Endonasal skull base surgery is growing exponentially as a subspecialty. In recent years, advances in endoscopic techniques and intraoperative navigation systems have allowed us to expand the indications of endoscopic skull base surgery. Major skull base centers worldwide are addressing larger and more complex lesions using endoscopic techniques. As a consequence, the skull base defects are more challenging to reconstruct. In this report, we present a novel technique to reconstruct the denuded septum remaining after the use of the vascular pedicled nasoseptal flap.

**Key Words:** Skull base reconstruction, nasoseptal flap, endoscopic skull base surgery.

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**INTRODUCTION**

Reconstruction with vascular pedicle flaps is now the standard of care for the reconstruction of skull base defects after endoscopic resection.1–4 Kassam et al. have demonstrated a substantial decrease in postoperative cerebrospinal fluid (CSF) leak rate using this technique after expanded endonasal approaches. The authors report <5% rate of postoperative CSF leak after the introduction of the vascular pedicled nasoseptal flap.5 However, the vascular pedicled nasoseptal flap leaves denuded bone and cartilage at its septal donor site. This denuded nasal septum is usually covered with silicone nasal splints, and it is then left to heal by secondary intention. The length of time to complete remucosalization is prolonged and is associated with crusting that impacts the postoperative quality of life. Patients often complain of nasal obstruction, sleep difficulties, anosmia, and the need for endoscopic nasal toilette including irrigations and/or debridement.

**TECHNIQUE**

The expanded endonasal approach is performed in standard fashion as described by Kassam et al.2 After the vascular pedicled nasoseptal flap is elevated and placed in the nasopharynx, a posterior bony septectomy is performed. We remove the vomer and ethmoid plate taking extreme care to preserve the opposite nasal septal mucosa, which will be used as a vascularized anteriorly based random flap to redrape the denuded septum. The posterior septectomy is extended anteriorly as needed to obtain the desired flap transposition (Fig. 1). Incisions are carried out using an extended insulated needle tip cautery on low cut setting. Three incisions are executed as shown in Figure 1. After the incisions are made, a contralateral anteriorly based nasal mucosal flap is created. This flap is then reversed 180° into the opposite side to cover the denuded septum (Fig. 2). In most patients the flap reaches the anterior most limit of the denuded septum allowing coverage of the entire septum. Otherwise, mucoperiosteum is harvested from the resected middle turbinate to redrape the remaining denuded portion of the septum. The flap is then secured to the nasal cartilaginous septum using a trans-septal quilting 4-0 absorbable stitch. This maneuver will keep the flap in contact with the cartilage and avoids interference of the flap with the passing of instruments through the nasal corridor. Placement of silicone nasal splints at the end of the surgery also helps keep the flap in contact with the nasal septum. The vascular pedicle...
nasoseptal flap is retrieved from the nasopharynx after tumor removal is completed, and the flap is used to repair the skull base defect.

DISCUSSION

Advancements in endonasal endoscopic skull base surgery have spearheaded an evolution in expanded approaches. As a consequence, mucoperiosteal vascular pedicled flaps are usually used for the reconstruction of cranial base defects. Denuded mucosal surfaces resulting from their harvesting are usually left to heal by secondary intention, thus prolonging postoperative nasal and septal remucosalization, which promotes nasal crust formation. Nasal crusting impacts postoperative quality of life causing nasal obstruction, sleep difficulties,
halitosis, and anosmia. This report describes an innovative technique that improves the remucosalization of the vascular pedicled nasoseptal flap donor site. We use an innovative technique to redrape the nasal septum with a local contralateral septal mucosal flap. Patients report less nasal crusting, better nasal airway, and less frequency of endoscopic nasal toilette.

CONCLUSION
The technique described in this report has proven to be safe, reliable, and produces no additional morbidity. It is an effective method of achieving fast nasal septal remucosalization, thus improving postoperative quality of life in patients after expanded endonasal approaches. Compared with remucosalization by secondary intention, this technique provides the patient with decreased nasal crusting formation, better nasal airway, and lessens the need for postoperative nasal toilette. We recommend the technique for every expanded endonasal approach.

BIBLIOGRAPHY