

CHOANAL ATRESIA REPAIR: 14 YEARS' EXPERIENCE

Hamad Al Muhaimeed, MD

Choanal atresia is an uncommon congenital anomaly. The reported incidence ranges between 1 in 5,000 and 1 in 10,000 live births.¹ Bilateral choanal atresia is a medical emergency, and almost always presents in the newborn as respiratory distress and cyanosis which are relieved by crying. The reflexes to facilitate breathing through the open mouth in response to nasal obstruction develop only weeks to months after birth, although an infant will mouth breath if the mouth is opened, either during crying, or with the help of an artificial oral airway.² Unilateral atresia, on the other hand, may go unrecognized until later in life, since associated respiratory distress is usually not encountered at birth.

Since the first description of choanal atresia by Roeder in 1775,⁴ many surgical approaches have been described. Transnasal, transpalatal and trans-septal approaches are the most commonly used procedures. The aim of this study is to present our experience in the surgical correction of choanal atresia.

Materials and Methods

The medical records of all patients diagnosed to have choanal atresia and treated at King Abdulaziz University Hospital (KAUH) between 1983 and 1997 were reviewed. Information collected included sex, age at presentation, type and site of atresia, presence or absence of other congenital anomalies, method of surgical repair, and postoperative complications. The diagnosis was made clinically and confirmed by CT scanning, or by plain x-ray with the aid of a choanogram.

All patients underwent surgical repair of choanal atresia, either through the transnasal or transpalatal approach. Curved urethral dilators were used to dilate membranous atresia. In case of bony atresia, the atretic plate was perforated transnasally using a urethral dilator, and a diamond drill was used to enlarge the posterior choanae with the help of an aural speculum to protect the wings of the nose. Tilley-Henckel and Blakesley forceps

were used in some cases, to remove the posterior end of the septum.

All cases were stented, using either hard portex (polyvinyl chloride), soft portex or polyethylene endotracheal tubes for a period of 6-8 weeks. All patients were given postoperative antibiotic prophylaxis for one week. Postoperative follow-up periods ranged from one to four years.

Results

During the study period, 30 patients with choanal atresia, comprising 18 males and 12 females, were managed at our institution. Their ages ranged between three days and 28 years. The pattern of choanal atresia is shown in Table 1. Choanal atresia was bony in 11 patients, bony-membranous in 10, and membranous in nine patients. The atresia was unilateral in 16 and bilateral in 14 patients. Three patients had other congenital anomalies, including submucosal cleft palate, Down syndrome and Apert's syndrome.

The outcome of atresia according to the surgical approach is shown in Table 2. The overall success rate after a single procedure was 60% (18/30). Transnasal puncture with or without dilation was performed on 24 patients. Ten of these patients required revision surgery using the same method. The remaining six patients had transpalatal repair as their primary treatment, with two patients requiring revision through the transnasal approach. Table 3 shows the outcome of atresia according to the type of stenting. Out of the 26 endotracheal portex tubes used in a single procedure, 17 (65.4%) remained patent after removal of the stent, compared to one out of the four (25%) polyethylene tubes.

Other complications were minor and included slight pressure necrosis of nasal tip in two patients, mild soft palate injury in one patient, and severe nasal discomfort plus headache in another patient. These complications were encountered in those patients who had transnasal puncture using large size hard portex nasal stent.

Discussion

Choanal atresia is an uncommon congenital anomaly, which consists of a bony, membranous or cartilagenous plate obstructing one or both posterior nasal apertures.

From the ENT Department, King Abdul Aziz University Hospital, Riyadh, Saudi Arabia.

Address reprint requests and correspondence to Dr. Al Muhaimeed: ENT Department, King Abdulaziz University Hospital, P.O. Box 245, Riyadh 11411, Saudi Arabia.

