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TRANSNASAL ENDOSCOPIC TREATMENT OF CHOANAL ATRESIA

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ABSTRACT

Choanal atresia is a rare structural abnormality in which the posterior opening of the nasal cavity, which flows through the nasopharynx and the inability to breathe, occurs. The aim of this study is to evaluate the efficacy and results of unilateral or bilateral choanal atresia management using modern endoscopic techniques. The study included seventeen patients who were admitted to the department of Ear, Nose and Throat in Tishreen university, who were underwent surgery for choanal atresia via endoscopic techniques, and study results and complications. After postoperative follow-up period between six months and tow years, two patient were developed with them a restenosis that requires a second surgery at rate 11.76%, while the rest of the patients did not have any complication with a total success rate of surgery 88.24%. The study showed that endoscopic surgery with the use of modern instrument increases the success rate and reduces the complications as a restenosis.

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INTRODUCTION

Choanal atresia is a congenital narrowing at the posterior choanae (the area from the nare to the nasopharynx (Cedin et al., 2012). Choanal atresia occurs at rate of 1/7000 newborns (Stieve, 1999). This is purely bony in 30% of cases and mixed bony and membranous in 70% of cases. In general, unilateral choanal atresia is more common than bilateral (65-75% of patients with unilateral), and females are more likely to have it (2:1 ratio to males). When unilateral, it most commonly occurs on the right side (Rombaux, 2003; Ramsden, 2009 and Anajar, 2017). Choanal atresia especially a bilateral atresia can be associated with other congenital defects such as CHARGE syndrome, Treacher Collins, and Crouzon's disease, and most importantly CHARGE syndrome. Because of the survival of the nasobuccal membrane that is usually present in the embryonic stage of the child after birth is very rare and is believed to be due to a mutation in the gene CHD7 (Stieve, 1999). CHARGE can be diagnosed with 4 of the major criteria or 3 major criteria and 3 minor criteria:

The following anatomic abnormalities contribute to forming the atretic choana: a narrowed nasal cavity, lateral impingement of the medial pterygoid plate, an abnormally thickened vomer, and a membrane most of mucosa and/or bone extending across the choana (Hengerer, 2008 and Newman, 2013). There are four main theories for the development of Choanal atresia, with no definitive embryology idenified. The theories include: 1- Persistence of buccopharyngeal membrane from the foregut. 2- Abnormal persistence of mesoderm in the nasochoanal region. 3- Abnormal persistence of nasobuccal membrane of Hochstetter . 4- Misdirection of neural crest cell migration with subsequent mesodermal migration. The presentation of the child will be dependent on if there is bilateral or unilateral atresia. Bilateral atresia is the most severe form associated with paradoxical cyanosis and stridor at birth that resolves with crying. Neonates are obligate nose breathers, preventing airflow from bilateral atresia. This obligate nasal breathing is an age dependent phenomenon due to immature coordination between respiratory effort and motor/sensory input. The neonate can have an oral airway or a McGovern nipple until surgical repair can be completed. Occasionally the neonate will need to be intubated. Unilateral atresia Presents later (5-24 months) with unilateral nasal discharge . Unilateral atresia can have delayed diagnosis given that the neonate can breathe through one nare. However, presentation is typically unilateral nasal discharge. If the atresia is associated with other syndrome there may be

Table 1. Diagnostic criteria for CHARGE syndrome

Major	Minor	Diagnosis
1.Ocular coloboma 2. Choanal atresia 3.Characteristic ear abnormalities 4. Cranial nerve abnormalities including sensory nerve hearing loss	1. Cardiovascular malformations 2. Genital hypoplasia 3. Cleft lip/palate 4. Tracheoesophageal fistula 5. Hypothalamo- hypophyseal dysfunction 6. Distinctive CHARGE facies 7. Developmental delay	Typical CHARGE : four majors or three majors and three minor .

