Correction of choanal atresia

Report of six cases treated by a modified transseptal method

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SUMMARY

A brief survey is presented of choanal atresia, its symptoms, diagnosis and treatment. Six cases in five patients have been treated by a modification of the transseptal method. Certain advantages of this method and the importance of the insertion of a specially made polyethylene tube are emphasized.

CHOANAL atresia is a congenital anomaly with failure of development of the posterior nares. In most cases, the condition is unilateral, but it may be bilateral and these gives rise to serious respiratory distress in the newborn infant. If bilateral choanal atresia is not immediately recognized and treated, the condition may cause asphyxia and death of the infant. Some neonatal deaths are undoubtedly due to this condition.

Various methods have been developed in the treatment of choanal atresia. By a modification of the transseptal method good access to the posterior part of the septum and to the deeper part of the nasal cavity is obtained. By this method we have now treated six cases of choanal atresia in five patients.

CASE REPORTS

Patient no. 1 was a 12-year-old boy who had always had secretion from the right side of the nose. When the patient was 12 years old, his mother discovered that he was unable to breathe through the right nostril. Examination revealed complete atresia of the right choana. Surgical removal of the bony plate was performed by the transpalatine approach. Six weeks later the patient had to be subjected to reoperation because of increasing stenosis. This time he was treated by a modification of the transseptal method. The choana was enlarged, and a portex tube was inserted through the nose; it remained in place for 6 weeks. The patient has now been followed for 2½ years after the operation. There is normal passage of air through both sides of the nose, and examination of the nasopharynx has shown adequate apertures of both choanae.

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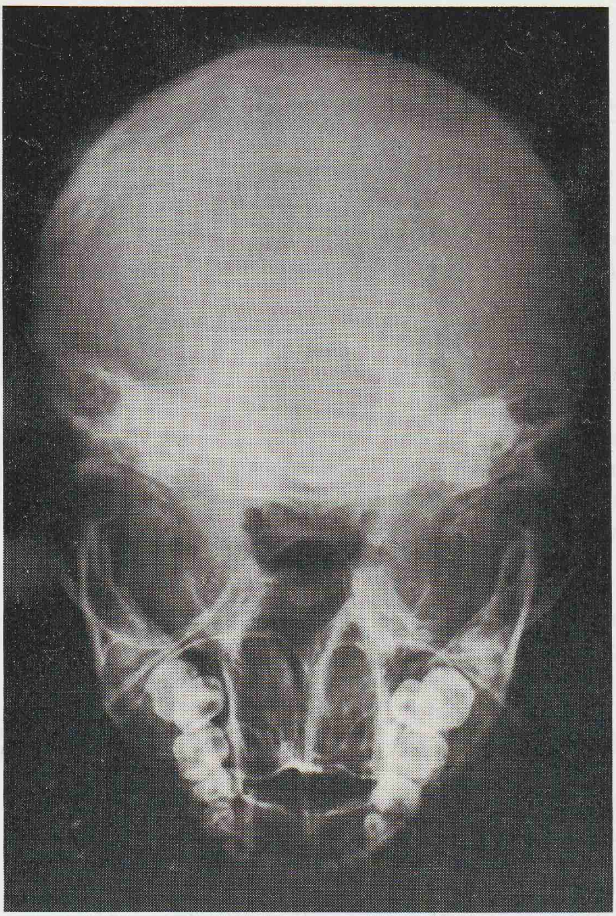

Figure 1. Radiograph of the cranial base showing osseous atresia of the right choana.

Patient no. 2 was a 3½-month-old girl who was born 3 weeks before term; birth weight 2200 grams. The infant was weak immediately after birth, without spontaneous respiration. After a couple of minutes she began to cry; an oral airway was inserted, after which respiration became sufficient. Total absence of air passage through both sides of the nose was observed, and probing with a catheter revealed complete bilateral atresia. The oral airway was kept in place for 4 weeks, and the patient was at first nourished through a ventricular tube and later, as sucking was still impossible, by means of spoon feeding. The respiration has since been sufficient through the mouth. When the patient was 18 months old, the choanal atresia on the right side was treated by means of the transseptal method. The mucosa on the septum and on the atretic choana was loosened after incision in the vestibule. Exposure of the atresia showed that it was complete and osseous. The bony plate was removed with a chisel. The mucosa was

replaced and excised, and a portex tube was inserted through the choanae, remaining in place for 2 months. At the age of 2 years the patient was treated in the same way on the left side and a portex tube was kept in place for 2 months.

