Acta Scientific Otolaryngology (ISSN: 2582-5550)

Volume 8 Issue 3 March 2026

Research Article

Comparative Study of Maxillary Sinus Ostium Preservation Technique Versus Wide Middle Meatotomy Technique in Management of Chronic Maxillary Sinusitis

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DOI: 10.31080/ASOL.2026.08.0797

Received: March 11, 2026

Published: May 20, 2026

Abstract

Introduction: E.S.S focuses on treating the underlying cause of the problem. This permits direct visualization of the maxillary sinuses and diseased or obstructive tissue which can be removed if necessary. There is often less removal of normal tissue and surgery can frequently be performed on an outpatient basis.

Objectives: A Hospital based case control study will be performed at Department of Otorhinolaryngology AlZahrae university hospital

Methods: 30 patients with bilateral Chronic Rhinosinusitis not responding to proper medical treatment.

Each of the thirty patients of the study group will undergo randomly uncinectomy with ostium preservation technique on one side and uncinectomy with middle meatal antrostomy on the other side.

Keywords: Maxillary Sinus Ostium Preservation; Middle Meatotomy; Chronic Maxillary Sinusitis

Introduction

Functional endoscopic sinus surgery (F.E.S.S) was started in Europe by Stammberger and Messerklinger W.in Germany and then introduced into the US by Dr. David W. Kennedy from the University of Pennsylvania in the mid 1980s. It has revolutionized the surgical treatment of chronic sinusitis [17].

FESS aims to remove nasal polyps, creates a sinus cavity, drain the purulent discharge and facilitates mucociliary clearance [5]. However Catalano in 2006 supported theory of minimally invasive sinus technique as it significantly improves the outcome in patients with chronic sinusitis and should strongly be considered as the initial surgical option for such patients and the effect of potential risks may happen following middle meatal antrostomy such as middle meatal scarring, interruption of mucociliary clearance and improper ostial function.

Sinus drainage is impeded by the transition spaces that the anterior paranasal sinuses drain into, not the ostia themselves. Addressing the transition spaces and leaving the ostia intact, using the minimally invasive sinus technique, should reverse chronic rhinosinusitis [19].

Materials and Methods

A Hospital based case control study will be performed at Department of Otorhinolaryngology Al-Zahra university hospital from December 2020 to 2023.

Study design

The study is designed as Prospective randomized comparative study.

- **Type of study:** Prospective randomized comparative study
- **Study setting:** At Alzahra hospital
- **Study Period :** 2 years
- **Sample Size:** 30 patients
- **Ethical Considerations:** All patients were included in this study only after taking written informed consent for the operation.

Study population

- Inclusion Criteria:
  - Patients aged between (17 – 56) years
  - Patients are 12 males (40.0%) and 18 females (60.0%)
  - Patients with moderate to severe chronic rhinosinusitis for at least 12 weeks, despite Proper medical therapy.
- Exclusion Criteria:
  - Any patient with Unilateral sinusitis
  - Aspirin sensitivity
  - Cystic fibrosis
  - severe nasal septal deviation
  - Invasine and Non Invasive Fungal Rhinosinusitis
  - Sinonasal tumours or diseases with severe impact on general immunity.

Study subjects

The populations included in our study were divided into two groups who undergo with two surgical techniques: Group A (underwent uncinectomy with Enlarging middle meatotomy on one side) Group B (uncinectomy with Ostium preservation on the other side).

- Each Patient of the study group will be subjected to Careful History taking applying appropriate symptom Score (Total Nasal Symptom Score),
- Total Nasal Symptom Scores (TNSS) Each symptom (sneezing, congestion, itching, and rhinorrhea) is graded from 0-3 by the participants during the screening (Table 1).
- Nasal Endoscopic Examination applying appropriate examination score, Lund-Kennedy endoscopic grading system (Table 2)
- High resolution CT imaging for sinonasal regions with careful evaluation of Osteomeatal Complex (OMC) that will be reconstructed at 1mm slice thickness Maxillary sinus grading and scoring system will be done according to Lund Mackay Scoring System (LMSS) (Table 3).