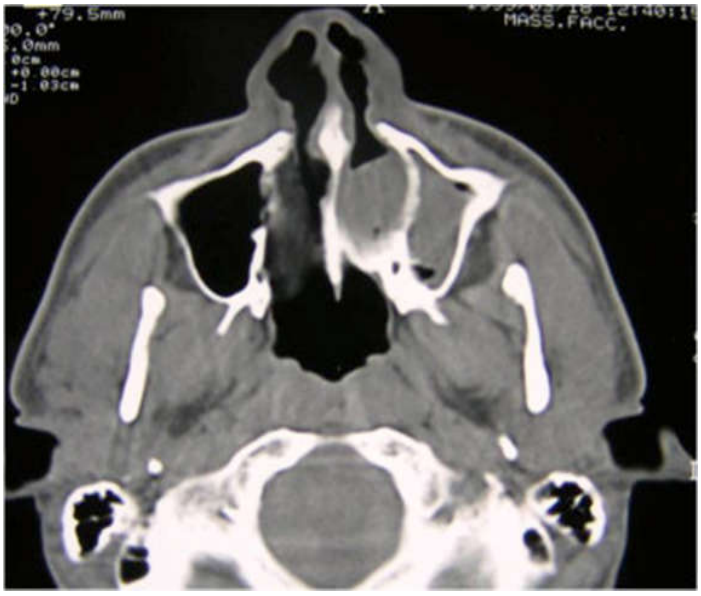

Figure 1. CT s of Congenital bilateral choanal atresia

other airway issues and tracheostomy may be the safest route (Rombaux, 2003 and Newman, 2013). Finally, it is important to remember that too aggressive nasal suctioning can lead to a functional stenosis. Where the bilateral side is often diagnosed after the birth of the child because of the symptoms of severe and rapid observation and the absence of the flow of airway in the area of obstruction. Most children with bilateral choanal atresia have severe respiratory difficulty after delivery with a determined chest wall movement. And the doctor is unable to insert a thin plastic tube from the nose of the child towards the pharynx, and he can apply a few drops of methylene blue dye inside the nose and monitor its passage towards the pharynx, or distill the dye shading on the rays inside the nose with perform a lateral radial image.

And he can use a reflective mirror across the mouth with the application of tongue depressor in the middle section of the tongue and reflect the components of the nasopharyngeal pharynx, and currently the doctor can use modern nasal endoscopy techniques. CT scans and magnetic resonance imaging (MRI) can also detect the location of the nasal passage. Axial tomography shows bone more accurately and clearly than magnetic resonance, but resonance may prevent the child from damaging the harmful rays (Newman, 2013) . Choanal atresia was first described by a physician named Roederer in 1755 (Newman, 2013 and Saraniti, 2017). However, the first recorded surgical repair was not until 1854 by Emmert. The technique Emmert used was a blind nasal puncture with a sharp narrow instrument. Blind puncture is not practiced any more due to the unacceptably high rates of serious complications like cerebrospinal fluid leaks, midbrain trauma, and petrous apicitis. A transpalatal repair can be done. However, this requires a u-shaped mucosal flap to be used. This can cause bleeding.

In addition, after this repair there is increased risk of developing crossbite anomalies, high arched palate and future need for orthodontic treatment. For these reasons this often is not the prefered approach (Cedin, 2012; Wang, 2008 and Kwong, 2015). Endoscopic repairs are becoming more prevalent. Originally, only older children were treated with this approach, but now even neonates can be treated with an endoscopic repair using a microdebrider or cutters. The size of the equipment can be limiting on the smaller children. Stents are a bit controversial. In the 1980s and 1990s stents were routinely placed after choanal atresia repair. However, now not everyone will place the stents. There is no data that confirms that stents prevent restenosis once they are removed and in unilateral choanal atresia the stent may actually be detrimental. If a stent is placed it often is either a nasal trumpet or a small endotracheal tube.

The importance of research and its objectives

Choanal atresia is a rare case and may be life-threatening , and due to the technical and scientific development in the E.N.T department at Tishreen University in Lattakia and cooperation with other specialties for the management of neonatal with these cases and even older patients, modern endoscopy techniques that have entered the world of surgery rather than surgery ,which was carried out by the palate. Where these surgeries carry a lot of surgical trauma on the oral cavity and major complications after it, such as edema, fistulas, restenosis and long period of hospitalization, especially in newborns with difficulty in oral nutrition, so this endoscopic surgery came to alleviate these complications (Teissier, 2008). This study will add to the current medical literature an additional look that makes it easier for otolaryngologists, head and neck surgery to

treat such cases. The aim of the study is to evaluate the efficacy and results of unilateral or bilateral choanal atresia management using modern endoscopic techniques.

