

## Back-and-forth endoscopic septoplasty: analysis of the technique and outcomes

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**Background:** To describe our clinical experience in 218 consecutive patients undergoing endoscopic back-and-forth septoplasty (EBFS), examining surgical indications, technique, and follow-up.

**Methods:** From January 2005 to November 2008, 218 patients underwent EBFS at the Department of Otorhinolaryngology, San Raffaele Hospital, Milan, Italy. The indication for EBFS in this series was nasal airway obstruction (NAO). Patients were studied with nasal rigid endoscopy and in some cases computed tomography (CT) was used to exclude rhinosinusitis. The most common concomitant diagnoses included allergic rhinitis and turbinate hypertrophy. EBFS facilitates the interruption of perichondrial and periosteal bridges, which are more represented in the anterior portion of the septum between the caudal quadrangular cartilage and the vomeropremaxillary crest. Septal splints were positioned. No nasal packing was required.

**Results:** No cases required conversion to a traditional headlight approach, and no intraoperative complications were encountered. Intraoperative mucosal microlacerations occurred in 77.98% of cases; suturing was required in only

8.25% of cases. Of 218 patients, 74.77% experienced resolution of NAO, while 16.06% experienced only improvement; 9.17% noted the persistence of symptoms. Complications included transient dental pain/hypesthesia (6.88%), septal hematoma (5.04%), synechiae formation (2.29%), epistaxis (1.83%), septal perforation (1.83%), cheek swelling (0.45%), and septal abscess (0.45%).

**Conclusion:** EBFS as a variation of endoscopic septoplasty (ES) represents a viable procedure with good outcomes and a low rate of complications. The technique allows lysis of tissue fibers while preserving the integrity of mucosa at the critical area using less force and reduces the probability of mucosal tears, based on embryologic knowledge of anatomical dissection. © 2011 ARS-AAOA, LLC.

**Key Words:** septoplasty; endoscopic septoplasty; back and forth technique; septoplasty technique; endoscopy; nasal septum

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Septoplasty is a well-established procedure that is commonly performed for treatment of nasal airway obstruction or rhinologic headache due to irritation of the septum caused by contact with the lateral nasal wall. The technique is often used in conjunction with other nasal procedures, including cosmetic rhinoplasty and endoscopic sinus surgery.<sup>1</sup>

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The application of endoscopic techniques to the correction of septal deformities was initially described in 1991 by Stammberger<sup>2</sup> and by Lanza et al.<sup>3</sup>

Endoscopic septoplasty (ES) is considered to be a valid alternative to traditional approaches<sup>4</sup> and provides several important advantages, such as offering a direct-targeted route to the anatomic deformity and improved visualization and magnification of the surgical field.<sup>5</sup>

We describe our clinical experience in 218 consecutive patients undergoing endoscopic back-and-forth septoplasty. The surgical indications, technique, and follow-up are discussed.

### Patients and methods

From January 2005 to November 2008, 218 patients underwent endoscopic back-and-forth septoplasty (EBFS) at the Department of Otorhinolaryngology, San Raffaele

Hospital in Milan. The average age was 36.5 years (range, 17.5–78.7 years) with a male/female ratio of 4:1. Four patients referred nasal trauma that occurred more than 3 years earlier. The remaining 214 patients had no history of nasal trauma.

All procedures were performed by the same surgeon. For 215 patients, it was the first procedure, whereas 3 patients had undergone previous septoplasty (in 2 cases a traditional procedure was employed, while 1 patient underwent an endoscopic procedure).

The indication for EBFS in this series was nasal airway obstruction (NAO).

Patients were collected in a visual database built on a 4th Dimension by 4D Inc.,<sup>6</sup> which was used to file all the information. A descriptive statistical analysis was performed.

