

Comparative Study between Middle Meatal Antrostomy with and without Partial Middle Turbinectomy in Patients with Chronic Sinusitis

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Abstract

Background and Objective: Background and objective of the study were to compare between the outcome of middle meatal antrostomy with and without partial middle turbinectomy.

Materials and Methods: A total of 30 patients satisfying the inclusion criteria with chronic rhinosinusitis were taken as the study population. The study period was from December 2014 to October 2016. In each patient, one side was randomly taken as control (Group 1) and another side as a case (Group 2). Group 1 - underwent middle meatal antrostomy without partial middle turbinectomy. Group 2 - underwent middle meatal antrostomy with partial middle turbinectomy. Patients were followed up after 1, 3, and 6 weeks and 6 months after surgery. Evaluation and comparison were done between case and control groups regarding post-operative symptom relief, patency of middle meatal antrostomy and occurrence of synechiae.

Results: This study showed that after 6 months follow-up, 36.7% had persisting nasal discharge in Group 1 and 30.0% in Group 2. After 6 months follow-up, 50.0% had persisting nasal obstruction in Group 1 compared with 30% in Group 2. After 6 months follow-up, 70% patients included in Group 1 had patent methyl methacrylate (MMA) when compared to 83.3% in patients in Group 2, and 26.7% had synechiae in Group 1 postoperatively when compared to 3.3% in patients who had undergone MMA with partial middle turbinectomy (Group 2). Improvement in nasal obstruction and occurrence of synechiae was found to be statistically significant ($P = 0.047$ and 0.039 , respectively).

Conclusion: This study concludes that partial middle turbinectomy can result in significant post-operative symptomatic relief and reduce the incidence of synechiae formation and thus help in improving surgical outcomes in patients with chronic rhinosinusitis.

Key words: Chronic rhinosinusitis, Functional endoscopic sinus surgery, Middle meatal antrostomy, Partial middle turbinectomy

INTRODUCTION

Chronic rhinosinusitis is one of the common conditions for which a patient seeks care from an otorhinolaryngologist. The disease affects a major proportion of the population worldwide and causes significant physical symptoms and emotional impairment adversely affecting the quality of life.

In this era, functional endoscopic sinus surgery (FESS) is widely used for the surgical management of chronic sinusitis. However, resection or preservation of middle turbinate in the absence of above-mentioned indicators during endoscopic sinus surgery is a matter of conflict. Those who oppose resection are in the opinion that, middle turbinate is an important anatomic and physiologic structure and unnecessary resection will lead to loss of landmark for future surgeries and causes increase post-operative complication. The other group who favor resection of turbinate is in the opinion that resection will cause improved visualization and decreases the chance of turbinate lateralization, formation of synechiae and stenosis of middle meatal antrostomy.

This study is hence undertaken to assess whether partial middle turbinectomy with middle meatal antrostomy has

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any effect on symptomatic relief, post-operative healing and any reduction of complications in patients with chronic rhinosinusitis.

Objective

To compare between the outcome of middle meatal antrostomy with and without partial middle turbinectomy.

MATERIALS AND METHODS

A prospective study of 30 patients with clinical diagnosis of rhinosinusitis, computed tomography (CT) paranasal sinuses (PNS) showing disease in bilateral maxillary sinus and osteomeatal complex, not responding to routine medical line of treatment was done in the Department of ENT, Sree Gokulam Medical College and Research Foundation from December 2014 to October 2016. Patients having symptoms and signs of chronic maxillary sinusitis with CT scan PNS showing disease in maxillary sinus and osteomeatal complex was selected. Patients with concha bullosa and paradoxical curvature of middle turbinate were excluded. Each patient was explained about the study, and written consent was taken from all the participants in the study population for the planned surgery. A detailed history was taken, and clinical examination was done. Routine blood examination and CT paranasal sinus axial and coronal cuts were taken. Each patient was given a score according to Lund-Mackey scoring of CT paranasal sinus tabulated. For this study, a score of 1 or above was considered abnormal. All patients were preoperatively evaluated with diagnostic nasal endoscopy. Each patient was given a score according to Lund-Mackey endoscopic scoring system. Score for each side was summed up. For this study, a score of 1 or above was considered to be abnormal.

