management. Patients who had received previous adequate medical management were evaluated immediately with computed topography (CT). Patients who had not received adequate medical management were started on appropriate regimes.

Prior to beginning of surgery, CT scans were reviewed with particular attention to the surgical anatomy and the extent of disease. The roof of ethmoid was again evaluated for slope and thickness in each of the areas.

The position of uncinate and width of infundibulum were re-evaluated along with shape of medial orbital wall and degree of pneumatisation of ethmoidal cells. The relative position of cells within frontal recess and their relationship with frontal sinus were identified.

When there was a significant septal deformity a septoplasty was performed at the time of surgery. In cases with bilateral disease, endoscopic surgery was performed on the wide side at the beginning of the operation. Septoplasty was then performed and middle meatalantrostomy on narrower side was proceeded with afterwards.

General anaesthesia was used in all 54 patients. Infiltration anaesthesia was with 2% xylocaine with 1:2,00,000 injected into uncinate process (3 to 4 injections), anterior part of the middle turbinate etc. Surface Anesthesia with a

combination of 4% xylocaine and 1:100000 Adrenaline was used. The eyes of the patients were never covered and patient was instructed not to blow the nose and inform immediately wherever slightest orbital pain occurs.

The first step in endoscopic ethmoidectomy was typically infundibulotomy. An uncinectomy was performed with sickle knife. Under endoscopic visualisation, all the disease was exenterated preserving the healthy normal mucosa. Maxillary ostium was identified and widened.

The maxillary sinus ostium was widened if it was narrowed or when there was significant maxillary sinus disease. When the disease was mild, the opening was usually extended to posterior fontanelle, and the size of opening thus created was around 4-6mm. When the maxillary sinus was severely involved, much of medial wall was removed, taking care not to extend too anteriorly so as to avoid injury to the nasolacrimal duct. Maxillary ostial widening was done in all the cases together with the uncinectomy.

After removing ethmoidal bulla, the ground lamella of the middle turbinate was infractured in its inferomedial segment.

The addressing of posterior ethmoid cells, sphenoidal cells or frontal sinus cells was done only when there was evidence of disease in either CT or diagnostic endoscopy. If the disease was limited, only uncinectomy and/ or anterior ethmoidectomy were done.

When diffuse disease was evident, total endoscopic ethmoidectomy, sphenoidectomy, middle meatalantrostomy and meticulous dissection of the frontal sinus was performed. Whenever bleeding occurred, cotton pledgets soaked in 4% xylocaine with 1:30,000 adrenaline were used to achieve haemostasis. A ribbon gauze soaked with soframycin ointment was put into the nasal cavity for one day.

Post operative care:

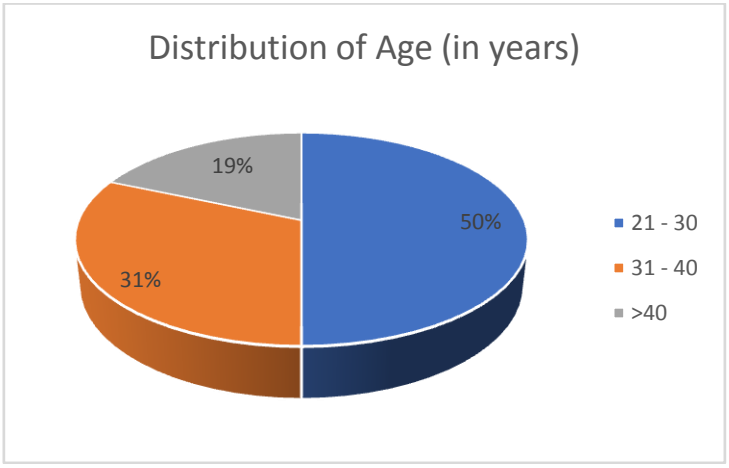
Each patient was prescribed a 5-day course of antibiotics, decongestants and painkillers. The patients were instructed not to blow the nose forcefully. They were ambulant on the evening of the same day. Endoscopic post-surgical examinations and cleaning of nasal cavity were performed in every case. Typically, blood, mucus, debris etc. were aspirated by cleaning on the third and fifth post operative days. Usually the patients were discharged on the seventh postoperative day after cleaning.

They were asked for follow up on the fourteenth post operative day. Nasal cavities were inspected under headlight and cavity cleaning was done to remove crusts, secretions and debris. Patients were subjected to endoscopy on seventh day. The characters of the nasal mucosa, polypoid changes, any abnormal secretions, patency of antrostomy were noted. The patients were asked to report in the fourth week for post surgical endoscopic evaluation. The cavities were inspected to note down the healing, presence or absence of mucosal hypertrophy, abnormal secretions, residual polyp, patency of the ostia etc. At each follow up on the first week, first month and third month, patients were questioned about subjective relief from headache, nasal discharge, nasal obstruction and postnasal drip. If any recurrence of the symptoms was present, the patient was subjected again to nasal endoscopy and evaluation.

