

**Original article**

## **A comparative study of partial uncinectomy versus complete uncinectomy in isolated maxillary sinus disease**

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### **ABSTRACT:**

**Introduction:** Chronic rhinosinusitis is one of the most common problems encountered by otorhinolaryngologist worldwide, leading to man-days loss at work and absenteeism at school. Treatment of choice for chronic rhinosinusitis is essentially medical and those refractory to adequate medical treatment are treated with functional endoscopic sinus surgery. Keeping in mind the philosophy of minimum surgery with mucosal preservation, conventional complete uncinectomy is considered to be unnecessary in isolated chronic maxillary sinusitis. Partial uncinectomy and middle meatal antrostomy would be sufficient to clear the disease from the maxillary sinus. It will interfere minimally with natural mucociliary clearance. Our study is conducted to evaluate the efficacy of partial uncinectomy versus complete uncinectomy in terms of post-operative improvement of symptoms and the surgical complications of two techniques of uncinectomy.

**Methods:** Our study included 34 patients with symptoms and signs of isolated chronic maxillary sinusitis, not responding to adequate treatment for 3 months. Patients were randomly assigned to partial and complete uncinectomy groups. Partial uncinectomy was done by creating a Parson's window in the lower one third of vertical portion of uncinuate process and complete uncinectomy group underwent conventional surgery. Symptoms improvement after the surgery and incidence of synechia formation in the middle meatus, injury to lamina papyracea, injury to nasolacrimal duct and obstruction of frontal recess were compared between the groups.

**Result:** Both partial and complete uncinectomy are equally good or nearly to the same extend in terms of symptoms relief. However the complication rates in partial uncinectomy group was significantly less compared to complete uncinectomy.

**Conclusion:** Although the surgical technique of partial uncinectomy is not widely used, this technique can be used for disease limited to maxillary sinus. It has advantages of less mucosal injury, minimal intra- and post-operative complications.

**Keywords:** Partial uncinectomy, Isolated chronic maxillary sinusitis

### INTRODUCTION

Removal of uncinuate process is the initial surgical maneuver to expose the infundibulum, ethmoid air cells and maxillary sinus ostium in functional endoscopic sinus surgery (FESS). Total uncinectomy is usually performed in FESS. There are two techniques namely, classical method described by stammburger and swing door technique described by wormald. However the aim of any surgery is to inflict minimal trauma to the surrounding tissues

resulting in not only lesser swelling, edema, pain and morbidity but also minimal interference to muco-ciliary activity and with optimal successful results from the patient's point of view both anatomically and physiologically. Osteomeatal complex (OMC) serves a very important role in muco-ciliary clearance as it has narrow passage leading to faster movement of mucus blanket as cilia are effective from both sides. While doing FESS, the general practice is to remove the whole of uncinat process, there by altering the very purpose of the OMC i.e. narrow passages, especially for frontal sinus drainage. Another fact is that cilia of the healed nasal mucosa beats abruptly and it affect the normal mucociliary clearance. Hence minimum surgery/minimum injury to mucosa is highly desirable. Keeping this in view it has been felt that for a limited disease of maxillary sinus complete uncinectomy may be an 'overdoing the surgery'. Professor Heinz Stammberger once said that I will be the happiest man if I find during the endoscopy that surgery is not required at all. Total removal of uncinat is essential in diseases involving sinuses other than maxilla but the vertical part of uncinat can be preserved in limited diseases like isolated maxillary sinus diseases.

Conventional complete uncinectomy may lead to delay in healing of the site, more synechia formation, injury to lamina papyracea or nasolacrimal duct, or risk of iatrogenic stenosis of the frontal recess<sup>1</sup>. Thus removal of the lower half of the uncinat may be sufficient in isolated chronic maxillary sinus diseases. Additionally this method is easier to perform and associated with less mucosal injury.

The surgical technique of partial uncinectomy is not widely performed and not widely studied. Shorter operation duration, more rapid healing and lower possibility of complications are advantages of this technique compared to conventional complete uncinectomy. This study is to fill the lacuna in the literature about the less studied partial uncinectomy and help the surgeons to choose a less invasive procedure with less morbidity and good outcome as the conventional method.