RESULTS AND ANALYSIS

In this study, data regarding sociodemographic variables such as age and sex were collected. The mean age of the study population was 38.37 ± 12.31 years. The percentage of males (56.7%) were found to be more when compared to females (43.3%).

Majority of the study population presented with nasal obstruction (70%) followed by headache (53.3%), nasal discharge (50%), postnasal discharge (46.7), sneezing (30), hyposmia (30%), facial pain (30%), dental pain (16.7), halitosis (16.7), epistaxis (23.3), and pain around eyes (13.3%).

The mean score according to Lund-Mackey scoring of CT paranasal sinus was calculated as 5.57. The mean score according to Lund-Mackey endoscopic scoring system was 2.47.

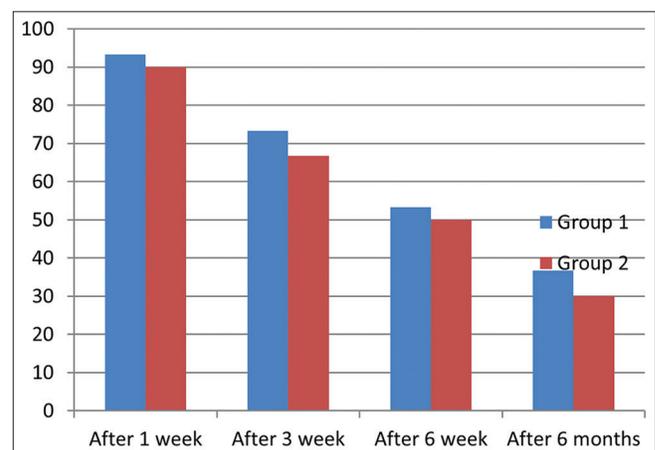
Comparison of Post-operative Symptom Relief

Nasal discharge

Postoperatively, after 1 week follow-up, 93.3% had nasal discharge in patients who had undergone methyl methacrylate (MMA) without partial middle turbinectomy (Group 1), when compared to 90.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 3 weeks follow-up, 73.3% had nasal discharge in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 66.7%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 weeks follow-up, 53.3% had nasal discharge in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 50.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 months follow-up, 36.7% had nasal discharge in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 30.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). The results are graphically represented in Graph 1.

Nasal obstruction

Postoperatively, after 1 week follow-up, 93.3% had nasal obstruction in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 90.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 3 weeks follow-up, 73.3% had nasal obstruction in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 63.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 weeks follow-up, 57.0% had nasal obstruction in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 47.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 months follow-up,



Graph 1: Comparison of postoperative symptom relief (nasal discharge)

50.0% had nasal obstruction in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 30%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). The results are graphically represented in Graph 2.

Patency of Osteomeatal Complex

Postoperatively, after 1 week follow-up, all patients who had undergone MMA without partial middle turbinectomy (Group 1), and patients who had undergone MMA with partial middle turbinectomy (Group 2) had score 0 for patency of MMA. After 3 weeks follow-up, 10.0% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 10.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 weeks follow-up, 16.7% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 10.0%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 months follow-up, 30.0% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 16.7%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). The results are graphically represented in Graph 3.

Synechiae

Postoperatively, after 1 week follow-up, all patients who had undergone MMA without partial middle turbinectomy (Group 1), and patients who had undergone MMA with partial middle turbinectomy (Group 2) had score 0 for synechiae. After 3 weeks follow-up, 3.3% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to nil, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 weeks follow-up, 6.7% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to nil, in patients who had undergone MMA with partial middle turbinectomy (Group 2). After 6 months follow-up, 26.7% had score 1 in patients who had undergone MMA without partial middle turbinectomy (Group 1), when compared to 3.3%, in patients who had undergone MMA with partial middle turbinectomy (Group 2). The results are graphically represented in Graph 4.

