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Research Article

To Study Concha Bullosa in Association with Chronic Rhinosinusitis and its Clinico-Radiological Outcome After Surgical Intervention

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Abstract

Introduction: To study the role of concha bullosa in patients of chronic rhinosinusitis, a prospective interventional study was done comprising of 60 patients who were having symptoms of sinusitis for more than 12 weeks. These were evaluated with the help of nasal endoscopy and Computed Tomography and patients diagnosed with concha bullosa were subjected to surgery and followed up at 3 months, 6 months and 1-year post-surgery.

Aim of the Study: 1. To determine the relationship between concha bullosa and chronic rhinosinusitis. 2. To evaluate clinical and radiological outcomes after surgical intervention. Study design: Prospective interventional study. Sample size: 60. Inclusion criteria: Patients above 18 years, Patients with signs and symptoms of chronic sinusitis for more than 3 months duration, patients consenting for surgery and patients willing to undergo CT scan of nose and paranasal sinuses and nasal endoscopy. Exclusion criteria: Patients with tumours of nose and pns, patients with history of previous nasal surgery, patients with associated DNS, history of nasal trauma and patients not fit for CT scan.

Conclusion: In our study an attempt was made to study the association of CRS patients having concha bullosa and its clinic-radiological outcome after surgical intervention.

Keywords: CT Scan; Concha Bullosa; Chronic Rhinosinusitis (CRS)

Introduction

Pneumatisation of nasal turbinates is called concha bullosa. Most often it involves middle turbinate. It can also involve superior and inferior turbinate though less common. Concha bullosa is one of the most common variants of sinonasal anatomy [1].

Rhinologists have used several specific symptom-based scores to evaluate treatment outcomes in Chronic Rhinosinusitis (CRS) patients, such as the Sinonasal Outcome Test 22 (SNOT-22) [2]. SNOT-22 is valid and and easy to use tool that can be used to facilitate routine clinical practice to highlight the impact of chronic rhinosinusitis on the patient's quality of life, and may also be used to measure the outcome of surgical intervention.

Diagnostic nasal endoscopy is an examination routinely used to evaluate burden of sinonasal inflammation in subjects with chronic

rhinosinusitis and its grading is done according to Lund-Kennedy Endoscopy score [3]. The Lund-Kennedy endoscopy scoring system grades visual pathologic states within the nose and paranasal sinuses including polyps, discharge, edema, scarring, and crusting graded on an ordinal scale from 0–2 for each side. Higher scores indicate worse observed disease**.**

Concha bullosa is best diagnosed radiographically as they are identified on CT scan, appearing as an air space of the middle turbinate surrounded by an oval bony rim. Concha bullosa (CB) has been involved as a potential risk factor in the recurrence of chronic sinusitis because it has a negative effect on the ventilation of paranasal sinuses and mucociliary clearance in the area of the middle meatus [4].

Currently, computed tomography is the method of choice for assessment of paranasal sinuses, nasal fossae and their anatomical variants. Computed tomography offers detailed study of anatomical variations.

The Lund-Mackay staging system was developed as a simple assessment tool to facilitate treatment decisions in the mid-1980s [5]. It includes symptom scores, radiologic staging, and endoscopy scores; however, it is the radiologic score that has become widely used.

Materials and Methods

A prospective interventional study was carried out in the Department of Otorhinolaryngology, Acharya Shri Chander College of Medical Sciences and Hospital, Jammu from 1st August 2023 to 31st July,2024 and a total of 60 patients presenting with signs and symptoms of chronic rhinosinusitis and on CT and nasal endoscopy showing concha bullosa were included in the study. Patients with tumours of nose and paransal sinuses, with history of previous nasal surgery, with DNS, nasal trauma and those not fit for CT were excluded from the study.

