Endoscopic Treatment for Choanal Atresia

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Choanal atresia is an infrequent congenital malformation. Classically, 4 surgical approaches have been described for its treatment: transnasal, transpalatal, trans-septal, and transantral. Of these, transpalatal was preferred. In recent years, the progress in nasal endoscopy has led to reconsideration of the transnasal route as being less invasive and providing excellent results. The use of stents to prevent re-stenosis is a controversial issue. However, the application of substances such as mitomycin may offer decreased need for stenting by reducing the development of cicatrix tissue. We report the case of a patient with bilateral choanal atresia and its surgical treatment using nasal endoscopy with topical mitomycin.
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Key words: Choanal atresia. Mitomycin. Endoscopic.

Tratamiento de la atresia de coanas por vía endoscópica

La atresia de coanas es una malformación congénita poco frecuente. Clásicamente se han descrito cuatro vías de abordaje para su corrección quirúrgica: transnasal, transpalatina, transeptal y endonasal. De todas ellas se consideraba de elección la vía transpalatina. En los últimos años, debido al avance de la endoscopia nasal, se impone la vía endonasal, por ser menos invasiva y proporcionar excelentes resultados. En cuanto al empleo de *stents* para prevenir las reestenosis, hay controversia; sin embargo, la aplicación coadyuvante de sustancias como la mitomicina nos permite prescindir de ellos y reducir la formación de tejido de cicatrización.
Presentamos el caso de un paciente con atresia de coanas bilateral y su manejo quirúrgico mediante cirugía endoscópica nasal con el empleo de mitomicina tópica.

Palabras clave: Atresia de coanas. Mitomicina. Endoscopia.

INTRODUCTION

Choanal atresia is a rare congenital malformation with an incidence of 1 in every 7,000-8,000 live births. It is more frequent in females, unilateral in 55% of cases, versus 45% bilateral. It comprises a lack of communication between the nasal cavity and the aerodigestive tract due to the failure to reabsorb mesenchymal tissue at that level. The atresic area is normally at the palatal-maxillary union, in front of the posterior edge of the vomer and the palatine bone. As for their nature, 30% are purely of the bone and 70% combine the bone and membranes[1].

It may appear in isolation or forming part of polymalformative syndromes such as CHARGE (coloboma, heart alterations, retarded growth, genital hypoplasia, hearing alterations such as hypoplasia of the outer ear and hypoacusia)[2].

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Unilateral choanal atresias may evolve asymptomatically, however when they are bilateral, the newborn child is unable to breathe through the mouth and this leads to clinical signs of intense dyspnoea, with pulling and bouts of cyanosis and desaturation that improve with the child's crying. On occasions, it may be necessary to apply intubation and feeding by orogastric tube.

Such nonspecific clinical signs may delay diagnosis, which is suspected when it becomes impossible to advance the nasogastric tube and is confirmed by an examination of the nasal passages using a flexible fibroscope or a rigid endoscope. The essential imaging technique is a computerized tomography (CT) which will reveal the bony or membranous nature of the stenosis, as well as indicating accurately its location and extension.

Over the last few years, we have witnessed a change in the surgical handling of choanal atresias, advances in nasal endoscopy has displaced the transpalatine route classically used. Although most authors continue to use prolonged post-operative stents to avoid restenosis, the use of drugs such as mitomycin, which prevents the formation of granulation tissue, allows us to do away with these.

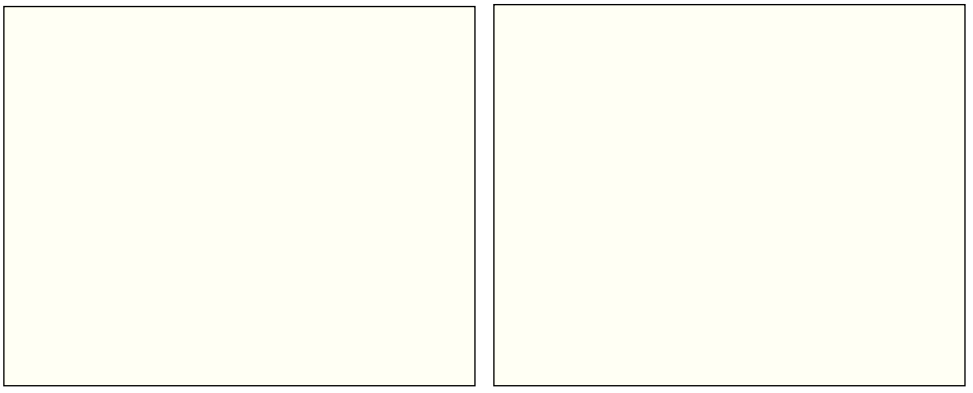

Figure 1. A: endoscopic view of the left nasal passage with visualization of the lower and medial turbinates and the septal wall. In the background, an image of the unperforated choana. B: image of the surgical intervention to extend the orifice created by means of a spoon scoop.

CASE STUDY

We present the case of a pre-term neborn baby girl who was referred with suspected bilateral choanal atresia in view of the impossibility of passing nasogastric tubes through either passage at the moment of birth; this suspicion was confirmed after a flexible fibroscopy examination of both nasal passages and verification of the absence of permeability.

