

Choanal Atresia: A New Technique for Permanent Treatment

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Abstract

Choanal atresia remains a challenge for the otolaryngologist. Restenosis may still occur post surgery and represents unsuccessful treatment. Current surgical endoscopic techniques still have a failure rate of around 15 percent. A more effective technique presenting lower rates of restenosis is necessary. This paper describes a new technique that may be more effective by using a reversal flap in the posterior septum. The authors provide a step-by-step description of this new procedure. The reversal flap covers the exposed bone surface with mucosa, which can prevent stenosis and contribute to a better healing process. The authors believe that by avoiding the raw area in the posterior septum, stenosis recurrence may be reduced and therefore recommend considering this technique for more effective treatment of choanal atresia.

Keywords: Choanal Atresia; Flap Technique; Endoscopic Repair; Congenital Nasal Obstruction

Introduction

Choanal atresia is a congenital obstruction of the posterior nasal choanae. Reported incidence in live births varies from 0.020% to 0.013%. The majority of cases are unilateral, with a higher prevalence among females [1]. The most widely accepted explanation is abnormal neural crest cell migration [2]. Mixed bony-membranous anatomy is found in 70% of patients. Congenital malformations such as CHARGE (Coloboma, Heart Defect, Atresia Choanae, Retarded Growth and Development, Genital Hypoplasia, Ear Abnormalities) and craniofacial syndromes are commonly associated with bilateral choanal atresia [2].

This congenital nasal obstruction presents respiratory distress at birth because infants are nasal breathers. Patients often require emergent intubation, and surgery is scheduled in the early neonatal period. However, unilateral atresia choanal may be discovered later in life due to chronic, foul-smelling, unilateral, rhinorrhea [3].

Various surgical techniques have been described in the literature. Since blind transnasal puncture was first described by Carl Emmert in 1854, different surgical approaches have become popular, such as transnasal, transpalatal, and transseptal. Regardless of the approach used, restenosis remains a potential complication [3].

The ideal surgical procedure should be safe, restore normal nasal passage, maintain surrounding craniofacial structures, and produce an effective result without restenosis. This article aimed to report a new, effective surgical technique to repair choanal atresia using the septonasal flap.

Methods

The technique may be used to treat unilateral and bilateral choanal atresia (Figure 1A and 1B).

Figure 1A: CT showing unilateral choanal atresia. Mucosa is outlined in red. **and 1B:** Endoscopy image showing atresic side.

Step 1: Infiltrate the mucosa bilaterally in the posterior nasal septum with lidocaine and adrenaline or only isotonic saline. (Figure 2)

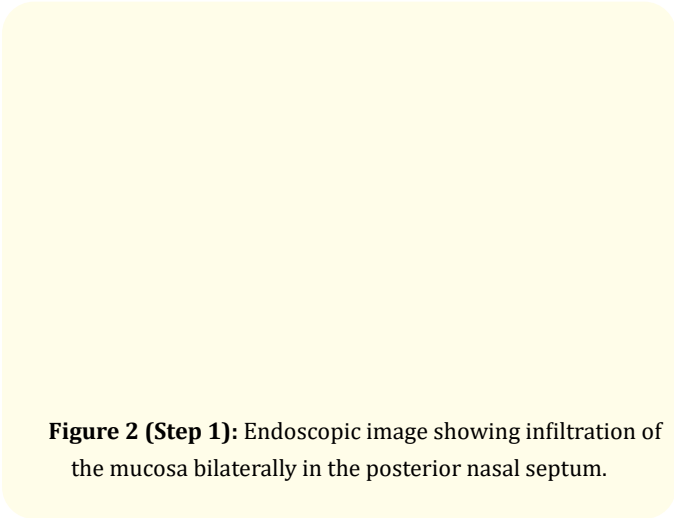


Figure 2 (Step 1): Endoscopic image showing infiltration of the mucosa bilaterally in the posterior nasal septum.

