

Comparative Study Between Lateral Laminectomy And Crushing Technique In Management Of Patients Who Underwent Septoplasty With Concha Bullosa

Khadiga Abd Allah Abd Rabou¹, Asmaa Fathy Elsyed Abdelal², Doaa Abd El-Halem Saif El-Din³, Lobna Kh. Sakr⁴, Heba Mohammed Galal⁵, Doaa Lotfy Ali⁶, Howida A. Ahmed⁷, Ola I Saleh⁸, Hebatullah Ali Zain Elabdeen Abdel alazim⁹

¹Lecturer of otolaryngology, Faculty of medicine for girls, Al-Azhar University, Cairo
bodyhamzawy8@gmail.com

²Lecturer of otolaryngology, Faculty of medicine for girls, Al-Azhar University, Cairo

³Lecturer of otorhinolaryngology, Faculty of medicine for girls, Al-Azhar University, Cairo

⁴Assistant professor of Radio-diagnosis, Faculty of medicine for girls, Al-Azhar University, Cairo

⁵Lecturer of radiodiagnosis, Faculty of medicine for girls, Al-Azhar University, Cairo

⁶Lecturer of radiodiagnosis, Faculty of medicine for girls, Al-Azhar University, Cairo

⁷Lecturer of radiodiagnosis, Faculty of medicine for girls, Al-Azhar University, Cairo

⁸Assistant professor of diagnostic radiology, Faculty of medicine for girls, Al-Azhar University, Cairo

⁹Lecturer of otorhinolaryngology, Faculty of medicine for girls, Al-Azhar University, Cairo
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Abstract

Background: Among of the most frequent anatomical alterations of the lateral nasal wall is concha bullosa (CB), which is pneumatization of the concha. **Aim:** The main objective of the study was to compare between the two regularly used surgical procedures (lateral laminectomy and crushing technique) of lateral excision and crushing for Concha Bullosa (CB). **Methods:** NOSE score was assessed for individuals who had been characterized with DNS and CB employing endoscopy and computerized tomography. All participants received septoplasty, and individuals were divided into two groups based on the surgical technique used to treat CB. Artery forceps were used in group I to crush the middle turbinate, while group II underwent lateral CB resection. At one month after surgery, postoperatively NOSE ratings were performed, and a comparison was made. **Results:** Both surgical techniques were quite successful in treating CB. Once comparing to preoperatively readings, the NOSE scores of all participants significantly improved. There was no statistical significant difference between the two surgical techniques. **Conclusion:** The anatomy of the nose and paranasal sinus frequently exhibits CB. It commonly coexists with DNS and, if over pneumatized, can result in sinus issues. Such circumstances call for surgical treatment. Although both lateral resection and the crushing of MT are frequently used procedures, the crushing method has the benefit of protecting the mucosa and causing fewer postoperatively problems.

Keywords: Concha bullosa, Lateral resection, Crushing technique, NOSE score, Septoplasty.

Introduction

Among the most frequent anatomical variations connected to the nose and paranasal sinus is concha bullosa (CB), also known as pneumatization of the middle turbinate (MT) (1). According to reports, this sinonasal anatomical variance occurs within 14 and 53% of the time. Despite being largely asymptomatic, it may have catastrophic consequences if over pneumatized(2). The CB may become infected from the ethmoid and frontal sinus, which will cause the development of a mucocele(3). The middle meatus could get narrowed and the CB could become so enormous that it can occupy the space between the septum and lateral wall, causing mucosal contacts and obstructing sinus drainage and ultimately in sinusitis (4).

There are differences of opinion among publications regarding the connection between CB and a deviated nasal septum (5). Unfortunately, several writers have shown that the existence of a large CB and contralateral DNS are strongly correlated (6, 7).

Several surgical techniques have been documented to address the anatomical deficiency, including crushing, submucosal resection, and partial excision of the lateral region of the middle turbinate (8). However, there isn't a certain agreement on the method that will produce the best results (9). Prior research utilising the Brief Smell Identification Test (BSIT) was done to assess how the two surgical methods (lateral turbinectomy and crushing technique) affected olfactory function (10).

An accurate, well-validated tool for assessing nasal obstruction is the NOSE Scale (Nasal Obstruction and Symptom Evaluation) (11). It includes five short, simple items that the individual must respond on their own. Every item is scored on a Likert scale ranging from 0 (Asymptomatic) to 4 (Severe Problems), and the results are added up and multiplied by 5 to produce a final result. It's being used to evaluate the disease's specific health findings (12). The model was widely utilised in worldwide publications for the objective evaluation of nasal obstruction in individuals who have had septoplasty and FESS (13, 14).

