Endonasal Transseptal Approach to the Nasal Dorsum

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Background: Dorsal deviations of the nasal cartilaginous septum are difficult to correct without exposing and correcting the deviated cartilaginous nasal pyramid. Also, spreader grafts application needs exposure of the nasal dorsum. There are two known approaches to the nasal dorsum: the external open approach and the closed endonasal approach through inter-cartilaginous incision. Both need dissection of the skin with consequent edema and fibrosis which may affect the result.

Objective: a transeptal endonasal approach to the nasal dorsum is described aiming to have a simple correction of the previous problems.

Study design: retrospective study. Setting: tertiary academic medical center.

Patients: the study included 20 adult patients, 14 had deviated nasal septum with cartilaginous deviations of the nasal dorsum, 2 patients had combined internal and external nasal valve collapse during inspiration and 4 patients had internal nasal valve obstruction after previous rhinoplasty.

Methods: Incision on the anterior border of the cartilaginous septum is done followed by elevation of the mucosa on the concave side. The usual septoplasty is performed to correct other associated deviations. A high incision on the septal cartilage parallel to the cartilaginous nasal pyramid is done 4-5 mm parallel to it. The strip of cartilage dorsal to the incision is dissected and separated from the upper lateral cartilages on both sides. A spreader graft may be inserted at this area if needed (done in all cases of combined external and internal nasal valve collapse and internal nasal valve obstruction and 4 cases with septal deviation) then fixed by sutures and silastic splints.

Results: from the 14 patients of cartilaginous dorsal deviation, 11 patients (78.6%) had correction of the cartilaginous septum & cartilaginous nasal pyramid deviation, while, 3 (21.4%) had mild residual deviation. Twelve patients (85.7%) had their nasal obstruction completely improved, and 2(14.3%) had partially improved. All patients with spreader grafts application improved functionally and esthetically.

Conclusion: the transseptal endonasal approach to the nasal dorsum is effective for correction of cartilaginous dorsal nasal deviations and application of spreader grafts without postoperative edema and fibrosis that may change the result.

Keywords: Endonasal transseptal, dorsal nasal deviation, deviated septum, spreader grafts, nasal valve obstruction

INTRODUCTION

Nasal deviations are usually due to trauma, whether external or due to failed rhinoplasty procedures. [1] Trauma results in various forms of deviation of both bony and cartilaginous vaults together with septal deviations. Cho and Jang (2013) [2] described 5 forms of nasal deviations from them were tilting or bending of the cartilaginous vault with straight bony pyramid. Patients with dorsal septal deviations associated with external cartilaginous (middle vault) nasal deviations need the nasal dorsum to be approached in order to correct this deformity. This is usually done through the open rhinoplasty or through intercartilaginous incisions in closed rhinoplasty. Another indication to approach the nasal dorsum is the application of spreader grafts in cases of nasal valve dysfunction. Many techniques are used to apply spreader grafts, whether through open or closed rhinoplasy approaches or even endonasally with fixation of the spreader grafts through tight fitting submucopericondreal tunnels, the use of tissue glue or sutures. [3] In this study a transseptal endonasal approach to the nasal dorsum is described to correct dorsal septal and cartilaginous vault deviations and to apply spreader grafts.

PATIENTS AND METHODS

This study included 20 adult patients, 13 males (65%) and 7 females (35%), with a mean age of 31 years

ranging from 18-54 years, 14 patients (11 males and 3 females) had deviated nasal septum with cartilaginous deviations of the nasal dorsum, 2 patients (1 male and 1 female) had combined internal and external nasal valve collapse during inspiration and 4 patients (1 male and 3 females) had internal nasal valve obstruction after previous rhinoplasty. The study was conducted for about 3 years (between 2011 and 2014). Patients needing further rhinoplasty procedures (e.g. those with bony nasal deviations and/or tip deformities) were excluded.

