OBJECTIVE

To introduce a new technique for treatment of membranous choanal atresia without the use of stents.

INTRODUCTION

- Choanal atresia affects 1 in 7000 births, ranging from bony and mixed to membranous.
- The communication between the nasal and oral cavities depend on the invagination of the nasal placodes around the fifth week of gestation. Failure of this may lead to the persistence of the bucopharyngeal membrane or overgrowth of vertical and horizontal processes of the palatine bone resulting in choanal atresia.1
- There are 5 described methods of choanal atresia repair: transpalatal, transnasal, sublabial transnasal, transantral, and transseptal approaches.
- Herein, we present the first report of the primary treatment of bilateral membranous choanal atresia using high pressure balloon dilation without stent placement. This technique involves membranous puncture and dilation with sequential increase in balloon size for short durations.

PROCEDURE 1

A 37-week female neonate was seen on day of life 0 for episodes of bradycardia and apnea, desaturation, and failure to pass a nasal trumpet. Based on flexible fiberoptic endoscope and CT sinus, the diagnosis of membranous bilateral choanal atresia was confirmed. CT sinus showed bilateral soft tissue in the posterior nasopharynx and slight thickening of the vomer, but no bony septa in the choanae. The patient failed oral feeds, but tolerated room air on day one after birth. Symptoms were also temporized by using a McGovern's nipple, an oral airway fashioned by creating a hole at the end of a pacifier, which also held the orogastric tube in place along the palate (Figure 1). On day of life 13, the patient was taken to the operating room for repair of bilateral membranous choanal atresia.

The surgical procedure was performed using the pediatric functional endoscopic sinus set. A zero-degree pediatric Hopkins rod telescope (Karl Storz, Germany) was used for direct visualization while using a small Frazier tip suction and straight Blakesley forcep to punctured and dilate. A 3.5mm and 5mm balloon dilator (Acclarent, Menlo Park, CA, USA) was passed through the opening of the choana and inflated to a pressure of 12 and 16 atmospheres for 1 minute each. The procedure was performed on both sides and bilateral patent choanae were established. No stents were placed.

The patient was extubated on post-operative day 1, tolerated room air and oral feedings without difficulty. Decadron ophthalmic drops were placed in the bilateral nares twice a day for two weeks.

At the 2.5-week follow-up, the patient was found to be gaining weight appropriately with complete resolution of noisy breathing. There were no further episodes of cyanosis or apnea and infrequently required breaks during feeding to mouth breath.

At the 3 month follow-up, the patient was found to have an increase in nasal drainage and nasal obstructive breathing, which prompted a course of amoxicillin and decadron drops. On in-office flexible endoscopy, she was found to have restenosis bilaterally with excessive secretions, but no signs of infection. Given the findings, we planned for another balloon dilation of the choanal atresia.

PROCEDURE 2

Approximately 4 months after the initial procedure, the patient returned to the operating room for a second balloon dilation of the choanal atresia.

The left and right nasopharyngeal airway was found to be significantly narrowed to approximately 1 to 2 mm. An Acclarent 3.5-mm x 12-mm and 5-mm x 24-mm sinus balloon was passed through both choanae and inflated to 10 and 12 atmospheres of pressure for 10 seconds, respectively.

Intraoperative discussion concluded that should the patient require another procedure, a 7-mm balloon would likely be an appropriate intervention.

The patient did well post operatively with improved feeding, weight gain, and nasal airflow, anecdotally and on exam. We planned for follow-up with endoscopic exam in 3-4 months.

DISCUSSION

- This is the first report on treatment of bilateral membranous choanal atresia using high pressure balloon dilation without stent placement.
- Approximately 90% of choanal atresia is described as being bony and 10% membranous; however, some are a combination of both components.
- In 1985, Stahl et al. noted that circular scars were the reason that failures occurred, regardless of technique.3 High pressure balloon dilation provides repair with minimal trauma to the surrounding mucosa and by radial pressure at the site of the stenosis.
- Based on literature, infants are obligate nasal breathers from birth to between 6 weeks and 6 months of age, which is ideal for humidification, warming, decontamination, and prevention of aspiration during feeding.4
- deAlmieda et al describes that infants are able to breath through their mouths; however, the duration of time from nasal occlusion until initiation of mouth breathing could be as long as 32 seconds, along with possible desaturations.5 Therefore, bilateral choanal atresia is a cause of life threatening upper airway obstruction that requires early recognition.
- Saafan et al. reported on the value of using stents after endoscopic management of bilateral choanal atresia and found that use of stents did not decrease the incidence of reclosure; however, did increase the complication rates.5
- Bedwell et al. is the only case series of five patient undergoing balloon dilation of unilateral and bilateral choanal atresia.6
  - One bilateral membranous atresia case was treated successfully with primary balloon dilation, with stent placement and two dilation treatments.
  - A second patient with bilateral bony and membranous atresia was treated primarily with balloon dilation and no stent placement and required a total of five dilations.
  - The other three patients had unilateral atresia and balloon dilation was the method of revision for restenosis after conventional transnasal treatment.

CONCLUSION

In the setting of choanal atresia, balloon dilation without stents may be sufficient in the treatment of membranous atresia, but may also offer additive benefits in dilating stenosis after removal of bony plates and assuring long-term patency.

REFERENCES