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An endoscopic approach to the deviated nasal septum – a preliminary study

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Abstract

The authors have used the nasal endoscope for the precise identification of pathological abnormalities of the nasal septum in relation to the lateral nasal wall including the osteo-meatal complex and in its ultraconservative management. The aim of the study was to compare the efficacies of endoscope-aided septoplasty (EAS) over traditional septoplasty (TS) in treating the pathological septum and turbinates, performed in 30 cases each. The subjective assessment was carried out by visual analogue scores and objective assessment by nasal endoscopy. This study demonstrates the superiority and limitations of the endoscopic approach in managing a deviated nasal septum and the turbinates. The endoscope-aided technique was found to be more effective in relieving the contact areas and nasal obstruction ($p = \leqslant 0.05$). The authors advocate a combined approach – an endoscopic approach for inaccessible posterior deviation and the conservative traditional technique for accessible anterior deviation of the nasal septum.

Key words: Nasal septum, surgery; Endoscopy

Introduction

Surgery on a deviated nasal septum has seen several modifications since its inception, starting from radical septal resection to mucosal preservation and subsequent preservation of the possible septal framework (Freer, 1902; Metzenbaum, 1929; Galloway, 1946; Cottle *et al.*, 1958; Maran, 1974). Recently, the emphasis has been on conservation of the septal framework rather than resection, as the former gives rise to lesser complications, allows concomitant rhinoplasty or a revision surgery later and moreover conservative surgery can be safely performed in children, without fear of a possible poor development of the midface.

The concept of conservative septal surgery is better conceived by a better understanding of the anatomy and the pathology of the nasal septum and of the biomechanical behaviour of the septal cartilage (Murakami *et al.*, 1982). The nasal endoscope allows precise pre-operative identification of the septal pathology and its associated lateral nasal wall abnormalities and helps in better planning of endoscope-aided septal surgery.

Although, traditional nasal septal surgery does improve the nasal airway, resection rather than conservative surgery is often used. There is often overexposure, unnecessary manipulation of the septal anatomy and more resection. Use of the endoscope addresses the above three areas favourably. In traditional surgery, relatively poor illumination, accessibility and magnification call for more exposure by a large incision and by elevation of flaps on both sides of the septum except usually on one side of the cartilage. In a septal deviation that is confined to a small area, the endoscope aids limited but sufficient exposure of the septal pathology (Example: spur, subluxation etc). The disarticulation of the vomerochondral junction and the ethmochondral junction is often found unnecessary in the endoscope-aided approach, endoscope aids very limited resection and thus more conservation by guiding precise shaving of the septal cartilage and proper placement of precise wedge resections. The lateral nasal wall pathology also can be better addressed at the same stage using the nasal endoscope.

The authors share their experience with traditional and endoscope-aided septoplasty and this preliminary study compares the efficacies of the two techniques, in terms of their outcome.

Materials and methods

This is a comparative study of the efficacy of endoscope-aided septoplasty and traditional septal surgery for a deviated nasal septum, conducted in the Department of ENT, Kasturba Medical College and Hospital, Manipal. Of the over 150 cases of deviated nasal septum underwent endoscope-aided septoplasty (EAS) during 1993 to 1996, an initial 30 cases were selected for this study that were available

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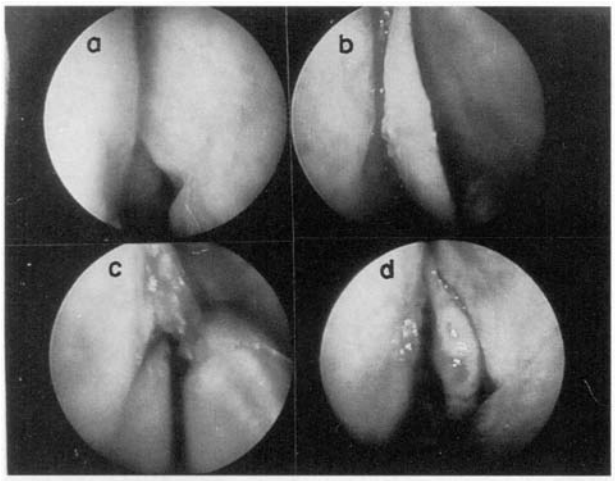

