

Severe Saddle Nose Deformity Reconstructed with Rib Cartilage

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Rezumat

Reconstrucția cu grefon cartilaginos a unui caz sever de nas în șa

Augmentarea dorsului nazal este în general dificilă din cauza neregularităților ce pot fi vizibile sub pielea dorsală nazală subțire. Nasul în șa reprezintă o patologie aparte și este în mod special dificil de reconstruit deoarece este important să se reconstruiască un suport scheletic suficient de rezistent și în același timp un dorsum esthetic. Reconstrucția stabilă a septului nazal este foarte importantă în tratamentul acestor deformități cu dublă implicație - funcțională și morfologică. Tratamentul nasului în șa depinde de gradul de severitate. Metoda cea mai acceptată astăzi este reprezentată de reconstrucția scheletală cu cartilaj autolog. Prezentăm un caz sever de nas în șa posttraumatic pentru al cărui tratament am ales reconstrucția cu o grefă dorsală realizată dintr-un singur fragment de cartilaj costal și un suport columelar solid. Reconstrucția nu a urmat tehnica clasică care utilizează două grefe "spreader" din cauza lipsei oaselor nazale și a cartilajelor triunghiulare ceea ce nu ar fi permis stabilizarea grefelor. Rezultatul a fost o piramidă nazală cu un suport scheletic solid, un dors estetic și o în același timp a funcției respiratorii. Nu am avut complicații cu excepția unei ușoare asimetriei narinare. La controlul de 14 luni nu s-a observat resorbția sau deplasarea grefei.

Cuvinte cheie: nas în șa, reconstrucția septului nazal, grefă cartilaj costal

Abstract

Augmenting the nasal dorsum is often a difficult task, because of the irregularities that might be visible under the thin dorsal nasal skin. Saddle noses are especially difficult to correct because of the need to provide strong structural support to the nose while at the same time achieving an aesthetic dorsum. Stable reconstruction of the cartilaginous septum is the critical challenge in the operative treatment of such deformities with both functional and morphological implications. Treatment depends on the degree of saddling. Autologous cartilage is widely recognized to be the standard against which other materials must be judged. It is the most acceptable and reliable long-term graft. We present a case of unusually severe posttraumatic saddle nose resolved with a single rather large costal cartilaginous graft and a columellar strut. Classic extended spreader grafts could not be used due to the lack of bony and cartilaginous support of the nasal pyramid and, thus, no possibility of stabilization. A normal nasal dorsum, as well as breathing improvement, were achieved and the patient was extremely satisfied with the result. We had no complications except a slight asymmetry of the nostrils. Graft resorption or displacement was not observed on the 14-months follow-up.

Key words: saddle nose, nasal dorsum reconstruction, costal cartilage graft

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Introduction

Augmentation of the nasal dorsum and especially the saddle nose deformity remains one of the most difficult tasks for the rhinoplasty surgeon. Autologous material is preferred by many surgeons, because it has a consistency similar to the nasal tissues, it is easily carved to the desired shape, the rate of resorption is minimal and virtually there is no rejection. Numerous types of grafts have been used to augment the nasal dorsum, but precise, long-term control over the shape, contour and alignment of the graft are still difficult to achieve and not predictable.

Of all the grafts used in rhinoplasty, dorsal nasal grafts are the most challenging because they are placed under the thinnest soft-tissue envelope of the nose (the rhinion) where they are most likely to produce visible irregularities of the contour if uneven or misplaced. Many surgeons even state that the ideal dorsal graft "does not exist" (1), being a "continuing quest" (2).

Synthetic materials seem to give the best results but have not been universally accepted because of the ever-present dangers of extrusion and infection (3). Irradiated homologous rib cartilage has been used successfully, but problems with warping, absorption and infection limit its application in the nose (4).

Case report

Patient M.S., 43 years old presented with a complaint of a low dorsum of the nasal pyramid, broad tip and breathing impairment bilaterally. She had suffered an accident at 2 months of age (as a child she got hung on the door handle and had a severe nasal wound for which she was hospitalized and operated).