Preoperative assessment included history and full clinical ENT examination. External nasal evaluation and photographs were used to document external cartilaginous deviations. Observation of the nasal ala during inspiration was done to figure out the presence of alar collapse. Anterior rhinoscopy and endoscopic nasal examination were used to assess septal deviations, internal nasal valve dysfunction and any other nasal pathology. Finally, to confirm the presence of external and/or internal nasal valve dysfunction; Cottle and modified Cottle tests were used. The modified Cottle test is done through observing inspiration improvement after supporting the upper then the lower lateral cartilages with a probe placed intranasally, to assess the internal and external nasal valves respectively. [4]

Surgical technique:

The procedure was done under general anesthesia with oral endotracheal intubation, after infiltration of the septum in the mucoperichondreal plane by 2% lidocain with 1:200 000 epinephrine, a hemitrasfixion incision was done usually on the concave side with elevation of the mucoperichondrial flap, keeping the septal cartilage attached to the mucoperichondrial flap at the side opposite to the incision. Dissection proceeded till the septal cartilage was separated from the upper lateral cartilage (ULC), the surgeon put his left index finger on the nasal dorsum to feel and direct the scalpel during separation. A second incision was then done in the septal cartilage 4-5 mm away and parallel to its dorsal border, without injury of the opposite mucosa, this dorsal strip was dissected from the mucosa in a dorsal direction till separated from ULC on the opposite side (Figs. 1,2). Septoplasty was completed as needed in these cases by cartilage scoring and removal of any bony or cartilaginous deviations, cartilaginous excisions were limited to the central part of the cartilage, making sure to preserve a minimum of 1cm intact strut dorsally and caudally to maintain the nasal dorsal and tip support. In cases where spreader grafts were needed, they were fashioned using autologous grafts from the nasal septal cartilage, spreader grafts were applied on both sides between the upper lateral cartilage and the cartilaginous septum, fixed in place by sutures and silastic splints for two weeks (Figs. 1,3).

Postoperative assessment included routine clinical examination, endoscopic nasal examination, postoperative photographs for patients with preoperative external deviations, and the patients' satisfaction as regards symptoms improvement. Mean follow up time was 1year, with a range of 5 to 18 months.