FIG. 1

a) Pre-operative photograph showing posterior deviation contacting and partially obscuring the middle turbinate. b) Intra-operative photograph showing shaving of the thickened cartilage at the bony cartilaginous junction. c) partial bony resection after shaving of the cartilage. d) Post-operative photograph showing relief of the contact area and a good view of the middle turbinate.

for a minimum follow-up period of one year (endoscopic group). The results were compared with that of traditional septoplasty (TS) performed by the authors, during 1991 to 1994, on 30 randomly selected cases (traditional group) who were also available for a minimum follow-up period of one year. They were carefully randomized attempting the best balance of other variants of the efficacies viz., age, sex, type of the deformity and the surgeon. The cases were evaluated by detailed history-taking and thorough clinical examination. Radiological investigation included a plain radiograph of the paranasal sinuses (Water's view) and when affordable, a coronal computed tomography (CT) scan of the osteomeatal complex. Allergy testing was performed in all cases out of which eight were positive in the traditional group and 10 in the endoscopic group. In the endoscopic group, diagnostic nasal endoscopy was performed, with special reference to identification of the septal and lateral wall deformities and contact areas without usage of a topical decongestant. The cases were taken up for surgery only when found refractory to medical therapy. The severity of the symptoms of the patients were scored using a visual analogue scale which was compared post-operatively to subjectively evaluate the efficacy of either surgeries. Objective assessment was done by nasal endoscopy.

The surgery in both groups was performed under local anaesthesia. In the traditional group, Cottle's maxilla-premaxilla technique (Cottle *et al.*, 1958) or Metzenbaum's technique (Metzenbaum, 1929) were followed. In addition, submucosal diathermy of the hypertrophic inferior turbinates was performed in all cases. The nasal cavities were packed with ribbon gauze soaked in liquid paraffin/BIPP following the surgery in the traditional group.

Steps of endoscope-aided septoplasty

★ Both nasal cavities were packed with cottonoid strips soaked in four per cent xylocaine with adrenaline (1 in 10,000) for about 10 minutes. Endoscopically, infiltration of the nasal septum was done using two per cent xylocaine with adrenaline (1 in 20,000) on the convex side of the cartilaginous septum, and along the crest and bony septum on both sides including the spur whenever present.

★ An incomplete incision was made at the caudal end of the septum in its lower half in most of the cases except when there was a caudal dislocation or anterior buckling, then the incision included the entire caudal end of the septum (hemitransfixation). The incision was made on the convex side in cases with anterior deviation and on the concave side for subluxation, spur or posterior deviation to expose the abnormality at the bony cartilaginous junction. In cases of an isolated bony spur, incision was made parallel to the floor, on the spur itself.

★ The initial mucoperichondrial flap was elevated using Cottle's elevator and Pilchard's nasal speculum. Further elevation was done using 0° Hopkin's rod nasal endoscope (4 mm), held in the left hand, keeping the tip of the endoscope between the mucoperichondrial flap and the septal cartilage.

