Complete nasal obstruction in a newborn may cause death from asphyxia. During attempted inspiration, the tongue, palate, and obstruction of the oral airway results. Vigorous respiratory efforts produce marked chest retraction. Inadequate airflow may occur if appropriate treatments are not available; however, if the infant cries and takes a breath through an unobstructed airway, obstruction is momentarily relieved. Then the crying stops, the mouth closes, and the cycle of obstruction begins again.

History of the Procedure: In 1755, Roederer first described congenital choanal atresia; therefore, this condition...
for more than 200 years. In 1854, Emmert reported the first successful surgical procedure for congenital choanal atresia using a curved trocar transnasally. Over the years, the necessity of serial dilatations to maintain patency of the choanae has been clearly recognized.

**Frequency:** The average rate of choanal atresia is 0.82 cases per 10,000 individuals. Unilateral atresia occurs more frequently on the right side. The ratio of unilateral to bilateral cases is 2:1. A slightly increased risk exists in twins. Maternal age or smoking history can increase the frequency of occurrence. Chromosomal anomalies are found in 6% of infants with choanal atresia. Few have monogenic syndromes or conditions.

**Race:** Choanal atresia occurs with equal frequency in people of all races.

**Sex:** More studies report significantly more females than males affected.

**Etiology:** The nasal cavities extend posteriorly during development under the influence of the posteriorly directed processes. Thinning of the membrane occurs, which separates the nasal cavities from the oral cavity. By the 38th gestational week, the 2-layer membrane consisting of nasal and oral epithelia ruptures and forms the choanae (posterior nares). Failure of this membrane to rupture results in choanal atresia. Although these choanae are not in the same location as the definitive choanae, which are more posteriorly located, the unexpectedly anterior extent of choanal atresia is explained.

**Pathophysiology:** A number of theories have been proposed to explain the occurrence of choanal atresia, and they are summarized as follows:

- Persistence of the buccopharyngeal membrane
- Failure of the bucconasal membrane of Hochstetter to rupture
- Medial outgrowth of vertical and horizontal processes of the palatine bone
- Abnormal mesodermal adhesions forming in the choanal area
- Misdirection of mesodermal flow due to local factors

**Clinical:** The clinical evaluation includes a complete physical examination to assess for other congenital anomalies. A simple method using a flexible fiberoptic endoscope could be used to determine the patency of the choana, but a complete nasal and nasopharyngeal examination performed using a flexible fiberoptic endoscope to assess the deformity. A simple method using the automatic tympanometry test for newborns for congenital choanal atresia was recently published. The sensitivity and specificity of the technique in unilateral choanal atresia was reported as 100 per cent. However, a high level of suspicion is required to diagnose bilateral choanal atresia, and severe airway obstruction and cyclical cyanosis are the classic signs of neonatal bilateral atresia. When crying all of the above signs, the neonatologist should be alerted to the probability of bilateral choanal atresia.

Many patients have an associated narrowed nasopharynx, widened vomer, medialized lateral nasal wall, and/or choanal atresia. Associated malformations occur in 47% of infants without chromosome anomalies. Nonrandom association of malformations is demonstrated using the CHARGE association, which appears to be overused in clinical practice. The component association are as follows:

- Coloboma of the iris, choroid, and/or microphthalmia
- Heart defect such as atrial septal defect (ASD) and/or conotruncal lesion
- Atresia of choanae
- Retarded growth and development

- Genitourinary abnormalities such as cryptorchidism, microphallus, and/or hydronephrosis

- Ear defects with associated deafness (The external, middle, and/or inner ear may be involved. Only a small number with choanal atresia and related components probably represent this entity.)

The percentages of the different anomalies in CHARGE association are as follows:

- Coloboma - 80%

- Heart defect - 58%

- Atresia of choanae - 100%

- Mental retardation - 94%

- Growth deficiency - 87%

- Genital hypoplasia in males - 75%

- Ear anomalies - 88%

**Differential diagnosis**

- Deviated nasal septum
- Dislocated nasal septum
- Septal hematoma
- Mucosal swelling
- Turbinate hypertrophy
- Encephalocele
- Nasal dermoid
- Hamartoma
- Chordoma
- Teratoma

**Imaging Studies:**

- Rhinography is a procedure that involves the administration of radiopaque dye into the nasal cavity as illustrated.