Diagnostic Nasal Endoscopy findings, clinical symptoms and Pre-operative Computed Tomography findings were scored with the help of Lund-Kennedy scoring, SNOT-22 and Lund-MacKay scoring and patients were subjected to surgery of concha bullosa in the form of lateral laminectomy and then post-operative scores evaluated.

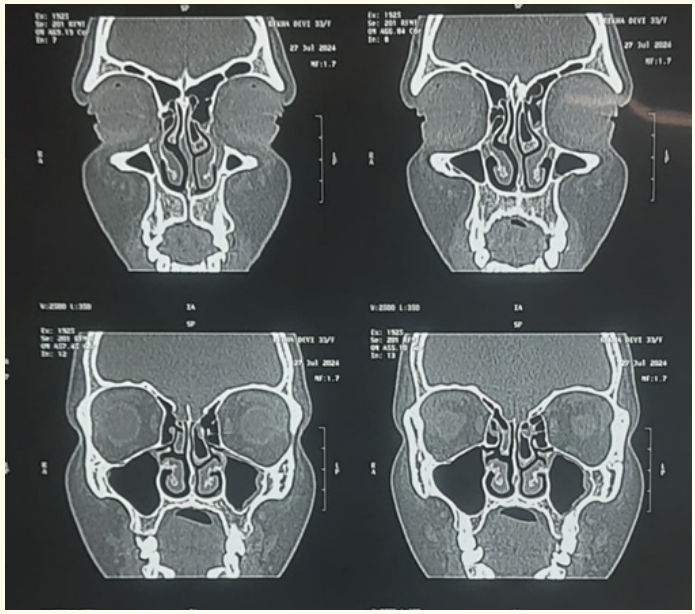


Figure 1: Pre-Operative Computed Tomography of patient showing concha bullosa (left).

Procedure

Using zero degree rigid nasoendoscope under general anaesthesia, after an preoperative preparation by application of cotton soaked in 1:1000 adrenaline solution via packing forceps to be placed in the middle meatus between middle turbinate and lateral nasal wall and also medially between middle turbinate and adjacent part of the nasal septum, left for about 10-15 minutes, then starting the submucosal injection of 1 ml of 2% xylocaine/oxymetazoline into the anteroinferior surface of concha bullosa.

For lateral laminectomy, the anterior and lateral parts of the pneumatized middle turbinate, including both the covering mucosa and underlying bone, were removed by leaving back only the infero-medial half of the middle turbinate.

A midline incision was given on the aerated middle turbinate with a sickle knife, which was done at the inferior and anterior end of the turbinate in the sagittal plane direction.

This incision was then prolonged posteriorly, as much as possible as shown in figure (2).

Starting from the incision line, and by careful dissection, a plane between the bony walls of the concha bullosa and its mucoperiosteal covering was created with subsequent formation of superiorly and posteriorly based mucosal flaps medially and laterally, which then was raised until the bony lateral lamella could be removed using Blakesley foreceps as shown in figure (3).

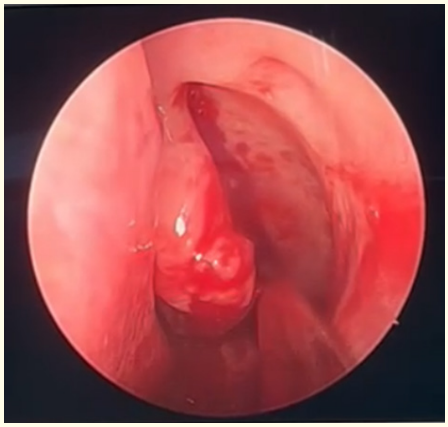


Figure 2: Midline incision in concha using sickle knife.