#### AIMS AND OBJECTIVES

Primary objective: To determine the efficacy of partial uncinectomy versus complete uncinectomy in terms of post-operative improvement of symptoms in isolated chronic maxillary sinus disease.

Secondary objectives: To evaluate the complications emerged during each techniques of uncinectomy.

#### MATERIALS AND METHODS

This hospital based prospective randomized comparative study was conducted at ENT department, Northern Railway Central Hospital, New Delhi from August 2019 to October 2020. All patients diagnosed with isolated maxillary sinus disease clinically and with computed tomography findings, not responding to adequate medical treatment for 3 months were included in the study and allocated for elective surgical procedure. In total, 34 patients were allocated randomly to partial and complete uncinectomy group equally using a random number table. The study protocol and surgical intervention were explained to the patient and family and an informed written consent was obtained for participation in the study. Clearance for the study was taken from our institutional ethical committee (IEC-NRCH).

All the patients included in the study underwent a detailed clinical examination pertaining to ENT, diagnostic nasal endoscopy, CT Paranasal sinuses and symptom assessment based on table adopted from SNOT-22 scale. Patients were asked about the severity of nasal blockage, runny nose, post nasal discharge, facial pain/pressure and decreased

sense of smell/taste and scores noted. Patients with disease involving a sinus more than maxillary sinus, acute sinusitis, retention cyst, diffuse polyposis, post-operative maxillary mucocele and benign or malignant tumors were excluded from the study.

In our study the most important symptoms of chronic rhinosinusitis (table no 1) is taken from SNOT-22 Scale<sup>2</sup> to compare the pre- and post-op symptoms score.

Table no 1: Symptom score table

1.Considering how severe the problem is when you experience it and how often it happens, please rate each item below on how "bad" it is by circling the number that corresponds with how you feel using this scale:	No Problem	Very Mild Problem	Mild or slight Problem	Moderate Problem	Severe Problem	Problem as bad as it can be
1. Nasal Blockage	0	1	2	3	4	5
2. Runny nose	0	1	2	3	4	5
3. Post-nasal discharge	0	1	2	3	4	5
4. Facial pain/pressure	0	1	2	3	4	5
5. Decreased Sense of Smell/Taste	0	1	2	3	4	5

### Surgical technique

**Anesthesia:** Surgery was done under surface and infiltrative local anesthesia. Both nasal cavities are packed with cotton pledget medicated with 4% lignocaine and 1:10000 concentration adrenaline. The packs are removed after 10 mins and infiltration with 2% lignocaine and 1:100000 concentration adrenaline is given over the axilla of middle turbinate and uncinat process.

**Position:** supine position with head up 15 degrees and slightly tilted to the right

**Partial uncinectomy group:** Partial uncinectomy is done by creating a parson's window<sup>3</sup> in the lower one third of uncinat with a back biting forceps by giving three sequential cuts in order to remove the entire width of uncinat. If ostium is not identified with parson's window, horizontal part of uncinat is medially fractured and removed, and ostium is identified using curved suction. Mucosa is then trimmed with debrider. The pathology in the maxillary sinus is cleared through the ostium using various forceps and saline irrigation.

**Complete uncinectomy group:** complete uncinectomy is done by swing door technique of Wormald<sup>4</sup>. A backbiting forceps is passed beyond the uncinat, opened and pulled gently backwards until the opened punch engages the uncinat and the uncinat is cut to its insertion on the lateral nasal wall. A right angled blunt probe is inserted through the cut uncinat and the probe is pulled anteriorly. This middle third of uncinat that has been swung

forward is grasped by Blakesley forceps and the uncinata removed in one piece. The infundibulum is now exposed and a curved suction is passed to the ostium. Care should always be taken to avoid penetrating the lamina papyracea. A pack in the middle meatus is placed to prevent synechia formation.

Post-operative Day 1: the middle meatal pack is removed. Nasal endoscopy and clots removal done. Nasal douching is done with normal saline. Patient is then reviewed weekly for a month and a final visit after 2 months to evaluate the improvement using the symptom score table. On each weekly visit, nasal endoscopy is done and any crust or dried secretions present removed. Any complications following the procedure were noted.