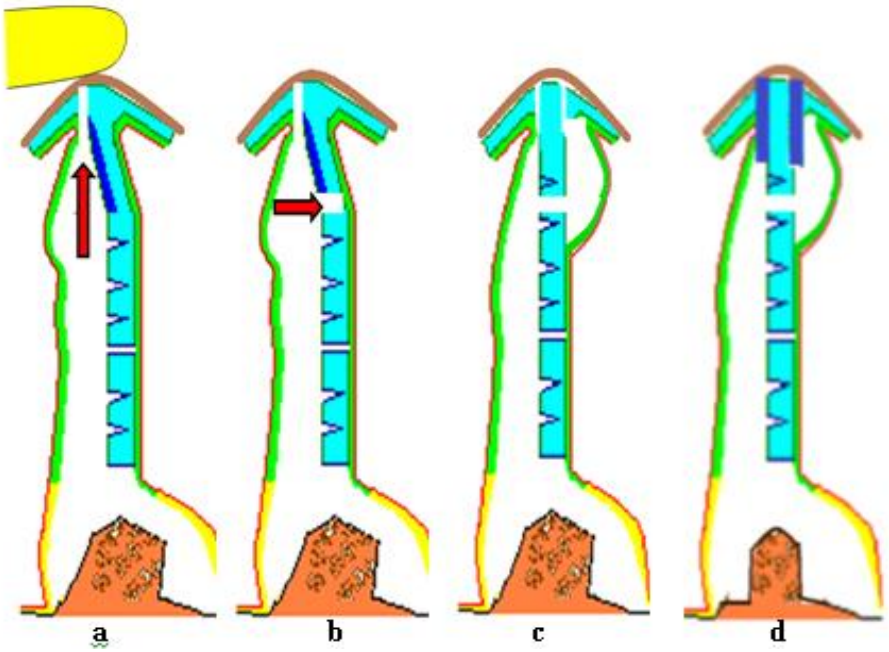
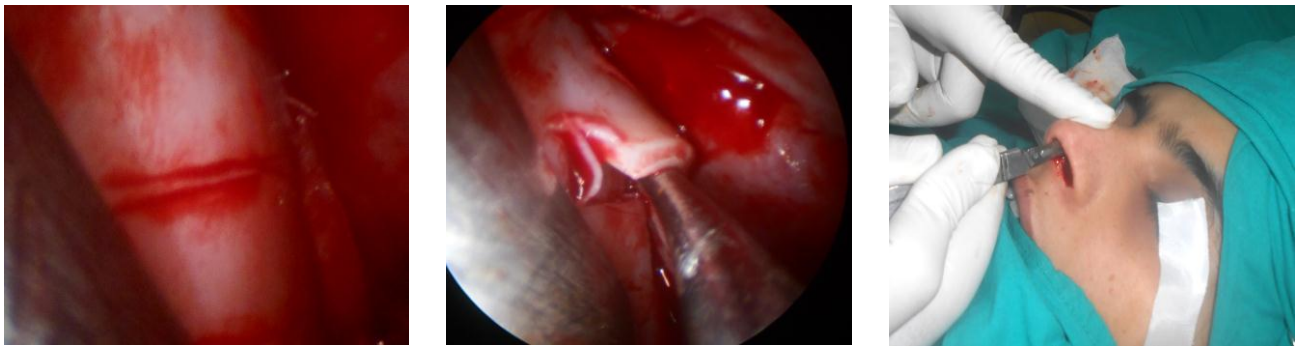


Fig 1 Showing: **a:** dissection of the mucoperichondrial flap on the right side with separation of the ULC from the septum, with the index finger on the external nose to feel the scalpel; **b:** Incision in the septal cartilage parallel to the nasal dorsum; **c:** dissection of the mucosa on the opposite side with separation of the ULC from the septum in the opposite side, the dorsal part of the septum is now corrected; **d:** spreader grafts are applied bilaterally



a **b** **C**

Fig 2 a: incision in the septal cartilage parallel to the nasal dorsum
b: dissection of the mucosa on the opposite side with separation of the ULC from the septum in the opposite side
c: Index finger on the external nose to feel the scalpel

Fig 3 Application of spreader graft on the right side after dissection and separation of the right ULC from the septum

RESULTS

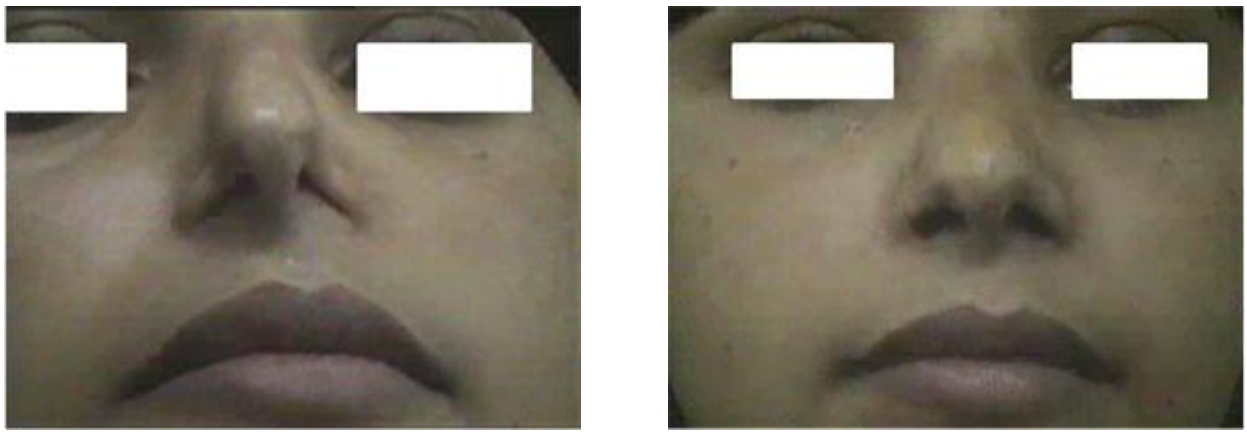
Our study included 20 adult patients, 13 males (65%) and 7 females (35%), with a mean age of 31 years ranging from 18-54 years, 14 patients (11 males and 3 females) had deviated nasal septum with cartilaginous deviations of the nasal dorsum to whom a septoplasty was done with transseptal endonasal separation of the upper lateral cartilage from the cartilaginous nasal septum to correct nasal obstruction and external cartilaginous nasal deviation, in 4 of them additional bilateral spreader grafts were applied.