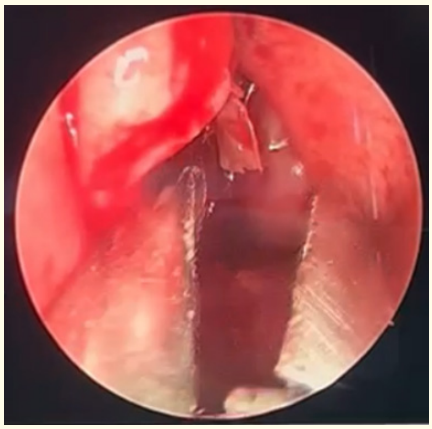


Figure 3: Lateral laminectomy of concha using blakesley forceps.

The mucosal flaps were reposited back, so reducing the size of the turbinate, without disturbance of its covering mucosa and retaining its original shape.

Results

Regarding the symptoms, most common symptom was headache (91.67%), followed by nasal block (85%), nasal discharge (50%), facial fullness, cough and halitosis.

Regarding type of sinusitis, most patients were having disease in the maxillary sinuses (38.33%), followed by anterior ethmoids (31.67%), frontal (14%), sphenoid and posterior ethmoids.

Regarding the laterality of concha bullosa, laterality of concha bullosa in patients, 60% patients had unilateral concha bullosa while 40% had bilateral concha bullosa.

And regarding the size most of the patients had small concha bullosa (40%), followed by moderate sized concha (35%), and large sized concha (25%) respectively.

Lund-Kennedy score of patients prior to surgery and post-surgery at 3 months, 6 months and 1 year and we found that patients with 9-12 score (moderate degree) of disease were around 29 in number (48.33%) prior to surgery, followed by those in 13-16 age group which were 25 in number.

After 3 months, 23 patients (38%) remained in this category of 9-12 score range. But at 6 months interval, in contrast to 25 patients presenting with 13-16 (severe) disease only 8 patients were found endoscopically having score of 13-16 (severe). At 12 months after surgery, 15 patients remained in moderate disease category with score (9-12), and 8 patients remained in severe category score of (13-16) and around 37 patients out of 60 came into 5-8 (mild disease) category with p value <0.01* statistically significant.

Table 1: Lund-Kennedy score before surgical intervention and after 3 months of surgical intervention.

Lund-Kennedy score	Before Intervention		After 3 months Intervention		p value
	N = 60	%	N = 60		
5-8	4	6.67	28	46.67	<0.01*
9-12	29	48.33	23	38.33	
13-16	25	41.67	9	15	
17-20	2	3.33	0	0	