#### Statistical analysis of data:

Formula used for calculation of sample,

$$n = \frac{Z^2_{1-\alpha/2} \sigma^2}{d^2}$$

$\alpha = 5\%$  (i.e. Confidence level = 95%)

$d = 10\%$

1. Standard deviation ( $\sigma$ )
2. Precision required =  $d$
3. Probability of type I error

Sample size is calculated by assuming at the most 5% risk, with minimum 80% power and 5% significance level (significant at 95% confidence level). Assuming 95% confidence level and a margin of error (confidence interval) of +/-12%, sample size will be 17 in each group. So we can consider 34 samples for the study.

Statistical analysis was performed by using descriptive and inferential statistics with chi square test/fisher exact test for categorical data and independent sample t-test to compare mean values between the two groups are used. Real scale data is presented in mean +/- SD. P-value less than 0.05 considered as significant at 95% confidence level. The statistical software SPSS version 24.0 is used in the analysis.

#### OBSERVATIONS AND RESULTS

Table no 2: Age distribution

		Group 1 (PU)	Group 2 (CU)	Total	Pearson Chi-Square	p-value
Age	21-30 years	7	4	11	5.562	0.135
	31-40 years	6	7	13		
	41-50 years	4	2	6		
	51-60 years	0	4	4		
Total		17	17	34		
Mean		33.41	39.59	36.5		
Std. deviation		7.39	10.61	9.53		

In our study age ranged from 24 to 56 years old with a mean age of 36.5 years (SD=9.53). The age group of 31 to 40 had the greatest number of patients, closely followed by age group 21 to 30 years.

Table no 3: Gender distribution

		Group 1 (PU)	%	Group 2 (CU)	%	Total	%	Pearson Chi- Square	p- value
Gender	Male	10	58.9%	9	52.9%	19	55.9%	0.119	0.73
	Female	7	41.2%	8	47%	15	44.1%		

Overall gender distribution of the population shows a slight increase in males. The slight increase in males may be due to more exposure to allergens during outdoor activities.

Table no 4: Distribution of presenting symptoms

Symptoms	Group 1 (PU)	Mean	SD	Group 2 (CU)	Mean	SD	Total	%	p-value
Post Nasal Discharge	16	3.71	1.16	14	3.059	1.56	30	88.2%	0.18
Runny Nose	6	1.06	1.52	8	1.412	1.62	14	41.1%	0.517
Nasal Blockage	5	1.00	1.67	6	0.941	1.35	11	32.4%	0.91
Facial Pain/Pressure	14	2.18	1.13	14	2.235	1.15	28	82.4%	0.881
Decreased Sense of Smell/Taste	4	0.53	1.01	5	0.706	1.16	9	26.5%	0.639

Two most common symptoms in the studied group were post nasal discharge (30, 88.2%) and facial pain/pressure (28, 82.4%). Runny nose were reported by 14 patients (41.1%), nasal blockage by 11 patients (32.4%) and decreased sense of smell/taste by 9 patients (26.5%).

Table no 5: Distribution of study subjects according to surgical indications

		Surgical Procedure				Total	%	Pearson Chi-Square	p-value
		PU	%	CU	%				
Surgical Indication	Chronic Rhinosinusitis	12	70.6%	12	70.6%	24	70.6%	3.6	0.165
	Fungal Sinusitis	1	5.9%	4	23.5%	5	14.7%		
	Antrochoanal Polyp	4	23.5%	1	5.9%	5	14.7%		
Total		17		17		34			

The most common diagnosis was chronic rhinosinusitis. Total of 24 patients (70.6%) were diagnosed with CRS (70.6% in both group 1 and group 2). Other less common diseases were fungal sinusitis (5, 14.7%) and Antrochoanal polyp (5, 14.7%). There were no significant difference between group 1 and 2 with regard to surgical indications.

