CASE REPORT

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Choanal atresia repair. The use of reinforced silicone tube to prevent restenosis*

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SUMMARY

There are different approaches for the repair of congenital choanal atresia. A stent is usually inserted in the nostrils to prevent restenosis. We describe a case of an infant who was presented with recurrent choanal stenosis and was managed by a stent made of reinforced silicone rubber tracheal tube. The tube has several advantages over other known stents.

Key words: choanal atresia, stents, reinforced tube

INTRODUCTION

Choanal atresia is the most common congenital anomaly of the nose with an incident of approximately 1 in 5000 to 7000 live births (Pascley, 1993). Initial management consists of airway maintenance. A surgical line of intervention is transnasal opening of the atresia followed by insertion of a stent in an attempt to prevent restenosis. We describe a case of an infant who was presented with recurrent restenosis and was managed by the insertion of a metal reinforced silicone rubber tube.

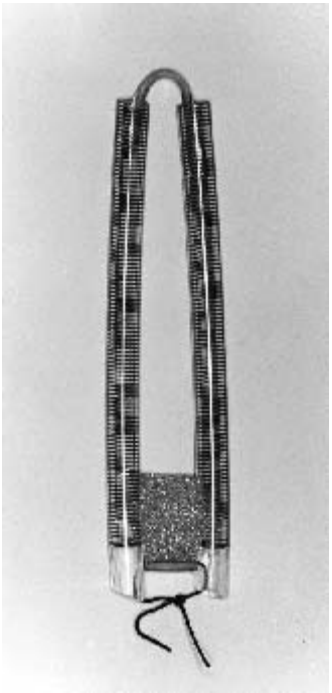

Figure 1. A prototype of the reinforced silicone rubber tube to prevent restenosis following choanal atresia repair.

Case History

A two month-old boy was operated upon in another hospital because of congenital bilateral choanal atresia where a preformed plain endotracheal tube was inserted following perforation, dilatation and resection of the posterior part of the vomer. The tube was removed after 8 weeks after which he gradually developed nasal obstruction. A similar tube was reinserted in the same hospital but was accidentally pulled by an elder brother. The infant was presented at the emergency room of our hospital with breathing difficulty but was maintaining oxygen saturation of 92%.

Examination of the nasopharynx under general anaesthesia using a 120° Hopkin's rod telescope revealed recurrent stenosis. A transnasal opening was carried out followed by dilatation. A metal reinforced silicone rubber tracheal tube size 3.5 internal diameter (Sims-Portex, UK) was trimmed and shaped and was cut elliptically from the middle, creating two separate tubes but still connected posteriorly by a band from the original tube to become U-shaped. Following the passage of two PVC suction catheters one through each nostril, they were pulled retrogradely to the outside of the mouth. Each catheter was fitted to the inside of the free end of the reinforced silicone tube. The nasal ends of the two catheters were then pulled from the outside bringing with them the inverted U-shaped reinforced tube. This made the modified tube to fit snugly in both nostrils, supported and connected anteriorly by a bridge made of a piece from a nasogastric tube to which is attached a square piece of sponge to protect the columella (Figure 1).

An appointment was scheduled after 6 weeks with instructions to the mother to maintain the patency of the tube by frequent suctioning. The tube was then removed and examination revealed both nostrils were patent. Nine months later the

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infant was symptom-free and thriving on breast-feeding. Examination did not demonstrate any evidence of restenosis.

DISCUSSION

Choanal atresia was first recognised in the 18th century and the first correction was performed in 1851 (Emmert, 1854). There are numerous surgical approaches to correct the problem including transseptal (Uffenorde, 1908), transpalatal (Brunk, 1909), sublabial (Lannois and Jacod, 1917) and transnasal (McGovern, 1953). Following bilateral choanal repair, a stent is usually inserted in both nostrils to avoid restenosis (Gleeson et al., 1985, Brown et al., 1996). There is no standard stent used for these cases, instead, surgeons fashion stents from several hard and soft materials (Carpenter et al., 1977). Most common is the stent made by modifying an endotracheal tube (Liston, 1980; Grundfast et al., 1990; Park et al., 2000). Other surgeons do not prefer stenting from the beginning, instead they perform serial dilatation of the choanae once a week for 4-6 weeks and still others maintain patency by regular bouginage every 2 months (Cowan, 1988).

Recurrence of stenosis in patients treated by the transnasal route may reach up to 80% (Evans and Machachlan, 1971; Winther, 1978; Bobin et al., 1983). The use of the endoscope in the transnasal approach offers better visualization of the posterior choana and results in minimizing the chance for restenosis (Greenberg, 2001). We believe that the cause of failure may be related to the material of the stent. Tracheal tubes made of polyvinyl chloride softens at body temperature and may collapse under pressure from without (Roland and Stovner, 1975) Pressure on the tube accompanies the attempt at restenosis of the choanae. In addition, repeated anaesthetics will unnecessarily subject the newborn to the hazards of multiple anaesthetics and tracheal intubation. Stents made of rubber may induce localised toxic tissue reaction (Stenton and Guess, 1970).

The literature on optimal stent material is scarce to non-existent (Park et al., 2000). The stent used in this case has a spiral metal imbedded in its wall. It is superior to other currently used stents as the metal wire stands the pressure of the surrounding tissues, especially that produced by attempts at restenosis. Furthermore, rather than yields to the pressure of the surrounding tissues, the imbedded metal wire expands at body temperature, thus helping in the supporting process of the stent. Besides, it keeps the lumen of the tube patent. Being flexible, the tube was easily introduced through the nostril, easy to bend in the nasopharynx when making the loop to introduce it into the other choana. In addition, it was well tolerated by the infant, better than the previous ones as the mother reported.

An additional advantage of this tube (like modern tracheal tubes) is that it is Z79-IT. This means that it has been tested and approved for use in humans, and its presence in direct contact with mucous membranes for long periods does not initiate inflammatory tissue reactions, which eventually result in scar tissue formation and restenosis.

A leading tube manufacturer is currently assessing the prototype for possible commercial production. When available in different sizes it could be the standard stent for the prevention of restenosis following the repair of choanal atresia.

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