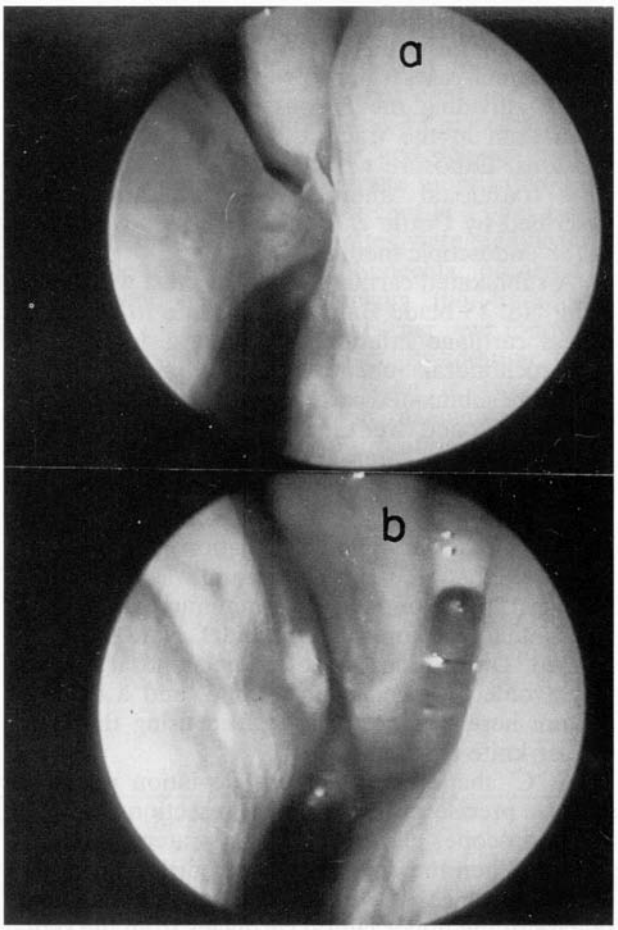

FIG. 2

a) Pre-operative photograph showing bony spur with contact obstructing the middle meatus. b) Post-operative photograph showing the results after the excision of the spur.

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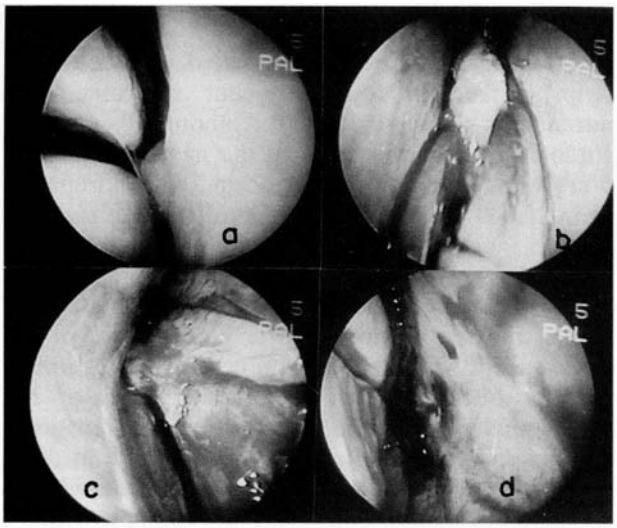

FIG. 3

Pre-operative endoscopic photograph showing a bony spur and subluxated septum with a contact area between it and the inferior turbinate. b) Incision and removal of the overlapping subluxated cartilage over the crest. c) Showing the remnants of the subluxated cartilage over the bony spur before the removal. d) Post-operative photograph after correction and realignment of the septum.

The right hand was used for instrumentation. Flap elevation in the correct cleavage plane was ensured to minimize bleeding. The endoscope was found to be more useful in this regard, especially in revision/post-trauma cases where proper cleavage is identified by dividing the fibrous adhesions, which are often seen at the fracture site/previous criss-cross incisions. Exposure was limited to the target area. The traditional anterior and inferior tunnels described by Cottle *et al.* (1958), was not followed in the endoscopic method.

★ A subluxated cartilage from the crest was shaved using No. 15 blade Bard Parker knife to resect the excess cartilage inferiorly, without dislocating the vomerochondral junction. At the anterior nasal spine, the subluxated cartilage was carefully trimmed and repositioned over the crest to prevent a supra-tip deformity. The laterally projecting part of the associated vomerine spur/prominent crest or overlapping cartilage, if any, was resected. In the case of a posterior deviation or a deviation at the ethmochondral junction, the bony septum was fractured to realign it in the midline, or a minimum resection of the caudal end of the ethmoidal plate was performed. Dislocation of the ethmochondral junction was avoided, especially in a child, and a deviated septum here was precisely shaved using the Bard-Parker knife (Figures 1–3).

