

Conchopexy Suture versus Bolgerization in preventing middle turbinate lateralisation following FESS*

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Abstract

Background: Middle turbinate lateralisation is the most common minor post-operative complication following functional endoscopic sinus surgery. This study aimed to compare the outcome between Conchopexy suture and Bolgerization method in preventing middle turbinate lateralisation.

Methodology: This was a prospective, comparative and interventional study conducted from May 2018 to November 2019 at Tribhuvan University Teaching Hospital, Kathmandu, Nepal. A total of 68 patients were divided equally into two groups. Following functional endoscopic sinus surgery, the middle turbinate was medialised either by Conchopexy suture or Bolgerization technique. Postoperative assessment was done on the second and 12th week of surgery, where the position of the middle turbinate and status of the sinus cavity were assessed using perioperative sinus endoscopic (POSE) score. Chi-square test and unpaired t test were used for comparison of postoperative results between two groups taking p value of < 0.05 as statistically significant.

Results: Lateralised middle turbinate and mean POSE score was 5/34 (14.8%) and 2.1 ± 1.25 , respectively, in Conchopexy group whilst in Bolgerization group it was 6/34 (17.6%) and 2.5 ± 1.46 . However, the observed differences were not statistically significant.

Conclusion: Conchopexy suture and Bolgerization techniques were equally effective in preventing middle turbinate lateralisation. Hence, either of these techniques could be used as an adjunct to FESS to avoid middle turbinate lateralisation.

Key words: Bolgerization, Conchopexy suture, endoscopic sinus surgery, middle turbinate lateralisation, Perioperative sinus endoscopic (POSE) score

Introduction

Functional endoscopic sinus surgery (FESS) in chronic rhinosinusitis (CRS) is indicated when it fails to respond to primary medical therapy⁽¹⁾. The middle turbinate (MT), which serves as an important landmark is medialised to gain wide access during FESS. Unfortunately, the MT can lateralise in 1-27%⁽²⁻⁵⁾ of cases postoperatively and is considered the most common complication. Lateralised MT is an untoward outcome as it obstructs osteomeatal complex hence, impairing the ventilation and drainage of sinuses and also preventing drug penetration to sinuses, which can consequently lead to increased revision surgery^(4,5). To avoid this, several additional procedures like Conchopexy

suture^(6,7), Bolgerization⁽⁸⁾, nasal pack⁽⁴⁾, bioresorbable implant⁽⁹⁾ and bioglue⁽¹⁰⁾ have been used to keep the middle turbinate medialised. Conchopexy suture and Bolgerization are widely used procedures with success rate of 90-92% and 88% respectively^(4,6,7). Conchopexy suture technique employs suturing of middle turbinate with nasal septum, which is preferred when the MT is unstable, however, it is technically difficult and lengthens operating time⁽¹¹⁾. In Bolgerization technique, controlled synechia is made between the middle turbinate and the nasal septum by creating a raw area over the antero-inferior part of middle turbinate and the adjacent nasal septum. Though this technique is easy to perform, it is associated with injury to unstable middle

turbinate and bears the risk of septal perforation. Comparison of the effectiveness of these two procedures in preventing middle turbinate lateralisation following FESS has rarely been assessed, which this study aimed to assess.

Materials and methods

It was a prospective, comparative study conducted at the Department of ENT-Head and Neck Surgery, Tribhuvan University Teaching Hospital, Maharajgunj Medical Campus, Institute of Medicine, Kathmandu, Nepal. After taking approval from ethical committee from the institutional review committee of Institute of Medicine, Kathmandu, Nepal (Ref no 271(6-11) E2/074/075) the study was carried out from May 2018 to November 2019 over 18 months. Informed consents to enroll in the study were taken from all patients.

Patients

Patients aged 14 years or older, of all genders, requiring bilateral FESS with or without septoplasty for chronic rhinosinusitis with nasal polyposis (CRSwNP) with or without deviated nasal septum were included in the study. Those with recurrence of polyp needing revision bilateral FESS but with intact middle turbinate were also kept in the inclusion criteria. Unilateral FESS and bilateral FESS where middle turbinate was damaged from previous surgery were excluded.