DISCUSSION

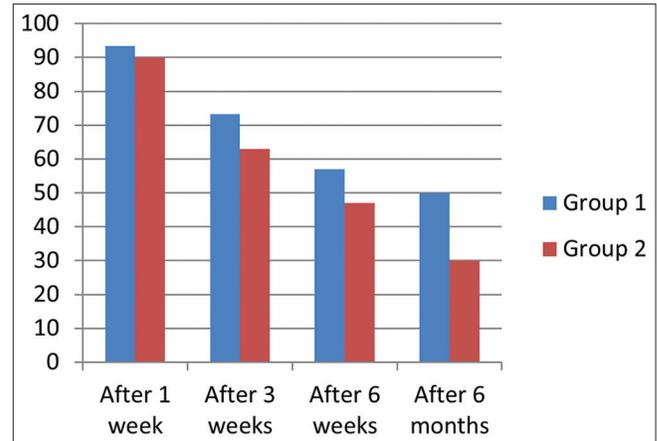
Chronic rhinosinusitis is a common health problem affecting a significant proportion of the population.

Pathogenesis of sinusitis was a point of interest from the 17th century onward. Zuckerkandl in early 19th century

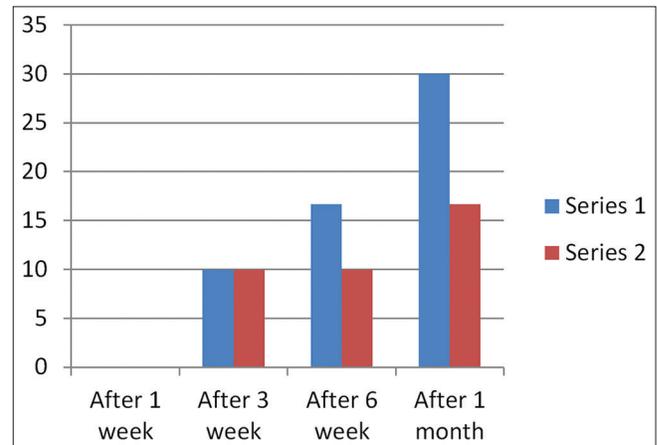
anatomically described PNS in detail and demonstrated the pathologies affecting it.¹

Schneider suggested that mucous was secreted by the lining mucosa of PNS.¹

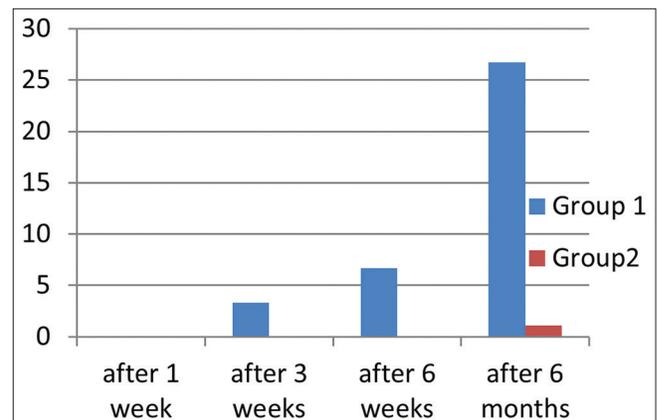
Transnasal sinus surgery began in 1886 when Miculitz reported on the endonasal fenestration of the maxillary sinus.¹



Graph 2: Comparison of postoperative symptom relief (nasal obstruction)



Graph 3: Comparison of postoperative MMA patency



Graph 4: Comparison of postoperative synechie

Later on, the anterior wall of the maxillary sinus was opened by surgeons through the canine fossa and was kept open for irrigation.² Caldwell (1893), Spicer (1894) and later Luc in 1897 closed the canine fossa incision after an intranasal antrostomy and the removal of the infected mucosa.²

Introduction of nasal endoscopy has revolutionized the treatment of chronic sinusitis. Hirschmann in 1901 used modified cystoscope to examine sinonasal cavity.³ Reichert in 1902 performed the first endoscopic sinus surgery using an endoscope to eradicate maxillary sinusitis, through the oroantral fistulae. Maltz in 1925 encouraged the use of endoscope for evaluation of sinonasal cavity. Hopkins invented the rod endoscope in 1950 following which, many surgeons used it for sinonasal surgery.³ Messeklinger in 1978 described the role of osteomeatal complex in the pathogenesis of maxillary sinusitis and he introduced the concept of FESS. Stammberger popularized this technique. Further development in FESS, was done by David Kennedy and Jim Zinreich after the implementation of modern imaging.