Table no 6: Distribution of surgical complications

		Surgical Procedure		Total	Pearson Chi-Square	p-value
		PU	CU			
Complications	Middle Meatal Synechiae	0	5	5	7.926	0.048
	Nasolacrimal Duct Injury	1	0	1		
	Injury to Lamina papyracea	0	1	1		
	Frontal Recess obstruction	0	0	0		
	NIL	16	11	27		
Total		17	17	34		

In the partial uncinectomy group, one patient had mild injury to nasolacrimal duct during the surgery. In the complete uncinectomy group, one patient had mild injury to lamina papyracea and 5 patients had middle meatal synechia on follow up. There were no frontal recess obstruction or stenosis observed in both groups on follows up. Complication rates are very less in partial uncinectomy group compared to complete uncinectomy group. The complication rates between the groups are statistically significant with chi-square value of 7.926 and p-value of 0.048.

Table no 7: Distribution of post-op improvement of symptoms in partial uncinectomy group

		Mean	N	SD	Mean difference	p-value
Pair 1	PND-Pre-OP	3.706	17	1.160	2.412	<0.001
	PND-Post-OP	1.294	17	0.920		
Pair 2	DSS/T-Pre-OP	0.529	17	1.007	0.235	0.104
	DSS/T-Post-OP	0.294	17	0.588		
Pair 3	RN-Pre-OP	1.059	17	1.519	0.529	0.046
	RN-Post-OP	0.529	17	0.874		
Pair 4	FP/P-Pre-OP	2.177	17	1.131	1.235	<0.001
	FP/P-Post-OP	0.941	17	0.659		
Pair 5	NB-Pre-OP	1.000	17	1.658	0.647	0.044
	NB-Post-OP	0.353	17	0.702		

PND-Postnasal discharge, DSS/T-Decreased sense of smell/Taste, RN-Runny nose, FP/P-Facial pain/Pressure, NB-Nasal Blockage

Table no 7 shows statistical significance in symptoms improvement in partial uncinectomy group, post nasal discharge (p-value <0.001), runny nose (p-value 0.0046), facial pain (p-value <0.001) and nasal blockage (p-value 0.044).

Table no 8: Distribution of post-op improvement of symptoms in complete uncinectomy group

		Mean	N	SD	Mean difference	p-value
Pair 1	PND-Pre-OP	3.059	17	1.560	1.706	<0.001
	PND-Post-OP	1.353	17	0.996		
Pair 2	DSS/T-Pre-OP	0.706	17	1.160	0.235	0.104
	DSS/T-Post-OP	0.471	17	0.874		
Pair 3	RN-Pre-OP	1.412	17	1.622	0.588	0.024
	RN-Post-OP	0.824	17	1.015		
Pair 4	FP/P-Pre-OP	2.235	17	1.147	1.235	<0.001
	FP/P-Post-OP	1.000	17	0.612		
Pair 5	NB-Pre-OP	0.941	17	1.345	0.471	0.027
	NB-Post-OP	0.471	17	0.717		

Table no 8 shows statistical significance in symptoms improvement in complete uncinectomy group. Postnasal discharge (p-value <0.001), runny nose (p-value 0.024), facial pain (p-value <0.001) and nasal blockage (p-value 0.027).

## DISCUSSION

Chronic rhinosinusitis is a common disease presenting to otorhinolaryngologist. It contributes a huge financial burden to the health care system and also leading to man-days loss at work and absenteeism at school. Treatment of choice for chronic rhinosinusitis is medical and those refractory to adequate medical treatment are treated surgically. The first step in functional endoscopic sinus surgery is the removal of uncinete process. It is essential to remove the uncinete for subsequent surgical procedure. Several complications have been reported regarding uncinectomy. These include incomplete removal, injury to mucosa and bleeding, synechia formation in the middle meatus, injury to lamina papyracea or orbital content, nasolacrimal duct injury, iatrogenic stenosis of the frontal recess. Partial uncinectomy involves removal of the lower half of the vertical portion of the uncinete process. It has minimal complications compared to complete uncinectomy. Minimal mucosal bleeding and less tissue injury are the advantages of partial uncinectomy.

We conducted a study to compare whether partial uncinectomy is as effective as complete uncinectomy regarding symptoms improvement and also to compare the surgical complications in both techniques. Our study found that both partial and complete uncinectomy are equally good or nearly to the same extend in terms of symptoms relief.



However the complications rates of partial uncinectomy is very less and statistically significant compared to complete uncinectomy.

