MINIMALLY INVASIVE ENDOSCOPIC SEPTOPLASTY - A REVIEW OF A NOVEL TECHNIQUE AND CLINICAL OUTCOMES


BACKGROUND

Though Septoplasty is one of the most common otolaryngological procedures performed today, many technical variations still exist. In the recent past focus has shifted from the conventional “headlight” septoplasty to a much more precise endoscopic guided septoplasty. Endoscopic guidance allows the surgeon to elevate the mucosal flaps with minimal trauma and maximum precision. However, with traditional endoscopic septoplasty there is considerable morbidity associated with septal suturing, splints, and nasal packing. The purpose of this study is to evaluate the results of a novel minimally invasive endoscopic technique that eliminates septal splints, quilting stitches, incision closure, or nasal packing.

METHODS

296 cases of minimally invasive endoscopic septoplasty performed at a tertiary care medical center by a single surgeon from August 2006 to August 2008 were retrospectively reviewed. Cases were reviewed with respect to indications, revision rates, and complications such as septal hematoma, post-operative bleeding, septal perforation, septal flapping, and adhesions. Institutional review board approval was obtained.

MINIMALLY INVASIVE SURGICAL TECHNIQUE:

All the patients were advised to stop to aspirin or aspirin based products, anticoagulants, and other products which would potentially cause bleeding for at least ten days before surgery. Patients with acute sinus infections were treated appropriately with preoperative antibiotics. In the preoperative area nasal mucosal decongestion is achieved by using nasal sprays of 0.05% oxymetazoline followed by 4% Cocaine mixed with 1 in 50,000 epinephrine. Each nasal spray was given three times, 5 minutes apart starting with 0.05% oxymetazoline since the initial vasoconstriction minimizes absorption of the cocaine used later. Endoscopic septoplasty done alone, or as part of FESS, can be done under local or general anesthesia using the laryngeal mask anesthesia (LMA) - the benefits of LMA include less anesthesia requirement, reduced coughing and bucking on emergence, minimal hemodynamic response, and ability to maintain on spontaneous ventilation.1-4

Approximately 1cc of 1 % lidocaine with epinephrine 1:100,000 is injected into the subperichondrial planes only at the site of incision (Figure-1). A modified curvilinear Killian incision measuring 2 cm in length is placed on the side of convexity, 0.5 -1cm behind the caudal margin of the

*,**,*** St.Elizabeth’s Medical Center, 736 Cambridge St, Boston-MA, USA.
quadrangular cartilage (Figure 2). However, the site of this incision can be altered in the presence of spurs or other caudal septal variations. Extreme caudal deflections may require an open or “traditional” septoplasty technique for the most caudal portion of the deflection, and an endoscopic technique for the remainder. Once the mucoperichondrial plane is incised, the gentle elevation of the flap is begun on the ipsilateral side using a custom made suction elevator (Figure 3). The mucoperichondrial flap elevation then proceeds carefully under full endoscopic visualization posteriorly up to the bony-cartilaginous junction. After elevation of the mucoperichondrial and mucoperiosteal flap on the ipsilateral side, the quadrangular cartilage is incised using a regular 15-blade knife directly under the anterior mucosal incision. The cartilage is incised carefully to avoid extending the incision through the mucoperichondrium and mucosa of the contralateral side. This careful incision of the caudal cartilage is an essential step of the technique as this would allow the surgeon to coapt the two mucosal flaps after surgery without the need for suturing. After indentifying the mucoperichondrial plane on the opposite side, the contralateral mucosal flap is elevated through the anterior cartilaginous incision, in a similar fashion to the initial side (Figure 4). A Ballinger swivel knife or small Takahashi forceps is used to excise most of the cartilage, taking care to preserve 0.5–1 cm of dorsal strut. Sometimes this is done using a Takahashi forceps due to a very thin cartilage component that is not easily cut with a Ballinger knife. After this initial piece of cartilage is removed, the remaining cartilaginous septum is removed from high in the nasal vault to the nasal floor. Removal of the quadrangular cartilage allows the surgeon to visualize the maxillary crest, and also provides much more room for the suction freer and endoscope. This additional room reduces the risk of perforation and allows the surgeon to work more easily through the narrow space provided between the mucosal flaps.

Using the suction elevator the mucoperiosteal flap is elevated on both the sides of the maxillary crest, and bony spurs are then removed with Takahashi forceps. The mucosal flaps are then dissected further posterior over the remaining bony septum, which can then be removed using a small Takahashi forceps under endoscopic visualization. Care is taken not to cause any opposing septal mucosal tears.

Once the targeted bone and cartilage is removed, the nasal cavity on both sides is visualized endoscopically to confirm complete removal of the deviated portion of the septum. The blood between the two mucosal flaps is gently suctioned using a Frazier suction canulla. The two septal mucosal flaps are coapted together without requiring any suturing or stapling of the incision site. A small (5 mm) stab incision is made in one mucosal flap in the posterior third of the septum to prevent any hematoma formation (Figure 5). No quilting sutures or septal splints are placed, and nasal packing is not required.

Endoscopic sinus surgery is performed last if required. Completing the septoplasty prior to any sinus surgery allows the surgeon additional time to assess the septal pocket for hematoma formation. The septal pocket can be assessed several times if necessary. The patient is usually discharged home within 90 minutes after surgery. Patients are allowed to return to work one day after surgery with minimal restriction in daily activities.