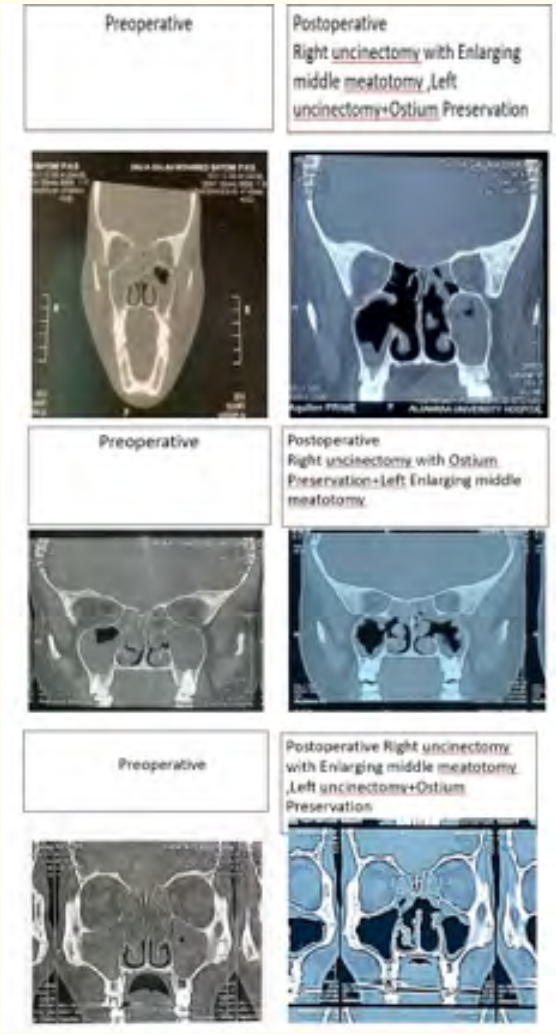

Figure 1

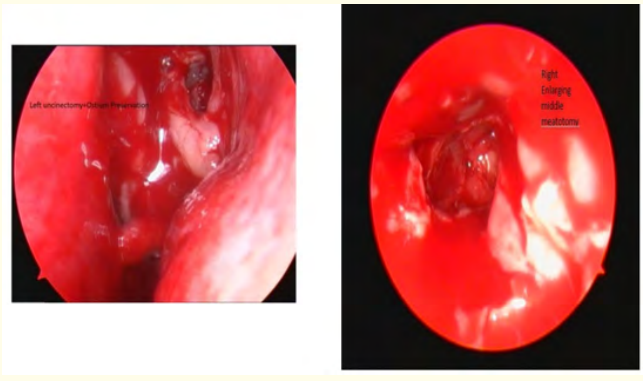

Figure 2

Score	Symptoms
0 = None	No symptoms evident
1 = Mild	Symptom present but easily tolerated
2 = Moderate	Definite awareness of symptom; bothersome but tolerable
3 = Severe	Symptom hard to tolerate; interferes with daily activity

Table 1: Total Nasal Symptom Scores (TNSS) Each symptom (sneezing, congestion, itching, and rhinorrhea) is graded from 0-3 by the participants during the screening.

Characteristics:	Score definition
Nasal polyps	0 = none; 1 = confined to middle meatus; 2 = beyond middle meatus
Discharge	0 = none; 1 = clear and thin; 2 = thick and purulent
Edema	0 = absent; 1 = mild; 2 = severe
Scarring	0 = absent; 1 = mild; 2 = severe
Crusting	0 = absent; 1 = mild; 2 = severe

Table 2: Lund-Kennedy endoscopic grading system.

Sinus	Right sinus	Left sinus
Frontal	0-2	0-2
Anterior ethmoids	0-2	0-2
Posterior ethmoids	0-2	0-2
Maxillary	0-2	0-2
Sphenoid	0-2	0-2
Osteomeatal complex	0 or 2	0 or 2

Table 3: Maxillary sinus grading and scoring system will be done according to Lund Mackay Scoring System.

