Endoscopic Repair of Congenital Choanal Atresia without Stenting at Queen Rania Pediatric Hospital

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ABSTRACT

Objective: To evaluate the effectiveness of endoscopic repair of congenital choanal atresia by removing the posterior aspect of the vomer bone along with the atretic plate without stenting.

Methods: This retrospective study included 16 children aged (6 days-13 years) who presented or referred to Queen Rania Hospital with congenital choanal atresia. Patients who had unilateral, bilateral, primary or revision cases were included in the study. All patients underwent endoscopic repair by removing the posterior aspect of the vomer bone along with the atretic plate without stenting. All patients were followed up for 18 months.

Results: Four patients were males, 12 were females. Three cases had bilateral atresia, one of them was revision. 13 cases were unilateral, 5 of them were revision cases. In unilateral cases the right side was involved in 8 cases and 5 in the left side. All cases were repaired endoscopically without stenting, only one patient out of 16 patients needed revision surgery.

Conclusion: Endoscopic repair of choanal atresia (unilateral or bilateral, primary or secondary) without stenting is an effective and safe method of treating choanal atresia with a high success rate.

Key words: Choanal atresia, Endoscopic, Stenting

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Introduction

Congenital choanal atresia is a congenital anomaly of the posterior nasal aperture that prevents airflow from the nose to the nasopharynx.[1] It is caused by failure in rupture of the nasobuccal membrane of Hochstetter which is normally reabsorbed during the sixth week of gestation.[2]

Although it is a rare condition, it is the most common congenital nasal malformation with incidence of one in every 8000-10000 live births. [3] It was first described by Johann Roederer in 1755. Females are affected more than males. [4] It may be unilateral or bilateral, isolated or associated with other craniofacial anomalies, with CHARGE syndrome being the most commonly associated anomaly.[2]

Since infants are obligate nasal breathers for the first few days after birth and have no ability to breathe through mouth, bilateral choanal atresia presents as medical emergency at birth with symptoms of respiratory distress and cyanosis which is relieved by crying. [5] Diagnosis is suspected immediately at birth after failure to

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pass nasogastric tube and confirmed by CT scan. Immediate airway management is necessary by insertion of oropharyngeal airway, orotracheal intubation or definite treatment by surgical repair.[6] Unilateral cases may remain undetected till late adulthood with symptoms of nasal obstruction and mucoid nasal secretions.[3] Its composition may be bony, membranous or mixed (bony and membranous) which is the most common type.[7]

Many surgical approaches have been used with endoscopic transnasal being the most preferred.[2] There is a great controversy regarding placing stents or not.[5] The aim of our study is to evaluate the effectiveness of repair of congenital choanal atresia endoscopically without stenting.

Methods

This retrospective descriptive study was conducted at Queen Rania Pediatric Hospital. The case notes for all patients who had choanal atrersia and underwent surgery from September 2009- September 2014 have been reviewed and the following data have been collected from the case notes: age, gender, presenting symptoms, type of anesthesia, prior surgery, CT scans, type of choanal atresia, surgical technique, associated malformations, recurrence and complications.

The surgical technique used is done under general anesthesia via orotracheal intubation. In all patients, packs soaked with adrenaline 1/10000 were inserted in both nasal cavities. Then infiltration with adrenaline 1/100000 was done in both sides of the septum, the atretic plate and through the mouth to the palate midway between the midline of the palate and the deepest gingiva. Using the zero degree 2.7mm sinus telescope, a puncture was done at the infero-medial side, then by using the french backbiter the posterior part of the vomer bone was removed in peices. The choana was widened using the backbiter, same was done for the other side then the posterior end of the septum was removed to make both choanae communicate together in a common wide neochoana, Fig. 1. In all our bony cases, using puncture and french backbiter was enough to open and widen the cavity, but if thick or hard bone was found using drill may be needed. Using microdebrider, trimming the mucosa of the edges of the common choana was done.

All patients were discharged with nasal decongestants and nasal saline lavage. All patients enrolled in the study were followed up for 18 months to detect patency of posterior choana by nasal endoscopy. The study population was comprised of 16 patients with age ranges (6 days-13 years).