Patients and Methods

Type of study

This was a prospective study.

Study setting and duration

This study was conducted at Zhraa Hospital, Faculty of medicine for girls, between July 2021 and August 2022.

Data collection

Individuals who had nasal blockage came in as outpatients to the ENT department. Up until the time of this investigation, participants of the present research primarily complaining of headache, unilateral or bilateral nasal obstruction, and aversion to smell without seeing a meaningful improvement on a variety of medications such as analgesics and anti-migrant treatments.

Preoperative topical anaesthetic testing was performed on all cases who had complained of headaches. A cotton pack enclosing 2% xylocaine was inserted between an aerated middle turbinate and the lateral nasal wall, as well as between the same turbinate and the adjacent portion of the nasal spectrum, and the assessment lasted for ten minutes. At five min, this assessment was deemed successful if the chronic pain had decreased by 50% or more. Only those individuals who tested positive for topical xylocaine were involved in the research.

50 people in all were selected for the research. Individuals were submitted for elective surgery under general anaesthetic after giving permission to conduct the study. They were all subjected to a septoplasty. The instances were divided into two comparable groups depending on Concha Bullosa's adjunct surgical treatment. Subjects received lateral laminectomy were classified in group II, while those who had middle turbinoplasty using the

crushing method were classified as group I. In cases with bilateral illness, turbinate operation was recommended for the side with the most severely nasal obstruction.

Diagnostic endonasal endoscopic examination and CT scan

Detailed ENT examinations, involving anterior rhinoscopy and Diagnostic Nasal Endoscopy (DNE) using Hopkins rod endoscopes (0°, 30°), were performed on all participants after thorough history-taking and demography analysis. Diagnostic endonasal endoscopic examination was done before and after surgery.

Individuals with a malformed septum and middle turbinate hypertrophy underwent Computerized Tomography of Nose and Paranasal Sinus (CT PNS) (Toshiba 160 multidetector CT) utilising 0.5 mm slices thickness in axial images with sagittal and coronal reformats. The CT scanning was performed before surgery. Individuals having symptoms of Deviated Nasal Septum (DNS) with Concha bullosa had their preoperative NOSE scores computed (Table 1).

Inclusion criteria

The research comprised patients who underwent septoplasty and middle turbinates' operations (crushing or lateral laminectomy) and had a positively topical xylocaine testing.

Exclusion Criteria

The study excluded individuals who had any further adjunctant procedures, such as inferior turbinates' surgeries, other surgical treatments for Concha Bullosa, and individuals who were not accessible for follow-up.

Surgical Method

Local infiltrations with 2% xylocaine and 1:200,000 adrenaline was performed after correct placement. In each instance, **turbinoplasty** was done after septoplasty. Using a Blunt Artery forceps after localized infiltrations, the turbinate was gradually crushed with little to no harm to the surrounding mucosa. In the lateral laminectomy method, the central turbinate's anterior portion was deeply incised with a Sickle knives or blades, and the laterally bony component of the turbinate was carefully detached till its posterior end. Next, a thru-cut device was used to extract the lateral portion. Upon this side that was handled, nasal packing was performed. On the first postoperatively day, the packs were taken off. Saline nasal douching was performed, and the participant was observed after one week and one month.

Participants were assessed one month postoperatively through using NOSE Index (Nasal obstructions and symptoms evaluations), and the outcomes of the two methods were comparable with the preoperatively ratings.

Ethical considerations

The Academic and Ethical Committee gave its support for the project. Each participant made a written informed consent to agree to participate in the survey. The Declaration of Helsinki, the code of ethics of the World Medical Association, was followed when conducting this research on humans.

Statistical Method

Statistical Package for the Social Sciences was used to perform survey data and data processing for the research (SPSS V 26). For quantitative, the mean score and Standard Deviation (SD) were employed, whereas frequencies and percentages have been used for qualitative. Combined and Separated in quantitative statistics, the average was compared across related and independent groupings using the student t-test. The Wilcoxon assessment was used to assess the olfactory functioning before and after surgery. $P < 0.05$. This score was considered statistically significant.