On clinical examination a very low, flattened and broad nasal dorsum with no dorsal aesthetic lines could be observed. On palpation no nasal bones were present. Only a stump of the frontal process of the maxilla could be palpated. The profile view showed severe saddling of the nasal dorsum with a scooped-out appearance. The dorsal defect was appreciated of being approximately 1.5 cm (Fig. 1 A-E).

The septal support test was positive (the tip collapsed when pressed, showing that no tip support was present). The nasal tip was boxy, poorly defined, broad, asymmetric (right dome more projected than the left), with a visible cleft between the domes due to the excessive interdomal angle. The nasal lobule was rotated upward with an obtuse nasolabial angle. The columella was retracted and the white upper lip appeared excessively long due to the retruded nasal spine. The nose appeared short in absolute terms.

The X-ray showed the low profile of the dorsum, with absence of nasal bones and bilateral inferior turbinates hypertrophy.

The diagnosis was saddle nose of traumatic cause with a severe structural deficiency requiring first functional restoration of the nasal septum and then dorsum augmentation.

Intraoperatively, after elevation of the skin dorsal flap,

we could notice that no nasal bones were present and the septal cartilage was present in a very limited amount. Assessment of the triangular cartilages revealed that they were also completely absent.

A piece of costal cartilage from the eighth rib was harvested. The harvested fragment, measuring 6 cm in length and 1.5 cm in width was carved from the periphery to the central portion, symmetrically, to reduce the tendency of warping. Carving of the graft was done with great care avoiding abrupt edges by beveling them. The skeletal support of the nose was reconstructed as an L-shape with a dorsal and caudal component. A rather thick and long one-piece dorsal graft was modeled (6 cm length, 1.5 cm in height and 1 cm in width) with a boat-like appearance (the superior end of the graft was 8 mm wide while the inferior end tapered to 5 mm, with the widest portion in the middle). Two spreader grafts were also trimmed to their final dimensions (Fig. 2). The stumps of the frontal processes of the maxilla were rasped in order to remove irregularities and prepare a raw bed to accommodate the graft. The proximal end of the graft was contoured to accommodate the radix. In order for the graft to be maintained in its straight position and be stable, a cerclage with a steel wire was brought through drilled holes in the frontal processes of the maxillary bone bilaterally and the dorsal graft. One oblique percutaneous K-wire was also inserted through the graft and the maxilla to add stabilization to the dorsal graft and prevent shifting. The distal end of the dorsal graft was split (tongue-in-groove fixation) to accommodate a stout columellar strut (2.5 cm long and 7 mm thick) designed to push down the columellar-labial angle and provide support for the tip (Fig. 3 A,B). The maximum width of the columellar strut was at the columello-labial angle. The strut was sutured with several 5-0 PDS sutures to the split ends of the dorsal graft. The strut was designed to rise above the dorsal graft, thereby bringing the tip above the dorsal line. The legs of the columellar strut were split vertically so that the septal strut straddled the nasal spine. In this manner, the strut was sutured with 4-0 PDS to the nasal spine through which a hole was drilled. Crus medialis were advanced on the columellar strut and sutured to it with several 5-0 PDS sutures (Fig. 3 C).

The tip was refined with cephalic trimming of the lower lateral cartilages, transdomal and interdomal sutures. The hypertrophied inferior turbinates were outfractured.

Closure was accomplished with 6-0 PDS. Doyle splints were maintained for 3 days postoperatively and the external splint was removed after 10 days. The K-wire was also removed after 10 days. The postoperative course was uneventful.

Results

A nice nasal dorsum was accomplished with normal height and normal dorsal aesthetic lines. The tip was refined, the nose lengthened and the columello-labial angle was decreased to 100 degrees. We had no early or late complications except a slight asymmetry of the nares. The patient



Figure 1. Severe posttraumatic saddling of the bony and cartilaginous vault, preoperative view. (A) frontal view- very low, broad nasal dorsum; (B) three-quarters view; (C) and (D) profile view- severe dorsum defect, shortened nose, overrotated nasal tip, obtuse columello-labial angle, retracted columella. (E) basal view- boxy tip, asymmetric domes

was extremely satisfied with the result and the breathing was very much improved. The result is shown at 14 months postop (Fig. 4 A-E). The postop Xray is shown in Fig. 5. No graft resorbition, warping or irregularities were noticed.

