

Transnasal endoscopic approach in repair of choanal atresia

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ABSTRACT

Introduction: The aim of the surgical treatment in choanal atresia is to open the posterior nasal aperture primis. For this purpose, many methods have been applied to date, and the transnasal endoscopic approach has been the preferred method in recent years and used in our study.

Materials and Methods: Between 1996 and 2017, transnasal endoscopic surgery was performed in six patients with the diagnosis of unilateral choanal atresia, atresia plaque resection and stent placement were performed in two patients, and stentless atresia plaque and posterior vomer resection operations were performed in four patients. Our patients were followed for at least 2 years and their results were evaluated.

Results: Choanal atresia was unilateral in all of our patients. Four of six patients were male and two were female. Our youngest patient was 7 years old, and our oldest patient was 22 years old, with a mean age of 13.6 years. Of the atresia plaques, four were osseomembranous and two were membranous. Adequate choanal patency was achieved in our patients who underwent atretic plaque and posterior vomer resection and did not use a stent. Restenosis developed in patients who underwent atretic plaque resection and used stent. In these patients, stent-free, posterior vomer resection was performed in revision surgery.

Conclusion: We believe that in the treatment of choanal atresia, atretic plaque and posterior vomer resection with the help of transnasal endoscopic surgery gives successful results, and the choanal opening opened without stenting provides adequate nasal breathing.

Keywords: Choanal atresia, Restenosis, Stent, Transnasal endoscopic surgery

Introduction

Choanal atresia is the developmental absence of communication between the posterior nasal cavity and the nasopharynx.^[1] It is rarely an anomaly. It has been reported that it is seen in one in 8000 births in most of the series.^[2] Choanal atresia is usually unilateral and occurs twice as often in women. In 90% of cases, the posterior choana is covered by the atretic bone plate.^[1] It is accepted that choanal atresia is caused by the continuation of the development of the bucconasal membrane, which should stop

embryological development until the 7th week.^[3]

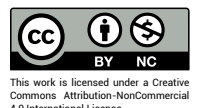
Congenital choanal atresia may also be associated with other anomalies.^[4] The word CHARGE is used to describe these different combinations of anomalies. These anomalies are; Retinal Coloboma, Heart defects, choanal atresia, mental retardation, genital hypoplasia, hearing loss, and ear anomalies.^[5]

Choanal atresia was first described by Roederer in 1755, and its first surgical treatment was performed by Emmert



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in 1854.^[3] Various methods have been proposed as surgical treatment. Until today many methods and techniques such as transnasal, transpalatal, transseptal, transantral, and laser application have been used.^[6-8] By the development of intranasal endoscopic surgery in recent years, surgeons preference became the transnasal endoscopic approach. The transnasal endoscopic approach is the surgical approach in our study. We discussed the results of the cases with stents and those without stents.

Materials and Methods

Our study included six patients who underwent surgical treatment with the diagnosis of unilateral choanal atresia in Istanbul Marine Hospital and the Private Turkey Hospital Otolaryngology Clinics between 1996 and 2017. This study protocol was approved by the Ethics Committee of Prof. Dr. Cemil Taşçıoğlu Training and Research Hospital, Istanbul, Turkey (Date: May 9, 2022; Decision No: E-48670771-514.99/116).

In the endoscopic nasal examination of the patients with unilateral nasal obstruction and nasal persistent runny nose, dense mucoid secretion was observed on the occluded side. After the secretion was aspirated, it was determined that there was no posterior aperture behind it. Unilateral choanal atresia was diagnosed in patients who underwent axial plane computed tomography with these clinical findings (Fig. 1).

All patients were operated under general anesthesia with endotracheal intubation.

