SURGICAL PEARL

A Unilateral Mucoperichondrial/Mucoperiosteal Flap Including Inferior Turbinate with Contralateral Underlay Xenograft for a Large Nasal Septal Perforation Repair

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Abstract

Findings: We describe a septal perforation repair technique aimed for moderate to large perforations, which involves a unilateral transpositional/rotational flap utilizing lateral nasal wall and inferior turbinate (IT) mucosa and a contralateral underlay porcine small intestinal submucosa mesh.

Meaning: The addition of IT mucosa as part of the unilateral lateral nasal wall mucoperichondrium/periosteal flap combined with a contralateral acellular matrix underlay optimizes the repair of larger perforations. The underlay acellular matrix acts as a scaffold for the regeneration of healthy mucoperichondrium akin to a tympanoplasty repair and reduces donor site morbidity.

Introduction

A septal perforation is a hole that lacks cartilage/bone and two mucoperichondrium/mucoperiosteum flaps. Prevalence of septal perforations ranges from 1% to 2.05%¹ and the causes include idiopathic (47%), traumatic (39%), inflammatory (8%), postsurgical (1–8%), and infectious (3%).^{2,3}

Septal perforation repair surgery is considered technically challenging with quoted success rates ranging from 52% to 100%.⁴ A recent systematic review recognized that larger perforations (>2 cm) posed a higher risk for incomplete closure, whereas smaller (<1 cm) to moderately sized (1–2 cm) perforations achieved a complete closure in 93% of patients.⁵

The aim of perforation repair surgery is to reconstruct the anterior septum and restore normal nasal function with improved sinonasal symptoms.⁶ Current trends in reconstruction typically rely on unilateral or bilateral mucoperichondrial flap advancement techniques,⁴ with the use of interpositional grafts ranging from autologous septal or auricular cartilage, fascia, periosteum, and xenografts.⁵ Regardless of the type of graft used current evidence supports the use of interpositional grafts because it reduces flap tension and the likelihood of flap ischemia.⁵

Overall, there is a need to improve success rates in larger septal perforation repairs as well as minimize patient donor site morbidity. We describe a new septal perforation repair technique that addresses larger perforations. It involves a larger unilateral advancement/rotational mucoperichondrial flap that utilizes the residual septal mucoperichondrial, nasal floor mucoperiosteum, lateral nasal wall mucoperiosteum in addition to the inferior turbinate (IT) mucoperiosteum. Importantly on the contralateral untouched side, a porcine small intestinal submucosa mesh xenograft is positioned as an underlay akin to a tympanoplasty. An interpositional crushed cartilage graft is placed between the mesh and repaired flap.

Surgical technique

The location and dimensions of the perforation are assessed (Fig. 1A). We recommend an external approach septorhinoplasty technique because it increases surgical exposure and provides better access to the superior septal mucosa area enabling an extension underneath the upper lateral cartilages if required. Importantly standard septorhinoplasty infiltration with 2% lidocaine hydrochloride and 1:80,000 adrenaline (epinephrine) is recommended with additional infiltration to the floor of the nose and

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Fig. 1. The dimension of the perforation is first assessed (A). The mucoperichondrial flap is raised (B) and a releasing incision is made anteriorly (C). The flap is then mobilized to cover the perforation (D) and the margins of the perforation are closed with absorbable sutures (E). Final result on the left (E) and right nasal cavity (F).

IT. The nasal skin is degloved through an inverted-V transcolumellar incision and the upper lateral cartilages are not divided from the septum to ensure continuity of the superior septal mucoperichondrial flap if required. We do not recommend nasal bone fracturing because the postoperative splints can cause an expansion phenomenon. As in the septoplasty technique the mucoperichondrial flap is mobilized inferiorly around the perforation and then extended onto the nasal floor. Typically, the

left-sided approach is preferred because it is easier for the right-handed surgeon (Fig. 1B). A separate skin rim incision is made running 1 cm anterior to the pyriform aperture on the nasal floor, extending laterally anterior to the IT and medially onto the membranous septum and connecting to the superior septoplasty dissection (Fig. 1C and Supplementary Video S1). A longitudinal incision is then made superiorly to the IT running posteriorly to the sphenopalatine artery (SPA) junction. The mucoperiosteum is

Fig. 2. Schematic illustration of the technique. (A) Incision lines. (B) The mucoperichondrial flap, raised from the lateral nasal wall, floor of the nose and nasal septum, is slid medially to cover the perforation. The dotted lines indicate the area of dissection and the incisions. (C) Final result showing the three layers repair of the perforation. From the right to the left: the mucoperichondrial flap, the crushed cartilage and the acellular matrix. A layer of acellular matrix is also placed on the floor of the operated nasal cavity.

dissected off the floor, lateral nasal wall, and IT posteriorly toward the posterior IT/SPA junction. The superior septal mucoperichondrium is released with a horizontal incision fading toward the floor posteriorly. The flap is then rotated medially to enable the perforation to close without tension (Fig. 1D and Supplementary Video S1). Only one suture (4/0 Vicryl Rapide; Ethicon, Inc.) is used to close the perforation (Fig. 1E and Supplementary Video S1). In case of larger perforations, whereby the extended lateral nasal wall flap is still not large enough the superior septal flap is extended over the nasal roof, including the mucoperichondrium over the upper lateral cartilages with a releasing superior incision. On the contralateral side an underlay porcine small intestinal submucosa mesh (BioDesign; Cook Medical, Bloomington, IN) is inserted, akin to an underlay tympanoplasty technique (Fig. 1F and Supplementary Video S1). In addition, the Biodesign covers the donor site on the lateral nasal wall and IT bone. A small piece of posterior septal cartilage (1 × 1 cm) is harvested, slightly crushed to preserve chondrocyte availability,⁷ and inserted between the flap and the acellular matrix. Importantly one absorbable suture (4/0 Vicryl Rapide; Ethicon, Inc.) is used to close the left marginal incision. A schematic illustration of the surgical technique is provided by Figure 2. After surgery, bilateral rolled reinforced silastic splints are inserted and kept in place for 3 weeks, secured with a 2/0 silk (Ethicon, Inc.) (Supplementary Video S1). Oral and topical wide-spectrum antibiotics are given while the splints are in place. In the first postoperative month crusting is common on the operated side but resolves spontaneously without causing any long-term sequelae and leaving a healthy regenerated IT mucosa.

Conclusions

The addition of IT mucosa as part of our unilateral lateral nasal wall mucoperichondrium/periosteal flap allows for larger perforation closure. In addition, a contralateral acellular matrix underlay seems to optimize the repair of larger perforations and acts as a scaffold for the regeneration of healthy mucoperichondrium akin to a tympanoplasty repair. It also preserves the mucoperichondrium on the contralateral side if revision surgery is required.

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Supplementary Material

Supplementary Video S1

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