Table 1 NOSE Scale (15):

Features	Severe	Fairly bad	Moderate	Very mild	Asymptomatic
Mouth breathing	4	3	2	1	0
Unable to get enough air through during exertion	4	3	2	1	0
Trouble sleeping	4	3	2	1	0
Nasal blockage/obstruction	4	3	2	1	0

Results

1- Demographic characteristics:

After reviewing the research criteria, 50 patients were chosen to be included in this report. In total, age ranged from 18 to 45 years. The mean age of the total participants was 30.5 ± 9.3 years. According to group I and II, the mean age was 29.6 ± 8.6 and 32.1 ± 7.8 respectively. Among the studied patients, there were 30 males (60%) and 20 females (40%). In group I and II, males represented 52 and 68% of each group respectively. The majority (84%) of participants came from urban regions (Table 2).

Table (2): Demographic characteristics of concha bullosa cases

Parameter	Total number of cases (n=50)	Group I (n=25)	Group II (n=25)
Age (years) (Range)	18-45	18-38	20-45
Mean \pm SD	30.5 ± 9.3	29.6 ± 8.6	32.1 ± 7.8
Sex			
• Male n (%)	30 (60)	13 (52)	17 (68)
• Female n (%)	20 (40)	12 (48)	8 (32)
Residence			
• Urban n (%)	42 (84)	23 (92)	19 (76)
• Rural n (%)	8 (16)	2 (8)	6 (24)

2- NOSE scoring

After one month postoperatively in this research, the NOSE scoring significantly improved for every participant (p value <0.001). When assessing the preoperative results of the two groups, group I's average score was 74.19 ± 8.75 and group II's was 76.32 ± 8.38 . Postoperatively average value for groups I and II were 21.94 ± 9.73 and 23.82 ± 8.89 , respectively. Both techniques have excellent success rates (p< 0.001). According to the total P-value between the two surgical techniques, there was no statistically significant difference (Table 2).

Table (2): Mean NOSE score of the studied patients:

Status	Group	N	NOSE Score (Mean \pm SD)	P-value 1
Pre-operative	Group I	25	74.19 ± 8.75	<0.001 (Highly significant)
	Group II	25	76.32 ± 8.38	
Postoperative	Group I	25	21.94 ± 9.73	<0.001 (Highly significant)
	Group II	25	23.82 ± 8.89	

p-value 2	0.652 (Not significant)
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P-value significant if $p < 0.05$, highly significant if < 0.01 .

p-value 1: the difference between the two groups pre and post-operative individually.

p-value 2: the total difference between the two surgical techniques.

3- olfactory function

Following surgery, both groups' olfactory functions were shown to have increased based on the findings of the BSIT (Figure 1).

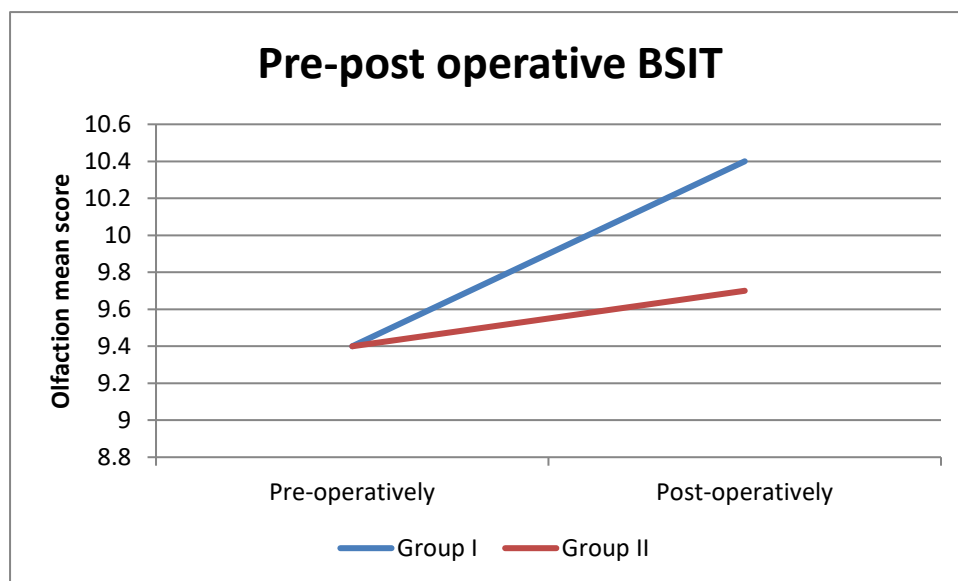


Figure 1. Olfactory functions according to the BSIT results in both groups. BSIT indicates Brief Smell Identification Test.