On admission, the patient presented bouts of desaturation and abdominal distention. In order to keep airways clear and allow breathing, a Guedel cannula was inserted with an orogastric tube at the same time. In this way the patient remained stable and saturation levels improved.

We performed a CT of the sinuses, identifying bilateral atresia of both choanae, more evident on the right side, mixed in nature and with a greater fibrous component on the left side.

The study was complemented to discard associated malformations, with negative results.

With a diagnosis of mixed bilateral choanal atresia, the patient was scheduled for surgical resection using the endonasal route. Under general anaesthesia, a nasal endoscopy was performed using 2.2 mm optics to view the choanal atresia (Figure 1A). After cleansing of secretions, it was perforated with a rigid aspirator in the lower internal angle of the expected choanal frame and it was then milled with an otological burr in the stenotic area. Using an otological spoon scoop (Figure 1B), all of the margins were extended to obtain a choanal lumen of 5 mm in diameter. We then applied topical mitomycin by means of nasal lenses at a concentration of 1 mg/ml for 5 min. We concluded with the placement of two 2.5 mm orotracheal intubation tubes, one in each of the nasal passages, attached at the level of the rhinopharynx and in front of the columella, protected so as not cause injury.

After 48 hours, the stents are removed using endoscopic monitoring, and the permeability of both choanae is confirmed. Nasal cleaning using saline solution is prescribed as a post-operative treatment along with topical corticoids with gentle aspiration.

The patient is discharged 2 days after the stents were removed.

After 3 months, a further endoscopic examination was performed under general anaesthesia and both choanae were seen to be permeable (Figure 2) and free from scabs or granulation tissue.

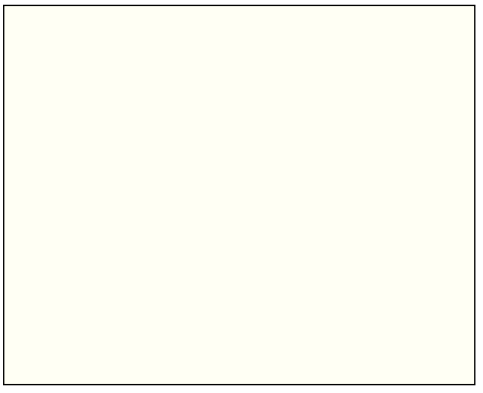

Figure 2. Endoscopy of the left nasal passage 3 months after surgery, with an image of the permeable choana.

DISCUSSION

The choice of technique and the timing of surgery in choanal atresia is based on several factors, such as whether it is unilateral or bilateral, its bony or membranous nature, associated anomalies and the patient's age, among others[3].

Taking all of these into account, nowadays it is common to apply surgical correction using endoscopic surgery[4]. Several different instruments may be used for resection, from otological surgical burrs to the recent application of CO_2 laser.

The classical transpalatine route would basically be reserved for after failures of prior surgery. The endoscopic route has the advantages of a reduction in surgery time and less intra-operative bleeding. In addition, as it is a less bloody route, it is not going to alter the growth centres for the bony palate and the pyramid of the nose. Finally, it also reduces the risk of palatal fistulae.

Numerous articles have reflected the successes, 80-90%[4], obtained with the endonasal route with or without long-lasting stents to avoid the risk of restenosis, which ranges from 0 to 85%[5]. The time they are left in place varies from a few weeks to months. However, maintaining these devices fosters local infection and the formation of granulation tissue and they may even be painful. For this reason, the current

trend is to do without stents, in such a way that, if we have left sufficient choanal lumen and with good post-operative care (involving frequent nasal rinsing and regular follow-ups), we can avoid the feared restenosis.

In our case, we also refered to the use of mitomycin C as a coadjuvant for endoscopic resection. This antimytotic agent inhibits the proliferation and migration of fibroblasts and, therefore, the formation of granulation tissue, thus avoiding the onset of scarring stenoses[6]. Its use in otorhinolaryngology is recent and it has basically been used in cases of laryngotracheal stenoses with excellent results[7]. There is no consensus among the various authors regarding the dose and exposure time for its application, and several ways of using mitomycin have been published, for example, we can use a topical dose of 1 mg/ml for 5 min or 0.4 mg/ml for 4 min[3]. Both techniques provide excellent outcomes.

No cases have been reported of the use of larger doses, as there is a potential risk of causing systemic effects (medullar aplasia, haemolytic-uraemic syndrome) due to its absorption through the mucosae; nonetheless, no such effects have been reported with the doses administered so far.

As for the results of a second application, animal studies have not shown that it implies a greater benefit than the initial application[8].

Bilateral choana atresia must be treated as soon as possible, in the first few days after diagnosis. To this end, the technique currently enjoying the greatest acceptance comprises surgical resection by means of nasal endoscopy, without the use of prolonged stents. These are not necessary if the essential care and regular follow-ups are ensured.

As for the role of mitomycin as a coadjuvant for surgical treatment, numerous studies have confirmed its suitability for reducing restenosis and justifying its use.

Finally we must not forget such other factors as gastro-oesophagic reflux, which must always be investigated because it may be a cause of restenosis and worsen the expected prognosis.

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