The invention and use of nasal endoscopy revolutionized the treatment of chronic sinusitis.

In this era, endoscopic sinus surgery is the most popularly used technique for the treatment of chronic rhinosinusitis with a history of failed medical treatment.

FESS is a minimally invasive technique which helps to eradicate the diseased mucosa improves ventilation of paranasal sinus and improves nasociliary clearance of mucus. Endoscope permits a better view of surgical field, more precise clearance of diseased mucosa and when compared to other conventional surgeries, it has fewer complications and a lower rate of recurrence. In spite of the advantages of FESS over other conventional techniques, the disease can persist after surgery. Recurrence of disease is mainly due to persisting anatomical obstruction and abnormal mucociliary clearance.

Various studies were conducted regarding the factors responsible for failure of FESS. Stenosis of natural ostium of maxillary antrum and formation of synechiae were found to be the major contributing factors causing recurrence of disease after FESS. Host factors such as duration of wound healing and proper post-operative management also decide the success rate of surgery.

The role of partial middle turbinectomy with FESS has been a matter of controversy. While some groups suggest that middle turbinate is an important landmark for future procedures and thus should be preserved, another group is

of the opinion that resection of middle turbinate can help in getting a better view of surgical field, lower incidence of turbinate lateralization and better outcome.

A study conducted by El-Nasser showed that middle turbinectomy in nasal patients with rhinogenic headache can significantly reduce the symptom and thus gives better outcome.⁴

A study was conducted by Ahmed-Hussien on the effect of nasal airflow resistance after middle turbinectomy. The study showed that when these two surgical techniques, i.e., FESS with preserved middle turbinate and FESS with resected middle turbinate were compared regarding mean post-operative nasal airway resistance, the study showed no significant statistical difference (t -test $P > 0.5$).⁵

This study was intended to assess the role of partial middle turbinectomy with MMA in patients with chronic rhinosinusitis. 30 patients with bilateral chronic sinusitis were selected in this study. In each side, one side underwent MMA without partial middle turbinectomy, and the other side had MMA with partial middle turbinectomy. This was done to reduce the confounding factors such as nature of tissue reaction and immunological etiology.

In this study, data regarding sociodemographic variables such as age and sex were collected. The mean age of the study population was 38.37 ± 12.31 years. The percentage of males (56.7%) were found to be more when compared to females (43.3%).

Majority of the study population presented with nasal obstruction (70%) followed by headache (53.3%), nasal discharge (50%), postnasal discharge (46.7), sneezing (30%), hyposmia (30%), facial pain (30%), dental pain (16.7), halitosis (16.7), epistaxis (23.3), and pain around eyes (13.3%). A study conducted by Gulati *et al.* showed that the majority of the study group presented with nasal discharge (75%), followed by postnasal discharge (67.5%), nasal discharge (57.5%), headache (57.5%), and sneezing (45%).

The post-operative outcome in the two groups, patients who had undergone MMA without partial middle turbinectomy (Group 1), and patients who had undergone MMA with partial middle turbinectomy (Group 2) were assessed both subjectively and also by check endoscopy at fixed intervals of time.