Variables		Group				Chi- square	P-value
		Enlarging Middle Meatotomy		Ostium Preservation			
		No.	%	No.	%		
Nasal Polyps (Post)	None	5	16.7%	5	16.7%	0.089	1.000
	Confined to Middle Meatus	17	56.7%	16	53.3%		
	Byond Middle Meatus	8	26.7%	9	30.0%		
Discharge (Post)	None	8	26.7%	8	26.7%	0.000	1.000
	Thin and Clear	22	73.3%	22	73.3%		
	Thick and Purulent	0	0.0%	0	0.0%		
Edema (Post)	Absent	14	46.7%	10	33.3%	1.111	0.292
	Mild	16	53.3%	20	66.7%		
	Severe	0	0.0%	0	0.0%		
Scarring (Post)	Absent	24	80.0%	22	73.3%	0.373	0.542
	Mild	6	20.0%	8	26.7%		
	Severe	0	0.0%	0	0.0%		
Crusting (Post)	Absent	24	80.0%	22	73.3%	0.373	0.542
	Mild	6	20.0%	8	26.7%		
	Severe	0	0.0%	0	0.0%		

Table 5: Comparison between group A (Enlarging Middle Meatotomy) and group B (Ostium Preservation) concerning Post operative Lund Kennedy Endoscopic Grading system.

Variables		Group				Chi square	P-value
	Enlarging Middle Meatotomy (A)		Ostium Preservation (B)				
	No.	%	No.	%			
Frontal (Post)	No Opacification	7	23.3%	13	43.3%	3.600	0.165
	Partial Opacification	13	43.3%	7	23.3%		
	100% Opacification	10	33.3%	10	33.3%		
Anterior Ethmoid (Post)	No Opacification	5	16.7%	2	6.7%	1.415 (FE#)	0.576
	Partial Opacification	15	50.0%	17	56.7%		
	100% Opacification	10	33.3%	11	36.7%		
Posterior Ethmoid (Post)	No Opacification	5	16.7%	5	16.7%	0.321	0.852
	Partial Opacification	13	43.3%	11	36.7%		
	100% Opacification	12	40.0%	14	46.7%		
Maxillary (Post)	No Opacification	8	26.7%	6	20.0%	2.513	0.285
	Partial Opacification	9	30.0%	15	50.0%		
	100% Opacification	13	43.3%	9	30.0%		
Sphenoid (Post)	No Opacification	14	46.7%	17	56.7%	0.743	0.690
	Partial Opacification	6	20.0%	4	13.3%		
	100% Opacification	10	33.3%	9	30.0%		
Osteomeatal Complex (Post)	Not Occluded	8	26.7%	8	26.7%	0.367	0.832
	Partially Occluded	11	36.7%	13	43.3%		
	Occluded	11	36.7%	9	30.0%		

Table 6: Comparison between group A (Enlarging Middle Meatotomy) and group B (Ostium Preservation) concerning post operative lund mackay imaging scoring system.

All patients of the study group will be evaluated Symptomatically, Endoscopically, Radiologically, Preoperatively and Postoperatively (1-6 months).

Results and Analysis

There is 30 patients in our study we divided into 2 groups The following observations were made in 30 patients who undergo randomly uncinectomy with ostium preservation technique on one side and uncinectomy with middle meatal antrostomy on the other side.

The difference between both groups A, B in Postoperative clinical assessment was found to be statistically insignificant as in group A there is 2 cases (6.7%) with no symptoms, 23 cases (76.7%) with mild symptoms, 5 cases (16.7%) with moderate symptoms and no cases with severe symptoms.

But In group B there is no cases with no symptoms, 20 cases (66.7%) with mild symptoms, 8 cases (26.7%) with moderate symptoms and 2 cases (6.7%) with severe symptoms P value 0.179 (Table 4).