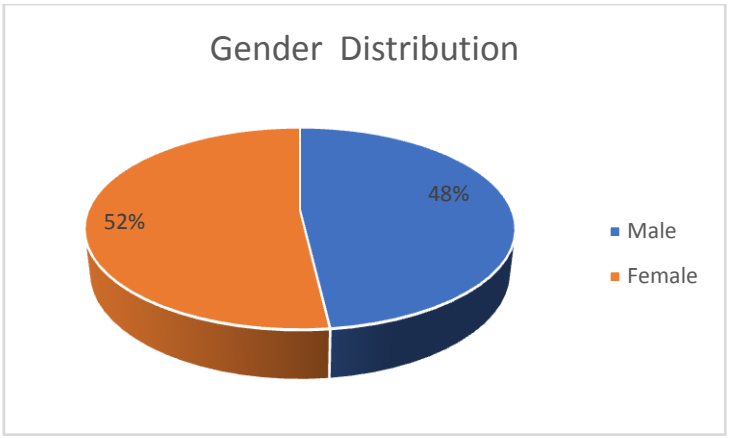
RESULTS

Following are the results from 54 patients included in this study.

The mean age of the study participants was 32.9 years with the standard deviation of 8.65 years. Out of 54 patients included in this study, there were 27 patients in the age group of 21-30 years, 17 patients in the age group of 31-40 years, 10 patients above 40 years of age.

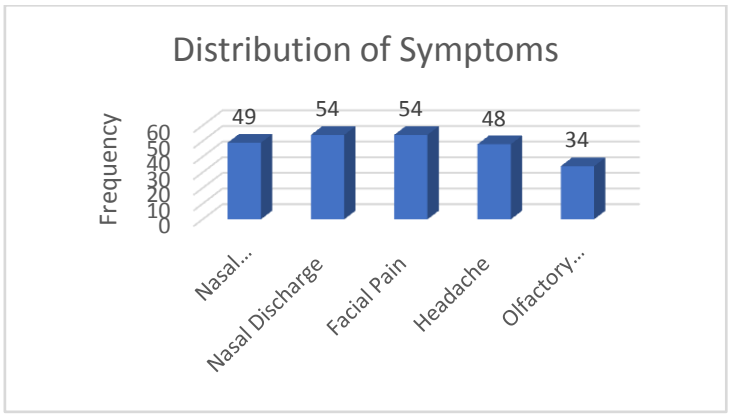


Out of the 54 patients included in this study, 28 patients were females and 26 patients were males.



Distribution of symptoms:

Out of the 54 patients included in this study, all of them presented with complaints of nasal discharge and facial pain. 49 patients had nasal obstruction at the time of presentation, 48 patients came with complaints of headache and 34 patients had olfactory alteration.



Nasal Obstruction:

Among the 54 patients included in this study, 91% of the patients had nasal obstruction pre operatively, 30% of the patients had nasal obstruction on post operative day 7, 6% of the patients had nasal obstruction on post operative day 30 and 2% of the patients had nasal obstruction on post operative day 90.

TABLE 1: COMPARISON OF PRE-OPERATIVE AND POST- OPERATIVE NASAL OBSTRUCTION

Visit	Nasal Obstruction n (%)
Pre-Operative	49 (90.7)
Day 7	16 (29.6)
Day 30	3 (5.6)
Day 90	1 (1.9)

*n = Number of positive cases;

Generalized Estimating Equation was used to test the difference in the proportion of nasal obstruction across the visits. There is a significant decrease in the nasal obstruction across the visits post-operatively. The odds of <1 indicates it's a protecting factor. Compared to pre-op on post-op day 7 the odds of getting positive was 0.043 (protective factor) and it is significant with the p-value of <0.001. Similarly, the odds of getting positive on day 30 and day 90 when compared pre-op were 0.006 and 0.002 respectively. And the reduction is statistically significant with the p-value of <0.001.

NASAL DISCHARGE:

Among the 54 patients included in this study, 100% of the patients had nasal discharge pre-operatively, 8% of the patients had nasal discharge on post-operative day 7, and no patients had symptom of nasal discharge on post-operative days 30 and 90.