MATERIALS AND METHODS

Sample of the study

A group of patients who visited the department of Ear, Nose and Throat Diseases at Tishreen University in Lattakia who have underwent endoscopic surgery to manage unilateral or bilateral choanal atresia since 2012 until 2018 . A retrospective study was conducted for patients who underwent this procedure, with a study of the results and complications between 2012 and 2017, as well as all the patients who reviewed the E.N.T department at Tishreen University in 2018. The study involved 17 patients who had unilateral or bilateral choanal atresia, and underwent transnasal choanal atresia surgery and underwent a nasal examination as a medical check-up after a period of six months to follow the results of the surgery to assess whether or not there had been a narrowing.

Surgical technique: After adequate nasal decongestion, the rigid endoscope was introduced in the nostril to visualize the atretic plate, the microdibrider was used to remove the excess soft tissue in front of the blocked area. The thinnest section of the atresia, usually found at the junction of the hard palate and vomer below the tail of middle turbinate, is the ideal point of entry into the nasopharynx. Posterior bony septum was removed to create a neo-unichoana using micro-back biting forceps or microscopic drill. No more than 1/3 of the bony septum is removed to prevent the potential adverse effect on the nasal growth centers. Avoiding bone ridges and covering the exposed bone surface with mucosa are essential to prevent post-operative restenosis (Secaattin, 2017; Velegrakis, 2013 and Uzomefuna, 2013). At the end of each surgical procedure, Stent was placed for 8 weeks, with the following follow-up with nasal fillings with physiological solution and endoscopic monitoring.

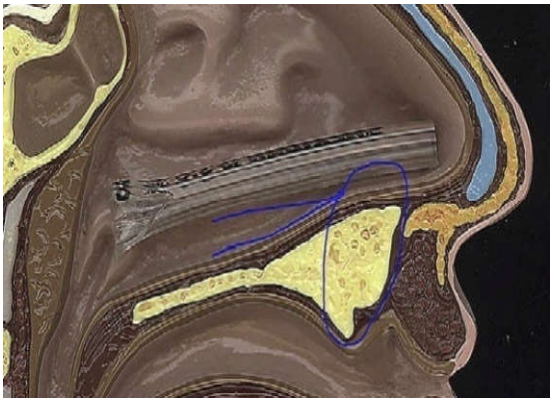

Figure 2. A picture showing where the stent is placed after surgery

RESULTS AND DISCUSSIONS

Fourteen patients underwent choanal atresia surgery between 2012 and 2018 at the E.N.T Department at Tishreen University in a transnasal approach .Stent had been placed for all patients, with the use of microscopic drill and microdibrider. And due to the endoscopic and CT study for all patients we divided patients into two groups:

- Ten patients with a Unilateral choanal atresia, ranging in age between two months and eight years (four females and six males), and the type of atresia was bony in nine patients and mixed in one patient , including eight cases of complete choanal atresia and two partial atresia.
- seven patients with bilateral choanal atresia , ranging in age between eight and twenty eight days (six females and one male), and the type of atresia was bony in six patients and mixed in one patient, including five cases of complete choanal atresia and two cases of partial atresia.

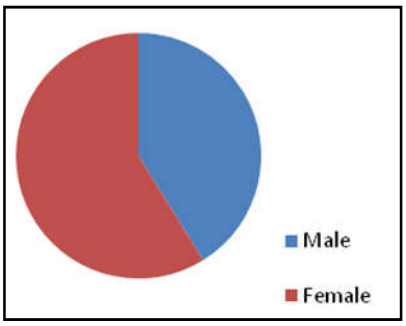

Figure 3. Sex distribution of the study cases

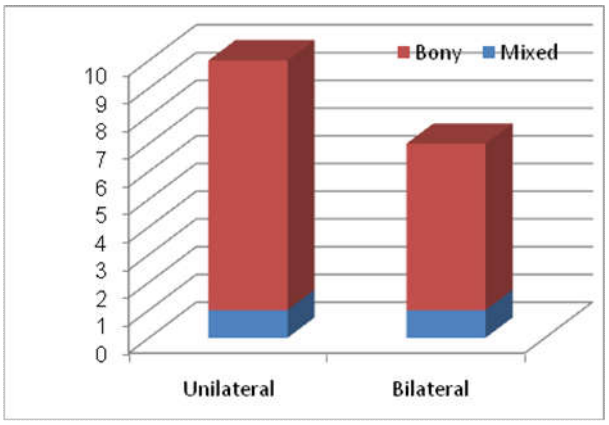

Figure 4. Types of choanal atresia

After postoperative follow-up period between six months and two years, two patients were developed with them a restenosis that requires a second surgery at rate 11.76% , while the rest of the patients did not have any complication with a total success rate of surgery 88.24%.

