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Effective Treatment for Choanal Atresia Using Laser and Steroid Stents: A Case Report

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Keywords

balloon dilation, CO_2 laser, endoscopic surgery, neonatal choanal atresia, steroid-eluting stents

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Choanal atresia (CA) is a rare congenital anomaly that significantly impacts the respiratory function of newborns.[1] Bilateral atresia is particularly severe, often leading to cyanosis, respiratory distress, and difficulty feeding. The primary treatment for neonatal CA is endoscopic transnasal repair.[2] Despite resolving immediate issues, surgery presents challenges such as the limited space within the neonatal nasal cavity and the potential for postoperative restenosis, which may necessitate further procedures. This article reports on a preterm neonate with bilateral CA treated using a hybrid technique involving CO_2 laser, balloon dilation, and drug-eluting stents. The scientific use of the patient's clinical data was approved by the Medical Ethics Committee of Southern Medical University Southern Hospital.

Case Report

A male preterm neonate, born at 35 weeks with a birth weight of 2570 g, presented with respiratory distress and was diagnosed with neonatal respiratory distress syndrome. Bilateral CA was suspected due to the inability to pass a nasogastric tube through both nostrils, confirmed by computed tomography (CT) scanning and nasal endoscopy (**Figure 1A,B**), identifying a membranous type of atresia. Echocardiography revealed a patent ductus arteriosus and a patent foramen ovale; renal ultrasound and ophthalmological examinations showed no additional anomalies.

On the 14th day of life, the neonate underwent endoscopic transnasal surgery to correct bilateral CA. The surgery utilized a 2.7-mm rigid endoscope and a 2-mm DEKA CO_2 laser fiber optic probe in pulsed mode (**Figure 2A**). The atretic plates were carefully ablated and perforated along the natural trajectory of the palatal and nasal septal planes. Once the nasopharynx was clearly visualized, the plates were excised while preserving the posterior section of the nasal septum (**Figure 2B**). A 10 Fr pediatric urinary catheter balloon was used to dilate the choanal regions bilaterally (**Figure 2C**). A half-dose steroid-eluting stent containing mometasone furoate 326 μg was implanted in each posterior nostril (**Figure 2D**) to minimize potential adverse effects associated with excessive exogenous corticosteroid treatment in developing infants. Postoperatively, the neonate received humidification care every 6 hours, and the recovery was uneventful. The patient was discharged from the intensive care unit on postoperative day 15. Follow-up endoscopic examinations confirmed that the drug-eluting stents had completely dissolved by 4 weeks post-surgery. At 3 months post-surgery, it was confirmed that the bilateral choanae remained patent (**Figure 1C,D**).

Discussion

The hybrid surgical approach reported in this case offers a minimally invasive and effective strategy for managing neonatal CA. The use of a CO_2 laser, with its precision cutting capabilities facilitated by a fiber optic probe, allowed for minimal bleeding and precise excision within the confined space of the neonatal nasal cavity. Balloon dilation played a critical role in the reconstruction and repair of nasal synechiae and atresia, with intraoperative balloon dilation expanding the surgical field and preventing early restenosis.[3] The use of a readily available 10 Fr pediatric catheter balloon for dilation was effective. Compared to traditional non-absorbable stents, steroid-eluting stents, which gradually release corticosteroids, can

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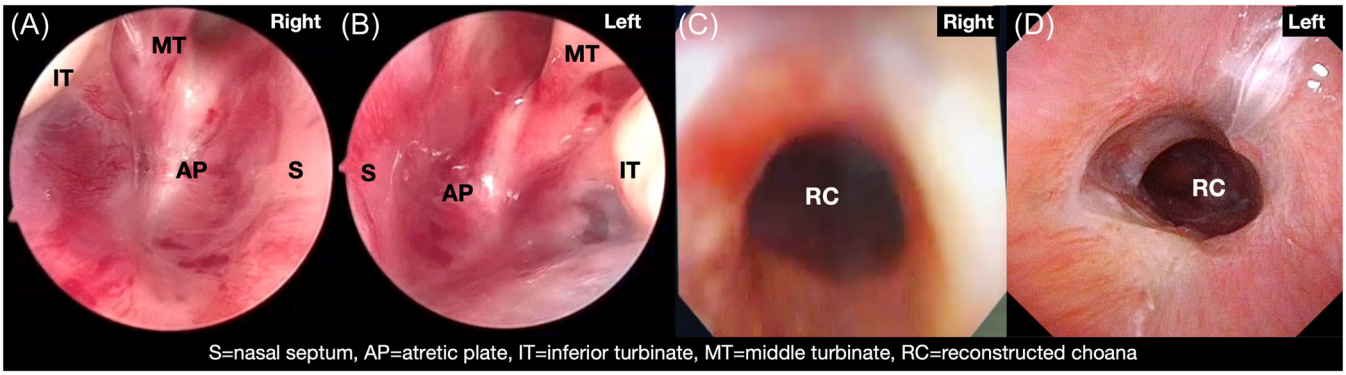