4- Diagnostic endonasal endoscopic examination and CT scan findings:

Concha bullosa was bilateral in 28 (56%) patients, and unilateral in 22 (44%) patients. Out of 50 cases of CB, 27 (54%) were on right side and 23 (46%) were on left side. One patient had mucopyocele of the CB, in its lamellar part, and three patients had extensive mucosal thickening within the CB. The distribution of anatomical variation of CB is shown in Table 1 (Figure 1).

Table 1 Anatomical variations of middle turbinate concha bullosa

Anatomical variation of concha bullosa	Number (%)	Total number (%)
Mucopyocele within lamellar type	1 (2%)	11 (22%)
Pure lamellar type	10 (20%)	
Air cells within bulbous type	1 (2%)	17 (34%)
Pure bulbous type	16 (32%)	
Polyp within extensive type	1 (2%)	22 (44%)
Mucosal thickening within the extensive type	3 (6%)	
Pure extensive type	18 (36%)	

Out of the 22 extensive conchae, 4 were on the right side (18.18%), which had associated ipsilateral osteomeatal complex blockage and mucosal thickening within the sinuses, and 3 (13.6%) had free ipsilateral osteomeatal complex without mucosal thickening of the sinuses. There was no statistically significant association between any

types of CB with sinusitis, but sinusitis was more predominant with the extensive type than with any other type of CB (Table 2, figure 2).

Table 2 Association of different types of middle turbinate concha bullosa with sinusitis

Concha bullosa type and laterality	Not associated with sinusitis	Associated with sinusitis	P value
Left lamellar	2	2	0.632
Right lamellar	3	4	0.755
Left bulbous	3	4	0.765
Right bulbous	6	4	0.221
Left extensive	6	4	0.461
Right extensive	7	5	0.844

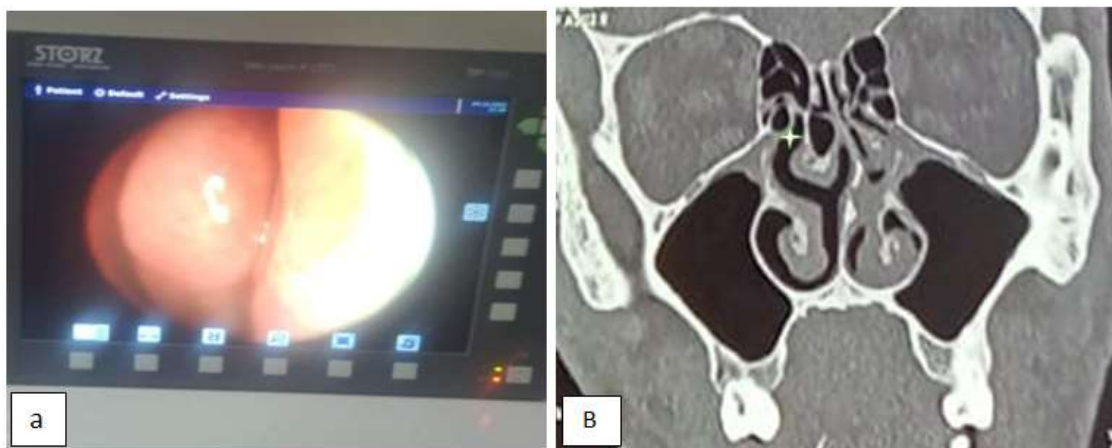


Figure (2): a) Preoperative Endoscopic view of Right Concha bullosa. b) CT scan of Right bulbous Concha bullosa is noted (astrix).