In our study we noted that partial uncinectomy had better effect on post nasal discharge (mean difference 2.412 versus 1.706 in complete uncinectomy) and nasal block (mean difference 0.647 versus 0.471 in complete uncinectomy). it may be due to preservation of more of normal drainage pathway by doing necessary limited resection of the uncinete. Though the difference is statistically not significant between the groups. The present study can be compared to study done by Wael Fawzy et al<sup>5</sup> where they also found that partial uncinectomy group had better effect on post nasal discharge.

In our study, middle meatal synechia was reported in 5 patients and injury to lamina papyracea was reported in 1 patient in complete uncinectomy group. The synechia were removed in the OPD under surface anesthesia. Such procedures may cause discomfort, inconvenience and additional medical cost to the patients. Injury to lamina papyracea was very minimal and there was no sequelae. No intervention was needed in the follow up period. The increased number of middle meatal synechia formation in complete uncinectomy group may be due to wide exposure of the raw mucosal area after complete uncinectomy. In comparison with the studies done by Byun et al<sup>6</sup> and Wael Fawzy et al, the commonest complication associated with complete uncinectomy group was the middle meatal synechia formation which can be compared with our study.

In our study, nasolacrimal duct injury was reported in one case in partial uncinectomy group, while stenosis of frontal recess was not reported in any case. Friedman et al<sup>7</sup> reported that nasolacrimal duct obstruction or frontal recess stenosis is theoretically possible but it is also an uncommon side effect. Nasolacrimal duct injury was very minimal and no intervention was needed in the follow up period. There were no cases of middle meatal synechia, lamina papyracea injury or frontal recess obstruction in partial uncinectomy group. The complication rates between the groups in our study is found to be statistically significant (chi-square 7.926 and p-value 0.048).

## CONCLUSION

1. Both partial and complete uncinectomy are equally good or nearly to the same extend in terms of symptoms relief but partial uncinectomy is associated with less complication rates.
2. This technique can be used for diseases limited to maxillary sinus. It has advantages of being faster, less mucosal injury, minimal intra- and post-operative complications and shorter healing time.
3. Multiple complications have been reported with conventional complete uncinectomy which requires frequent hospital visit, further surgical procedures and additional medical cost to the patients. This technique may be unnecessary for diseases limited to maxillary sinus.
4. Thus partial uncinectomy is a good alternative for complete uncinectomy in patients with isolated maxillary sinus disease needing surgery. It is recommended that for limited diseases involving maxillary sinus, it should be frequently used.

**BIBLIOGRAPHY**

1. Cohen NA, Antunes MB, Morgenstern KE. Prevention and management of lacrimal duct injury. *Otolaryngol Clin North Am.*2010; 43:781–8.
2. Kennedy JL, Hubbard MA, Huyett P, Patrie JT, Borish L, Payne SC. Sino-nasal outcome test (SNOT-22): a predictor of postsurgical improvement in patients with chronic sinusitis. *Ann Allergy Asthma Immunol.*2013;111(4):246-251.e2.
3. Bachi T Hathiram, Vicky S Khattar. Atlas of operative otorhinolaryngology and head and neck surgery: Rhinology and anterior skullbase surgery (including endoscopic sinus surgery). 1<sup>st</sup>ed. New Delhi: Jaypee Brothers. 2013;Vol 2. p.461.
4. Wormald PJ, McDonogh M. The 'swing-door' technique for uncinectomy in endoscopic sinus surgery. *J Laryngol Otol.*1998;112(6):547-551.
5. WaelFawzy, IsmaielEssa. Comparative study bet partial uncinectomy and total uncinectomy for management of isolated maxillary sinus disease. *AAMJ.* 2015; VOL 13. SUPPL-1.
6. Byun JY, Lee JY. Usefulness of partial uncinectomy in patients with localized maxillary sinus pathology. *AM J Otolaryngology-Head Neck Med Surg.* 2014; 594-597.
7. Friedman M, Landsberg R, Schults RA, Tanyeri H, Caldarelli DD. Frontal sinus surgery: endoscopic technique and preliminary results. *Am J Rhinol.* 2000;14(6):393-403.