Two patients (1 male and 1 female) had combined internal and external nasal valve collapse during inspiration and 4 patients (1 male and 3 females) had internal nasal valve obstruction after previous rhinoplasty, spreader grafts were placed in the last six patients. Patients were clinically examined in regular postoperative visits with a mean follow up time of one year.

From the 14 patients of cartilaginous dorsal deviation, 11 patients (78.6%) (Including those with spreader grafts) had correction of both nasal septum and cartilaginous nasal dorsum deviation, while, 3 (21.4%) had mild residual deviation; 12 patients (85.7%) had their nasal obstruction completely improved, while, 2 (14.3%) had partially improved (Figs. 4,5, Table 1). All Patients with nasal valve problems had their nasal obstruction and alar collapse during inspiration improved.

Preoperative **Postoperative**

Fig 4 Correction of cartilaginous deviation of the nasal vault by septoplasty with transseptal endonasal separation of the ULC from the septum bilaterally



Preoperative inspiration **Postoperative inspiration**

Fig 5 Improvement of alar collapse during inspiration after transseptal endonasal application of spreader grafts. This patient had combined internal and external nasal valve obstruction and both improved postoperatively

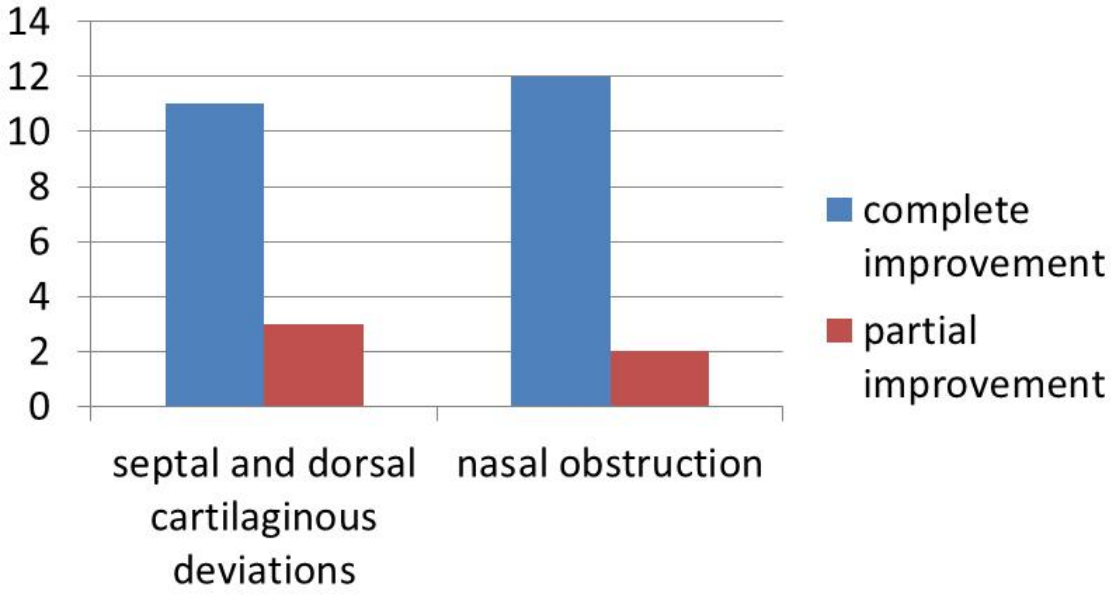


Table 1 Postoperative improvement in patients with preoperative external cartilaginous deviation