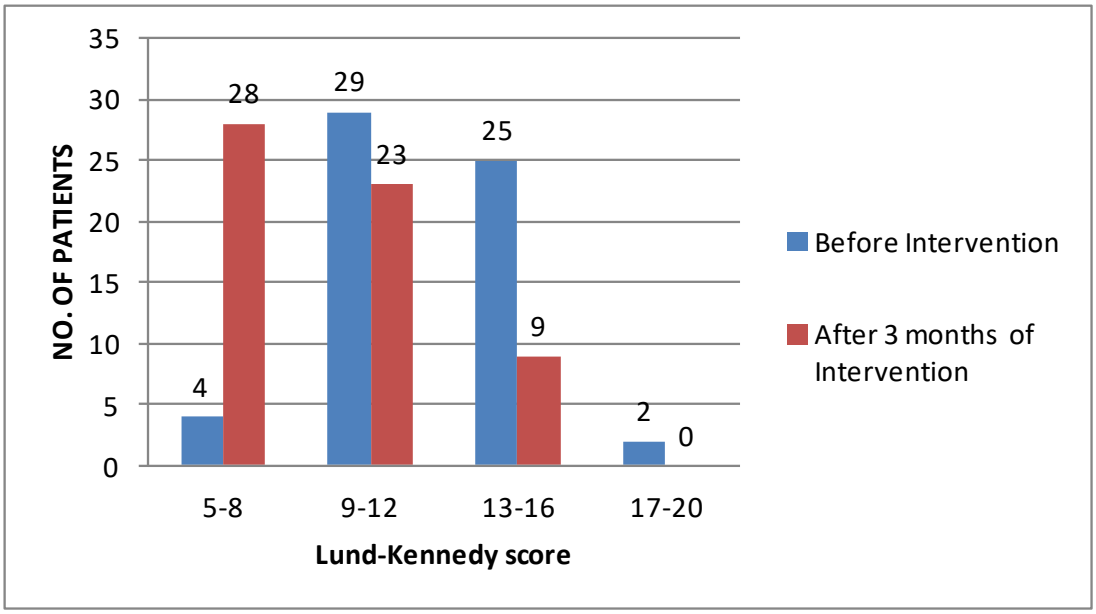


Table 2: Lund-Kennedy score before surgical intervention and after 6 months of surgical intervention.

Lund-Kennedy staging	Before Intervention		After 6 months Intervention		p value
	N = 60	%	N = 60		
5-8	4	6.67	32	53.33	<0.01*
9-12	29	48.33	20	33.33	
13-16	25	41.67	8	13.33	
17-20	2	3.33	0	0	

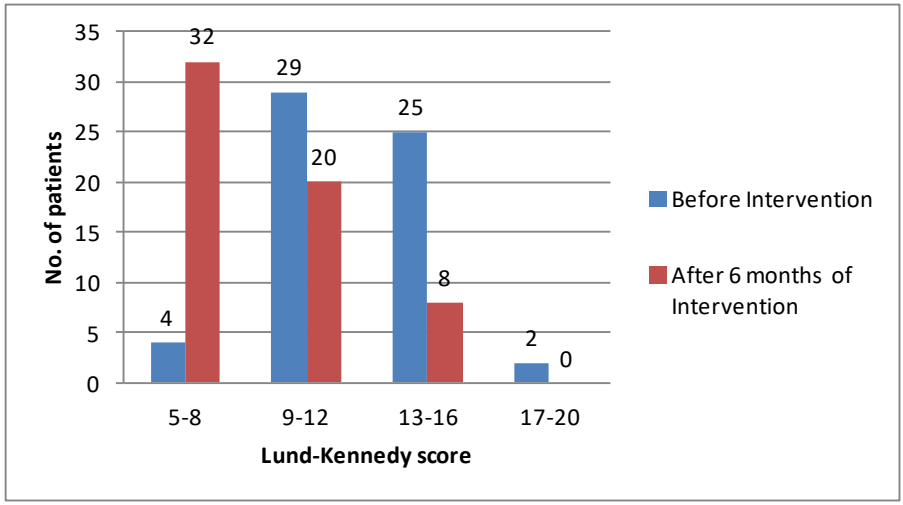
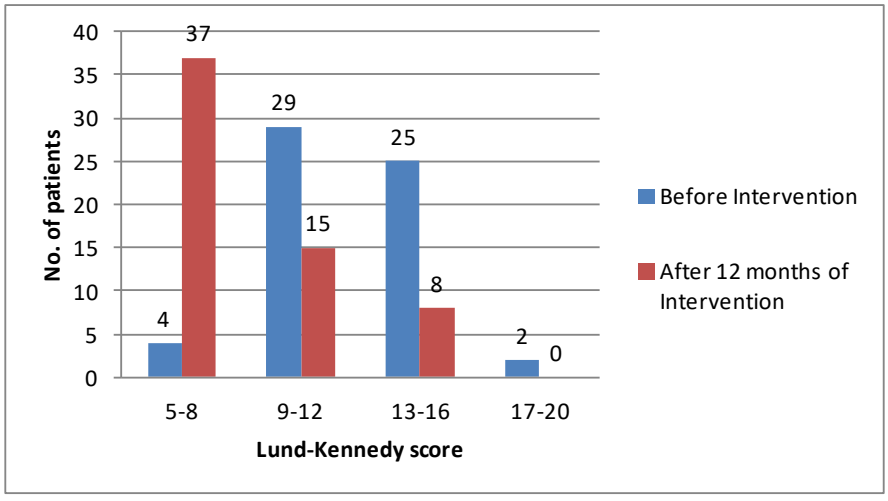


Table 3: Lund-Kennedy score before surgical intervention and after 12 months of surgical intervention.