★ A 'C' shaped cartilaginous deviation was dealt with by precise multiple wedge resections aided by the endoscope, placing them on strategic sites and planes. When the deviation involved the dorsal part of the cartilage, the endoscope helped in guiding release of the upper lateral cartilages from the septal cartilage.

★ In cases with caudal dislocation or anterior buckling of the cartilage, this part was corrected last, after correcting the rest of the septum, anticipating further increase in the antero-posterior length of the septum.

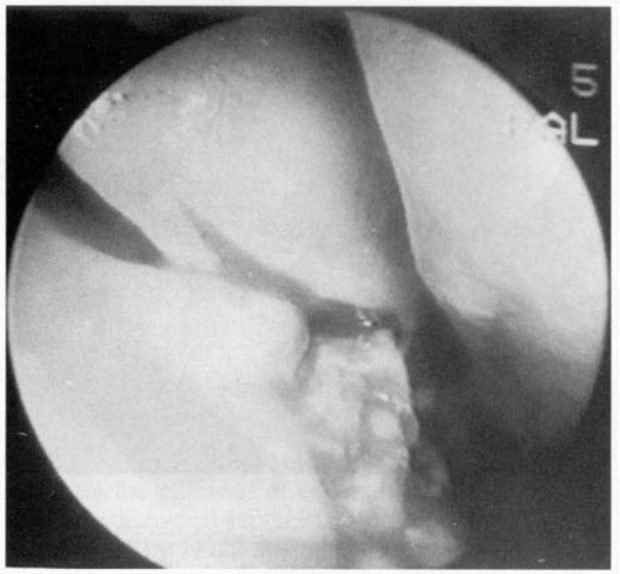

FIG. 4

Intra-operative photograph showing exposure and removal of the spur contacting the middle turbinate, by an incision directly on the spur when no other septal deformity is present.

★ A spur without any other obvious septal deformity, was resected after incision and exposure made directly over the spur (Figure 4).

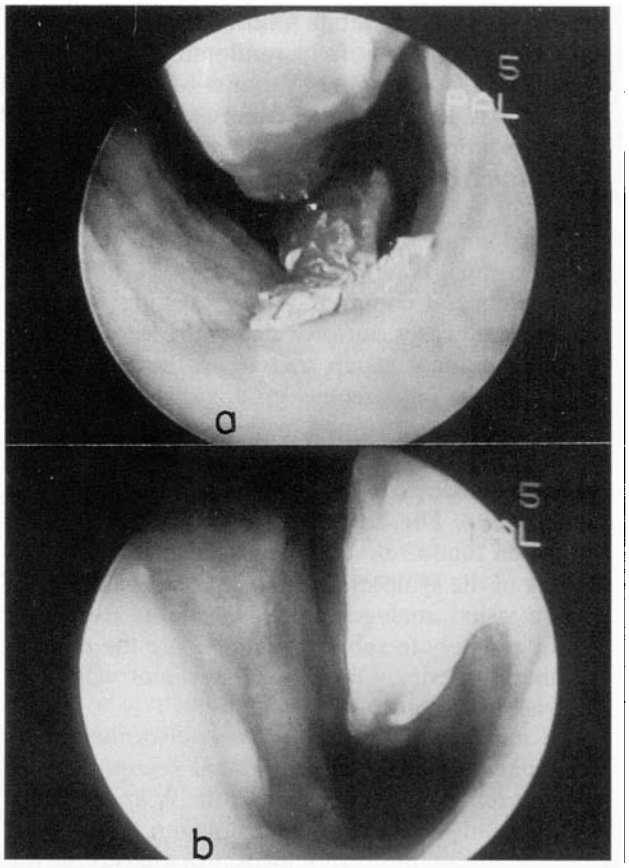

FIG. 5

a) Intra-operative photograph showing inferolateral excision of the inferior turbinate after correction of the nasal septum. b) Post-operative photograph after one month showing the improvement in the airway.

