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► **To cite this version:**

A. Depeyre, M. Schlund, C. Delmotte, V. Dupuch, N. Pham Dang, et al.. Extracorporeal septorhinoplasty: Technical note. *Journal of Stomatology, Oral and Maxillofacial Surgery*, 2020, 121, pp.579 - 584. 10.1016/j.jormas.2020.03.005 . hal-03493261

HAL Id: hal-03493261

<https://hal.science/hal-03493261>

Submitted on 7 Nov 2022

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Technical Note

Extracorporeal septorhinoplasty: Technical note

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Extracorporeal septorhinoplasty: Technical note

1. Introduction

Deviation of nasal septum influences both function and shape of the nose. It could alone or associated with other nasal deformities be responsible for deviation of the entire nasal unit. Severe nasal septal abnormalities can be encountered in traumatic and iatrogenic context but also in cleft lip and palate patients (1). Precise diagnosis of deviated nose due to severe septal deformity is essential and should guide the adequate treatment plan as classical septoplasty techniques could not properly correct these deformities and restore satisfactory nasal shape and function (2).

The concept of extracorporeal septoplasty was first described by King and Ashley to correct these severe nasal septal deviations (3). They take out the whole septum, resculpt it to straighten it and finally replant it. Within the last past decades, the concept of extracorporeal septoplasty has been thoroughly revisited and refined to avoid aesthetic complications described with this technique such as saddle nose or nasal dorsum irregularities (2,4,5). While management of the keystone area between bony and reconstructed cartilaginous dorsum has undergone profound changes, it remains challenging and considered as technically demanding to execute (6).

The aim of this article is to present the surgical procedure and the different suture techniques of the replanted septum and to discuss indications, advantages and limits of the extracorporeal septorhinoplasty.

2. Technical Note

2.1 Preoperative assessment

The usual clinical examination was completed by a functional evaluation with rhinomanometry, which gave an objective evaluation of the nasal airflow.

A complete facial CT scan was prescribed to localize deviation of nasal septum in cephalo-caudal and antero-posterior axis, and to appreciate the degree of septal dislocation and ossification in case of traumatic nose (Please insert Figure 1). This information was used to prepare at best neoseptum reconstruction

2.2 Installation

The patient was placed in dorsal decubitus and surgery was performed under general anesthesia with a pre-shaped oral intubation.

2.3 Surgical approach, incision and exposure

Only columella and internal nasal septum underwent local anesthesia by lidocaine with 1:200000 epinephrine, followed by topical lidocaine with naphazoline-saturated cotton pledgets. A midcolumellar incision (stair step or inverted V), with a No 11 blade, prolonged bilaterally with marginal incisions was realized (Please insert Figure 2).

Cartilaginous tip dissection was performed in the subperichondral plane and was extended upward to the bony nasal vault.

2.4 Septum dissection and dislocation

Septum dissection and dislocation, were performed in 3 steps (incision and exposition, dissection, dislocation and separation).

– Incision and exposition

Membranous septum was incised to expose the anterior edge of nasal cartilaginous septum. Then a bilateral perichondrial flap from the superoexternal surface of upper lateral cartilages was safely dissected and preserved to cover the replanted neoseptum at the end of the procedure (Please insert Figure 3A).

– Dissection

Subperichondrial dissection of the nasal septum was performed at first on the concave side to limit the risk of mucosal injury and secondly on the other side. A bilateral extramucosal dissection of the junction of the border between the dorsal septum and upper lateral cartilages was realized to preserve an intact mucosal wall. Dorsal septum and upper lateral cartilages could, at this step, be safely separated (Please insert Figure 3B). Septum dissection was extended to the posterior and inferior junction with the vomer and maxilla up to the anterior nasal spine.

– Dislocation and separation

An upper separation of the nasal septum was performed. Different situations could be encountered depending on septal deviation level and dorsal hump reduction planning.

- If a high separation was recommended; the bony septum was vertically fractured as far as possible posteriorly by piezosurgery. If dorsal hump reduction was not performed, a paramedian osteotomy could be realized with the piezoelectric instrument to remove the bony septum from the dorsum. Afterwards, an « en bloc » removal of the bony-cartilaginous septum partition was achieved (Please insert Figure 3C).
- If a low separation was recommended, when just a marginal anterior and caudal deviation of nasal septum was present, a partial extracorporeal septorhinoplasty could be performed and the septal cartilaginous section level was adapted at a lower level to treat extracorporeally the partial deviated septum (Please insert Figure 3D).

2.5 Extracorporeal septal remodeling

The ideal reconstructed septum should be as large as possible with stable upper and anterior borders. Different situations could be encountered.