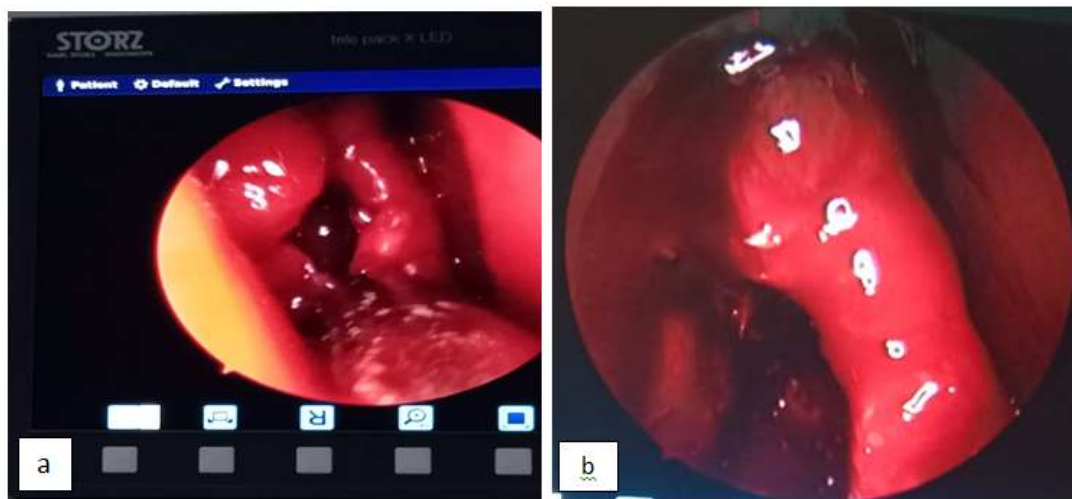


Figure (3): a) Lateral laminectomy during the operation. b) Endoscopic Imaging of the Right Lateral laminectomy at the end of operation.

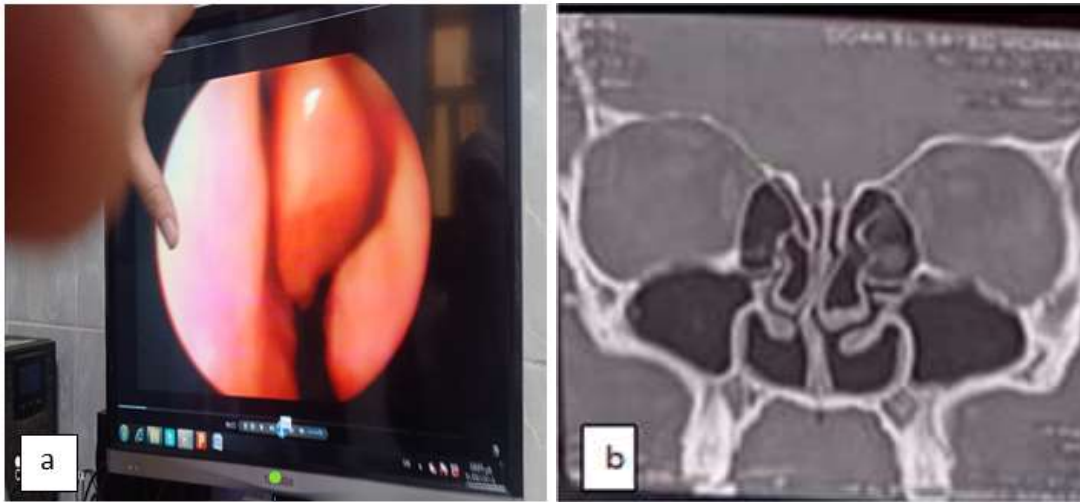


Figure (4): a) Preoperative Endoscopic view of Left Concha bullosa. b) Preoperative CT scan bilateral bulbous Concha bullosa (astrixes).

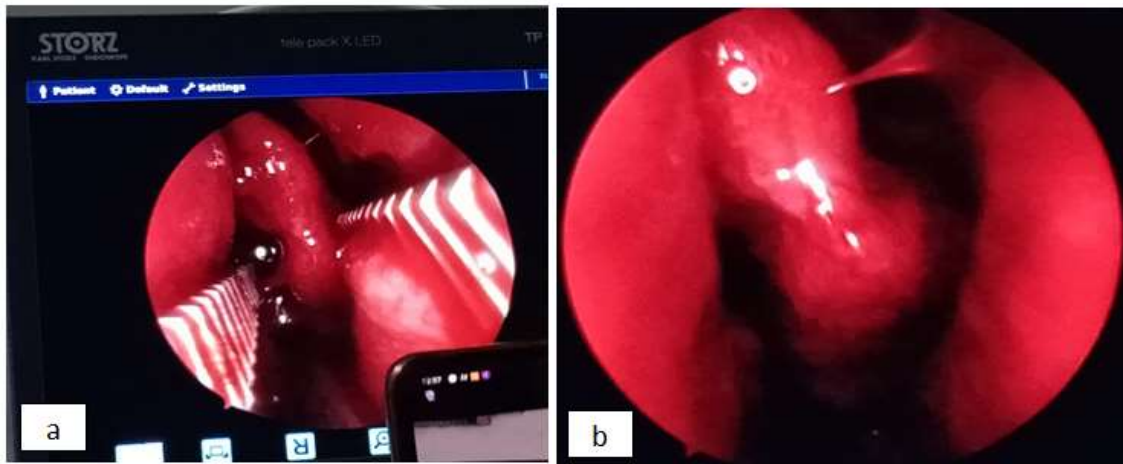


Figure (5): a) crushing of Concha bullosa during operation. b) Endoscopic Imaging of the Crushing technique at the end of the operation.