Preoperatively, 2% Lidocaine and 1/50,000 epinephrine were infiltrated into the septal mucosa, inferior turbinate



Figure 1. Computed tomography of a patient with right choanal atresia shows an osseomembranous atresia plaque.

and atretic plate submucosa. In surgeries performed using the transnasal endoscopic method, 2.7 and 4 mm rigid telescopes with an angle of 30 degrees were used. With a sickle scalpel, we made a “L” shaped mucosal incision on the atretic plaque starting from the upper part of the nasoseptal rim and continuing laterally from the junction with the floor of the nasal cavity. Our first two patients were osseomembranous type, and we removed the structures on the atretic plate with the help of a flat nasal forceps after separating the mucosa on the atretic plate sufficiently from the bone with the help of a nasal aspirator tip. Using a 4 mm chisel, we started from the naso-septal junction, which is the tiniest part of the bone plate, and divided the bone plate from medial to lateral and removed the bone plate as needed. We were careful not to leave any bone or mucosal residues at the lower edge of the newly established posterior choanal opening. The lateral wall was open enough to easily see torus tubarius on that side. We decided that the newly made choanal opening was sufficient by comparing it with the other open posterior choanal opening. We placed a 10 mm diameter stent consisting of a polyethylene tube dressed on a nelaton catheter (Fig. 2) into the newly made choanal opening.

We sutured this stent to the columella skin with a 2/0 silk suture. We removed the stent 8 weeks later, whose postoperative controls were performed at 1 week intervals (Fig. 3a). At the end of the 2nd post-operative year, we decided that the choanal patency was not functionally sufficient and performed revision surgery on two of our patients who had stent insertion.

An incision was made endoscopically with a sickle



Figure 2. The placement of the stent in the newly established choanal aperture is shown.

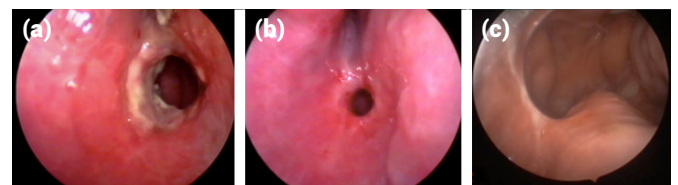


Figure 3. The image of the patient who underwent transnasal endoscopic atreticplaque resection with stent at 8 weeks (a), 2 years after stent removal (b), and 2 years after revision surgery (c).

scalpel, starting from the upper part of the nasoseptal rim and extending to the base, in our two patients who used stent but developed stenosis 2 years later, and in the other four patients. Atretic plaque mucosal flaps were removed with the help of a sickle scalpel and a forceps. In patients with osseomembranous type atresia, a 4 mm chisel was used for bone plates. A resection of 10–15 mm was performed in the posterior part of the vomer according to the ages of the patients with the help of a back-biting forceps. Meanwhile, the mucosal flap of the other side of the septum was protected and laid down toward the atresia with the help of a tampon that was placed in the nasopharynx (Fig. 4). By this maneuver all bony surfaces around the posterior septum were covered to help the healing process. Transnasal irrigation with physiological saline was done for 2 weeks postoperatively and antibiotic therapy was given. Stenosis was not observed in any of the patients in the following 2 years.

Results

Of the six patients included in the study, four were male and two were female. Our youngest patient was 7 years old, and our oldest patient was 22 years old, with a mean age of 13.6 years. All patients were patients with unilateral atresia and unilateral nasal obstruction and nasal discharge. Four of the patients have atresia on the right side and two on the left side. In axial computed tomography,

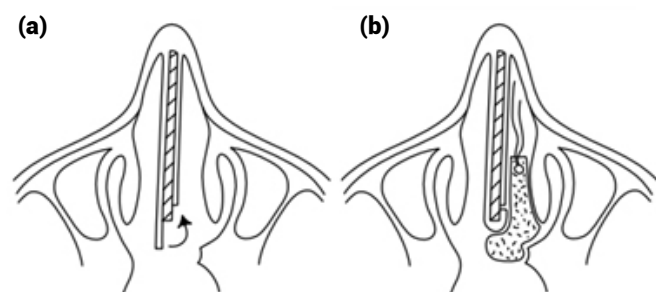


Figure 4. Atretic plaque, posterior vomer resection (a) and insertion of tamponade into the newly opened choanal opening (b).

four patients were osseomembranous type and the other 2 were membranous type. No other congenital anomaly was found in any of four patients. At the end of the 2 year follow-up two patients developed restenosis (Fig. 3b).

