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Endoscopic septoplasty as a routine approach: Our experience on 647 patients



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ABSTRACT

Introduction: A variety of surgical techniques of septoplasty have been described. The aim of the present study was to assess the feasibility of endoscopic septoplasty as a routine approach both alone and during other sinonasal – skull base endoscopic procedures.

Methods: A retrospective study of all patients admitted for endoscopic septoplasty that were performed between January 2011 and December 2017 was conducted. Patients that performed septoplasty either alone or in combination with sinus surgery or skull base surgery were included. Data regarding post-operative major complications such post-operative hemorrhage, synechia, and septal tears or perforation were collected.

Results: 647 patients were included. Postoperative hemorrhage was observed in 0,3% of patients, synechia in 5,2% of cases, and septal tears and/or perforations in 6,2% of the whole study population. An incomplete septal correction was observed in 27 patients (4,2%).

Conclusions: The endoscopic technique provides a better visualization allowing to observe fewer complications. It can also be considered as an excellent and effective teaching tool.

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1. Introduction

A deviated septum is a common condition that involves a displacement of the septum to one side (C-shaped) or both sides (S-shaped) of the nose. A variety of surgical techniques for septoplasty have been described and subsequently improved up to now, especially with the advent of endoscopy. The introduction of the endoscope provides a direct approach to septal deformity (especially in posterior deviation) and allows sinus management simultaneously (Pons et al., 2015; Champagne et al., 2016a; Champagne et al., 2016b; Mandour, 2017; Kulkarni et al., 2015; Sousa et al., 2005; Lemonnier, 2014; Hwang et al., 1999; Hong et al., 2016; Gupta, 2005; Chung et al., 2007; Bothra and Mathur, 2009; Gulati et al., 2009; Sathyaki et al., 2014).

In the literature, endoscopic septoplasty seems to improve visualization of septal deviation, especially in the posterior and

inferior area, to shorten surgery, and to provide a better anatomic result (Pons et al., 2015; Champagne et al., 2016a; Champagne et al., 2016b; Mandour, 2017; Kulkarni et al., 2015; Sousa et al., 2005; Lemonnier, 2014; Hwang et al., 1999; Hong et al., 2016; Gupta, 2005; Chung et al., 2007; Bothra and Mathur, 2009; Gulati et al., 2009; Sathyaki et al., 2014).

Therefore, the aim of the present study was to assess the feasibility of endoscopic septoplasty as a routine approach both alone and during other sinonasal – skull base endoscopic procedures.

2. Materials and methods

A retrospective study of all patients admitted for endoscopic septoplasty performed by the same senior surgeon (M.G.) between January 2011 and December 2017 was conducted. Between January 2011 and November 2016, surgical interventions were performed at the University Hospital of Turin, Turin, Italy, whereas between December 2016 and December 2017 surgical interventions were

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performed at the University Hospital of Novara, Eastern Piedmont University, Novara, Italy.

Patients with severe septal deviation were eligible. Three groups of patients were included: patients with functional complaints of chronic nasal obstruction related to septal deviation that performed septoplasty alone (SA group); patients who underwent septoplasty associated with Functional Endoscopic Sinus Surgery, where the presence of a severe septal deviation could compromise the outcome of sinus surgery alone (F group); patients who underwent septoplasty during transnasal skull base endoscopic surgery in order to obtain a wider access to both nostrils (SB group).

Exclusion criteria were history of septal surgery, chronic nasal granulomatosis diseases, uncontrolled asthma, previous radiation therapy to the head and neck, pregnancy, and very anterior septal deformities (septo – columellar dislocation) that would have required open or combined septoplasty.