RESULTS:

The charts of 296 patients who underwent minimally invasive endoscopic septoplasty by a single surgeon in a tertiary care center over a 24 month period were analyzed retrospectively. Mean age was 49.6 with a range of 15–74 years, and the Male:Female ratio was 1.6:1. The mean follow-up duration was 10.6 months.
Of 296 cases, 260 were primary cases of septoplasty and 36 were revision procedures. Table-1 shows the various indications.

Complications included post-operative bleeding (2%), septal perforation (1%), adhesions (1%), septal hematoma (0.03%), and septal flapping (0.03%). Two (0.06%) patients required non-operative treatment for post-operative bleeding. Three patients (1%) underwent revision septoplasty for persistent caudal deflection.

**DISCUSSION:**

Though septoplasty is one of the most common otolaryngological procedures, variations in techniques still exist. Since the first description of endoscopic septoplasty by Lanza and colleagues\(^5\) and Stammberger\(^6\) in 1991, the popularity of endoscopic septoplasty is ever increasing. With the increasing incidence of Endoscopic sinus surgery being performed\(^7\), access to the middle meatus remains the most common indication in our study. Even in cases of extreme septal deviation towards one side with clear access to the middle meatus on the other, septoplasty was performed first before starting the endoscopic sinus surgery. Performing endoscopic septoplasty first allows the surgeon time to check bleeding and hematoma formation before the end of the surgery.

Endoscopic guidance allows the surgeon to elevate the mucoperichondrial and mucoperiosteal flaps under direct visualization thereby minimizing any mucosal tears. This technique also allows the surgeon to utilize a smaller incision, thereby requiring no closure of the incision. The post operative morbidity is reduced by avoiding the nasal packing that is one of the most important causes of postoperative morbidity in nasal surgeries\(^8,9\). All patients in the study were able to return to work or school one day following surgery, demonstrating a reduced morbidity compared to conventional techniques, though no objective data was available to compare with other studies as this metric

---

**Fig 1** (a) Showing infiltration of lidocaine with epinephrine to the sub-perichondrial plane. (b) Showing modified Killian incision.

**Fig 2** (a) Showing mucoperichondrial and mucoperiosteal flap elevation on the ipsilateral side (b) Showing elevation of the flap on the contralateral side after cartilage incision with 15 blade knife.

**Fig 3** Showing Ballenger swivel knife is being used to resect the septal cartilage.

**Fig 4** Showing stab incision being given to prevent haematoma
was not reported elsewhere. The endoscopic technique also allows the surgeon to teach others as every move can be seen on the video screen, and one can easily monitor younger surgeons as they perform the procedure. This is in stark contrast to headlight surgery where only the operating surgeon can see the operative field.

In our study, quilting sutures or septal splints were not used for approximating the two septal flaps after surgery. Furthermore, the postoperative incidence of hematoma and bleeding were comparable to studies where either quilting sutures and or splints were used\textsuperscript{10-11}. Good pre-operative nasal decongestion, meticulous dissection of the mucosal flaps under direct visualization, and time to assess for persistent septal pocket bleeding helps to reduce the incidence of postoperative hematoma and bleeding.

Other complications of this technique were rare and comparable to those described in the literature. This included persistent caudal deviation, though only three patient’s necessitated a revision procedure. These 3 patients had total relief of nasal obstruction and snoring after undergoing the revision procedure where an extended excision of the caudal end of the quadrangular cartilage was performed. Since the deviated portion of the septum is precisely removed under endoscopic guidance the incidence of postoperative remnant deviation is reduced significantly. Persistent deviation of the septum was only found to be a postoperative complication in 3 patients who had severe caudal dislocation preoperatively. Hence, our results suggest that severe caudal deflection may preclude an entirely endoscopic approach. A combination of open and endoscopic approaches can be employed in these situations.

The septal perforation rate in our study was 1% and is comparable to 0.9% reported by Hwang et al\textsuperscript{11} and less than the 3.4 % reported by Chung et al\textsuperscript{10}. Since the mucosal flaps are elevated under direct visualization, care can be taken to prevent any opposing tears in the septal mucosal flaps. In the presence of an acutely angulated spur, tear in the flap on the spur side is likely. The surgeon would begin by dissecting the mucosal flap on the opposing side with extreme caution to prevent a tear. If successful, the dissection can then begin on the side of the perforation where a tear is expected. This approach prevents bilateral overlapping tears which have a high chance of causing a perforation. Keep in mind that if a perforation does occur and it is in a posterior location, it will probably remain asymptomatic.

The incidence of adhesions reported in our study is 1%, which is less than reported by other studies\textsuperscript{10}. In our opinion, the avoidance of septal splints or nasal packing reduces the risk of adhesions; however, the key element in preventing adhesions is the meticulous flap elevation avoiding septal mucosal trauma.

The limitations of this study include lack of control group undergoing conventional septoplasty done by the same surgeon to compare the operative time and clinical outcomes.

CONCLUSION-

Minimally invasive endoscopic septoplasty is a viable alternative to conventional open and targeted endoscopic septoplasty, with comparable or lower complication rates. This novel technique avoids nasal splints, septal stitches, nasal packing for improved patient comfort while maintaining a low complication profile and low revision rate.

REFERENCES


9- Awan MS, Iqbal M. Nasal packing after septoplasty: a randomized comparison of packing versus no packing in 88 patients Ear Nose Throat J. 2008 Nov;87(11):624-7


Address for correspondence:

Peter Catalano, MD, FACS, FARS
St. Elizabeth’s Medical Center
736 Cambridge Street, Boston,
MA 02134 USA
Peter Catalano, MD, FACS, FARS
Chief of Otolaryngology
Tufts University School of Medicine
Medical Director of Research
Steward Health Care.