Patients nos. 3, 4 and 5 were a girl and two boys aged 10 years, 3½ years and 15 months respectively, all with unilateral choanal atresia. In all three cases, transseptal operation was performed, and a portex tube was inserted and left in place for 2 months. They have all been followed for 12 months after the operation. Patient no. 4 has slightly obstructed, but sufficient air passage through the nose on the side concerned; in the others the nasal airway is normal.

DISCUSSION

Choanal atresia is a congenital anomaly with failure of breakdown of the bucconasal or buccopharyngeal membrane (Evans et al., 1971). The breakdown of the membrane normally occurs about the 35th-38th day (Flake et al., 1964; Peer, 1969). Choanal atresia may be unilateral or bilateral, partial or complete. In about 90% of the cases, the atresia is bony, and in 10% membranous. The anomaly is very rare and is reported to occur with an incidence of about 0.02% (Singleton, 1968).

There may be a certain familial tendency to the occurrence of choanal atresia, and the condition is sometimes associated with other congenital malformations, such as the Treacher-Collins syndrome or branchial arch abnormalities (Cherry et al., 1966; Grahne et al., 1966).

The symptoms of bilateral choanal atresia consists of respiratory distress immediately on birth. A newborn infant will normally breathe through the nose, and by forced respiration the mouth is tightly closed (Bales, 1966). In bilateral choanal atresia, this may lead to asphyxia and, if the condition is not recognized, to the death of the infant. If the newborn infant cries the mouth will open. In cases of bilateral choanal atresia the respiration will then be sufficient, and intermittent respiratory distress may thus be a characteristic feature. The condition is most dangerous during the first few days or weeks of life. After this time most infants will have learned to breathe through the mouth. The respiratory distress may also become apparent during sucking, and the baby may become cyanotic as it is unable to breathe through the nose during feeding.

In unilateral choanal atresia these alarming symptoms of respiratory distress are usually absent. The symptoms consists of unilateral lack of air passage through the nose and thick sticky secretion from the affected side of the nose. The posterior edge of the vomer is often thickened and deviates to the atretic side (Figure 1 - patient no. 3). Normal development of the paranasal sinuses and the facial skeleton on the side concerned is usually present (Diamant et al., 1963; Flake et al., 1964), but the bony palate is often high and vaulted on the side of the atresia (Owens, 1951).

The diagnosis can be made in a simple way by probing the nose with a catheter, by cautious blowing through the nose with a Politzer balloon, by noticing the

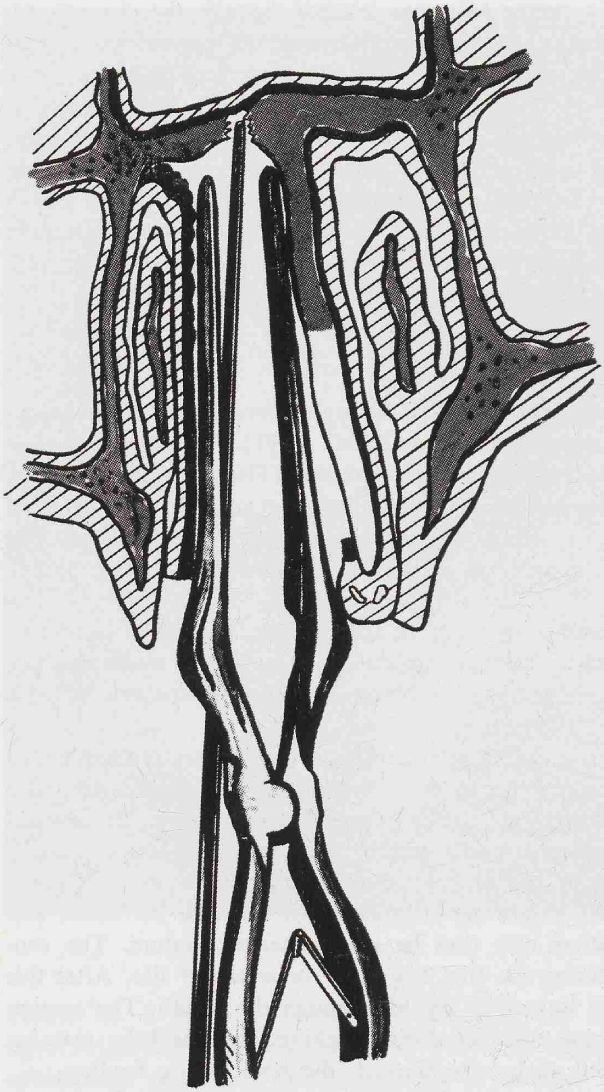

Figure 2. Schematic representation of the access to the choanal atretic area (modified after Denecke et al., 1967).

passage of a dye from the nose to the pharynx, or by x-ray examination after instillation of a radio-opaque contrast medium into the nose.