DISCUSSION

The famous statement that says "as the septum goes, so goes the nose" [5,6] stresses the importance of septal correction in order to correct external nasal deviations and vice versa, i.e., dorsal deviations of the nasal cartilaginous septum are difficult to correct without correcting the deviated cartilaginous nasal pyramid

As a rule, septoplasty is performed to correct breathing problems, but often it becomes pivotal to correct external nasal deviation, representing a central step in rhinoplasty surgery. Even in patients with no functional problems, septal surgery may represent one solution for obtaining a proper realignment of the external nasal pyramid. Therefore, the septum deserves attention not only for functional, but also for aesthetic surgery. [7]

Parilla et al., (2013) [7] stated that in some cases, high cartilaginous septal deviation can explain solely a twisted nasal dorsum on the outside. In these circumstances, the upper lateral cartilage is often asymmetric, therefore, routine septal straightening may not be sufficient and separation of the upper lateral cartilage from one side or two is demanded starting with the convex side [7]. If these manoeuvres are not sufficient, a spreader graft between the septum and the upper lateral cartilage is indicated. In patients with high septal deviations associated with a bony crooked nose, osteotomies are required. [7, 8]

All these procedures are used to be done as a step of rhinoplasty whether through open or closed rhinoplasty approaches.

Cho and Jang (2013) [2] described 5 forms of nasal deviations among them were tilting or bending of the cartilaginous vault with straight bony pyramid. They used open or closed rhinoplasty approach through intercartilaginous incisions to correct deviations. Curvatures of the dorsal septum were corrected with several grafts such as spreader, septal batten, and septal bone grafts. [2]

In cases with severe deviations of the septal cartilage involving both dorsal and caudal portions of the L-strut, with sever external deviaton the extracorporeal septoplasty technique may be effective. It consists of the total removal of the quadrangular cartilage followed by the extracorporeal reconstruction of a new septal plate that is subsequently re-implanted between the two mucoperichondrial flaps. [9]

This may be carried out in combination with a closed rhinoplasty which carries out the tendency to develop dorsum notching or saddling, [10] or through an open approach which is more reliable because of the easier visualization for dissection and re-implantation [11] or finally through a more conservative modification, that spares the dorsal cartilage and a portion of the caudal septum, thus maintaining a support for the nasal archway through closed or open rhinoplasty approach , this reduces destabilization risk and to preserve the nasal dorsum contour. [12,9]

In this study we separated the upper lateral cartilage from the septum through trasseptal, endonasal rout which is simpler and decreases the post-operative

edema which occurs due to dorsal dissection in rhinoplasty approaches.

For the 150 patients with tilting of the cartilaginous vault with straight bony pyramid in the study done by Cho and Jang (2013), [2] 92.7% had satisfactory outcomes, while in the 101 patients with bending of the cartilaginous vault with straight bony pyramid 89% patients had satisfactory outcomes. [2]

In our study (78.6%) of the patient had correction of both cartilaginous septun & cartilaginous nasal pyramid deviation after septoplasty with transseptal endonasal separation of the upper lateral cartilage from the septum bilaterally with spreader graft application in some patients, while, (21.4%) had mild residual deviation.

Unlike the study of Cho and Jang [2] who classified the deformities and described the correction of each separately, the majority of studies included patients with bony deviations who needed osteotomies, so their results were not comparable to ours.