Standardized surgical technique was as follows. After packing with lidocaine/naphazoline to retract the mucosa, diagnostic endoscopy was performed to check all of the deformities of the septum and to plan the subsequent surgical repair. A solution of xylocaine 2% with adrenaline was injected into the septal mucosa in the submucoperichondrial plane bilaterally, thus resulting in hydro-dissection, elevating the peri-chondrium and periosteum from the underlying cartilage and bone, and blanching the overlying mucosa. The incision was performed ipsilaterally to the septal deformity. A 15-blade scalpel was used to make an L-shaped incision through the mucosa and underlying perichondrium. The vertical limb of the incision was made immediately anterior to the septal deformity. The horizontal limb was created at the junction of the septum and the nasal floor. Then, the identification of the submucoperichondrial plane was obtained to avoid creating an intraoperative mucosal perforation. A posterior superiorly based mucoperichondrial flap was raised by a sweeping vertical motion of a Cottle periosteal elevator or a Freer suction elevator. When a spur was encountered, the flap was first elevated above and below the deformity. The 2 tunnels were then connected, releasing the mucosa over the point of maximal tension. The Cottle periosteal elevator was used to incise and cross over the septal cartilage. The contralateral submucoperichondrial plane could then be directly visualized with the 30° telescope and the second flap raised, again in the submucoperichondrial plane. Septal cartilage and bone were removed in a piecemeal fashion prior to complete dissection of the contralateral flap if needed to improve visualization or ease the elevation of the mucosa over additional deformities. Once the septal spur or deviation was addressed, the mucoperichondrial flaps were reopposed and the bilateral nasal cavities were visualized to ensure patency of the internal nasal valve and airway. The risk of postoperative septal hematoma formation was reduced by the horizontal limb of the incision, which acted as a drainage pathway when left unsutured. Therefore, septal quilting sutures were not required (Pons et al., 2015; Champagne et al., 2016a).

Clinical endoscopic post-operative follow-up was performed whereas CT scan was reserved to selected cases.

Data regarding postoperative major complications such postoperative septal hemorrhage, synechiae, and septal tears or perforation were collected. Moreover, the incomplete septal corrections were recorded as partial surgical failure.

Functional assessment was performed by the Nasal Obstruction and Septoplasty Effectiveness (NOSE) questionnaire, which patients filled out at the preoperative and 6-month consultation. The NOSE survey is a brief, validated, disease-specific instrument designed to measure nasal obstruction before and after treatment.

This study was granted an exemption from IRB approval as a retrospective study by the local institutional review board. We followed Helsinki Declaration guidelines. Informed consent was obtained from all participants.

3. Results

Between January 2011 and December 2017, 647 patients admitted for septoplasty (either alone, or associated with Functional Endoscopic Sinus Surgery, or during skull base surgery) were included. All were managed endoscopically by the same senior surgeon (M.G.) expert in conventional septoplasty and endoscopic sinus surgery.

On the whole, the study population included 150 consecutive patients that underwent endoscopic septoplasty alone (SA group), 432 patients that performed endoscopic septoplasty during FESS (F group), and 65 patients that performed endoscopic septoplasty during an endoscopic approach to skull base lesions (SB group) (Fig. 1).

Combined approach for the inferior turbinates was performed by means of radiofrequency in 35 cases (8%) in F group; at least one inferior turbinate out-fracture was carried out in 7 patients (10,8%) in SB group. No inferior turbinate surgery was executed in SA group (see Figs. 2 and 3).

Data regarding the observed complications are listed in Table 1, together with a review of the complications data from the recent literature.

Postoperative septal hemorrhage was observed in just 1 patient from both SA (requiring additional nasal packing) and F groups (needing surgical revision), with an overall incidence of 2 out of 647 (0,3%). Synechiae occurred in 6 patients, 20 patients, and 8 patients from SA, F, and SB groups, respectively. The overall incidence rate of synechiae was 5,2% (34 out of 647).

Then, 10 cases of septal tears and/or perforations were observed in SA group, 23 in F group, and 7 in SB group, adding up to a percentage of 6,2% within the whole study population.

Finally, an incomplete septal correction was observed in 27 patients (4,2%).

No other major complications were reported.

In 601 patients (92,9%) a good functional result was achieved, as confirmed by endoscopic and subjective examination by NOSE questionnaires. NOSE score improved postoperatively in all groups, and equally across groups (Table 2). Therefore, 23 patients (3,6%) complained of a residual nasal obstruction, 18 patients (2,8%) reported the persistence of contact point headache, and 34 patients (5,3%) recorded nasal discharge. In 12 patients (1,8%) a “headlight” conversion was performed during surgery.