TABLE 2: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE NASAL DISCHARGE

Visit	Nasal Discharge n (%)
Pre-Operative	54 (100)
Day 7	4 (7.4)
Day 30	0
Day 90	0

*n = Number of positive cases;

Generalized Estimating Equation was used to test the difference in the proportion of nasal discharge from pre-op to post-op. All subjects were reported to have nasal discharge. And post-op day 7, there were 4 (7.4%) subjects with the nasal discharge. The reduction of presence of nasal discharge from pre-op to post-op day 7 was significant with the p-value of <0.001. There were no cases with nasal discharge reported on post-op day 30 and day 90.

FACIAL PAIN:

Among the 54 patients included in this study, 100% of the patients had facial pain pre-operatively, 9% of the patients had facial pain on post-operative day 7, 9% of the patients had facial pain on post-operative day 30 and 2% of the patients had facial pain on post-operative day 90.

TABE 3: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE FACIAL PAIN

Visit	Facial Pain n (%)
Pre-Operative	54 (100)
Day 7	5 (9.3)
Day 30	5 (9.3)
Day 90	1 (1.9)

*n = Number of positive cases;

As the model for Generalized Estimating Equation did not converge, McNemars's Chi-square test was used to test the difference in proportion of facial pain across the visits. All subjects were presented with facial pain at pre-op. On post-op day 7, only 5 (9.3%) of the subjects reported with facial pain. And on day 30 and day 90 the number of subjects with facial pain were 5 (9.3%) and 1 (1.9%) respectively. The reduction proportion of facial pain across the visits when compared with the pre-op were statistically significant with the p-value of <0.001.

HEADACHE:

Among the 54 patients included in this study, 89% of the patients had headache pre-operatively, 18% of the patients had headache on post-operative day 7, 6% of the patients had headache on post-operative day 30 and none of the patients had headache on post-operative day 90.

TABLE 4: COMPARISON OF PRE-OPERATIVE AND POST- OPERATIVE HEADACHE

Visit	Headache n (%)
Pre-Operative	48 (88.9)
Day 7	10 (18.5)
Day 30	3 (5.6)
Day 90	0

*n = Number of positive cases

Generalized Estimating Equation was used to test the difference in the proportion of headache across the visits. There is a significant decrease in the headache across the visits post-operative on day 7, day 30 and day 90. The odds of <1 indicates it's a protecting factor. Compared to pre-op on post-op day 7 the odds of getting positive was 0.028 (protective factor) and it is significant with the p-value of <0.001. Similarly, the odds of getting positive on day 30 when compared to pre-op was 0.007 with 95% CI of 0.002 to 0.029. And the reduction is statistically significant with the p-value of <0.001.

Olfactory Alteration:

Out of the 54 patients included in this study, 63% of the patients had olfactory alteration pre-operatively, 9% of the patients had olfactory alteration on post-operative day 7, 2% of the patients had olfactory alteration on post-operative day 30 and no patient had olfactory alteration on post-operative day 90.

TABLE 5: COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE OLFACTORY ALTERATION

Visit	Olfactory Alteration n (%)
Pre-Operative	34 (63)
Day 7	5 (9.3)
Day 30	1 (1.9)
Day 90	0

*n = Number of positive cases

Generalized Estimating Equation was used to test the difference in the proportion of olfactory alteration across the visits. There is a significant decrease in the olfactory alteration across the visits post-operative on day 7, day 30 and day 90. The odds of <1 indicates it's a protecting factor. Compared to pre-op on post-op day 7 the odds of getting positive was 0.011 (protective factor) and it is significant with the p-value of <0.001. Similarly, the odds of getting positive on day 30 when compared to pre-op was 0.060 with 95% CI of 0.023 to 0.155. And the reduction is statistically significant with the p-value of <0.001.

Anatomical Variants:

Out of the 54 patients included in this study, 5 of the patients had concha bullosa, 8 patients had paradoxical middle turbinate, 5 patients had laterally bent uncinate process.

TABLE 6:

Anatomical Variant	No of Patients	%
Concha Bullosa	5	10
Paradoxical Middle Turbinate	8	15
Laterally Bent Uncinate Process	5	10

DISCUSSION

Chronic sinusitis has become one of the most common disease surpassing arthritis. The pathogenesis of chronic hypertrophic inflammatory sinusitis remains an enigma. Ostiomeatal obstruction was ignored for many years as a factor in the pathogenesis of chronic disease. However, the large number of publications currently drawing attention to the importance of this area could lead to other potential underlying factors being forgotten.(Sinusitis can be controlled to some extent by medical therapy. Majority of those which are not controlled by it can be successfully managed by Functional Endoscopic Sinus Surgery).