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TABLE I

COMPARISON OF THE SUBJECTIVE RESULTS OF THE TWO SURGERIES BASED ON THE PRE- AND POST-OPERATIVE VISUAL ANALOGUE SCALE SCORES

Symptoms (no. of cases T/E)	Traditional (n = 30)				Endoscopic (n = 30)				
	Benefited		Not benefited		Benefited		Not benefited		
	R	I	S	W	R	I	S	W	
	no. of cases (percentage)								*p* value*
Headache (n = 24/22)	4	9	8	3	7	11	4	0	<.05
	(17)	(38)	(33)	(12)	(32)	(50)	(18)	(0)	
Nasal obstn. (n = 22/25)	7	5	9	1	14	8	3	0	<.02
	(32)	(23)	(41)	(4)	(56)	(32)	(12)	(0)	
Rhinorrhoea (n = 12/15)	2	7	2	1	3	8	3	1	NS
	(17)	(58)	(17)	(8)	(20)	(53)	(20)	(7)	
PND (n = 16/19)	2	7	7	0	3	9	7	0	NS
	(12)	(44)	(44)	(0)	(16)	(47)	(37)	(0)	
Hyposmia (n = 2/3)	0	0	2	0	0	2	1	0	NS
	(0)	(0)	(100)	(0)	(0)	(67)	(33)	(0)	

Key: T = traditional, E = endoscopic, R = resolved, I = improved, W = worsened, S = same, PND = post nasal drip.
*p value is calculated by Chi square test.

★ A thickened cartilage was shaved precisely on one or both sides. When thickened septum was found to be due to hypertrophic/polypoidal mucosa, a submucosal cautery of the septum was performed from inside out.
★ A gross anterior deviation was dealt with using the traditional technique to start with and deformities present posteriorly were treated endoscopically.
★ Associated lateral wall pathology was treated simultaneously whenever indicated by trimming of the inferior/middle turbinate depending on the pathology. Mulberry hypertrophy of the posterior end of the inferior turbinate was amputated under endoscopic control (Figure 5).
★ A stab incision was made in the inferior aspect of the mucoperiosteal flap close to the floor on one side before the closure of the flap, to prevent haematoma formation. The splinting was done using prefashioned dental wax plates (baseplate wax) sterilized in cidex® solution and anchored by catgut sutures (Nayak *et al.*, 1995).

Results

The age in the traditional group varied from 17 to 58 years with a mean of 28 years. The age of the endoscopic group varied from 18 to 52 years with a mean of 24 years. The follow-up period varied from one year to three years with a mean of 1.2 years. The subjective assessment scores pre- and post-operatively for individual symptoms were compared and classified into resolved, improved, same and worsened. The comparison of subjective efficacy of the two techniques is given in Table I. The post-operative nasal endoscopic findings as on last available follow-up is given in Table II, which is an objective assessment of the efficacy of the two techniques. Endoscope-aided septoplasty was found to be more effective in treating symptoms such as nasal obstruction (55 per cent in traditional *vs* 88 per cent in endoscopic group) and headache (55 per cent in traditional *vs* 82 per cent in the endoscopic group). The post-operative incidence of persistent deviation and contact areas was much lower following endoscopic correction compared to that following the traditional septal surgery (49 per cent and 20 per cent respectively in traditional *vs* 13 per cent and 0 per cent respectively in the endoscopic group). Persistent turbinate pathology was more often seen in the traditional group (37 per cent *vs* 13 per cent). Moreover, the complication rates were significantly more in the traditional group. Synechiae occurred in 17 per cent of cases following the traditional septoplasty as compared to three per cent following the endoscope-aided septoplasty. In addition, post-operative haemorrhage was seen in two cases, external nasal deformity and haematoma were found in one case each of the traditional group.

