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Evaluation and Treatment of Inferior Concha Bullosa

Alt Konka Büllozanın Değerlendirilmesi ve Tedavisi

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ABSTRACT Objective: One of the nasal concha pneumotization forms is concha bullosa. It often occurs in fetal life as an anatomical variant. It is mostly encountered in the middle turbinate and inferior concha bullosa (ICB) is extremely rare. In most cases, ICB is asymptomatic and diagnosed incidentally. The treatment of symptomatic cases is turbinoplasty surgery. Our aim in this study is to share our experience by presenting our cases in which this rare surgery was applied. **Material and Methods:** In our study, 6 patients who underwent turbinoplasty with a diagnosis of ICB with a retrospective screening performed between 2015-2021 were included in the study. All patients' surgical procedures were performed under general anesthesia by the same surgeon. Turbinoplasty was performed with the endoscopic method, taking care to protect the medial mucosa of the inferior turbinate. **Results:** Six patients aged 14-27 years were included in the study. The presenting complaint was nasal obstruction in all patients. Endoscopic turbinoplasty was performed in all patients, septoplasty was performed in four patients and endoscopic sinus surgery was performed in two patients. No complications were observed. **Conclusion:** In the literature, it has been reported that the frequency of ICB is less than 1% and most of the cases are unilateral. Therefore, inferior concha turbinoplasty is one of the rare otorhinolaryngology applications. In this surgery, care should be taken to protect the medial mucosa of the inferior turbinate. Thus, complications such as empty nose syndrome can be prevented.

Keywords: Turbinates; nasal obstruction; nasal cavity

ÖZET Amaç: Nazal konka pnömotizasyon formlarından biri de konka büllozadır. Genellikle fetal hayatta anatomik bir varyant olarak ortaya çıkar. Sıklıkla orta konkada görülür ve alt konka bülloza (AKB) oldukça nadirdir. Çoğu zaman AKB asemptomatiktir ve tesadüfen teşhis edilir. Semptomatik vakaların tedavisi turbinoplasti ameliyatıdır. Bu çalışmadaki amacımız, nadir görülen bu ameliyatın uygulandığı olgularımızı sunarak deneyimlerimizi paylaşmaktır. **Gereç ve Yöntemler:** 2015-2021 yılları arasında yapılan retrospektif tarama ile AKB tanısıyla turbinoplasti uygulanan 6 hasta çalışmaya dâhil edildi. Tüm hastaların cerrahi işlemleri genel anestezi altında ve aynı cerrah tarafından yapıldı. Turbinoplasti işlemi endoskopik yöntemle, alt konka mediyal mukozasının korunmasına özen gösterilerek yapıldı. Kanama kontrolü için bipolar koter ve nazal tamponlar kullanıldı. Aynı seansta diğer burun patolojilerine yönelik işlemler de yapıldı. **Bulgular:** Çalışmaya 14-27 yaşları arasında 6 hasta dâhil edildi. Başvuru şikâyeti tüm hastalarda burun tıkanıklığıydı. Tüm hastalara mediyal mukoza korunarak endoskopik turbinoplasti yapıldı. Aynı zamanda 4 hastaya septoplasti, 2 hastaya endoskopik sinüs cerrahisi yapıldı. Hastaların takiplerinde semptomlar 2 hafta içerisinde kayboldu. Kanama, koku kaybı, boş burun sendromu gibi bir komplikasyon görülmedi. **Sonuç:** Literatürde, AKB frekansının %1'den daha az olduğu ve vakaların çoğunun unilateral olduğu bildirilmiştir. Bu nedenle inferior konka turbinoplasti nadir kulak-burun-boğaz uygulamalarından biridir. Bu ameliyatta alt konkanın mediyal mukozasını korumaya özen gösterilmelidir. Böylece boş burun sendromu gibi komplikasyonların önüne geçilebilir.