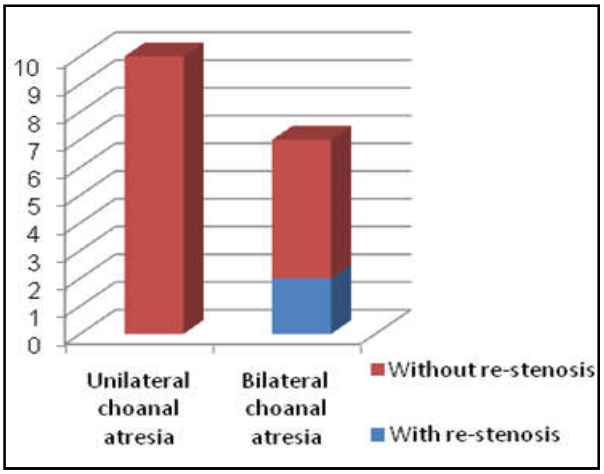

Figure 5. The rate of incidence of re stenosis in the choanal after the initial surgical operation

Table 2. Distribution of cases and types of choanal atresia

Size of atresia	Type of atresia	Age during surgery	Number of patients	Sex	
5 complete	1 mixed bony 5	8 days – days 28	6	female	Bilateral
2 partial	bony 1	20 days	1	male	
8 complete	bony 4	2 months –22 years	4	female	
2 partial	bony 5 mixed 1	3 months - years 8	6	male	Unilateral
			17		Total

Since newborns completely depend on nasal breathing during the first three weeks of life, bilateral choanal atresia is considered a medical emergency, while unilateral choanal atresia rarely presents with significant respiratory distress and diagnosis may be delayed for years. CT scanning is the procedure of choice in the evaluation of choanal atresia , it serves to confirm the diagnosis (unilateral or bilateral), evaluate choanal atresia (vomer bone width and choanal airspace distance), exclude other possible nasal sites of obstruction, determine the degree of bony, membranous, or mixed atresia and delineate abnormalities in the nasal cavity and nasopharynx. Hundreds articles have been published on choanal atresia, this alone is the evidence of the difficulties and controversies otolaryngologist, head and neck surgeons encounter in the management and surgical treatment of this disorder .Many Surgeons who perform surgical repair of choanal atresia have sought (this is the past participle of seek) a technique that offers direct access, good visualization, short operating times, and low morbidity. Currently, transnasal and transpalatal approaches are the most commonly used and safest methods of surgical repair. The transpalatal approach has the disadvantages of long operative times, and risks of palatal fistula, crossbite, palatal muscle dysfunction, and dento alveolar growth disturbance. Endoscopic transnasal repair carries the risk of disruption of growth centers, cerebrospinal fluid leaks, skull base injury, and injury to the sphenopalatine artery. Endoscopic repair allows for excellent visualization of the choana, short operative times, and very minimal bleeding. Several authors even advocate endoscopic repair in an effort to be able to fashion flaps over raw areas to prevent possible postoperative stenosis.

There is considerable debate on the benefit of using stents in surgical correction of choanal atresia. Many authors have argued that the use of stents is absolutely necessary for successful repair. Stents have been used in most reported surgical procedures. Many authors believe that stenting prevents postoperative restenosis. The duration and material of stenting vary from one study to another, and the former can range from several weeks to months, however, stents are associated with local infections and pain, formation of granulation tissue, and nasal synechia. Stent management is often complicated by migration or excessive pressure on the nasal ala. The use and duration of stenting following surgical management of choanal atresia remains under significant controversy in the literature [15,16,17]. There are many studies that point to its importance and these correspond to our results .In any case, the endoscopic transnasal approach is less satisfactory and harmful to tissues. Our results regarding to the method of choice are matching many authors like Natacha et al. and Wang et al. who found that, in general, a transnasal endoscopic approach with the aid of a power instrument is a safe useful procedure for the repair of choanal atresia, and see that this technique permits an angled vision, excellent visualization and magnification of the atretic plate.

Compared with traditional techniques, this technique allowed a shorter hospital stay and less blood loss.

Conclusions and recommendations

A transnasal endoscopic repair of choanal atresia with the use of modern devices is the recommended procedure in terms of high success rate and low complications. Postoperative stenting for eight weeks reduces re-stenosis and reversion. Despite advances in vision systems and surgical instruments, re-stenosis is the most challenging problem after postoperative surgery of choanal atresia, so new strategies must be developed to prevent constriction.