The most frequent presenting complaints in our series were nasal discharge 54 (100%) and facial pain 54 (100%), Nasal obstruction was present in 49 (91%). Other complaints were headache 48 (89%) and decreased smell perception 34 (63%).

In David Kennedy's series of 120 patients the most common symptoms were nasal discharge (70%), nasal obstruction (67%), headache (61%), recurrent infection (43%), and olfactory disturbance (37%).

In a study by Dale H.Rice of 100 consecutive patients, the most common nasal finding was nasal mucosal congestion (erythema) (100%). Polyp (mass) (25%), muco purulent rhinorrhoea (42%) and edema (100%). These findings and previously reported lack of reliability of plain radiographs argue for a complete evaluation in these patients.

Our review of 54 sinus CT scans confirms the rhinogenic and ostiomeatal complex theories of chronic sinus disease. Most of the CT scans showed maxillary sinus disease. When patients' symptomatology was correlated with CT scan appearance, there was only 50% correlation. Younis et al reported that 20% of patients had intraoperative findings more extensive than shown in CT scan. On the contrary, in our observations we had a correlation of 90% between CT findings and intraoperative findings.

Because of the aforementioned observations, it has become apparent to us that the important indication for Middle meatalantrostomy is that of CT findings. Therefore we have given weightage of 50% to CT, 25% to the symptoms and 25% to physical examination in deciding when to operate. Stammberger and Wolf stated that even if physical examination and extensive radiographic and otherstudies are normal, a patient with a good history for chronic sinus disease will often benefit from FESS.

As far as anaesthesia is concerned, general anesthesia was used in all the cases.

We encountered a significant number of Anatomical variations in our study with 10% of patients showing Concha Bullosa, 15% showed paradoxically bent middle turbinate, 10% had laterally bent uncinate process. (jn a study by A.Danielsen and JanJDIofsson on 230 patients, 11.3% of them showed Concha Bullosa, 15.22% showed paradoxically bent middle turbinate, 8.7% showed laterally bent uncinate process, which roughly correlates with our study.

Our series demonstrates that the incidence of complications from endoscopic surgery is not high. No significant operative or postoperative complications occurred. Complications such as CSF rhinorrhea, visual loss, intra operative orbital haematoma have not been seen in any patient. Our complication rate was 20%, 5 cases of hemorrhage (9%) and there were 6 cases of synechiae (11%), all were minor complications. There was not a single major complication in our study.

However, with time complications are bound to occur in any large series. A decision to undertake surgery should never by considered lightly or without adequate informed consent. Hence, the main concern is what can be done to minimize the complications. First, repeated cadaver dissections with endoscopic instruments is recommended. Good haemostasis is mandatory. The surgeon must go through progressive learning steps, if the goal of improving techniques is to be achieved.

In our study, patients were followed for 3 months. Their subjective improvement showed 96% over all result. Out of them 90% markedly improved, 4% mildly improved and 2% had no improvement at all.

In the study of 120 patients by David W.Kennedy 97.5% patients were improved, 2.5% patients were not improved, the degree of symptomatic improvement did not vary significantly depending upon the extent of disease present preoperatively.

In a series by Smith and Brindley (1993) 88% of 200 patients symptom free 41.5% patients still required some medical therapy. The followup was for 17 months.

Of 227 operated sides evaluated endoscopically post operatively by Dr.David W.Kennedy, 44.9% showed some evidence of residual disease. This high percentage is due to stringent criteria laid down i.e., if there was, even the slightest evidence of mucosal hypertrophy, inflammation or discharge it was taken as abnormal. His period of follow up was 18 months, which was considerably longer than our study.

Despite the existing controversies on a better management of rhino sinusitis & current knowledge of chronic rhino sinusitis, functional endoscopic sinus surgery is the approach that has shown success in the past when compared to medical management [6, 7].

With the results shown in our study, Middle Meatal Antrostomy makes the most sense when surgery is truly required in the management of chronic maxillary sinusitis.

CONCLUSION

Patients with chronic maxillary sinusitis who did not benefit with medical line of treatment were treated with middle meatalantrostomy in our study to assess the effectiveness. Middle Meatal Antrostomy was successful in relieving the symptoms of chronic maxillary sinusitis such as nasal obstruction, nasal discharge, facial pain, headache and reduced sensation of smell. This study demonstrates that the Middle MeatalAntrostomy is a safe and efficient method for treating Chronic Maxillary Sinusitis.

ETHICAL STATEMENT:

i. The present study is in compliance with Ethical Standards
ii. No Funding received
iii. The authors of this study have no conflict of interest
iv. Ethical approval obtained from the ethical committee of our institution
v. Informed consent obtained from all patients

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