In their study, Khosh et al. [13] reported that previous rhinoplasty is the most common cause of nasal valve obstruction (79% of their patients). Also, Elwany and Thabet [14] reported rhinoplasty as the cause of obstruction in 72% of their patients, in their study of nasal valve obstruction. Grymer [15] and Sheen [16] have shown that rhinoplasty causes internal valve narrowing in 25% of patients and external valve narrowing in 85% of patients.

This goes with our study where previous rhinoplasty was the cause of internal nasal valve obstruction in two thirds of our patients.

The use of spreader grafts, introduced by Sheen in 1984 , is the most accepted technique to address dysfunction of the internal nasal valve. [17] They reinforce the ULCs, prevent their collapse against the septum and allow widening in nasal valve angle and cross-sectional area. [15]

Although Sheen [16] originally described the placement of spreader grafts via an endonasal approach, the open rhinoplasty approach is perhaps more frequently used in practice for spreader grafts placement. Open rhinoplasty approach has the advantages of improved visualization and potentially more accurate fixation of the cartilage grafts, however, increased postoperative edema and recovery time and the risk of a visible transcolumellar scar are from the disadvantages of this approach. [17]

In the closed rhinoplasty approach, the internal nasal valve area is approached via a transfixion incision combined with an intercartilaginous incision, then, after elevation of the skin envelop overlying the nasal dorsum, grafts are placed between the divided ULC and septum under direct visualization and are suture stabilized; [17] but post-operative edema is also present.

Different techniques for placement and stabilizing of spreader grafts are described for the endonasal approach, including using a tight submucoperichondreal pocket, tissue adhesives, and sutures. [16,18]

Yoo and Jen (2012) [17] through a closed rhinoplasty approach, performed endonasal placement of spreader grafts in 41 patients with internal nasal valve dysfunction via a transfixion incision combined with an intercartilaginous incision. 61% of their patients reported significant improvement, 37% noted some improvement, and 2% described no change.

Pontius and Williams (2005) [19] applied spreader grafts endonasally through tight fitting submucoperichondrial tunnel in the internal nasal valve area, fitting into the angle between the upper lateral cartilage and the septum and exerting a cantilever effect.

While Andre et al. (2004) [3] placed spreader grafts submucoperichondrially without dividing the upper lateral cartilages from the septum in 89 patients, grafts were whether secured in a tight-fitting tunnel, fixated with 2-cyanobutylacrylate tissue glue, or were fixated with transcutaneous and transseptal sutures. 88% had optimal or improved breathing and 11% had no change; but these results cannot judge the spreader grafts efficacy as in 84 of the patients they had another pathology causing nasal obstruction where a concomitant functional nasal surgery was done in the form of septum correction, inferior turbinate reduction, ethmoidectomy or a combination of these procedures.

Unlike the open and the closed approaches, in our study there is minimal manipulation of the nasal skin and subcutaneous tissue thus decreasing the incidence of edema and subsequent fibrosis which may affect the final result. Also unlike those techniques using tunnels, our technique allows dissection and separation of septal cartilage and ULC in order to fit the spreader grafts between them.

In our study both patients with combined external and internal nasal valve dysfunction have improved. Improvement of the alar collapse may be explained by secondary lateral repositioning of lower lateral cartilage after the use of spreader grafts. This comes in agreement with Gunther (1997) [20] who stated that slight lateral repositioning of the lower lateral cartilages may be a secondary effect of spreader grafts used for middle third problems. [21]

CONCLUSION

The transseptal endonasal approach to the nasal dorsum has proved to be effective for correction of cartilaginous

dorsal nasal deviations and application of spreader grafts without an external scar and with less postoperative edema and fibrosis that may follow other aproaches.

This study was previously presented as a scientific presentation at the 21st Rhino Egypt annual meeting; February 19-21, 2015; Cairo, Egypt.

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