Anahtar Kelimeler: Nazal konkalar; burun tıkanıklığı; nazal kaviteler

Nasal turbinates; they are intranasal structures that usually have 6 in each person, 3 in each nasal cavity (superior, middle and inferior). The main functions of these structures are thermoregulation, humidification and filtration of nasal air. The superior and middle turbinates are extensions of the ethmoid bone. However, the inferior turbinate is a structure consisting of an independent bone and surrounding mucosal layer originating from the lateral nasal wall.[1]

Pneumatization of the nasal turbinates is a common variant and most of them occur in the middle turbinate. Pneumatization of superior turbinate is rare, and

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pneumatization inferior turbinate (PIT) is extremely rare. The cause of this pneumatization is not yet known. It can be considered a variant of normal anatomy.[1-3] This pneumatization can develop in different forms, the one in the form of an air-filled sinus chamber is called concha bullosa.[4]

Inferior concha bullosa (ICB) is often asymptomatic and incidentally diagnosed radiologically on tomography images. In the literature, few cases of symptomatic ICB have been described. It has been revealed that the most common symptoms in these cases are nasal obstruction, headache and sinusitis.[5]

In this study; by presenting 6 symptomatic ICB cases, we shared our experience about the surgical procedure and its results in these patients.

MATERIAL AND METHODS

This research was prepared as a retrospective review covering the years 2015-2021. Six patients who presented with various nasal symptoms and were diagnosed with ICB by preoperative tomography imaging and underwent surgical treatment were included in the study.

All patients were operated by a same surgeon, and turbinoplasty was performed using the same surgical technique. Surgery for other accompanying pathologies was also performed at the same operation. This study was approved by the KTO Karatay University Faculty of Medicine Non-Pharmaceutical and Non-Medical Device research ethics committee (2021/015). Our study was carried out in accordance with the Declaration of Helsinki.

SURGERY

All patients were operated under general anesthesia. With the endoscopic method, an incision was made from the anterior base of the inferior turbinate to the tail part with a scalpel. The medial mucosa of the inferior turbinate was preserved, and the lateral part was removed together with the bullous part, and partial turbinectomy was performed. Bleeding control was achieved with bipolar cautery. Surgicel (Surgicel® Ethicon, Somerville, USA) packing was placed lateral to the inferior turbinate. In addition, middle turbinate turbinoplasty was performed with a similar method for the treatment of middle concha bullosa (MCB) in all patients.

RESULTS

Six patients aged 14-27 years were included in the study. The first complaint of all patients was nasal obstruction, additionally, 2 patients had rhinorrhea and 1 patient had headache. ICB was bilateral in two of our patients. Preoperative examination revealed middle concha bullosa in all patients, sinusitis in 2 patients, and septum deviation in 4 patients (Figure 1). Turbinoplasty was applied to the pneumatized inferior and middle turbinates of all patients (Figure 2, Figure 3). In addition, septoplasty was performed in 4 patients and endoscopic sinus surgery was performed in 2 patients (Table 1).

The patients were checked on the 7th day, 15th day and 1st month postoperatively. In these controls, the clots and crusts in the nasal cavities were cleaned and the complaints of the patients were recorded. Nasal crusting was observed in all patients, which

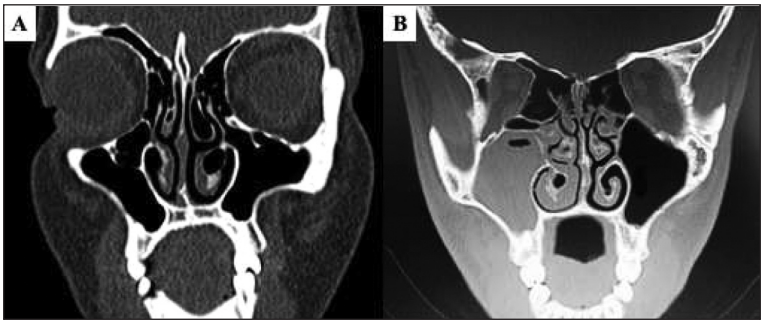

FIGURE 1: Coronal section tomography image of two cases (**A:** Case-1, **B:** Case-2).