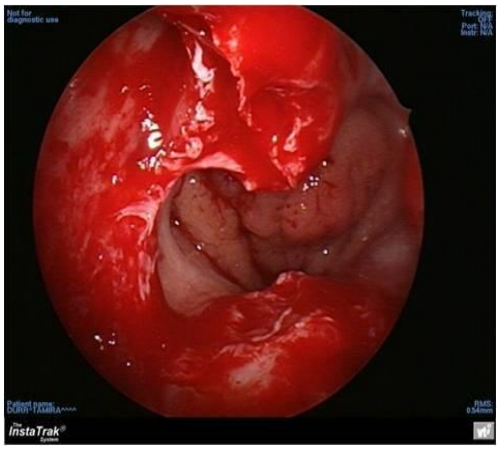

Fig. 1: Wide common neochoana after removal of the vomer bone and posterior septum

Results

Sixteen patients aged (6 days-13 years) were enrolled in the study. 4 patients were males with mean age of 6.2 years and 12 were females with mean age of 7.8 years, Table I. Three cases were bilateral, 2 of them were primary cases and one of them had previous surgery at other peripheral hospital (revision cases). Thirteen cases were unilateral, 8 of them were primary cases and 5 were revision cases. In unilateral cases the right side was involved in 8 (62%) cases and 5 (38%) patients had the left side involved. Regarding the nature of the atresia, 12 cases were found to be of a mixed type, 4 cases were pure bony and none were of the membranous type, Table II. Two patients had associated malformations, one had CHARGE syndrome and the other had atrial septal defect.

Follow up for these patients was done for 18 months. All patients had patent posterior choana, except one male patient with right side primary mixed type developed re-stenosis after 6 months and needed revision surgery. Only one patient developed bleeding post operatively and was managed by a nasal pack.

Table I: Characteristics by gender

Characteristic	Total number	Unilateral	Bilateral	Mean age (years)
Males	4 (25%)	3	1	6.2
Females	12(75%)	10	2	7.8

Table II: Characteristics of unilateral and bilateral cases

Characteristic	Total number	Primary	Secondary	Mixed type	Bony type
Unilateral	13(81%)	8	5	9	4
Bilateral	3 (19%)	2	1	3	0
Total Number	16	10	6	12 (75%)	4 (25%)

Discussion

The surgical technique used to repair all patents in our study patients was done by endoscopic removal of the atretic plate with wide resection of the vomer bone and the posterior septum to obtain a large choana without stenting.

Only one patient developed restenosis; out of the 16 patients, 12 were females, 13 were unilateral with the right side involved in 8 of them and 12 patients were of mixed type.

Congenital choanal atresia is the most common congenital nasal anomaly.[1] Its presentation varies from respiratory difficulty, only during infection, to complete obstruction. Bilateral atresia presents early with respiratory distress while unilateral atresia may remain asymptomatic until first upper respiratory tract infection develops.[8]

It is more common in females,[3] in our study we also found that females (75%) are more affected than males (25%), although some studies showed no gender difference, as in a study done by Hengerer AS, *et al* on 73 patients.[9] In unilateral cases higher prevalence was found in the right side,[1] also in our study right side was involved in 62% of patients.

Congenital choanal atresia is classified according to composition into: Bony, membranous and mixed (bony and membranous). The most common type is mixed, in a study done by Manica *et al*[1] mixed type was found to be (77.8%). In our study 3 cases out of 14 (19%) were found to be pure bony. While 13 patients were of mixed type (81%) and none of our patients were of membranous type. It may be an isolated anomaly or one feature of associated anomalies as CHARGE syndrome. In our study only one case was associated with CHARGE syndrome which is female with bilateral mixed type.

Different approaches for surgical repair are used. Endoscopic, transnasal, transpalatal and transseptal. The transpalatal approach has many drawbacks: time consuming, increased bleeding risk, maxillofacial growth problems, palatal dysfunction and palatal fistulas.[3] The transseptal approach is rarely used for younger patients with unilateral atresia and now the transnasal approach is the preferred approach.[5]

In our study, only one patient out of 16 patients developed re-stenosis (6%), so, the success rate was 94%. In a study done by Schoem SR, they analyzed 13 children who underwent transnasal endoscopic repair without stenting, there were no recurrent cases.[10] Another study done by Ibrahim AA, *et al* on 21 patients using the same approach showed that 3 patients developed restenosis.[11] Also, Cedin AC, *et al* used stentless folded -over-flap technique and no recurrent cases were found.[12] A study done by El-Ahl MA, *et al* using the same technique showed a zero recurrence rate.[13]

Also Magdy ES in his comparative study between stent and non-stent groups found that the use of stents didn't decrease the re-closure or restenosis rate.[5] On the other hand in Sun P, et al study on 15 patients using stents for 3 months, no recurrence rate was found.[14]

All revision cases in our study were done primarily in peripheral hospitals using stents and all were revised endoscopically without stenting. No recurrent cases were found.