The difference between both groups A and B in Postoperative endoscopic assessment by Lund Kennedy Endoscopic Grading system found to be statistically insignificant as In both groups A&B there is 8 cases (26.7%) with no discharge, 22 cases (73.3%) with Thin & Clear discharge and there is no cases with thick and Purulent discharge, P value was 1.000 for nasal Discharge. In group A there is 14 cases (46.7%) with no edema, 16 cases (53.3%) with Mild edema and no cases with severe edema. In group B there is 10 cases (33.3%) with no edema, 20 cases (66.7%) with Mild edema and no cases with severe edema, P value 0.292 for Edema (Table 5). The difference between both groups A and B in Postoperative Radiologic assessment by lund mackay imaging score was found to be statistically insignificant in the assessment of the maxillary sinus, as in group A there is 8 cases (26.7%) with no opacification, 9 cases (30.0%) with partial opacification and 13 cases (43.3%) with 100% opacification, in group B there is 6 cases (20%) with no opacification, 15 cases (50%) with partial opacification and 9 cases (30%) with 100% opacification P value 0.285 (Table 6). In our study it was observed that both groups A and B postoperatively showed improvement separately in their overall clinical assessment by TNSS, endoscopically by Lund Kennedy Endoscopic Grading system and radiologically by lund mackay imaging score but the difference between both groups A, B was found to be statistically insignificant.

Discussion

The effectiveness of both interventions (uncinectomy with ostium preservation and uncinectomy with antrostomy) is still questionable in the treatment of patients with chronic sinusitis developed by nasal polyp. This study aimed to compare the effectiveness of both methods for the drainage system in patients who usually have severe and longstanding nasal diseases [11].

Our aim is to compare the efficacy of the Ostium Preserving Technique Versus Enlarging Middle Meatotomy Technique in the Management of Chronic Maxillary Sinusitis.

Our study included 30 patients, each of the thirty patients of the study group will undergo randomly uncinectomy with ostium preservation technique on one side and uncinectomy with middle meatal antrostomy on the other side.

The mean age of our cases was 36.17, females represented 60% of cases and 40% males comparing to Myller 2013 as his study group was 30 cases 20 females represented 66.6% and 33.33% males mean age 47 years.

With Wadwongtham and Aeumjaturapat as their study group were 60 cases 26 females represented 43.3% and 56.6% males mean age 42 years.

With Dany 2018 their study group were 60 cases 28 cases females represented 46.6% and 53.3% males mean age 40.5 years.

In our study, we grouped the patients into 2 groups preoperatively and postoperatively

All preoperative assessment of our patients include Patients with moderate to severe chronic rhinosinusitis for at least 12 weeks, despite proper medical therapy, as we exclude cases of Unilateral sinusitis, Aspirin sensitivity, Cystic fibrosis, Severe nasal septal deviation and Sinonasal tumours or diseases with severe impact on general immunity.

In our study we found that there is no significant difference (P value 1.000) preoperatively between group (A) Enlarging middle meatotomy and group (B) ostium preservation as regards subjective (TNSS).

In the study of Myller 2013 there was no significant difference preoperatively between both groups.

In the study of Wadwongtham and Aeumjaturapat 2003 there was no significant difference preoperatively between both groups.

In the study of Albu and Tomescu 2004 there was no significant difference preoperatively between both groups.

In our study we found that there is no significant difference (nasal polyp) (P –value 0.100) preoperatively, edema (P –value 1.000) between group (A) Enlarging middle meatotomy and group (B) ostium preservation as regards by lund kennedy Endoscopic grading system.

In our study we found that there is no significant difference (P value 0.292) preoperatively between group (A) Enlarging middle meatotomy and group (B) ostium preservation as regards by lund Mackay Imaging Scoring system.

In our study we found that there is no significant difference (P value 0.179) postoperatively between group (A) Enlarging middle meatotomy and group (B) ostium preservation as regards subjective clinically by (TNSS) score.

Myller 2013 there was significant difference postoperatively between 2 groups as regards subjective clinically.

In Dany 2018 there was a significant difference postoperatively as regards subjective clinically (TNSS) score with middle meatal antrostomy.

Improved more than 50% headache, more than 60% in facial pain and 91.5% improvement in rhinorrhea.

Albu and Tomescu 2004 there was no significant difference postoperatively between 2 groups as regards subjective clinically as rhinorrhea improved equally between large and small antrostomy 40%.