Figure 1. Preoperative endoscopic images (A and B) showing bilateral choanal atresia. Three months postoperatively, the reconstructed right (C) and left (D) posterior nasal passages are patent with smooth mucosa.

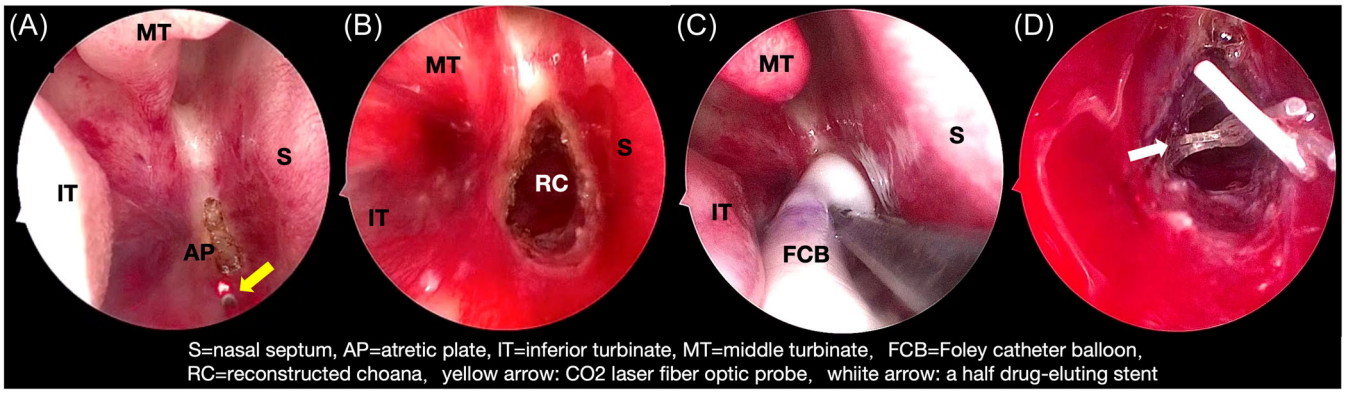

Figure 2. Using a CO_2 laser fiber optic probe, the atresia plate was removed (A), enabling reconstruction of the posterior nasal passage (B). A 10 Fr Foley catheter balloon was used for dilation (C) before implanting a half-drug-eluting stent (D).

mitigate inflammation and edema in the surgical field, reducing the risk of restenosis.[4] In this case, implanting a half-steroid-eluting stent containing 326 μg of mometasone furoate in each posterior nostril minimized potential adverse effects associated with excessive exogenous corticosteroid treatment in developing infants. This case of membranous CA presented without any bone exposure in the surgical field, eliminating the necessity for the mucosal flap technique, which is generally employed to prevent scarring and granulation tissue associated with bone exposure.[5] The omission simplified the surgical approach. While this case demonstrates the potential advantages of the hybrid "double insurance" approach combining balloon dilation with drug-eluting stents, further studies are necessary to confirm these findings across a more extensive patient population.

Author Contributions

Haoran Huang, drafted the manuscript; **Lijun Xu**, collected patient information and edited images; **Yinyan Lai**, revised the manuscript and polished the language; **Haocheng Tang**, performed diagnosis, surgical treatment, and follow-up, and revised the manuscript; all authors gave final approval of the submitted version.

Disclosures

Competing interests: The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this case report.

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