Using stents has many disadvantages; it causes discomfort, localized ulceration, erosion of the nares, needs long-term antibiotics use, stent blockage and the unsightly aspect of having stents protrude from the nose.[5]

Mitomycin, which is an antiproliferative agent, that prevents granulation formation by inhibiting fibroblast formation, has not been applied to our patients. Success rate was excellent without applying it.

The limitation of our study was the small number of patients; to get more reliable result we recommended a prospective study with large number of patients.

Conclusion

Endoscopic repair of congenital choanal atresia (unilateral or bilateral, primary or secondary) by removing the posterior aspect of the vomer bone along with the atretic plate without stenting is an effective and safe method of treating choanal atresia with high success rate.

References

1. **Manica D, Schweiger C, Netto CCS, *et al.*** Retrospective study of a series of choanal atresia patients. *Int Arch Otorhinolaryngol* 2014; 18:2-5.
2. **Llorente JL, López F, Morato M, *et al.*** Endoscopic treatment of choanal atresia. *Acta Otorhinolaryngol Esp*. 2013; 64(6): 389-395.
3. **Rodríguez H, Cuestas G, Passali D.** A 20-year experience in microsurgical treatment of choanal atresia. *Acta Otorhinolaryngol Esp* 2014; 65(2):85-92.
4. **Velegrakis S, Mantsopoulos K, Iro H, Zenk J.** Long-term outcomes of endonasal surgery for choanal atresia: 28 years experience in an academic medical centre. *Eur Arch Otorhinolaryngol* 2013; 270:113-116.
5. **Magdy S.** Endoscopic management of congenital bilateral posterior choanal atresia: value of using stents. *Eur Arch Otorhinolaryngol* 2013; 270: 129-134.
6. **Kumar S, Gupta S, Naglot S, Sahni JK.** Bilateral choanal atresia: is it really a surgical emergency? *Indian J Otolaryngol Head Neck Surg* 2013; 65; 205-209.
7. **Ceylan K, Emir H, Kizilkaya Z, Samim E.** Bilateral congenital choanal atresia in a 7-day-old patient: transnasal endoscopic repair with stent. *Eur Arch Otorhinolaryngol* 2007; 264: 837-840.
8. **Asma A, Roslenda AR, Suraya A, *et al.*** Management of congenital choanal atresia after multiple failures: A Case Report. *Med J Malaysia* 2013; 68 (1):76-78.
9. **Hengerer AS, Brickman TM, Jeyakumar A.** Choanal atresia: embryologic analysis and evolution of treatment, a 30-year experience. *Laryngoscope* 2008; 118(5): 862-866.
10. **Schoem SR.** Transnasal endoscopic repair of choanal atresia: why stent? *Otolaryngol Head Neck Surg* 2004; 31(4): 362-366.
11. **Ibrahim AA, Magdy EA, Hassab MH**. Endoscopic choanoplasty without stenting for congenital choanal atresia repair. *Int J Pediatric Otorhinolaryngol* 2010; 74(2): 144-150.
12. **Cedin AC, Fujita R, Laércio MCO.** Endoscopic transseptal surgery for choanal atresia with a stentless folded-over-flap technique. *Otolaryngol Head Neck Surg* 2006; 135(5): 693-698.
13. **EL-Ahl MA, EL-Anwar MW.** Stentless endoscopic transnasal repair of choanal atresia starting with resection of vomer. *Int J Pediatric Otorhinolaryngol* 2012; 76(7): 1002-1006.
14. **Sun P, Ge W, Liu W. *et al*.** Transnasal endoscopic choanal plasty for repairing congenital choanal atresia. *Chinese J of Otolaryngology Head and Neck Surgery* 2014; 49(7): 564-567.