In our study we found that there was no significant difference (P –value 1.000 for Nasal Polyps) and (P – value 0.292 for edema) postoperatively between group (A) Enlarging middle meatotomy and group (B) ostium preservation as regards Endoscopically by lund kennedy Endoscopic grading system.

In the study of Salam and Cable 1993 showed oedematous or polypoidal mucosa seen in 88 sinuses presented (86.3%) with enlarging middle meatotomy.

But in our study the edema was 53.3% with enlarging middle meatotomy group and 66.7% with ostium preservation group.

In our study we found that there is no significant difference (P value 0.285) postoperatively between group (A) Enlarging middle meatotomy and group (B) ostium preservation as regards Radiologically by lund Mackay Scoring system.

In the study of Wadwongtham and Aeumjaturapat 2003 there was significant difference (p-value) 0.002 postoperatively as regards Radiologically the patency of drainage for the maxillary sinus between Large middle meatal antrostomy group represented %85 and Undisturbed maxillary ostium group represented 63.3% But in our study there is high significance difference (P value was 0.009**) as no opacifications of the maxillary sinus was 26.7%, partial opacifications was 30.0% and 100% Opacification was 43.3% with enlarging middle meatotomy group.

there is high significance difference (P value was 0.007**) as no opacifications of the maxillary sinus was 20.0%, partial opacifications was 50.0% and 100% Opacification was 30.0% with ostium preservation group.

In the study of Jina 2015 there was a significant difference (P 0.01) postoperatively as regards Radiologically the opening rate of maxillary sinus was 97.5% at the side without expanding the ostium (ostium preservation group) after 6 months and 77.5% at the side with expanding the ostium (enlarging middle meatotomy group).

In our study we found that there is a high significant difference (P value 0.000**) between preoperative group and postoperative group regarding subjective clinical assessment (TNSS score) in group A (Enlarging middle meatotomy).

In the study of Kamel 1989 there was a significant difference between preoperative group and postoperative group (95%) improvement regarding subjective clinical assessment.

In the study of Ishibashi., *et al*. 1999 there was a significant difference between preoperative group and

postoperative group (88%) subjective clinical assessment.

In the study of Lavigne., *et al*. 2000 contrary with our study, there was no significant difference between preoperative group and postoperative group (46%) persistent improved and (54%) were unchanged or worsened subjective clinical assessment.

In our study we found that there is a high significant difference (P value 0.000**) for nasal polyp and(P value0.001**) for edema between preoperative group and postoperative group regarding endoscopic assessment by lund kennedy endoscopic grading system in group A (Enlarging middle meatotomy).

In the study of Dany., *et al*. 2018 there was no significant difference between preoperative group and postoperative group for assessment of polyps (P value 0.221) and for highly significant difference between preoperative group and postoperative group for assessment of edema (P value 0.000).

In our study we found that there is a high significant difference (P value 0.009**) for the maxillary sinus between preoperative group and postoperative group regarding radiological assessment by lund Mackay scoring system in group A (Enlarging middle meatotomy) in all sinuses except the sphenoid sinus there is no significant difference.

In the study of Salam and Cable 1993 showed a significant difference 80% widely patent for the maxillary sinus.

In the study of Dany., *et al*. 2018 there was no significant difference (64%) between preoperative group and postoperative group for the maxillary sinus regarding radiological assessment by lund Mackay scoring system.

In our study we found that there is a high significant difference (P value 0.002**)between preoperative group and postoperative group regarding subjective clinical assessment (TNSS) in group B (Ostium preservation).

In the study of Singh., *et al*. 2021 there was a significant difference (80.58) between preoperative group and postoperative group regarding subjective clinical assessment (TNSS).

In our study we found that there is a high significant difference (P value 0.009**)for nasal polyp and(P value 0.002**) for edema between preoperative group and postoperative group regarding endoscopic assessment by lund kennedy endoscopic grading system in group B (Ostium preservation).

In our study we found that there is a high significant difference (P value 0.007**) for the maxillary sinus between preoperative group and postoperative group regarding radiological assessment by lund Mackay scoring system in group B (Ostium preservation) in all sinuses except for the frontal and the sphenoid sinuses there are no significant difference.