Before surgery, patients were studied with nasal rigid endoscopy, and in some cases computed tomography (CT) was used to exclude rhinosinusitis. The most common concomitant diagnoses included allergic rhinitis and turbinate hypertrophy, and thus concomitant turbinate surgery was nearly always performed (95%). We excluded patients with sinonasal polyposis and chronic rhinosinusitis. All patients

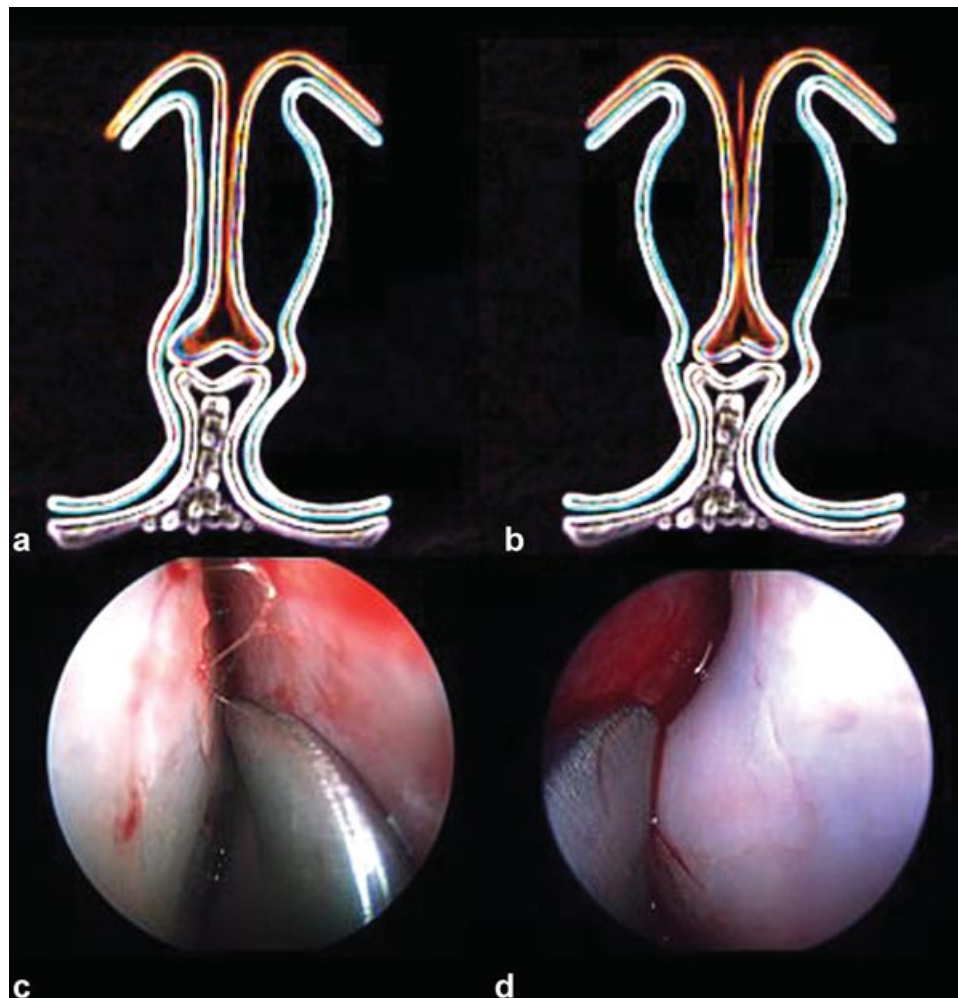
underwent topical nasal therapy with mometasone furoate spray and nasal douche for 3 months before surgery.

Demographic data, surgical indications, intraoperative technique and findings, and postoperative follow-up were analyzed.