REFERENCES

Anajar, S., Hassnaoui, J., Rouadi, S., and et al., "A rare case report of bilateral choanal atresia in an adult", *International Journal of Surgery Case Reports*, 37, 2017, pp. 127–129.

Bangiyev, J.N., Govil, N., Sheyn, A., Haupert, M., and Thottam, P.J., "Novel applicationof steroid eluting stents in choanal atresia repair: a case series", *Ann Otol.Rhinol. Laryngol* 126, 1 , 2017, 79–82.

Cedin, A.C., Atallah, A.N., Andriolo, R.B., and Cruz, O.L., "Pignatari SN.Surgery for congenital choanal atresia", *Cochrane Database SystRev*, 2012. CD008993.

Hengerer ,A. S., Brickman, T. M., and Jeyakumar, A., " Choanal atresia: embryologic analysis and evolution of treatment, a 30-year experience", *Laryngoscope*, 118, 5, 2008, pp. 862-866 .

Ibrahim, A.A., Magdy, E.A., Hassab, M.H., "Endoscopic choanoplastywithout stenting for congenital choanal atresia repair", *Int J Pediatr Otorhinolaryngol*. 74, 2010, pp. 144-50.

Kim, H., Park, J.H,. Chung, H., Han, D.H., Kim, D,Y., Lee, C,H., and et al., "Clinical features and surgical outcomes of congenital choanal atresia: factors influencing success from 20-year review in an institute", *Am J Otolaryngol*, 33, 3, 2012,:308–12.10.1016/j.amjoto.2011.08.010 [PubMed] [Cross Ref]

Kwong, K.M., "Current updates on choanal atresia", *Front Pediatr*, 3, 1, 2015, pp. 6-10.

Newman, J. R., Harmon, P., Shirley, W. P., Hill, J. S., Woolley, A. L., and Wiatrak, B. J.," Operative management of choanal atresia: a 15-year experience", *JAMA Otolaryngol Head Neck Surg,* 139,1,2013:715.10.1001/jamaoto.2013.1111 [PubMed] [Cross Ref].

Ramsden, J. D., Campisi, P., and Forte, V., "Choanal atresia and choanal stenosis", *Otolaryngol Clin North*, 42, 2009,pp. 39-52.

Rombaux, P., Toeuf, C., Hamoir, M., Eloy, P., Bertrand, B., and Veykemans, F.," Transnasal repair of unilateral choanal atresia", *Rhinology*, 2003, pp. 31:-41 .

Saraniti, C., Santangelo, M., and Salvago, P., "Surgical treatment of choanal atresia with transnasal endoscopic approach with stentless single side-hinged flap technique: 5 year retrospective analysis", *Brazilian Journal of Otorhinolaryngology*, 83, 2, 2017, pp. 183–189.

Secaattin, G., Elif, B., et al., "Treatment of Congenital Choanal Atresia via Transnasal Endoscopic Method", *Journal of Craniofacial Surgery,* 28, 2, March 2017, pp. 338-342.

Stieve, M., Kempf, H.G., and Lenarz, T., "Management of choanal atresia in cases of craniofacial malformation*", J Maxillofac Oral Surg*, 8, 1, 1999, pp. 41–52.

Teissier, N., Kaguelidou, F., Couloigner, V., Franc¸ois M, and Van, D. T., "Predictive factors for success after transnasal endo-scopic treatment of choanal atresia", *Arch Otolyngol Head NeckSurg*, 134, 2008, pp. 57-61.

Uzomefuna, V., Glynn, F., Al-Omari, B., Hone, S., and Russell, J., "Transnasalendoscopic repair of choanal atresia in a tertiary care cen-tre: a review of outcomes" *Int J Pediatr Otorhinolaryngol*; 76, 2013, 61-73.

Velegrakis, S., Mantsopoulos, K., Iro, H., and Zenk, J., "Long-term outcomes of endonasal surgery for choanal atresia: 28 years experience in an academic medical centre", *Eur Arch Otorhinolaryngo*l, 270, 1, 2013, 113–6.10.1007/s00405-012-1982-y [PubMed] [Cross Ref].

Wang, Q., Wang, S., Lin, S., Chen, H., and Lu, Y., "Transnasal endoscopic repair of acquired posterior choanal stenosis and atresia", *Chin Med J*, 121, 12, 2008, pp. 1101–1104.

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