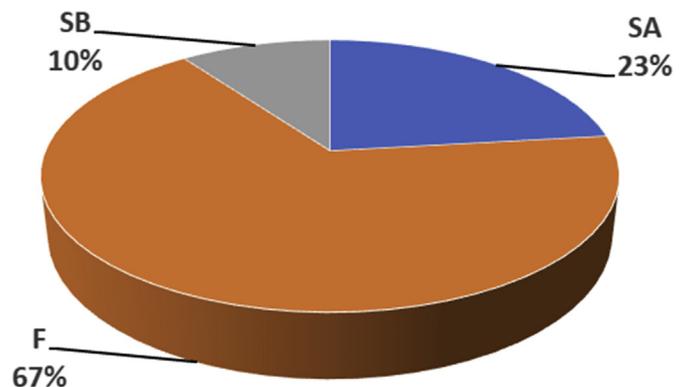


Fig. 1. Study population, including “Septoplasty Alone” (SA) group with 150 patients, “Septoplasty during FESS” (F) group with 432 patients, and “Septoplasty during an endoscopic approach to skull base lesions” (SB) group with 65 patients.

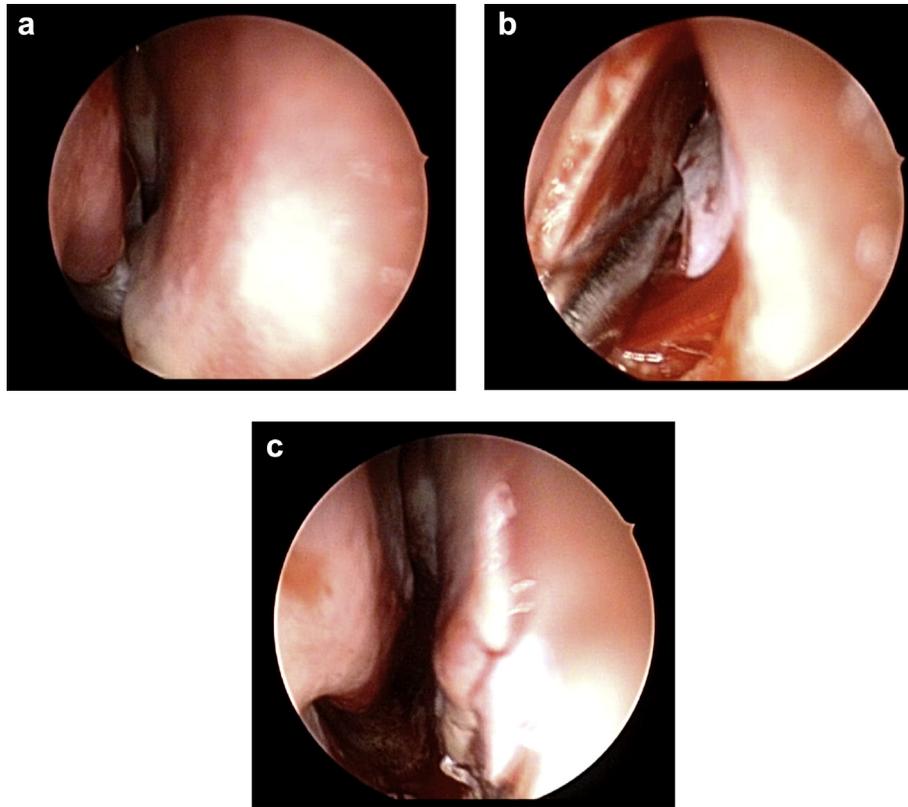


Fig. 2. Endoscopic intra-operative images showing a right septal spur (a), the spur removal (b), and the immediate post-operative result (c).