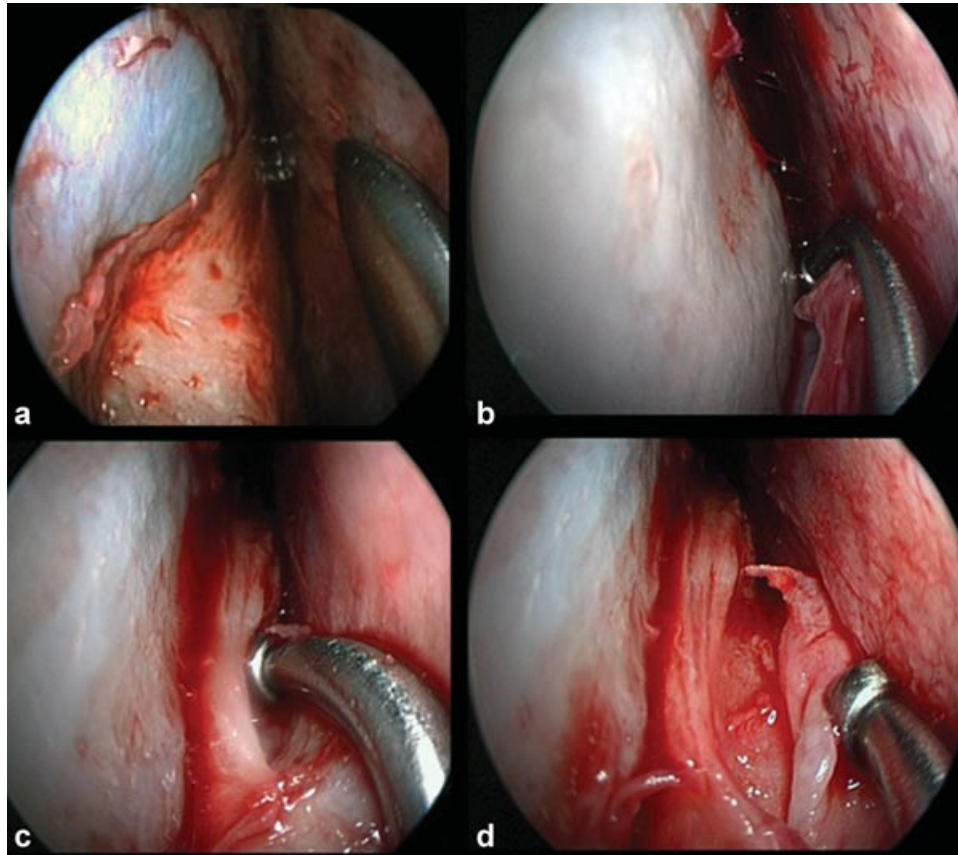
### Surgical technique

All patients were treated under general anesthesia. Topical decongestion was applied using cotton pledgets soaked in 4% (4 parts per 1000) adrenaline suited in both nasal fossae. Mepivacaine 20 mg/mL and adrenaline 1:200,000 were injected in a submucoperichondrial plane bilaterally in the area of flap incision and elevation.

EBFS was performed with a 4-mm 30-degree rigid nasal endoscope. We initially used a headlight approach to perform a hemitransfixion incision contralateral to the side of maximal deviation and to dissect the first 5 mm of septal mucosa in order to prepare the superior tunnels. At this point, an endoscope was introduced into the nose to complete the superior tunnels bilaterally, establishing a subperichondrial-subperiosteum plane (Fig. 1).



**FIGURE 1.** Superior tunnel elevation. (A,B) Schematic demonstration of the technique. (C,D) Respective endoscopic view.



**FIGURE 2.** (A,B) Left inferior tunnel research as indicated by a Cottle palpator. (C,D) In the back-and-forth technique the dissecting direction facilitates the interruption of connective-tissue fibers using a ball-shaped double-ended probe.

Next, the vomer was approached with a back-and-forth technique and the 2 inferior tunnels were accessed bilaterally (Fig. 2A,B). The fused perichondrial-periosteal tissue was scraped in a posteroanterior direction to interrupt the perichondrial and periosteal bridges. The dissecting direction facilitates the interruption of connective-tissue fibers using a ball-shaped double-ended probe in a back-and-forth direction (Fig. 2C,D).

Two chondrotomies were then carried out on the concave side of the cartilaginous septum. The first was horizontal and caudal, above the vomer. The second chondrotomy was vertical and ran caudocranially in proximity and parallel to the chondroethmoidal junction. The triangular strip of cartilage defined by the 2 chondrotomies was shelled out and removed. The remaining cartilage was pushed aside with the endoscope. At this point, it was easy to correct and remove any deviation in this area with precise and focused resection.

Once satisfactory correction was achieved, the septal flaps were then reapposed and the septal incisions were closed with a running quilting absorbable suture. A transseptal quilting stitch was also applied to avoid formation of hematoma.

Septal splints were then positioned to prevent synechia formation. No nasal packing was required.

## Results

Intraoperatively, 8% of patients had evidence of a bony deviation only, while 10% of cases had a cartilaginous deviation; 82% of patients had both bony and cartilaginous deviations. No case required conversion to a traditional headlight approach, and no intraoperative complications were encountered. Intraoperative mucosal microlacerations occurred in 170 patients (77.98%); suturing was required in 18 cases (8.25%).