Lund-Kennedy score	Before Intervention		After 12 months Intervention		p value
	N = 60	%	N = 60		
5-8	4	6.67	37	61.67	<0.01*
9-12	29	48.33	15	25	
13-16	25	41.67	8	13.33	
17-20	2	3.33	0	0	



Before intervention headache is most common symptom (91.67%) followed by nasal block (85%) and nasal discharge (83.33%). After 3 months of Surgical Intervention, there is significant decrease in symptoms of study subjects with nasal block in 13 (15%), nasal discharge 14 (11.67%) and headache among 15 (10%) of the participants.

After 6 months of surgical intervention, 12 patients had headache (10%), 10 patients (15%) had nasal blockage and 11(11.7%) had nasal discharge.

After 12 months of surgical intervention, 6(10%) patients had headache, 9 (15%) patients had nasal blockage and 7(11.67%) had nasal discharge.

Table 4: Symptoms among the study subjects before and after 3 months of surgical intervention.

Symptoms	Before Intervention		After 3 months of surgical Intervention		p value
	N = 60	%	N = 60	%	
Headache	55	91.67	15	10.00	<0.01*
Nasal block	51	85.00	13	15.00	<0.01*
Nasal discharge	50	83.33	14	11.67	<0.01*
Facial fullness	21	35.00	9	8.33	0.011*
Cough	16	26.67	6	6.67	0.018*
Halitosis	7	11.67	1	1.67	0.029*

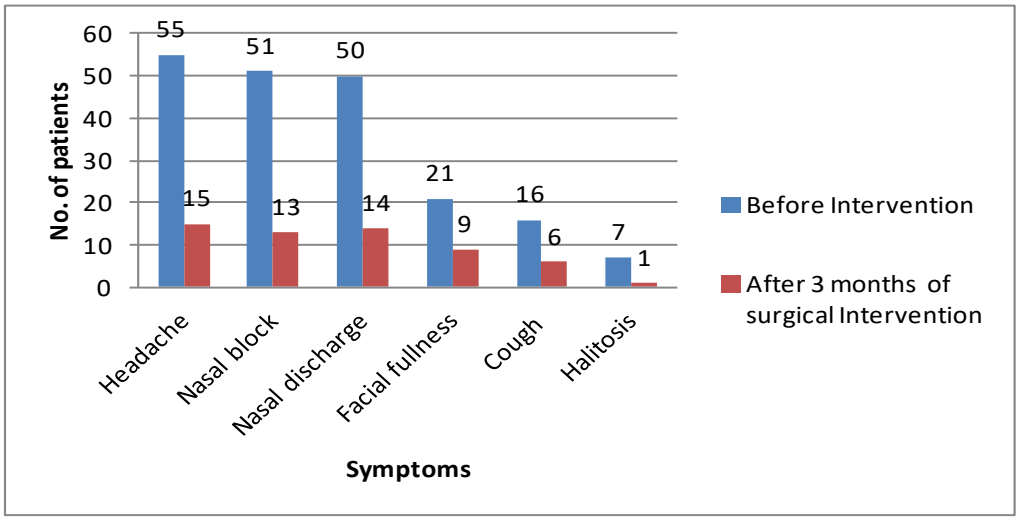


Table 5: Symptoms among the study subjects before and after 6 months of surgical intervention.