- In case of sufficient quantities of usable bony cartilaginous septum, redundant and dislocated pieces could be excised and straight ones kept to be sutured together providing a stable reconstructed nasal neoseptum. If needed, the cartilage and bone could be smoothed with a diamonded piezotome insert, which might straighten the bent septum. If the cartilage became straight but thin and unstable with this procedure, some pieces of the perpendicular plate could be sutured as a double layer onto the cartilaginous septum to create a stiffer frame.
- In case of preoperative nasal valve impairment but also to prevent it postoperatively, a cartilaginous spreader graft could be fixed to the upper border of the neoseptum (Please insert Figure 4A).
- In post-traumatic cases with multiple fracture sites and when exceptionally, quantity of straighten septal cartilage was insufficient; a polydioxanone (PDS) foil could be used to provide a template to stabilize cartilaginous pieces that were sutured on. Septal reconstruction could also be performed from rib cartilage allowing straightness and a large quantity of cartilage available to harvest.

2.6 Reimplantation and fixation of the neoseptum

The neoseptum is then replanted in its perichondrial envelope that was to say between the subperichondrial and subperiosteal layers dissected before. To insure a long-term stability, the most important at this step was to strongly fix the neoseptum. Two techniques were commonly used.

- If nasal bones were sufficiently large and if nasal osteotomies were performed, the technique called « criss-cross » suture was preferred. A drill hole was marked and created through the caudal and medial end of nasal bone. Fixation of neoseptum was then realized with a 4.0 non-absorbable round needle suture passing through the upper part of upper lateral cartilages, the neoseptum and the drill holes previously described (Please insert Figure 4B).
- If the « criss-cross » suture was not possible or in case of partial extracorporeal septorhinoplasty, a fixation by multiple horizontal « U-shaped » 4.0 non-absorbable round needle sutures to upper lateral cartilages was performed (Please insert Figure 4C).

After positioning anterior and caudal part of the reconstructed septum on the median line, face to anterior nasal spine, a double 3.0 non-absorbable round needle suture was performed passing through periosteum of the premaxilla and the neoseptum. If needed, a hole was drilled to pass the needle through and to anchor it more strongly to anterior nasal spine.

2.7 Camouflage techniques and closure

The two perichondrial flaps dissected at the step of separation and dissection of septum and upper lateral cartilages were sutured on the median line. Suture was performed with 6.0 absorbable stitches (Please insert Figure 4D). If this technique was not sufficient, cartilage onlay graft, diced cartilage embedded in fascia or temporal fascia flap could also be used to smooth the dorsal surface.

Surgical approach closure was realized with 5.0 absorbable sutures on intranasal incisions and 6.0 non-absorbable sutures on skin incision.

To protect the surgical result, nasal wall was lined with a combined forehead and nasal splint and neoseptum was also encased by intranasal silicone splints during 15 days, preventing any

shifting with movements during postoperative period.

3. Discussion

Severe deviations of nasal septum, especially when the anterior and superior, or caudal parts are involved, represent one of the most difficult challenges for nasal surgeons (1). In these cases, conservative surgical procedures with cartilage radial incisions or removal of deviated segments may give unsatisfactory result. They can lead to relapse because of the strong tendency of cartilage to return to its original shape or to near-total cartilage resection, also resulting in postoperative saddling of the middle vault and internal valve collapse (7). Simple replacement of cartilage segments between the two mucoperichondrial layers, as suggested by other authors, is a highly imprecise maneuver that fails to reinforce anterior and superior septum and may create postoperative reduplication of the cartilage with nasal obstruction (8). Extracorporeal septorhinoplasty with external septal cartilage remodeling and its reinsertion within the mucoperichondrial pocket represents an alternative to deal with these issues and to enhance good functional and aesthetic results (9). In our practice, this technique is particularly interesting for severe anterior and superior septal deviation, but also for severe caudal septal deviation with the development of the anterior septal reconstruction alternative.

The current concept of extracorporeal septorhinoplasty consists of « en bloc » removal of the bony-cartilaginous septal partition, extracorporeal creation of a straight and firm neoseptum (L-strut), and reimplantation by fixation to both bony and cartilaginous framework. The whole procedure is performed as part of a septorhinoplasty using an open approach that is surely more adequate and surgeon friendly (2,5). Although possible, secure fixation of the neoseptum on the keystone area and internal nasal valve grafting are significantly more difficult and risky with a closed approach (10).

