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Original article

Endoscopic septoplasty: Learning curve

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ABSTRACT

Aims: The aim of the current study was to report the learning curve for endoscopic septoplasty for a senior surgeon already trained in endonasal sinus surgery.
Material and methods: From November 2011 to September 2012, 100 patients were prospectively included and grouped in 5 consecutive groups of 20 by date of surgery. The primary endpoint was operative time. Intra- and postoperative complications and functional assessment were also analyzed.
Results: Operative time decreased with the surgeon's experience and became stable after 60 procedures. Operative time saving was about 10 min per 20 procedures. Mean operative time was stable between groups 4 (21.1 ± 9.6 min) and 5 (19.2 ± 8.2 min). There was a 2% rate of conversion to conventional surgery for technical problems. The number of procedures free of accidental mucosal lesion increased and became stable after 40 procedures. There was a 4% rate of residual postoperative perforation. Nasal Obstruction and Septoplasty Effectiveness (NOSE) score improved postoperatively in each group ($P < 0.05$).
Conclusion: After 60 endoscopic septoplasty procedures, a senior surgeon masters the surgical technique with satisfactory operative times, and a decreasing rate of intra- and postoperative complications.

1. Introduction

Endoscopic septoplasty has been commonly performed since the development of endonasal surgery [1–5]. It is now a routine ENT procedure, tending to replace conventional surgery [6–10].

There are numerous reports of endoscopic septoplasty in the literature, but no studies of the associated learning curve [3–24].

The present study sought to assess the learning curve for endoscopic septoplasty performed by a senior surgeon already trained in endonasal septal and sinus surgery.

2. Material and methods

The study was conducted in a teaching hospital. Between November 2011 and September 2012, all patients admitted for septoplasty to be performed by the same senior surgeon were managed endoscopically. Patients with functional complaints of nasal obstruction related to septal deviation were eligible. At least 1 month's local medical treatment, usually based on corticosteroids or vasoconstrictors, was systematically tried out in first line. A preoperative phadiatop test was performed to rule out allergic etiology. Septoplasty was indicated in case of absence of clinical improvement.

Inclusion criteria were chronic nasal obstruction associated with obstructive septal deviation and failure of local and medical treatment. Preoperative sinus CT was systematic, to rule out other causes of nasal obstruction.

Patients were included prospectively, in consecutive groups according to date of surgery.

Exclusion criteria were rhinoplasty or sinus surgery performed in the same step, history of septal surgery, very anterior septal deformity (septo-columellar dislocation), and valve syndrome or turbinate hypertrophy.

Surgery was standardized, whatever the type of deviation. After xylocaine-naphazoline packing, initial endoscopy analyzed global septal deviation for preoperative planning. The septum was injected subperichondrally with 1% xylocaine with adrenaline. The mucosal incision was left inter-septo-columellar. The left face of the septum was released subperichondrally up to the chondro-vomerine junction. The cartilage was resected for about half a centimeter back from the mucosal incision. The right face of the septum was released subperichondrally up to the chondro-vomerine junction, the inferior part of which was then dislocated. An anterior cartilage strap of about 2 cm was resected, up to the vomer. Posterior release was continued subperiosteally at the vomer and perpendicular ethmoid lamina. The bony septum was sectioned with Mayo scissors in the midsection. The foot of the septum was resected with an osteotome. The septal mucosal flaps were

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Table 1
Surgical data.

Group	Mean operative time (min)	Conversion for technical problems	Procedures free of accidental mucosal perforation	Large intraoperative mucosal perforation
1	52.4 ± 17.7	1	2/20	11/20
2	42.3 ± 11.2	0	4/20	8/20
3	32.7 ± 11	0	8/20	4/20
4	21.1 ± 9.6	1	10/20	2/20
5	19.2 ± 8.2	0	9/20	1/20
Total	33.5 ± 11.5	2%	33%	26%

repositioned and nasal cavity endoscopy was performed to locate any residual deformity, which was resected on a case-by-case basis. Closure used 1 or 2 Vicryl Rapide® 4/0 sutures. 1 mm Silastic® splints were positioned on either side of the septum, and bilateral packing was performed; the splints were removed after 10 days.

The main study endpoint was operative time for endoscopic septoplasty, measured from the start of initial endoscopy to the fitting of the Silastic® splints.

Intraoperative incidents were recorded.

Conversion was defined by the impossibility of completing the procedure endoscopically, requiring crossover to conventional surgery.