Symptoms	Before Intervention		After 6 months of surgical Intervention		p value
	N = 60	%	N = 60	%	
Headache	55	91.67	12	10.00	<0.01*
Nasal block	51	85.00	10	15.00	<0.01*
Nasal discharge	50	83.33	11	11.67	<0.01*
Facial fullness	21	35.00	7	8.33	0.002*
Cough	16	26.67	5	6.67	0.009*
Halitosis	7	11.67	1	1.67	0.029*

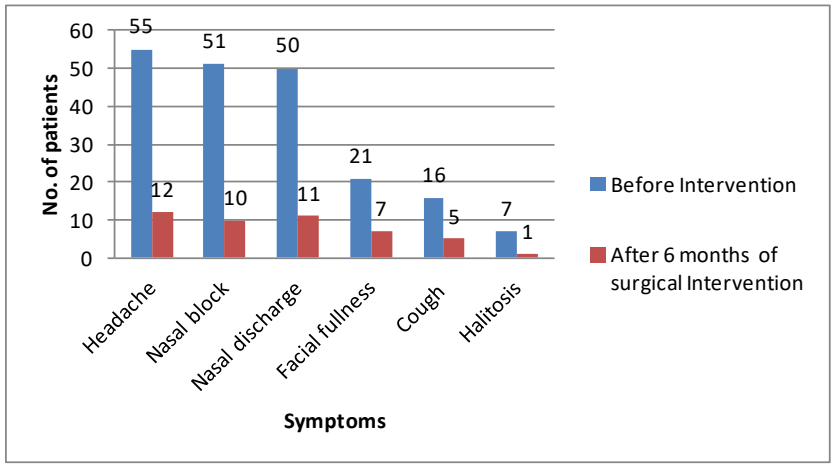
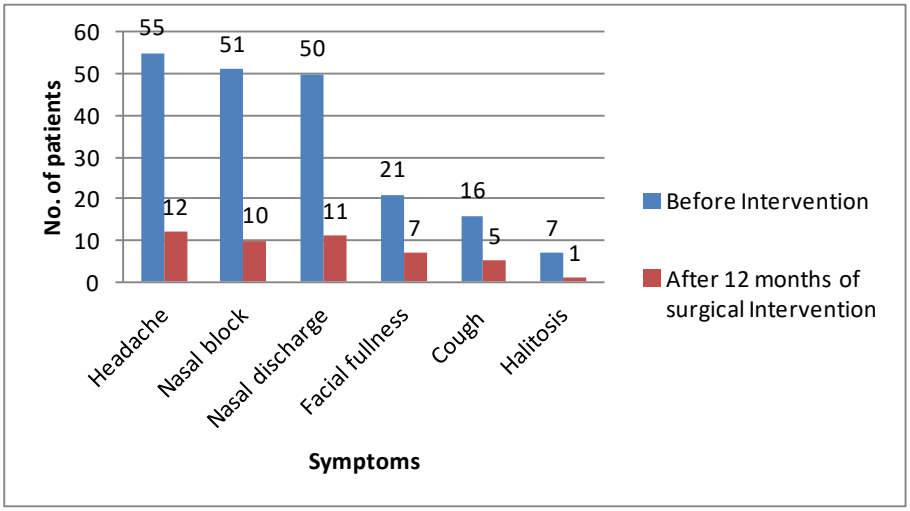


Table 6: Symptoms among the subjects before and after 12 months of surgical intervention.

Symptoms	Before Intervention		After 12 months of surgical Intervention		p value
	N = 60	%	N = 60	%	
Headache	55	91.67	6	10.00	<0.01*
Nasal block	51	85.00	9	15.00	<0.01*
Nasal discharge	50	83.33	7	11.67	<0.01*
Facial fullness	21	35.00	5	8.33	0.004*
Cough	16	26.67	4	6.67	0.007*
Halitosis	7	11.67	1	1.67	0.029*