Allocation and execution of medialisation procedure (Conchopexy suture or Bolgerization)

The medialisation procedure was randomly allocated before surgery. This involved picking up a paper from shuffled pieces of paper with either Conchopexy suture or Bolgerization written. Following FESS with or without septoplasty, the allocated procedure was done to medialise the MT on both sides. The patients were blinded with regards to the medialisation procedure allocated.

The Conchopexy suture procedure adopted in this study was described by Lindemann et al.⁽⁶⁾. Vicryl 3/0 (Ethicon) was passed through the antero-inferior part of middle turbinate and the adjacent nasal septum on one side and further passed through the antero-inferior part of middle turbinate on the other side. The suture was then traversed through the septum just anterior to the middle turbinate in patients who had FESS with septoplasty. Whilst those who underwent FESS only, the suture was passed through the cartilaginous septum to avoid the difficulty in passing the suture through the perpendicular plate of ethmoid which remained intact as septoplasty was not done. Similarly, Bolgerization, originally described by Bolger et al.⁽⁸⁾, was modified slightly in our study. Instead of using a sickle knife like Bolger did to create a 5x5 mm raw area on the medial aspect of antero-inferior portion of MT and adjacent nasal septum, microdebrider was used. Bilateral middle meatus was packed with

three small pieces of polyvinyl nasal packs whilst the nasal cavity was additionally packed with one large polyvinyl nasal pack on each side irrespective of the medialisation procedure followed. The nasal packs were removed after 48 hours postoperatively.

Outcomes assessed

On the second postoperative week (POW), crusts and secretions were cleared off the nasal cavity whilst the outcomes were assessed on 12th POW. The position of MT was assessed as the primary outcome and status of sinus as secondary outcome at 12th POW. The assessor was blinded about the type of MT medialisation procedure while noting the findings. The MT was considered lateralised if any portion of middle turbinate was in contact with the lateral nasal wall or normal if either medialised or remained in normal anatomical position. In POSE score, normal sinuses were considered healthy, however, presence of oedema, secretions, crusting and polypoidal changes were considered unhealthy.

Statistical analysis

For comparison of outcomes between the two groups, unpaired t test and Chi-square test were used. SPSS version 23 was used to analyze the result and $p < 0.05$ was taken as statistically significant.

Results

A total of 70 patients were enrolled in our study during the study period however, two of them were lost for follow up on 12th POW. Hence, the outcome of 68 patients were assessed and analyzed. Both the Conchopexy suture and Bolgerization group had 34 patients each. None of the cases were revision cases. The age of the patient ranged from 14 - 70 years with a mean age of 36.26 ± 13.74 years. Most of the patients fell in the 40 - 50 years age group. There were 42 males and 26 females with male: female ratio of 1.6:1 (Table 1).

Primary outcome

In the Conchopexy suture group, the MT was lateralised in 5(14.8%) patients whilst in Bolgerization group, it was lateralised in 6(17.6%) patients. Although the lateralised MT was seen more in Bolgerization group, the difference was not statistically significant (Table 2).

Secondary outcome

The mean POSE score in Conchopexy suture group was lower than in Bolgerization group, the difference being not statistically significant (Table 2). The middle meatus, ethmoid and sphenoid sinuses were normal in more patients in Conchopexy suture group as compared to Bolgerization group, whilst normal frontal sinuses outnumbered in Bolgerization group as compared to Conchopexy suture group. However, these differences were not

Table 1. Age and gender distribution (n=68).

Age group	Males		Females		Total
	Conchopey Suture	Bolgerization	Conchopey Suture	Bolgerization	
< 20 years	0	2	2	5	9
21-30 years	2	4	5	4	15
31- 40 years	5	5	2	2	14
41- 50 years	8	6	3	1	18
51- 60 years	6	2	0	1	9
> 60 years	1	1	0	1	3
Total	22	20	12	14	68
	42 (61.8%)		26 (38.2%)		

Table 2. Position of middle turbinate and mean POSE score in both groups.

	MT medialisation procedure		Chi-square test
	Conchopey suture (n=34)	Bolgerization (n=34)	
Position of middle turbinate			
a. Normal	29 (85.2%)	28 (82.4%)	p = 0.741
b. Lateralised	5 (14.8%)	6 (17.6%)	
Mean POSE score	2.1 ± 1.25	2.5 ± 1.46	p = 0.229

statistically significant (Table 3). Mucoïd secretion was the most common unhealthy finding in these sinuses.