Revision surgery was performed at the end of the 2nd year in these two patients who had stents previously (Table 1). In all our patients who underwent primary surgery and revision surgery, at the end of 2 year follow-up, the choana was sufficiently open (Figs. 3c and 5).

Discussion

The aim of the surgical treatment of choanal atresia is to open the choana which is closed with atresia plaque, and to ensure the connection between the nasal cavity and the nasopharynx. Although there is no specific method that is the gold standard to achieve this aim, advanced transnasal endoscopic approaches are preferred because they reduce the traumatic damage that causes postopera-



Figure 5. Image of the patient who underwent posterior vomer resection with stentless transnasal endoscopic surgery at the end of 2nd year.

Table 1. Features and outcomes of patients in the study

	Gender	Age	Atresia Type	Stent	Revision
S.A.	Male	21	Osseomembranous	+	+
H.E.	Male	22	Osseomembranous	+	+
A.E.	Female	10	Membranous	-	-
A.C.C.	Male	7	Osseomembranous	-	-
B.K.	Male	13	Osseomembranous	-	-
T. A.	Female	9	Membranous	-	-

tive scar and stenosis.^[7]

After Owens reported highly successful results with the transnasal approach in 1965, this method became one of the most accepted approaches due to its good field view.^[1,8] However, the transnasal approach has disadvantages such as bleeding, prolonged surgery, bone defect in the palate, fistula, development of infection, and long recovery time.^[9,10] In addition, the transpalatal approach is not recommended before the age of 6 years because it adversely affects maxillofacial development and causes malocclusion.^[11,12]

The transnasal endoscopic approach has been the first choice method for many surgeons after its first application by Stankiewich in 1990.^[13] This approach provides the best view, it is the safest, and it has been shown to be beneficial.^[14,15] However, after this approach, it has been reported that restenosis may develop due to the formation of post-operative scar, synechia, and granulation tissue. Although the use of stents and mitomycin has been recommended to reduce these problems, their use has become controversial over the years.^[15,16,17,18] Jose Luis Llorente et al. reported that 100% successful results could be obtained with transnasal endoscopic surgery without using stent or mitomycin.^[15] The use of a stent, which is a controversial issue, leads to inflammation in the tissue, resulting in a granulation tissue formation and ultimately restenosis.^[17]

Restenosis rates of 50–70% have been reported in some studies in which stent was used together with the transnasal endoscopic approach.^[19,20] Studies suggesting removal of the posterior wall of the vomer to provide choanal patency with a transnasal endoscopic approach without using a stent or mitomycin have been reported.^[21,22] In our study, we performed revision surgery for stenosis 2 years later in two patients for whom we used a stent together with the transnasal endoscopic approach. In revision surgery, we reconstructed the choanal opening by resection of the posterior wall of the vomer. With these two revision surgeries in which we did not use a stent we saw that the choanal patency was sufficient in the controls of the patients at the end of the 2nd year. Afterward we performed posterior vomer resection with stent free transnasal endoscopic surgery in four patients we operated on, and closed the resection site with a septum mucosal flap on the other side. With this method we observed that there is no synechia, granulation and scar tissue, and wound healing is faster.

Conclusion

In addition to the development of restenosis, there are also disadvantages such as morbidity and long hospitalization time in patients who use stents in choanal atresia surgery. On the other hand, stent related complications were not observed in patients who underwent stent free, posterior vomer resection and these patients did not require long term antibiotics and had shorter recovery and hospitalization times. With these privileges, we think that posterior vomer resection with help of transnasal endoscopy is a preferable method in the treatment of choanal atresia.

Disclosures

Ethics Committee Approval: This study protocol was approved by the Ethics Committee of Prof. Dr. Cemil Taşcıoğlu Training and Research Hospital, Istanbul, Turkey (Date: May 9, 2022; Decision No: E-48670771-514.99/116).

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