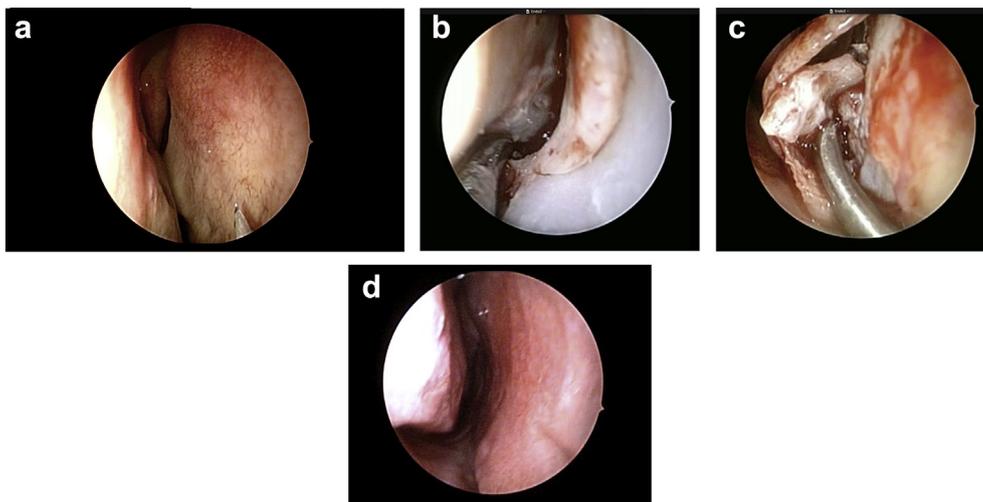


Fig. 3. Endoscopic intra-operative images showing a right septal spur (a), the mucosal flap elevation (b), the following spur removal (c), and a post-operative two months follow up endoscopic view (d).

4. Discussion

Owing to improved visualization, the endoscopic approach seems to offer both technical and educational advantages over traditional septoplasty (Lemonnier, 2014). Anatomic results seem better with endoscopy, providing a significantly better anatomic correction of septal deviation. This may be due to a better intraoperative visualization of anatomy, and less mucosal damage, thanks to direct visualization of the flap during detachment (Champagne et al., 2016a; Champagne et al., 2016b).

Together with less mucosal damage, endoscopy seems to induce fewer postoperative complications. Our results confirm the data from the recent literature, thus highlighting the good functional and clinical outcomes following endoscopic septoplasty. Few complications were observed in all study subgroups.

Nevertheless a recent meta-analysis by Hong et al. underlined the ongoing debate regarding which approach had better outcomes and fewer complications. The authors concluded that the endoscopic approach seemed to have some advantages in selected patients. However, the findings were not conclusive, because of the low quality of the included studies (Hong et al., 2016).

Table 1

Data regarding complications after endoscopic septoplasty from the study population and from the recent literature.

	SA (n = 150)	F (n = 432)	SB (n = 65)	Tot (n = 647)	Hwang et al., 1999	Sousa et al., 2005	Gupta, 2005	Chung et al., 2007	Bothra and Mathur, 2009	Gulati et al., 2009	Sathyaki et al., 2014	Hong CJ et al., 2016 *	Champagne et al., 2016b	Mandour, 2017
Post-op hemorrhage	1 (0,6%)	1 (0,2%)	0 (0,0%)	2 (0,3%)	-	0%	4%	0,9%	0%	-	-	0–1%	-	-
Synechiae	6 (4,0%)	20 (4,6%)	8 (12,3%)	34 (5,2%)	4,5%	-	0%	2,6%	25%	8%	0%	5–14%	5%	0%
Septal tears/ perforation	10 (6,6%)	23 (5,3%)	7 (10,7%)	40 (6,2%)	0,9%	0,7%	-	3,4%	-	-	-	4–30%	-	-
Incomplete correction	8 (5,3%)	17 (3,9)	2 (3,1%)	27 (4,2%)	-	2,6%	0%	0,9%	15%	8%	0%	1–23%	4%	16,7%

Table 2

NOSE score in the study population.

	pre operative NOSE score	Postoperative NOSE score	P value
SA	14.7 ± 2.14	4.7 ± 1.7	p < 0.05
F	16.4 ± 3.71	5.1 ± 1.4	p < 0.05
SB	11.3 ± 2.04	4.2 ± 1.6	p < 0.05

We noticed several advantages during the execution of endoscopic septoplasty in all the three surgical scenarios.