Step 2: Using a cautery tip microdissection, perform a vertical incision in the posterior septum, from the floor to the roof, opposite the atresic side. The incision creates a flap. Keep the pedical base on the nasal septum floor and roof. (Figure 3)

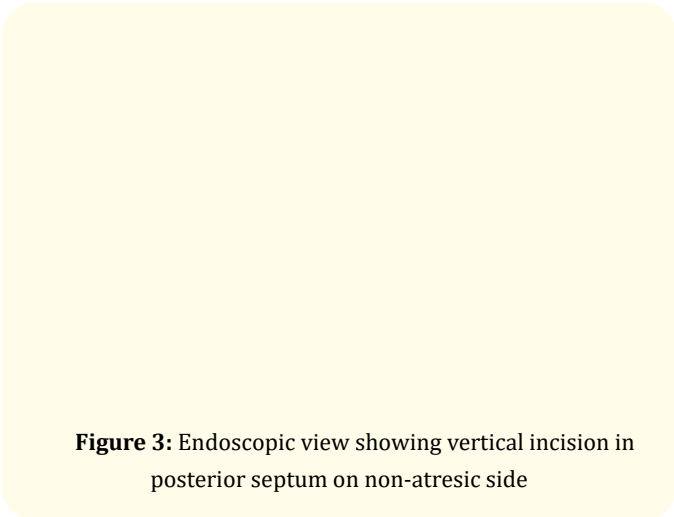


Figure 3: Endoscopic view showing vertical incision in posterior septum on non-atresic side

Step 3: Detach flap from the posterior border of the nasal septum.

Step 4: Remove the vomer and posterior ethmoid lamina with a 6 mm Cottle nasal chisel. Drill nasal fossa floor of the posterior nasal septum to flatten the area (Figure 4A and 4B).

Step 5: Perform a vertical incision in the middle of the atresia, which posteriorly will create a flap on the posterior septum. (Figure 5A and 5B)

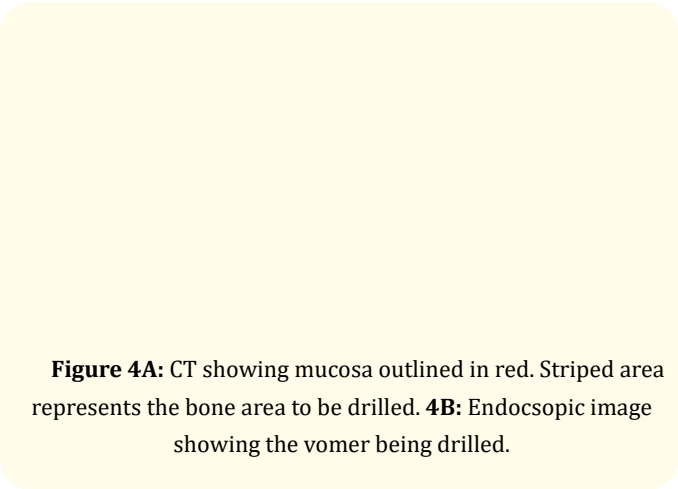


Figure 4A: CT showing mucosa outlined in red. Striped area represents the bone area to be drilled. **4B:** Endoscopic image showing the vomer being drilled.

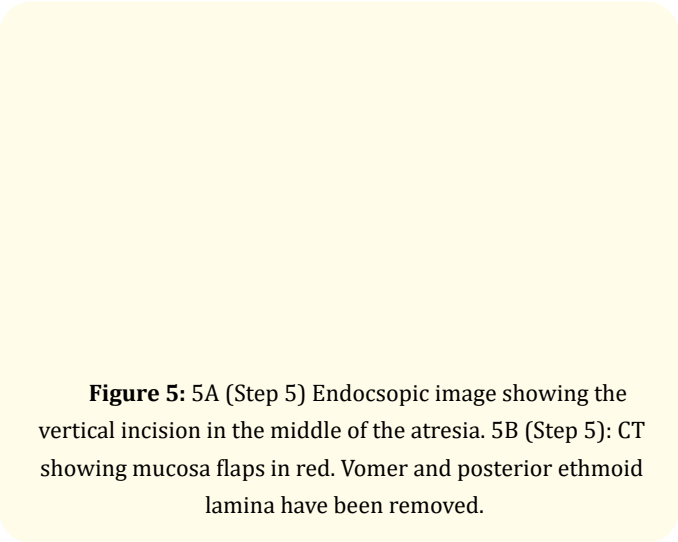


Figure 5: 5A (Step 5) Endoscopic image showing the vertical incision in the middle of the atresia. 5B (Step 5): CT showing mucosa flaps in red. Vomer and posterior ethmoid lamina have been removed.

Step 6: Detach the mucosa, and drill the lateral side of the atresic bone (Figure 6).