Discussion

Lateralised middle turbinate is the common complication following FESS with its incidence ranging from 1- 27%^(4,5). There are various possible reasons for this. Removal of the uncinate process creates a raw area in lateral nasal wall. Due to repeated instrumentation during disease removal, the lateral aspect of MT gets denuded. Mobilization of MT renders it unstable, and healing by synechiae formation to lateral nasal wall results in MT lateralisation. Lateralised MT obstructs the drainage pathway of sinuses leading to recurrent sinus disease. It is often associated with poor surgical outcome⁽⁴⁾.

Though there are various methods described in the literature, Conchopey suture and Bolgerization method are commonly used for MT medialisation. Conchopey suture technique is useful in unstable MT and nasal pack is not required after the procedure. However, this method is traumatic, technically difficult and lengthens operating time. In contrast, Bolgerization is technically easy, causes minimal trauma and maintains middle meatal patency. However, this method can cause septal perforation, and requires a nasal pack to keep the raw area between MT

Table 3. Status of maxillary, ethmoid, frontal and sphenoid sinuses at 12th POW.

	Conchopey suture (n= 34)	Bolgerization (n=34)	Chi-square test
Middle meatus/MMA			
Normal	21	18	p = 0.625
Unhealthy	13	16	
1. Narrowing	3	4	
2. Maxillary sinus contents	10	12	
a. Mucoïd secretion/oedema	7	10	
b. Purulence/allergic mucin	3	2	
Anterior ethmoids			
Normal	26	24	p = 0.310
Unhealthy	8	10	
a. Crusting	2	2	
Mild	2	2	
Extensive	0	0	
b. Oedema	2	3	
Mild	2	2	
Diffuse	0	1	
c. Secretion	3	3	
Mucoïd	2	2	
Purulence/ allergic mucin	1	1	
d. Polypoid change	1	2	
Mild	1	2	
Diffuse	0	0	
Frontal sinus			
Normal	30	32	p = 0.392
Unhealthy	4	2	
a. Oedema	4	2	
Sphenoid sinus			
Normal	31	29	p = 0.451
Unhealthy	3	5	
a. Oedema	3	5	

and septum in contact after the procedure.

Demographic statistics

Age distribution

The most common age group affected by nasal polyposis in this

study was 40-50 years accounting up to 26.5%. A study by Gyawali et al.⁽¹²⁾ at our institute in 2015 showed higher prevalence at a slightly younger age group of 31-45 years. This could be because the latter study included patients only up to 45 years of age. Bettega et al.⁽¹³⁾ states fifth decade as the common age group to be affected. We cannot comment on the prevalence of nasal polyposis in extreme age groups as none of our patients fell in that category.

Gender distribution

In this study, males were affected more (61.8%) than females (38.2%) with male to female ratio being 1.6:1 which is similar to the study by Gyawali et al.⁽¹²⁾ and Jahromi et al.⁽¹⁴⁾. However, Husle et al.⁽¹⁵⁾ found the male to female ratio increasing from 1.3 to 2.2. Ceylan et al.⁽¹⁶⁾ has also reported higher prevalence of nasal polyposis in males as compared to females.

Status of the middle turbinate

Lateralised middle turbinate

It is most the common complication following FESS and also the most common cause for revision endoscopic sinus surgery accounting from 35 - 78 %^(5,17). In our study, the MT was lateralised in 14.7% patients in the Conchopexy suture group and 17.6% in the Bolgerization group, which was statistically insignificant. This was higher than reported in the study by Hegazy et al.⁽¹⁸⁾. It could be because we followed strict criteria to consider the middle turbinate as lateralised when the upper part of the MT was seen touching the lateral nasal wall irrespective of its extent even if the inferior part of the turbinate was medialised. The overall outcome of the medialisation technique performed was also influenced by the technique and surgical skills of various surgeons. Postoperative infection, improper nasal douching, and structural memory of MT after out fracturing during FESS also contribute to middle turbinate lateralisation⁽⁴⁾.

Normal/medialised middle turbinate

In our study, more patients in Conchopexy suture had middle turbinate either in normal or medialised position than those of Bolgerization group. Hegazy et al.⁽¹⁸⁾ in study of 39 patients, reported normal MT in all patients of Conchopexy suture group and 85% patients of Bolgerization group.