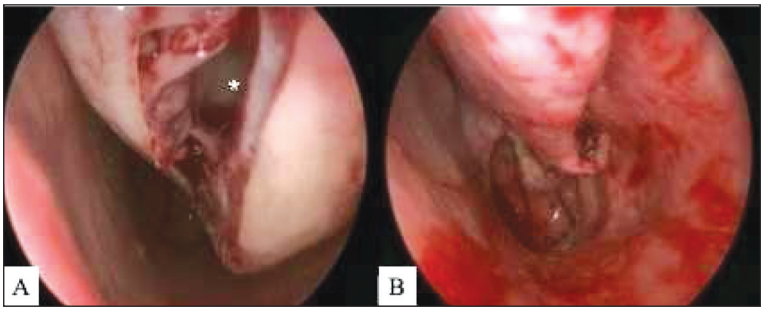

FIGURE 2: Case-1; **A:** *Inside of the concha bullosa after incision, **B:** Appearance after partial turbinectomy.

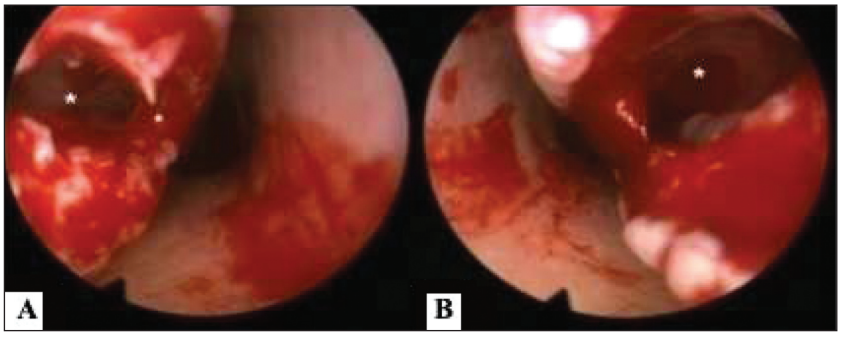

FIGURE 3: Case-3; **A, B:** Intraoperative view of bilateral inferior concha bullosa after incision (*inside of the concha bullosa).

TABLE 1: Clinical characteristics of the patients.

Case no	Age	Gender	ICB side	Other pathology	Surgery
1	17	F	Left	Left MCB	Turbinoplasty
2	19	M	Right	Right MCB+right maxillar sinusitis	Turbinoplasty+right ESS
3	14	F	Bilateral	Left MCB+left maxillar&ethmoid sinusitis+septum deviation (right)	Turbinoplasty+left ESS+septoplasty
4	27	F	Bilateral	Right MCB+septum deviation (left)	Turbinoplasty+septoplasty
5	20	F	Left	Bilateral MCB+septum deviation (right)+ left hemifacial hypoplasia+rinoplasty (2 years ago)	Turbinoplasty+septoplasty
6	24	M	Left	Left MCB+septum deviation (left)	Turbinoplasty+septorhinoplasty

ICB: Inferior concha bullosa; MCB: Middle concha bullosa; ESS: Endoscopic sinus surgery.

lasted for 2 weeks. No bleeding, empty nose syndrome, or loss of smell was observed in any patient. Nasal congestion disappeared in all 6 patients in our series.

DISCUSSION

ICB is an anatomical variation in which there is a sinus-shaped cell filled with air in the inferior turbinate, and therefore the turbinate is hypertrophic and causes nasal obstruction. Middle concha bullosa is the most common anatomical variation in the sinonasal region and its incidence has been reported to be between 13% and 53% in the literature.[6,7]

The pneumatization of the inferior turbinate is very rare and almost all cases in the literature have been published as case reports. The incidence of ICB has been reported to be less than 1%, and unilateral ICB is more common than bilateral cases.[8,9]

Not all PIT cases reported in the literature are complete concha bullosa. Bolger et al., proposed a

classification for middle turbinate pneumatization, according to this they divided the types of pneumatization into 3; lamellar, bulbous and extensive. Pneumatization with only the vertical lamella of turbinate was named as lamellar type, pneumatization with only the inferior part of turbinate was named as bulbous type, and pneumatization with both vertical lamella and inferior part was named as extensive type.[6] Ingram and Richardson, on the other hand, stated that the types of pneumatization were similar for the inferior turbinate and this classification could be used.[10] All of the cases in our study were bulbous type PIT.