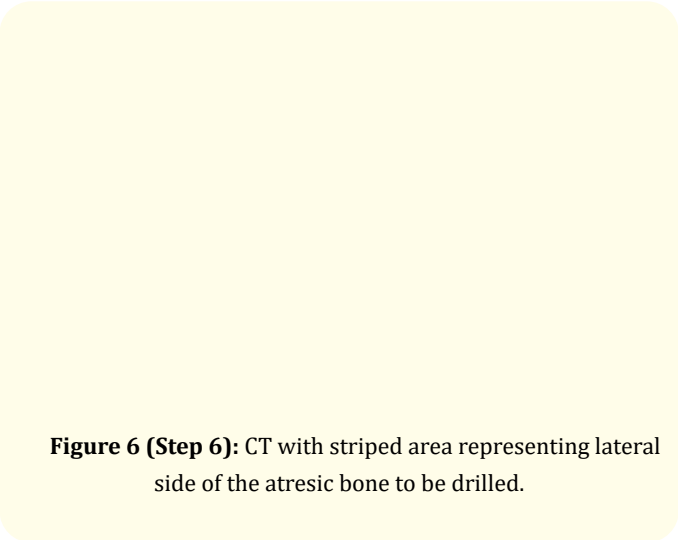
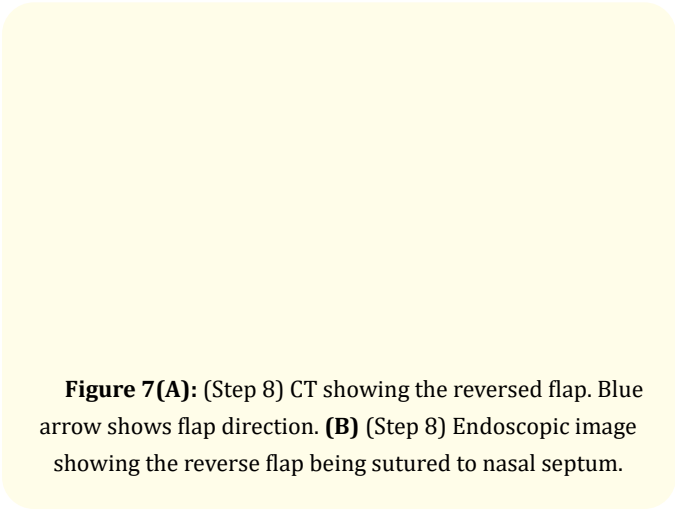


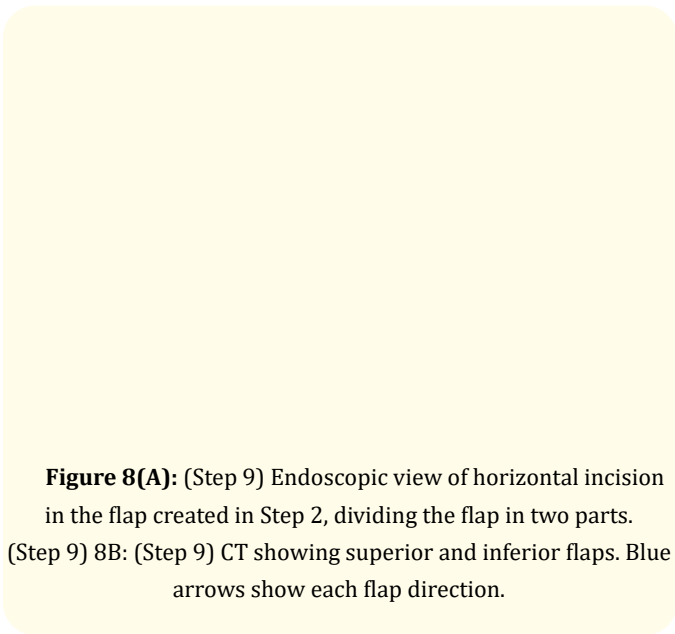
Figure 6 (Step 6): CT with striped area representing lateral side of the atresic bone to be drilled.

Step 7: Perform a horizontal incision approximately 2 mm from the top and another approximately 2 mm from the floor of the posterior septum flap on the atresic side. Both horizontal incisions must be connected perpendiculaly with the vertical incision made in step 5.