This study shows that after 6 months follow-up, 63.3% had an improvement for nasal discharge postoperatively in patients who had undergone MMA without partial middle turbinectomy (Group 1) and 70% had an improvement

for the same in patients who had undergone MMA with partial middle turbinectomy (Group 2). The P value was 0.687 and showed that post-operative improvement for nasal discharge after partial middle turbinectomy was statistically not significant. A study conducted by Santosh *et al.* showed that, after 6 months follow-up, 20 out of 50 (40%) patients who had undergone MMA with partial middle turbinectomy had improvement for nasal discharge postoperatively when compared to 10 out of 50 (20%) patients who had undergone MMA without partial middle turbinectomy ($P = -0.029$).⁶

The difference in result could be on account of subjective assessment of nasal discharge in this study against endoscopic assessment only in the study conducted by Santosh *et al.*

This study also assessed the improvement in nasal obstruction after partial middle turbinectomy. After 6 months follow-up, 50% had improvement for nasal obstruction postoperatively in patients who had undergone MMA without partial middle turbinectomy (Group 1), and 70.0% had an improvement for the same, in patients who had undergone MMA with partial middle turbinectomy (Group 2). The P value was 0.047 and thus showed that post-operative improvement for nasal obstruction after partial middle turbinectomy was statistically significant.

A study conducted by Gulati *et al.* showed that, after follow-up, 50% patients who had undergone MMA without partial middle turbinectomy had improvement for nasal obstruction when compared to 88% in patients who had undergone MMA with partial middle turbinectomy ($P < 0.01$).⁷ Our findings confirm to the findings of the study conducted by Gulati *et al.*

Patency of middle meatal antrostomy was compared between the two groups. This study showed that, after 6 weeks follow-up, 83.3% in patients who had undergone MMA without partial middle turbinectomy (Group 1) had patent MMA when compared to 90% in patients who had undergone MMA with partial middle turbinectomy (Group 2). It also showed that after 6 months follow-up, 70% patients who had undergone MMA without partial middle turbinectomy (Group 1) had patent MMA when compared to 83.3% patients who had undergone MMA with partial middle turbinectomy. The P value was 0.5 for 6 weeks postoperatively and 0.125 for 6 months postoperatively and was found to be statistically not significant.

A study conducted by Gulati *et al.* showed that 75% in patients who had undergone MMA without partial middle turbinectomy (Group 1) had patent MMA when compared

to 90% in patients who had undergone MMA without partial middle turbinectomy (Group 2).⁷ The P value was 0.01 which showed statistical significance. The difference in findings is probably due to different methods used in assessment of width of MMA.

This study compared the rate of synechiae formation postoperatively between the two groups. It showed that after 6 months follow-up, 26.7% had synechiae in patients who had undergone MMA without partial middle turbinectomy (Group 1) when compared to 3.3% in patients who had undergone MMA with partial middle turbinectomy (Group 2). The P value was 0.039 and found to be statistically significant.

A study conducted by Santosh *et al.* showed that after 6 months follow-up, 25% had synechiae in patients who had undergone MMA without partial middle turbinectomy (Group 1) when compared to 5% in patients who had undergone MMA with partial middle turbinectomy (Group 2). The P value was <0.01 .⁶

Both studies show that the reduction in synechiae formation is a significant factor in post-operative periods of patients with MMA with partial middle turbinectomy.

In this study, patients who had undergone MMA with partial middle turbinectomy showed better post-operative symptomatic relief in nasal discharge and nasal obstruction when compared with patients who had undergone MMA without partial middle turbinectomy. The study also showed that MMA patency was improved in patients with resected middle turbinate when compared with preserved middle turbinate. The formation of synechiae postoperatively was significantly reduced in patients who had undergone MMA without partial middle turbinectomy.

CONCLUSION

This study was conducted to compare the outcome between middle meatal antrostomy with and without middle turbinectomy in patients with bilateral chronic sinusitis. The parameters assessed were post-operative symptom relief for nasal discharge and nasal obstruction, patency of MMA and synechiae formation assessed endoscopically. All the parameters showed improvement after MMA with partial middle turbinectomy when compared to MMA without partial middle turbinectomy. Two parameters, post-operative symptomatic relief of nasal obstruction and formation of synechiae was found to be statistically significant and in agreement with other similar studies. Nasal discharge and MMA patency, though improved, was not found to be statistically significant.

This study concludes that partial middle turbinectomy can result in post-operative symptomatic relief and significantly reduce the incidence of synechia formation postoperatively and thus help in improving long-term surgical outcomes in patients with chronic rhinosinusitis.

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