Postoperative complications included transient dental pain or hypoesthesia in 15 patients, which were more intense on postoperative day 1 and recovered spontaneously after few days. Eleven patients developed a septal hematoma that was subsequently evacuated. Postoperative synechia involving the septum were found in 5 patients and were lysed under local anesthesia in an outpatient setting in all cases. Four patients experienced epistaxis on day 0 and required packing, which was removed the day after. Four patients developed septal perforations, 3 of which were small and asymptomatic and required no additional treatment. One perforation was anterior and surgery was necessary. Swelling of the cheek occurred in a 45-year-old woman on postoperative day 1 that resolved spontaneously within a few days. One patient developed a septal abscess on postoperative day 6. The patient was a young woman

who promptly underwent intravenous antibiotic therapy and drainage of purulent material from the abscess sac. One of the patients required revision septoplasty for a persistent anterior septal deviation.

Patients were hospitalized for 1 day, and were released on the first postoperative day. Ten days after septoplasty, patients underwent a clinical visit to aspirate nasal secretions and remove splints.

Follow-up assessment included nasal endoscopy to evaluate surgical results. Postoperative visits were performed on days 10 and 30, and at 3 and 6 months after surgery. Follow-up time ranged from 24 to 70 months (mean 54 months).

Of the 218 patients, 74.77% experienced resolution of nasal airway obstruction, while 16.06% experienced only improvement; 9.17% noted the persistence of symptoms. No differences between bony, cartilaginous and mixed deviations were noted in subjective outcomes.

## Discussion

The endoscopic back-and-forth technique was described for the first time by Mantovani et al.<sup>7</sup> in an external approach. The procedure offers a safe approach to the critical area between the cartilaginous septum and the vomeropremaxillary crest, where the attempt to connect the subperiosteal and the subperichondrial planes of dissection often results in mucosal tears. The fused perichondrial-periosteal tissue lying above the vomeropremaxillary crest is thicker and more represented in the anterior portion of the septum between the quadrangular cartilage and the palatine bone. It can be explained on the basis of embryologic studies because the membranous reflections surrounding the 3 important sutures in the nasal septum have different patterns of development. If the mucous membrane can be easily elevated over the suture line between the quadrangular cartilage and perpendicular plate of the ethmoid because the mucoperichondrium and mucoperiosteum are almost continuous, the suture line between the quadrangular cartilage and the vomer has a more intricate anatomical situation. The perichondrium overlaying the quadrilateral cartilage divides into an inner and outer layer. The outer layers of perichondrium and periosteum over the vomer are continuous. Otherwise, the inner layer merges with the inner layer of vomer periosteum, extending into and through the suture. The suture is wide and the inner layers are thick. On the other hand, for the suture between the vomer and per-

pendicular plate of the ethmoid, the periosteum covering the latter also divides into 2 layers, but fewer fibers of the inner layer pass into the suture line and they are very thin.<sup>8</sup> Therefore, the real advantage of this technique is the application of less force in the back-and-forth direction, based on anatomical dissection and knowledge of embryogenetic studies.

Endoscopic evaluation allows better visualization and magnification of nasal mucosa, and therefore if laceration does occur it can be followed such that it is not widened.


In our patient cohort, we observed a large percentage of intraoperative septal perforations (77.98% of patients). These were microlacerations of the nasal mucosa often less than 1 mm, which can be seen under endoscopic view. Other investigators have also documented septal perforations as complications occurring postoperatively.<sup>4,9-13</sup> It is difficult to compare the percentage of septal microlacerations observed in the present report with literature data since to our knowledge they have not been previously reported.

Complications in our series were minimal and transient with no long-term consequences. All of them were minor complications. These complication rates are similar to those previously reported in the literature for both a traditional approach and for ES,<sup>4,12,13</sup> except for cheek swelling, which has not been previously described. We did registered no major complications such as loss of vision, cerebrospinal fluid leaks of anterior skull base, and loss of smell.<sup>14-16</sup>

Among those who underwent EBFS in our series, 74.77% achieved resolution of symptoms and satisfaction, 16.06% experienced partial improvement, while 9.17% still had obstruction. Previously reported success rates vary from 63% to 85% depending on the length of follow-up and the method of assessment.<sup>17-23</sup>

Our results for NAO are highly similar to previously reported improvement rates and are based on the level of satisfaction expressed by patients as other authors have reported.<sup>1,12</sup>

## Conclusion

EBFS, as a variation of ES, represents a viable procedure with good outcomes and a low rate of complications. The technique allows lysis of tissue fibers while preserving the integrity of mucosa at the critical area using less force and reduces the probability of mucosal tears, basing on embryologic knowledge of anatomical dissection. 

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