A free airway and normal respiration must be secured in the newborn infant with bilateral choanal atresia. This can be done most simply by means of an oral airway (McKibben, 1957; Sjövall, 1963). In the course of 3-5 weeks, the infant will normally have learned to breathe through the mouth (Bales, 1966). Surgical treatment can then be postponed until the child has reached the age of $1\frac{1}{2}$ - 2 years (patient no. 2).

Some authors recommend acute primary surgical intervention with penetration of the bony or membranous membrane and insertion of a polyethylene tube through the choanae, and a second operation at the age of 4-6 months (Peer, 1969). Primary tracheostomy followed by surgical treatment of the choanal atresia has also been recommended (Hogeman and Toremalm, 1968), but tracheostomy in the newborn is generally dissuaded (Diamant et al., 1963).

In unilateral cases, surgical treatment will usually be postponed until the age of 2-3 years, or perhaps even later. In some cases, the diagnosis will not be made until the patient is relatively old (patients nos. 1 and 3).

The most common method for definitive surgical treatment of choanal atresia is removal by the transpalatine approach, which is recommended in various modifications (Wilson, 1957). Surgical treatment may also be given by the transnasal, transanthral or transseptal method (Denecke et al., 1967). We have used the last-mentioned method in six cases, and have found it very convenient and lenient to the child.

In our modification of the transseptal approach we use the hemitransfixion incision through the skin in the vestibule, about 3 mm behind the caudal margin of the septum (Cottle et al., 1958). The mucosa is loosened from the side of the septum concerned, from the floor of the nasal cavity and over the atretic area. It has been possible without difficulties in all cases, even in the youngest patient who was only 15 months old. Bleeding has been very slight. After loosening of the mucosa over the atretic choana the bony plate is removed by means of a chisel and a pair of forceps (Figure 2). The mucosa is replaced over the choana and excised over the newly formed choana. In comparison with the transpalatine approach, this method is relatively easy, and an incision in an otherwise normal palate is avoided. The transnasal approach is suitable in most cases, but especially in the presence of a high and vaulted palatal arch (Diamant et al., 1963).

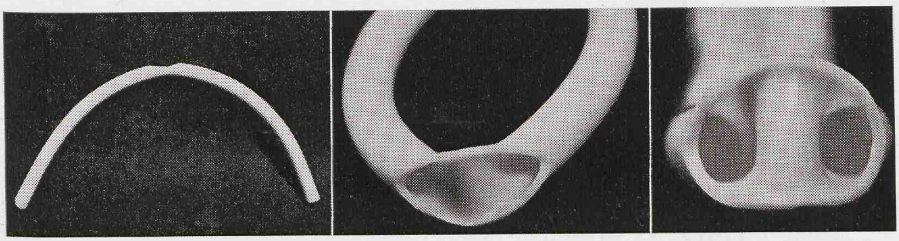

Figure 3. Portex tube for insertion through the choanae.

In our series, the choanal atresia was osseous in all six cases. In two, the bony atresia was incomplete, with a small membranous area in the inferior medial part of the bony plate. After removal of the atresia a polyethylene tube was inserted by the method of Hogeman and Toremalm (1968). An oblong hole was made in the middle of the tube. It was placed through the side of the nose

where the atresia was present and pulled out through the other side, so that the opening in the middle part of the tube was at the posterior edge of the septum (Figure 3). This gives the advantage that the patient is able to breathe freely through both sides of the nose through the inserted tube. After about 8 weeks the polyethylene tube was removed. The patients were seen weekly for cleaning of the tube. We did not encounter any difficulties in maintaining a free airway through the nasal tube. All five patients breathed freely through the nose and slept with the mouth closed.

In patient no. 2 with bilateral choanal atresia a free airway was secured by means of an oral airway for a couple of weeks after birth. After this critical period, there were no respiratory problems and definitive surgical treatment could be postponed until the child had reached a suitable size at the age of about 18 months.

RESUME

Les auteurs passent rapidement en revue la symptomatologie, le diagnostic et le traitement des atrésies choanales. Six cas d'atrésie chez 5 malades ont été traités par une variante de la méthode transseptale. Les auteurs exposent les avantages de cette méthode, notamment de l'emploi d'un tube de polyéthylène.

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