Postoperative complications were compiled by the surgeon: hemorrhage, synechia, residual anatomic deviation, and septal perforation.

Functional assessment used the Nasal Obstruction and Septoplasty Effectiveness (NOSE) questionnaire, which patients filled out at the preoperative and 6-month consultation [25,26] (Appendix 1).

Qualitative data were analyzed on Chi^2 test and quantitative data on Student *t* test. The significance threshold was set at *P* (critical uncertainty value) < 0.05.

The study had approval from the clinical trials scientific committee of the Percy Hospital (October 2011).

3. Results

Between November 2011 and September 2012, 100 consecutive patients admitted for isolated septoplasty were included. All were managed endoscopically by the same senior surgeon, well versed in conventional septoplasty and other endonasal procedures, with initial training in endoscopic septoplasty.

Patients were distributed in 5 consecutive chronological groups: group 1 (nos. 1 to 20), group 2 (nos. 21 to 40), group 3 (nos. 41 to 60), group 4 (nos. 61 to 80) and group 5 (nos. 81 to 100).

3.1. Intraoperative parameters

Operative time shortened with operator experience, stabilizing after 60 procedures. Mean operative time was long for the first 20 procedures, at 52.4 min (± 17.7 min). There were 2 subsequent stages in the learning curve: first, after 40 procedures, mean operative time fell to 32.7 min (± 11), then, after 60 procedures, stabilized at 21.1 ± 9.6 min in group 4 and 19.2 ± 8.2 min in group 5. The learning curve (Fig. 1) was downward between groups 1 and 4, then plateaued between groups 4 and 5 (Table 1).

Operative time fell significantly between groups 1 and 2 ($P < 0.05$), 2 and 3 ($P < 0.05$) and 3 and 4 ($P < 0.05$). The difference between groups 4 and 5 was not significant.

There was 2% crossover to conventional surgery, for technical problems: 1 case in group 1 and 1 in group 4.

The number of procedures free of accidental mucosal perforation (< 3 mm) increased over the learning curve, stabilizing after 40 procedures (Table 1).

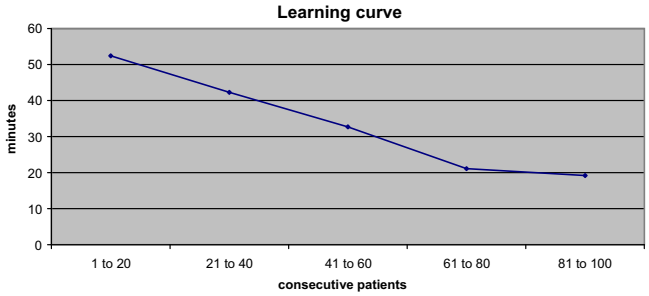

Fig. 1. Learning curve.

The number of serious intraoperative mucosal perforations (≥ 3 mm) declined from group to group (Table 1): 11 in group 1, 8 in group 2, 4 in group 3, 2 in group 4, and 1 in group 5.

3.2. Postoperative parameters

There was a 4% rate of residual postoperative perforation, restricted to the first 3 groups: 2 in group1, 1 in group 2, and 1 in group 3 (Table 2).

There was a 5% rate of synechia, stable over learning curve: 2 in group 1, 1 in group 2, none in group 3, 1 in group 4, and 1 in group 5 (Table 2).

Repermeabilization failure (NOSE gain < 5/20) was due to synechia in 2 cases and to insufficient anterior (columellar) deviation correction in 1 case (group 4).

3.3. Functional assessment

Surgery was indicated on NOSE score and clinical examination. Nasal permeability measures being difficult of access, poorly reproducible and poorly correlated with self-reported functional impairment, objective measurements by acoustic rhinometry or rhinomanometry were not included in the study design.

NOSE score improved postoperatively in all groups ($P < 0.05$), and equally across groups (Table 3), from a mean 16.2 ± 4.1 preoperatively to 6.4 ± 2.8 ($P < 0.05$).

The rate of repermeabilization failure, defined as NOSE gain < 5/20, was 3%: 1 case in group 1, 1 in group 2, and 1 in group 4 (Table 3).

Table 2
Postoperative complications.

Group	Perforation	Synechia	Repermeabilization failure
1	2	2	1
2	1	1	1
3	1	0	0
4	0	1	1
5	0	1	0
Total	4%	5%	3%