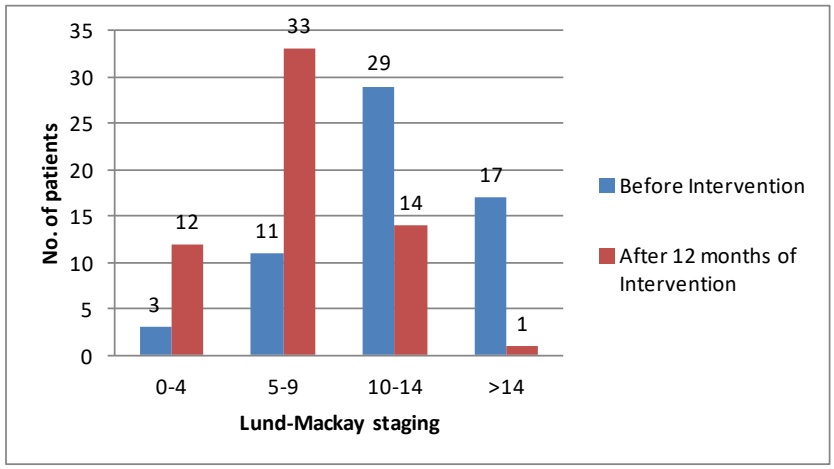


Majority of subjects (48.33%) showed 10-14 Lund-Mackay score before surgical intervention while a score >14 was showed by 28.33%. After 12 months of surgical intervention; the majority of subjects 33 (55 %) showed 5-9 Lund- Mackay score while 14 (23.33%) subjects score was 10-14 Lund-MacKay score. Hence there was significant improvement in Lund-Mackay score after 12 months of surgical intervention, $p < 0.05$.

Table 7: Lund-Mackay staging among the study subjects before and after 12 months of surgical intervention.

Lund-Mackay staging	Before Intervention		After 12 months of Intervention		p value
	N = 60	%	N = 60	%	
0-4	3	5	12	20	<0.01*
5-9	11	18.33	33	55	
10-14	29	48.33	14	23.33	
>14	17	28.33	1	1.67	

*: statistically significant.



Discussion

Concha bullosa, which designates a pneumatized middle turbinate, is one of the most common anatomical variations seen in the nasal cavity. It has been recognized that this pneumatization operates as a pathogenetic factor of chronic or recurrent sinusitis [6].

Concha bullosa intruding into the middle meatus may fill the space between septum and lateral wall impinging on the infundibulum and maxillary sinus ostium creating areas of mucosal contact and alters normal airflow thus producing negative influence on paranasal sinus ventilation and on the mucociliary clearance in ostiomeatal complex thus making the relevant sinus prone to infection [7].

Variations of anatomical structure related to OMC obstruction may be identified through CT analysis and should be performed before any FESS intervention. CT plays a central role in the modern management of CRS due to its ability to delineate mucosal disease and to demonstrate a primary obstructive pathology.

Patients with higher disease severity on CT scan showed significantly larger improvement in symptom scores measured with the Chronic Sinusitis Survey after treatment. The Lund-Mackay score measures a different aspect of chronic rhinosinusitis to subjective measures of disease severity with which it is often compared.

The purpose of the surgical procedures of the functional endoscopic sinus surgery is to get rid of the osteomeatal obstruction and to retrieve natural ventilation and mucociliary function of the sinuses [8]**.** Surgical intervention is not required in asymptomatic Concha Bullosa; however, medical treatment may be indicated to provide short-term symptomatic relief including antibiotics, topical steroids, antihistamines and topical nasal decongestants [9]. Nevertheless, nowadays many different surgical approaches for Concha Bullosa treatment are used, such as endoscopic lateral or medial partial resection, turbinoplasty, total resection, crushing and crushing with intrinsic stripping. However, there is no obvious consensus about which is the best surgical option yet [10]**.**

Conclusion

Pneumatization of the middle turbinate which is referred to as concha bullosa, is one of the most common anatomical variations of the lateral wall of the nose. In our study an attempt was made to study the association of CRS patients having concha bullosa and its clinic-radiological outcome after surgical intervention. We found a statistically significant relation between the presence of concha bullosa and occurrence of CRS.

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