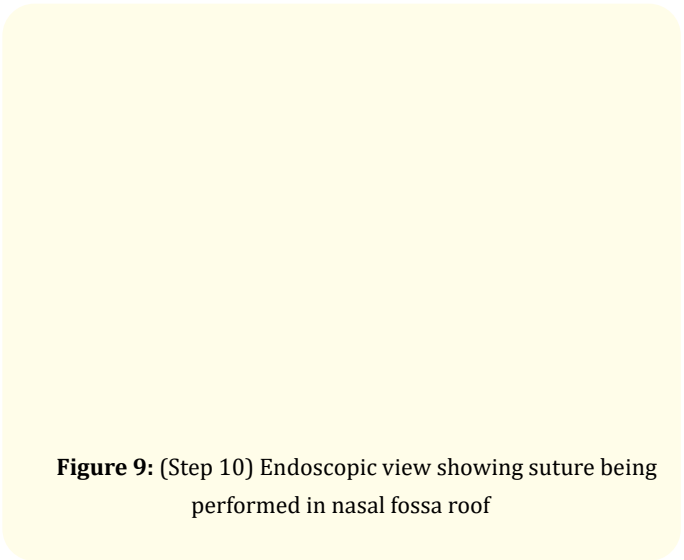
Step 8: Turn the flap to the opposite side of the septum, which creates a reverse flap, and suture flap to the nasal septum (Figure 7A and B)



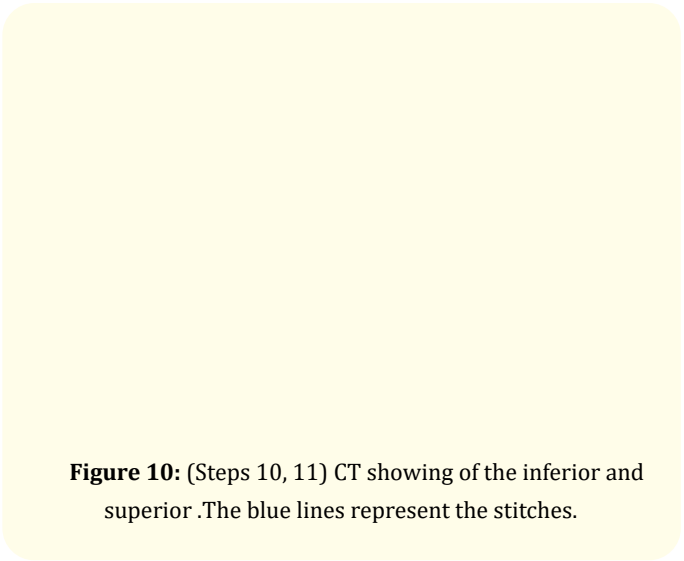
Step 9: Perform a horizontal incision in the flap created in Step 2, dividing the flap in two parts. Attach the top part to the roof and the bottom part to the floor. Each part will cover the exposed raw areas (Figure 8A and B).



Step 10: Suture the superior flap of non-atresic side to the opposite nasal fossa roof (Figure 9 and 10).



Step 11: Suture the inferior flap to the nasal floor of the atresic side (Figure 10).



Step 12: Suture the remaining mucosa flaps from the lateral wall of the atresic side to cover the exposed area of lateral wall (Figure 11A and B).

Figure 11 (A): (Step 12): Endoscopic image showing suture of the remaining mucosa flaps from the lateral wall of the atresic side to cover the exposed area of lateral wall. **(B):** (Step 12) CT showing sutures in reverse flap and lateral wall.

Discussion

Choana atresia management currently lacks a gold standard of treatment [4]. Using a stent is not recommended due to risk of otitis and high chance of recurrence [5,6]. Several patch techniques are currently used, and no evidence exists of one providing greater benefit [7-13]. However, none of the techniques involve using a reverse flap in the posterior septum.

By using the reverse flap, all the raw area could be covered (Figure 12), providing a better healing process. The greater distance between raw areas decreased the risk of synechiae and consequentially restenosis.

The authors believe that avoiding a raw area in the posterior septum may produce a lower chance of stenosis recurrence.

Figure 12: Endoscopic view showing final result of surgery on atresic side. No bone is exposed.

Results

The endoscopic approach using this kind of flap without stenting is safe, reproducible, and effective. Therefore, the authors recommend using this technique for permanent treatment of choanal atresia.

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