Discussion

Various techniques have been described for the correction of a deviated septum (Freer, 1902; Metzenbaum, 1929; Galloway, 1946; Cottle *et al.*, 1958; Maran, 1974). The concept of submucus resection was popularized and refined by Killian

TABLE II

OBJECTIVE ASSESSMENT

Nasal endoscopic findings on last available follow-up	Traditional surgery (n = 30) no. of cases	%	Endoscopic surgery (n = 30) No. of cases	%	*p* value
1. Persistent deformity					
a) anterior deviation	4	13	3	10	NS
b) posterior deviation	7	23	1	3	<.05
c) spur	4	13	0	0	<.05
2. Persistent contact with turbinates	6	20	0	0	<.01
3. Persistent pathology of the turbinates	11	37	4	20	NS
4. Discharge in the mid meatus	13	43	8	27	NS

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(1904) and Freer (1902) separately in the early twentieth century. However, an increasing incidence of complications of septal surgery led to more and more conservative septoplasty. Metzenbaum (1929) described the swinging-door technique for caudal dislocation and subluxation. Galloway (1946) removed the entire nasal cartilage and replaced it as a single autograft. Refinements in septal surgery have been popularized by Cottle (1958). Maran (1974) has described septoplasty, but used a more radical technique in the terms of removal of the bony septum to make the septum free inferiorly and posteriorly. For a good septoplasty it is necessary to understand the pathological abnormalities per operatively and the nasal endoscope has become a remarkable aid allowing closer vision of the abnormalities in remote areas and hence providing relative magnification. It is also essential to know the biomechanical behaviour of the cartilaginous septum as described by Murakami *et al.* (1982). Use of this concept has helped the authors to refine their endoscopic technique with better results.

Changes in the size and shape of the turbinates are always associated with deviated nasal septum. Moreover, in the allergic nose, inferior turbinates are the main shock organs (Slavin and Friedman, 1987) and middle turbinate squeeze syndrome is often seen where the middle turbinate is tightly pressed against the olfactory area of the septum (Trevino and Gordon, 1993). Various techniques are described to deal with such turbinates such as submucosal diathermy, surface cautery (Simpson and Groves, 1958), partial turbinectomy (Meredith, 1988), endoscopic partial inferior turbinectomy using a powered microcutting instrument (Davis and Nishioka, 1996), partial endoscopic middle turbinectomy (Lamear *et al.*, 1992) etc. The nasal endoscope helps with better identification of the pathological site in the turbinates and helps in its precise management to improve the airway by selective partial resection of the turbinates.

The advantages of the nasal endoscope in septal surgery include the following:

(1) Facilitates accurate identification of the pathology due to better illumination, improved accessibility to remote areas and due to relative magnification of areas present posteriorly and superiorly.

(2) Better understanding of the lateral wall pathology associated with the septal deformity.

(3) Allows limited incision and elevation of the flaps not compromising with adequate exposure of the pathological site.

(4) Allows correct identification of the cleavage planes of flap elevation especially in revision and difficult post-traumatic cases. This minimizes the chances of tears and prevents perforations.

(5) Elevation of flap in the correct plane minimizes intra-operative bleeding. Moreover, troublesome bleeding, due to removal of bony spurs, and from remote areas can be managed better with bipolar cautery using endoscopic aid.

(6) Allows realignment by limited and precise resection of the pathological areas and/or by precise repair, by strategically placed wedge resections/ shaving of cartilage.

(7) Unlike the nasal speculum, the endoscope does not distort the septal framework during its use and thus provides correct information regarding the septal pathology.

(8) Effectively relieves the contact areas and thus the contact headaches by allowing accurate intra-operative assessment.

(9) Allows ultraconservative as well as effective septal surgery thus not jeopardizing the development of the nose and the mid face in children. Ultra conservation also preserves the supports of the external framework – thus allowing better concomitant rhinoplasty.

(10) With landmarks well preserved, it keeps the option open for revision surgery, if indicated.

(11) Helps in accurate nasal splinting thus avoiding the morbidities of nasal packing.

(12) Simultaneous sinus surgery can be done without the fear of lateralization of the middle turbinate and consequent synechia formation. Giles *et al.* (1994) in their series of 38 patients describe the use of nasal endoscopes in limited septal resection to facilitate endoscopic sinus surgery.

(13) Helps in teaching of the septal anatomy, pathology and surgery.

(14) Helps in documentation.