The ideal reconstructed septum would be as large as possible with stable upper and anterior borders (2). Recommended minimum dimensions of the neoseptum L-strut are 30-35 mm at the dorsal end and 20-25 mm at the caudal border (8). If only small pieces of cartilage are available and a large straight perpendicular plate of the ethmoid bone is present, this plate can be used as a scaffold to support small pieces of conjoined cartilage (11). Bone alone is not an optimal graft for the septum L-strut due to its tendency to be resorbed. Some authors recommend the use of an artificial material such as PDS foil, which seems to act as a scaffold and a guide for cartilage regeneration (12). However, this biomaterial device presents a risk of foreign body reaction especially to an already traumatized nose. A preferential approach is the use of rib cartilage harvesting that is planned prior to surgery, with the help of a CT scan, in case of absence of sufficient septal donor tissue. The key point to avoid warping of rib cartilage is by sectioning the rib at the beginning of the operation, hydrating the sectioned cartilage, and using only its core sections for straight grafts. Conchal cartilage is the choice if nonstructural grafts are needed, such as for supratip, nasion, or lateral nasal wall camouflage grafts but is surely not a reliable material for structural grafting (8).

The most critical point in extracorporeal septorhinoplasty is reimplantation of the neoseptum. This requires reattachment of both the cephalic dorsal neoseptum and the caudal part to the anterior nasal spine. To reattach the cephalic dorsal neoseptum to the bony-cartilaginous transition zone, two surgical techniques are mainly used: classical U-shaped sutures to the upper lateral cartilages and the « criss-cross » suture technique (Please insert Figures 5A and 5B). Gubisch et al. also described the transcutaneous transosseous cerclage suture, performed in a percutaneous fashion and very interesting especially when the nasal bones are too short to permit the « criss-cross » suture. Both techniques aim at stable and strong reattachment of the neoseptum at the bony-cartilaginous transition zone and to avoid complications such as saddling nose (5). We think, therefore, that « criss-cross » or

transcutaneous cerclage sutures are mandatory when lateral nasal bones osteotomies are performed adding instability to the nasal framework. However, when osteotomies are not realized, fixation to the upper lateral cartilages may be sufficient, also allowing easy positioning of spreader grafts to treat nasal valve insufficiency. When just a caudal without middle third dorsal deviation of the septum is observed, it is much more adapted to perform an anterior septal reconstruction (ASR) that may be a good alternative minimizing destabilization of the keystone area. Thus, ASR is sutured to the upper lateral cartilages or to the remaining non-deviated septal cartilage and appears a more conservative technique than extracorporeal septorhinoplasty (6,13,14) (Please insert Figure 5C). Furthermore, to avoid possible irregularities of the nasal dorsum following extracorporeal septorhinoplasty, camouflage techniques can be used as suggested above. One of our favorite, and most of the time sufficient, is to suture on the median line the two upper cartilages perichondrial flaps dissected previously. With the use of this technique and a strong fixation of the neoseptum, complications and imperfect results can be avoided.

Fixation of the neoseptum caudal border to the anterior nasal spine was originally performed by passing a stitch through the cartilage and then through a hole drilled into the bone with a burr. After a few cases, the suture of the reconstructed septum was performed directly through the periosteum of the anterior nasal spine without differences in longterm outcomes (8).

As a conclusion, anterior and/or superior complex septal deviations may not be adequately addressed through standard septoplasty techniques; and it appears that extracorporeal septorhinoplasty by open approach is an alternative but effective procedure that can correct a severely twisted nasal septum (Please insert Figure 6). Reconstruction of the septum will sometimes require the use of the ethmoid perpendicular plate or extranasal cartilage grafting or exceptionally biomaterial (PDS) (15). Secure fixation of the neoseptum

to the keystone area and to the anterior nasal spine is the key point to obtain a long-lasting stabilization of nasal dorsum.

Disclosure of interest

The authors declare that they have no competing interest.

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Figure captions

- **Figure 1.** Axial CT-scan image showing complete anterior septal luxation.
- **Figure 2.** Landmarkings of the stair step columellar incision.
- **Figure 3.** Dissection of the two bilateral subperichondrial flaps (**A**). Dissection of the junction of the border between the dorsal septum and the upper lateral cartilages (**B**). « En bloc » removal of the bony-cartilaginous septal partition (**C**) and partial extracorporeal septorhinoplasty (ASR) (**D**).
- **Figure 4.** Extracorporeal septoplasty with straight parts of resclupted septal cartilage sutured together with sprader grafts to recreate a non-deviated L-strut (**A**). Fixation of the neoseptum at the upper extremity by « criss-cross » suture (**B**) and by « U-shaped » sutures to the upper lateral cartilages (**C**). Camouflage technique by suture of the two perichondrial flaps (**D**).
- **Figure 5.** « U-shaped » sutures fixation of the neoseptum (**A**). « Criss-cross » suture fixation of the neoseptum (**B**). Anterior partial septal reconstruction (ASR) (**C**). (*The different types of suture are pointed by red arrows. The suture to anterior nasal spine is pointed by a blue arrow*).
- **Figure 6.** Case of a young woman patient presenting a severe caudal deviation of the septum. Preoperative images (**A and B**). Postoperative images (**C and D**)

