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TABLE 1. *The pattern of choanal atresia.*

	# of patients (%)
Nature of atretic plate	
Bony	11 (36.7)
Bony membranous	10 (33.3)
Membranous	9 (30)
Laterality of atresia	
Unilateral	16 (53.3)
Bilateral	14 (46.7)

TABLE 2. *Outcome of atresia according to the surgical approach.*

Surgical approach	Success	Stenosis	Total
Transnasal	14	10	24
Transpalatal	4	2	6

TABLE 3. *Outcome of atresia according to type of stent.*

Type of stent	Success	Stenosis	Total
Endotracheal portex tube	17	9	26
Polyethylene tube	1	3	4

Although a high incidence of other associated anomalies has been reported,^{4,7} only three cases (10%) were found to have other congenital anomalies in this series. Thus our series seems to have a very low incidence of other associated anomalies.

Many methods are used to diagnose choanal atresia. Absence of misting on a metal plate or of movement of a wisp of cotton wool in front of the nostrils,³ or failure to pass a soft nasal catheter would be considered diagnostic of the choanal atresia. Choanography has been the traditional method of confirming the diagnosis of atresia. The current investigation of choice, however, is computerized tomography. This gives more information with regard to the actual structures involved and their thickness, and whether the obstruction is membranous or bony.

The most commonly used procedures are the transnasal, transpalatal and trans-septal approaches, and recent discussions have centered primarily on which approach yields best results with the least morbidity and probability of requiring revision surgery. The key to successful treatment is probably not so much the surgical approach as the particular anatomic abnormality responsible for the atresia. High-resolution CT scanning has been found to be helpful in defining the anatomic abnormality quite clearly, and aids in the selection of the best surgical approach.⁶ CT scanning was not routinely requested in this series. It was only requested in the three cases associated with other anomalies.

The transpalatal procedure has a higher success rate, enables superior visualization, and permits short-term stenting. It is the best approach in older children and in revision cases.⁸ The transnasal procedure, on the other hand, is preferred in cases of infants, as it is quick, safe and avoids hard palate and alveolar arch growth retardation, which are possible complications of this

particular approach. Recent advances in endonasal endoscopic surgery have opened the way for endoscopic transnasal repair of choanal atresia, as it provides direct and excellent visualization of the nasal cavity and posterior choanae. It is associated with less morbidity than the transpalatal procedures.^{9,10}

The major problem with any approach is stenosis following removal of stents. Some authors¹¹ have reported a high recurrence rate with transnasal (73%) and transpalatal approach (66%). The rate of stenosis seems to be lower when the vomer is removed, be it through a transpalatal or transnasal approach.

In our institution, we prefer the transnasal puncture and dilatation as the initial procedure of choice. In this series, lasting success has been obtained in the majority (58.3%) of cases by a single, simple procedure. If stenosis occurs, it can often be managed by simple repeat dilatation. Unfortunately, it was difficult to obtain a favorable long-term result irrespective of type of technique used.

The type and duration of nasal stenting are important factors in the outcome of choanal atresia repair. Many types of stents have been suggested.^{12,13} We had good results and fewer complications using endotracheal portex tubes (polyvinyl chloride).

Most studies^{1,13,14} prefer the stents to stay for 6-12 weeks. We usually keep them for 6-8 weeks. Some authors^{13,15} have recommended the use of broad-spectrum antibiotics for the whole period of stenting. This recommendation would have been of value if the study group were large and controlled for age and type of stent. Prolonged use of antibiotics may occasionally cause the growth of resistant strains of microorganisms. Patients in this series had been given broad-spectrum antibiotics for one week postoperatively. It is logical for the patient to be placed on antibiotics two weeks prior to stent removal in order to reduce the recurrence rate of stenosis.

Transnasal puncture and dilatation followed by stenting with endotracheal portex tubes for 6-8 weeks is the initial surgical procedure of choice. It is quick and safe, with minimum blood loss, and avoids hard palate and alveolar arch growth retardation. The present series has a low incidence of other congenital anomalies.

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