The limitation of the use of the nasal endoscope may include loss of binocular vision, need for frequent cleaning of the tip of the endoscope especially when there is more bleeding, and that combined traditional and endoscopic methods may be required if pathology also involves the caudal most part of the septum, i.e. anterior buckling and trimming of the excess caudal end of the septum.

The authors in this preliminary series discuss the endoscopic management of various septal deviations and demonstrate the superiority of this technique in terms of both subjective and objective efficacy by a retrospective comparative study. However, a randomized study on a larger and longer series is necessary to provide a more accurate and valid comparison.

Conclusion

Endoscope-aided septoplasty for a deviated nasal septum is a viable alternative to conventional septal surgery. This approach is safe, effective and conservative. The endoscope can be utilized to precisely identify the type of the septal deformity preoperatively, permitting proper planning of conservative surgery. This scope also aids in performing the conservative septal surgery with minimal exposure, limited manipulation of the septal framework and least resection. The advantages and limitations of use of a nasal endoscope in septal surgery has been discussed at length. This preliminary study demonstrates the superior role of this endoscope-aided approach in the management of deviated nasal septum, both subjectively and objectively. However,

only a larger series with a longer follow-up, will more accurately reveal its efficacy. The authors advocate combination of approaches – endoscopic for the inaccessible middle and posterior part and traditional for the accessible anterior most portion of the nasal septum.

References

Cottle, M. H., Fisher, G. G., Gaynon, I. E. (1958) The maxilla-premaxilla approach to extensive nasal septum surgery. *Archives of Otolaryngology* **68:** 301.

Davis, W. E., Nishioka, G. J. (1996) Endoscopic partial inferior turbinectomy using a power microcutting instrument. *ENT Journal* **75[1]:** 49–59.

Freer, O. (1902) The correction of deflections of the nasal septum with a minimum of traumation. *Journal of American Medical Association* **38:** 636.

Galloway, T. (1946) Plastic repair of the deflected nasal septum. *Archives of Laryngology* **44:** 141.

Giles, W. C., Gross, C. W., Abraham, A. C., Greene, W. M., Avner, T. G. (1994) Endoscopic septoplasty. *Laryngoscope* **104:** 1507–1509.

Killian, G. (1904) Die submucosae Fensterresektion der Nasenscheidewand. *Archiv fur Laryngologie und Rhinologie* **16:** 362.

Lamear, W. R., Davis, W. E., Templer, J. W., McKinsey, J. P., Del Porto, H. (1992) Partial endoscopic middle turbinectomy augmenting functional endoscopic sinus surgery. *Otolaryngology – Head and Neck Surgery* **107[3]:** 382–389.

Maran, A. G. D. (1974) Septoplasty. *Journal of Laryngology and Otology* **88:** 393–402.

Meredith, G. M. (1988) Surgical reduction of hypertrophied inferior turbinates: A comparison of electrofulgeration and partial resection. *Plastic Reconstructive Surgery* **81:** 892–897.

Metzenbaum, M. (1929) Replacement of the lower end of the dislocated cartilage versus submucous resection of the dislocated end of the septal cartilage. *Archives of Otolaryngology* **9:** 282.

Murakami, W. T., Wong, L. W., Davidson, T. M. (1982) Applications of the biomechanical behavior of cartilage to nasal septoplastic surgery. *Laryngoscope* **92:** 300–309.

Nayak, D. R., Murthy, K. D., Balakrishnan, R. (1995) Septal splint with wax plates. *Journal of Postgraduate Medicine* **41:** 70–71.

Simpson, J. F., Groves, J. (1958) Submucosal diathermy of the inferior turbinate. *Journal of Laryngology* **72:** 292.

Slavin, R. G., Friedman, W. H. (1987) Nasal allergy – medical and surgical treatment. In *Advances in Otolaryngology – Head and Neck Surgery*, vol. 1 (Myers, ed.) Year Book Medical Publishers, Inc, Chicago, pp 91–102.

Trevino, R. J., Gordon, B. R. (1993) Allergic rhinosinusitis: The total rhinologic disease. *ENT Journal* **72(2):** 116–129.

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