In the study of Jina 2015 there was significant difference (P value 0.01) for the maxillary sinus between preoperative group and postoperative group regarding radiological assessment.

In our study we found that there is no significant difference between the two techniques but there were effective procedures individually in cases with chronic maxillary sinusitis.

Our results are in agreement with Myller (2006) as there was no statistical difference between the 2 operative techniques uncinectomy on one side only and on a contralateral side a middle meatal antrostomy was additionally performed.

Myller in (2013): agreed with our study as he conclude that both procedures (uncinectomy only on one side and antrostomy on the contralateral side) seem to be efficient in providing relief and satisfaction (clinically).

Our results are in agreement with kamel 1989 as he concluded that the middle meatal antrostomy is an effective and safe procedure in treating cases with chronic maxillary sinusitis as the patency rate was 94.7%.

Our results are in agreement with Wormald and Mcdonogh 1998 as they recommended uncinectomy as it allows easy identification of the natural ostium with patients with chronic maxillary sinusitis.

Our results are in agreement with Ishibashi., *et al*. 1999 as they concluded that the middle meatal antrostomy is an effective and safe procedure in treating cases with chronic maxillary sinusitis as the patency rate in their results was 88% significantly improved.

Our results are in agreement with Albu and Tomescu 2004 as their results were on the relationship between the size of antrostomy and the degree of improvement in each of the sinusitis symptoms and they concluded that the size of the middle meatal antrostomy has no influence on the outcome of endonasal surgery for chronic rhinogenic maxillary sinusitis.

Our results are in agreement with Luukkainen., *et al*. 2012 as they concluded that there was good results with both surgical procedures (ostium preservation or antrostomy).

Our results are also in agreement with Dany 2018 as he concluded that the middle meatal antrostomy was a safe and effective procedures in patients with chronic maxillary sinusitis, there was a significant improvement subjectively as well as objective parameters.

Our results are in contrary with Lavigne., *et al*. 2000 as 46% of the study group had persistant improvement after enlarging meatotomy and 54% were unchanged or worsened after surgery with disabling rhinorrhea and repeated sinusitis. More than 50% of patients with perennial rhinitis and CRS do not improve after surgery, a response that may be predicted by more cells expressing IL-5 mRNA in the ethmoid sinuses. The increased number of cells expressing IL-5 mRNA may have the potential to be used as a marker for prediction of the response to surgery. The worsening of symptoms in some patients with CRS after sinus surgery could

be a result of the disturbance of the anatomy of the sinuses and exposure to the environmental allergens.

Our results are in contrary with Toskala and Rautiainen 2005 as they concluded that the surgery didn't improve mucociliary clearance postoperatively. Because mucociliary function in maxillary sinusitis remains poor even 6 months postoperatively, with many pathological findings still visible in the sinus epithelium.

Our results are on contrary to Salam and Cable 1993 as their study showed 80% success rate after enlarging middle meatotomy. However, their study is against uncinectomy with ostium preservation only because Maxillary ostial drainage wasn't enough, they concluded that a significant relationship existed between the degree of patency and the degree of improvement in each of the symptoms of chronic maxillary sinusitis.

Our results are on contrary to Levine and Jankowski 1990 as they recommended a large middle meatal antrostomy for the maxillary ostium in cases of chronic maxillary sinusitis as the maxillary ostium is not adequate for drainage and it needs a large gravity dependent drainage.

Our results are on contrary to kennedy., *et al*. 1987 as their study depend on middle meatal antrostomies as the patency rate was 98% postoperatively clinically and endoscopically. They suggest that mucociliary clearance occurs through the surgically widened ostium.

Our results are in contrary with Jina 2015 as her study was against antrostomy but she agreed with uncinectomy procedure as her results were 97% opening rate at the side with no expanded ostium but there were 77.5% at the contralateral side (antrostomy side). She concluded that the surgery leads to disruption of mucociliary movement, by causing retention of secretions with subsequent obstruction of the maxillary ostium.

Conclusion

Both surgical techniques (Enlarging middle meatotomy) and (Ostium preservation) are effective in treating chronic maxillary sinusitis.

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