- CT scanning is the radiographic procedure of choice in the evaluation of choanal atresia. For good results, performed to clear excess mucus, and a topical decongestant is applied (see [Image 2](#)). The purpose of CT scanning includes:
  
  - Confirm the diagnosis of choanal atresia (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.
- Delineate abnormalities in the nasal cavity and nasopharynx.

**Diagnostic Procedures:**

- Failure to pass an 8F catheter through the nasal cavity more than 5.5 cm from the alar rim
- The lack of movement of a thin wisp of cotton under the nostrils while the mouth is closed
- The absence of fog on a mirror when it is placed under the nostrils
- Acoustic rhinometry
- Listening for breath sounds with either a stethoscope or a Toynbee auscultation tube
- Gently blowing air into each nasal cavity with a Politzer bag
- Administering into the nose a colored solution that is visible in the pharynx

**Surgical therapy:** Treatment can be divided into emergent and elective definitive categories. Bilateral choanal atresia is an emergency that is best initially treated by inserting an oral airway to break the seal formed by the tongue again oral airway can be well tolerated for several weeks. The method of repair is controversial, with no technique having acceptance. Bilateral choanal atresia in the newborn requires prompt diagnosis and airway stabilization. An oral ε nipple, and intubation are viable options. The ideal procedure for choanal atresia restores the normal nasal passage to growing structures important in facial development, is technically safe, requires short operative time, and provokes hospitalization and convalescence.

**Procedures**

Transnasal puncture, with or without a microscope, became unpopular because of the high rate of failure that the This was attributed to the difficulty in visualizing the choanal area that required special surgical attention, such as bridge and bony narrowing of the lateral walls. The transnasal approach becomes more difficult in the presence of turbinate hypertrophy, nasal discharge, and elongation of the depth from the nasal vestibule to the posterior choanae.

The transseptal technique consists of making a window in the septum anterior to the atretic plate.

Transpalatal repair is a technique that provides excellent exposure and has a high success rate but requires more increased blood loss, possible occurrence of palatal fistula, palatal dysfunction, and maxillofacial growth disturbance of this procedure (see Image 3).

The endoscopic technique (nasal or retropalatal), with or without powered instrumentation, offers excellent visual in removing the bony choanae. Microdebriders will continue to advance the field of endoscopic surgery, providing fields and causing less tissue trauma for experienced surgeons. However, the severity of complications, including rapidly aspirating orbital and cerebral contents when laminae are violated, must be appreciated and respected.
Carbon dioxide and potassium titanyl phosphate (KTP) lasers are easy and quick and create minimal discomfort. The time of hospitalization is short, and the operation can be repeated if a good result is not initially achieved. Most irrigation is not usually needed.

Postoperative details: Infants with documented gastroesophageal reflux disease (GERD) require prolonged stenting for choanal restenosis and removal of granulation tissue. Stenting is usually performed using an endotracheal tube. The advantages of Foley catheter stenting for choanal atresia are as follows:

- Well tolerated by the patient
- Simple to introduce, fix, and remove
- Minimizes septal or columellar necrosis
- Minimizes nasal cavity and paranasal sinus infections
- Adjustable with inflation or deflation of the balloon that controls the pressure on the choanal walls
- Easy to fix in cases of unilateral atresia

The use of stents in the treatment of patients with choanal atresia is a controversial subject. Some surgeons believe that stenting is useful in stabilizing the nasal airway in the postoperative period to prevent the development of stenosis by maintaining an open choana. However, others believe that stents may act as a nidus for infection and may induce a foreign body reaction. This choanal restenosis, much as an endotracheal tube may cause subglottic stenosis. Therefore, the use of stents for choanal atresia requires the use of prophylactic antibiotic and antireflux medications.

Cedin et al (2006) analyzed the use of a new stentless surgical technique for choanal atresia. They reported that, using neither stents or nasal packing, they were able to allow fast recovery in a one-step surgery.

Follow-up care: Following surgical repair of choanal atresia, patients may require operative debridement or percutaneous dilatation. Periodic dilations can sometimes be performed as an outpatient procedure with local decongestant and topical anesthetic urethral sounds.


Caption: Picture 2. Choanal atresia. CT scan showing membranous and bony choanal atresia. From T.L. Tewfik and V.M. Der Kaloustian, with permission.