First of all, endoscopy allows a complete and appropriate approach and correction of posterior deviations of the septum. In fact, the ability to closely visualize the entire nasal cavity facilitates the diagnosis and management of posterior deformities that might otherwise go undetected or untreated. Such enhanced visualization could also be useful in selected revision procedures where clear tissue planes may no longer be present. Moreover, the endoscopic approach allows for placement of the mucosal incision to be tailored to the individual patient. In the case of a mid-septal or posterior septal deviation or spur, this obviates the need for a hemitransfixion or Killian incision and allows for a more limited procedure, resulting in reduced submucoperichondrial dissection (Pons et al., 2015; Champagne et al., 2016a; Champagne et al., 2016b; Mandour, 2017; Kulkarni et al., 2015; Sousa et al., 2005; Lemonnier, 2014; Hwang et al., 1999; Hong et al., 2016).

Second, there is an educational advantage. During conventional septoplasty, only the operator can monitor performance because of the narrow operative field: for junior surgeons, it is difficult to acquire the technique, understand the procedure, and be supervised by a senior surgeon when operating alone (Pons et al., 2015; Champagne et al., 2016a; Champagne et al., 2016b). Instead, having the endoscopic image projected on a screen allows for the attending surgeon to demonstrate the technique and gives him or her the ability to monitor the resident's progress and provide constructive feedback (Pons et al., 2015; Champagne et al., 2016a; Champagne et al., 2016b; Mandour, 2017; Kulkarni et al., 2015; Sousa et al., 2005; Lemonnier, 2014; Hwang et al., 1999; Hong et al., 2016; Gupta, 2005; Chung et al., 2007; Bothra and Mathur, 2009; Gulati et al., 2009).

Third, endoscopic septoplasty is least invasive, has minimal blood loss, and minimal tissue handling leading to less postoperative complications. Functional results in the present series were good, with satisfactory global NOSE score gain. However good NOSE results were also achieved using the traditional septoplasty technique, in agreement with the recent literature (Gupta, 2005; Chung et al., 2007; Bothra and Mathur, 2009; Gulati et al., 2009; Sathyaki et al., 2014; Paradis and Rotenberg, 2011; Garzaro et al., 2019).

As for complications, we observed few cases of postoperative hemorrhages, synechie, and septal tears/perforations. The endoscopic approach allows a reduced flap dissection in the initial steps

of the procedure; moreover, the correct attachment of mucosal flap at the end of septoplasty may be directly checked. These two steps represent the most tricky phases in reducing the mucosal tearing, and subsequently the risk to develop perforations and/or synechiae. An incomplete correction was limited to few patients. Furthermore, as there is no need of sutures, no postoperative hematomas are encountered following endoscopic septoplasty.

Finally, as it was found during surgical procedures of patients belonging to F group, when septal surgery is required ahead of endonasal surgery, endoscopy facilitates the passage from one step to the other, thus shortening surgery time. Furthermore, some endonasal procedures require prior septoplasty simply to give access to the sinus.

The main limit of this study is the retrospective design; the absence of a control group represents another weakness: a prospective randomized controlled study could perhaps clarify the role of the endoscopic approach in comparison with the traditional techniques of septoplasty.

A possible further limitation of the study is the difference of the scope of septoplasty during FESS and skull base surgery. Of course, in such conditions the indications to septoplasty are different from patients who underwent septoplasty alone. However, this limitation could also be considered not only as a confounding factor but also as a further demonstration that this technique can provide several advantages in specific clinical conditions, such as to provide a wide endoscopic corridor to the sphenoid sinuses and the skull base. Furthermore, during FESS surgery it can be an aid to obtain a better access to middle meatus and ethmoidal region.

5. Conclusion

Endoscopic septoplasty can be considered an effective technique that can be performed safely alone or in combination with endoscopic sinus surgery. The percentage of complications that occurred in this series was superimposable with those reported in the literature.

The endoscopic technique provides a better visualization, even posteriorly, allowing a limited and minimal invasive surgery with fewer intraoperative and postoperative complications. Furthermore, the endoscopic approach can also be considered as an excellent and effective teaching tool that allows junior surgeons' performance to be supervised.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

No disclosures.

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