In a retrospective study, Yang et al. evaluated 59,238 paranasal computed tomography (CT) scans and detected PIT in 16 patients. In addition, it was stated that the pneumatization was bilateral in 2 patients. Of the 18 PITs, 9 were lamellar, 2 were extensive and 7 were bullous types of pneumatization. In this article, where the incidence of PIT was 0.03, approximately 1/3 of these cases were true concha bullosa.[11] In a similar study by Oztürk et al., PIT was detected in 10 (0.04%) of 2,500 cases. Six of these PIT cases are lamellar, 2 extensive, and 2 bullous. In this study, the true concha bullosa composes 1/5 of the PITs.[9]

When the studies in the literature were examined, most of the cases were presented from our country. This made us think that ICB may be a more common variation in Turkish society. Or, incidental diagnoses may increase the number because paranasal CT are examined frequently in our country. However, in these 2 studies in which large series were examined, no significant difference was observed in the incidence of PIT.[9,11]

Three theories are considered about the occurrence of PIT. First; it is the formation of PIT because the interlamellar epithelium of the inferior turbinate skeleton, which ossified in fetal life in the form of double lamella, is not properly invaginated. The second; is the formation of an air sac due to maxillary sinus pathology at the inferior turbinate attachment point. The third theory is that maxillary sinus pneumatization progresses to the inferior turbinate in fetal life.[11,12]

ICB is usually asymptomatic and diagnosed incidentally. Nasal obstruction is the most common clinical complaint due to the ICB. In addition, symptoms similar to inferior turbinate hypertrophy such as headache and purulent discharge are seen. Dysosmia and epiphora are less common symptoms.[5,9,11] The presenting complaint in all 6 patients in our study was nasal obstruction. In addition to ICB, MCB was found in all of our patients and septum deviation was found in 4 of them. Turbinoplasty for ICB and MCB was performed in 6 patients, and septoplasty was performed in 4 patients. None of our patients had any complaints of nasal obstruction after surgery. It is a fact that septoplasty contributes to this situation as much as turbinoplasty surgery.

PIT and inferior turbinate hypertrophy cannot be distinguished by anamnesis and physical examination. Decongestant sprays can be used to make this distinction. While the reduction in concha size after decongestant administration suggests hypertrophy, the absence of change in size should suggest pneumatization. Although this test does not give a specific finding, it may be useful in clinical differentiation.[1,12] Tomography, especially coronal section, is required in the diagnosis of ICB.[13] Axial sections, are helpful in distinguishing "pseudopneumatization" that may occur with the curvature of the inferior turbinate.[14]

Treatment is resection of the concha bullosa if the patient is symptomatic.[11] The preservation of the medial aspect of the inferior turbinate during surgery is important for the continuation of turbinate functions and the prevention of empty nose syndrome. In addition, concha incision surface bleeding should be controlled by electrocauterization.[15]

CONCLUSION

ICB, although often asymptomatic, is a rare cause of nasal congestion. It can also cause symptoms such as headache, rhinorrhea, and sinusitis. Even if it is considered a variant of normal anatomy, symptomatic cases should be treated surgically. In surgery, it is critical to protect the medial mucosa, maintain concha functions and prevent empty nose syndrome.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Mustafa Güllüev, Nurdoğan Ata;* ***Design:*** *Mustafa Güllüev,* ***Control/Supervision:*** *Nurdoğan Ata;* ***Data Collection and/or Processing:*** *Mustafa Güllüev;* ***Analysis and/or Interpretation:*** *Nurdoğan Ata;* ***Literature Review:*** *Mustafa Güllüev, Nurdoğan Ata;* ***Writing the Article:*** *Mustafa Güllüev, Nurdoğan Ata;* ***Critical Review:*** *Nurdoğan Ata;* ***References and Fundings:*** *Mustafa Güllüev;* ***Materials:*** *Mustafa Güllüev.*

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