Discussion

Because of its pneumatization, concha bullosa is primarily visible in the central turbinate. Pneumatization of the middle turbinate that involves both the lamellar and bulbous regions is referred to as extended pneumatization. In the lamellar form, pneumatization is restricted to the vertical lamella; in the bulbous type, the inferior bulbous portion is pneumatized. Bullosa concha(16). Additionally, it was found that big CB, particularly those of the bulbous kind, can constrict the middle meatus and infundibulum, leading to recurring sinusitis. The anatomical abnormality can be corrected using a variety of treatments; however the preferred method is not clearly agreed upon. MT crushing, submucosal resections and lateral laminectomy are the most often used surgical techniques (1). In this investigation, we investigated the postoperatively results of lateral laminectomy with MT crushing as an additional septoplasty surgery. The NOSE assessment, which was designed by Stewart et al. and has undergone rigorous testing and validation, was used to compare the two approaches' efficacy (17).

In this investigation, group I had twenty-five subjects (52% of whom were males). There were 17 (68%) males in Group II. The researches by Mehta et al. and Vobilisetty RK et al. revealed similar results of male predominance (1, 18). Conversely, according to another research, CB is more prevalent in females (19). The discrepancy might well be brought on by the survey's eligibility criteria and smaller sampling size. Unilateral or bilateral nasal obstruction was the main complaint in all patients. All subjects exhibited DNS with unilateral or bilateral CB after endoscopic and CT examination. All subjects had septoplasty operations. Surgery was often performed on the side with the larger CB in bilateral CB instances. It was discovered that the DNS was located contralateral to the

significant CB in 15 (30%) of instances. This agrees with the findings of the Stallman et al. and Vobilisetty RK et al. investigations (1, 20). In the corresponding populations, both operations had excellent results (P-value <0.001 High Significant). Although Group I subjects (Crushing method) led to a little higher subjective improvements than the lateral laminectomy of the MT in Group II subjects, the difference wasn't statistically significant. In the survey performed by Andaloro et al. and Vobilisetty RK et al., opposite outcomes were attained (1, 21). However, two (16.66%) of the participants had synechia development between the lateral wall and the turbinate, and lateral excision of MT was linked to higher bleeding during surgery. The synechia was immediately released endoscopically in the outpatient area. Because the middle turbinate's structure and functioning are well maintained and the crushing process generates minimum mucosal injury, no such issues were observed in group II individuals. In addition, it is anticipated that the intact turbinate mucosa in the crushing approach, as opposed to the lateral excision of MT, may lead to quick healing (22).

Olfactory chemicals that come from the nasal cavity and reaching the olfactory epithelium are what cause us to perceive smells. Inflammatory and tumoral disorders, septal deviations of the nasal cavity, structural issues like CB, and other conditions might impair smell perceptions by obstructing airflow and the delivery of odour molecules to the olfactory epitheliums (23, 24). There are numerous studies that claim that olfactory abnormalities that developed right after nasal surgeries and were treated to remove edoema and inflammatory processes eventually healed (23, 25). In a study by Apuhan et al (26), It was discovered that nerve cells had been present in biopsy specimens from the lateral, anterior, and medial substrates of the concha of individuals who underwent surgery to treat their CB at percentages of 81.4%, 60%, and 32.8%, respectively. It was also noted that lateral turbinectomy might result in the absence of smell.

Conclusion

In the practise of ENT, CB is a typical result. The majority of CB instances do not necessitate surgical treatment. When the flaw is large, bullous, and creates obstruction, it may occasionally be required to fix it. Numerous studies have shown that CB and DNS can coexist. The crushing of MT and the resection approach are frequent surgical techniques for CB. There is no statistically significant difference between the two procedures' efficacy as a septoplasty augmentation. Furthermore, the mucosa is preserved and there are fewer post-operative difficulties when the turbinate is crushed. In the event of large CB, numerous surgeons favour lateral resection to crushing, however additional difficulties are anticipated with the resection procedure. Therefore, depending on the patient's observations, in our view, the surgical treatment should be chosen individually.

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