POSE score

Several scoring systems such as Lund Kennedy endoscopic score (LKES), modified LKES, discharge, inflammation and polyp/oedema (DIP) score and POSE score are described in literature for endoscopic evaluation of polyp, oedema, discharge, crust and scarring in nose and paranasal sinuses⁽¹⁹⁻²¹⁾. POSE score⁽²⁰⁾ was used for our study as it provides a detail assessment of the status of the middle turbinate and sinuses. A total score of 40 was obtained by adding score of 20 from each side. Higher score

denoted worse outcome. POSE score was recorded at 12th postoperative week to allow sufficient time for sinuses to heal and also allow the vicryl sutures to dissolve.

Middle meatus and maxillary antrum

Middle turbinate being close to osteomeatal complex interferes with mucociliary drainage and ventilation of the sinuses. In the study by Musy et al.⁽²²⁾, middle meatal stenosis was found to be the cause for revision surgery in 39% of the cases. In our study, the maxillary antrum was normal in 61.7% of patients in Conchopexy suture group as compared to 53% of patients in Bolgerization group. However, it was not statistically significant ($p = 0.625$).

Ethmoid cavity

Ethmoid sinus was normal in 76.5% in Conchopexy suture group and in 70.5% in Bolgerization group however, it lacked statistical significance ($p = 0.31$). The crusting, secretions, mucosal oedema and polypoidal changes were seen more in Bolgerization group as compared to suture group. Unhealthy sinuses were common in patients not following proper nasal douching technique. In our study, none of the patients had diffuse polypoidal change or polyposis. The follow-up assessment at three months may be a short period for polyposis to reoccur so, a study with long term follow up may be required.

Frontal sinus

Frontal sinus has complex anatomy so proper clearance of pathology along with preservation of frontal recess mucosa is vital during surgery. The causes for failure of primary surgery include lateralised MT, incomplete removal of agger nasi cells, frontal cells, supraorbital ethmoid cells, neo-osteogenesis of frontal recess and polypoid mucosa obscuring the recess⁽¹⁷⁾. Frontal sinus was normal 94.2 % of patients in Bolgerization group and 88.2% in Conchopexy suture group however, it was not statistically significant ($p = 0.392$). Among those patients with unhealthy sinuses, oedema of frontal recess was present more in Conchopexy suture group (11.8%) and as compared to Bolgerization group (5.8%). None of the patients had completely obstructed frontal recess which could be due to the shorter duration of follow up.

Sphenoid sinus

Sphenoid sinus was normal in 91.2% patients of the Conchopexy suture group and 85.3% of Bolgerization group however, it was not statistically significant ($p = 0.392$). Among those with unhealthy sinuses, oedema was present more in patients of Bolgerization group (14.7%) as compared to the Conchopexy suture group (8.8%). None of the patients had completely obstructed sphenoid sinus ostium. In the study by Musy et al.⁽²²⁾, the cause for revision surgery was persistent sphenoid

sinus disease in 27% of the cases. In our study, the frontal and sphenoid sinuses were least affected by lateralised turbinate as compared to the maxillary and ethmoid sinus.

Limitations

There were few limitations in our study. The extent and severity of the disease in both groups were not assessed. Patients with extensive disease could have led to unstable middle turbinate which might influence the outcome. The outcome of medialisation could have been affected by the varied surgical expertise of multiple surgeons involved in this study. There was no control group to compare the medialisation techniques with natural course of healing. The long term effect of these medialisation techniques and sequelae from lateralization could not be assessed due to short follow up. For more valid results, a study with a large sample size and longer follow up is recommended. In addition, comparing the outcome of one technique on one side and another technique on the other side in the same patient is also recommended as it avoids confounding factor that can affect the outcome when done in different patients.

Conclusions

Conchopexy suture and Bolgerization techniques were equally effective in preventing middle turbinate lateralisation.

Authorship contribution

UG and BP were involved in concept and design, drafting the manuscript, critical revision of the manuscript, RKM wrote the

protocol, collected and analyzed data, drafted the manuscript. All authors read and approved the final manuscript.

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Ethics approval and consent to participate

Ethical approval was taken from institutional review committee of Institute of Medicine, Nepal (Ref no 271(6-11) E2/074/075). Consent taken to participate in the study.

Consent for publication

Not applicable.

Availability of data and materials

Not applicable.

Conflict of interest

The authors declare that they have no competing interests.

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