Discussion

Saddle nose deformity has multiple causes, most of the deformities being the result of trauma (septal haematomas or abscesses, fractures of quadrilateral cartilage as a result of different trauma which is one of the main causes of morbidity (5,6), extensive septal surgery). The mechanism of injury is very important in the management of the resultant defect (7). Over-resection of the nasal dorsum is a relatively common error in rhinoplasty surgery and may lead to a saddle nose appearance. Other causes are infection (syphilis, leprosy, tuberculosis), inflammatory conditions (polychondritis, Wegener's granulomatosis, sarcoidosis), tumours, cocaine use. It can also be familial or ethnic.

Clinically, the saddle nose has a scooped-out appearance on a lateral view which gives the illusion of an excessive width from the front view. Its pathologic basis is represented by a substantial loss of the dorsal height, be it cartilaginous, bony or both. In addition, there is middle vault depression with internal nasal valve insufficiency, columellar retraction, loss of tip support, shortened vertical length, overrotated tip. The nose is overly short with lack of support and loss of osseous and cartilaginous integrity.

In contrast to most other operations in esthetic nasal surgery, where the object is to modify an existing form, the

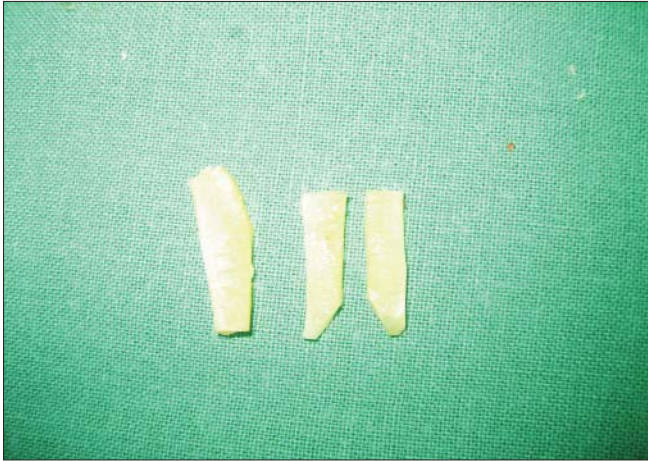


Figure 2. Intraoperative view-piece of harvested costal cartilage (left), and two spreader grafts (right) va deveni "Intraoperative view-Columellar strut (left), and two spreader grafts (right) designed from costal cartilage

usual goal in saddle nose surgery is the restoration of a former state (8). The goal is not only to restore an aesthetic dorsum, but to restore the supportive nasal framework in order to improve breathing and achieve a stable long-term result. The preoperative consultation is a very important moment in the patient-doctor relationship and the use of images can improve this communication (9).

The main feature of a saddle nose is loss of septal support with both functional and aesthetic implications. The surgeon should provide a strong and stable support to the saddle nose using the patient's autologous tissue which will last for the rest of his or her life (10) given that tissue transplantation represents the latest milestone in face reconstruction (11). The surgery of a saddle nose has a reconstructive character and is not only a simple cosmetic camouflage. Rollin Daniel classified septal noses in five types according to the degree of the severity of septal support (12). The surgical correction of saddle nose deformity should be approached according to an algorithm and to the severity of the deformity. The treatment ranges from simple dorsal camouflage with onlay grafts or diced cartilage to septal support reconstruction with spreader grafts and columellar strut (13,14,15).

The dorsal nasal skin is very thin and even carefully crushed, trimmed or scored cartilage can produce visible irregularities. Autologous grafts for nasal augmentation have been used, such as dermis (16), cartilage, bone (17,18) with various results. Bone grafts have the disadvantage of being too hard for the lower third of the nose, having significant donor site morbidity and a higher resorption rate than cartilage. Dermis and fascia have an unpredictable absorption rate (up to 10%), moreover they can be used only for camouflage, not for support. Alloplastic materials are increasingly recognized to have limited indications in rhinoplasty because of the possible complications. Autogenous cartilage grafts, on the other hand, are soft, non-absorbable, abundant and infection resistant (19), easy to shape and have a natural feel when used in situ.

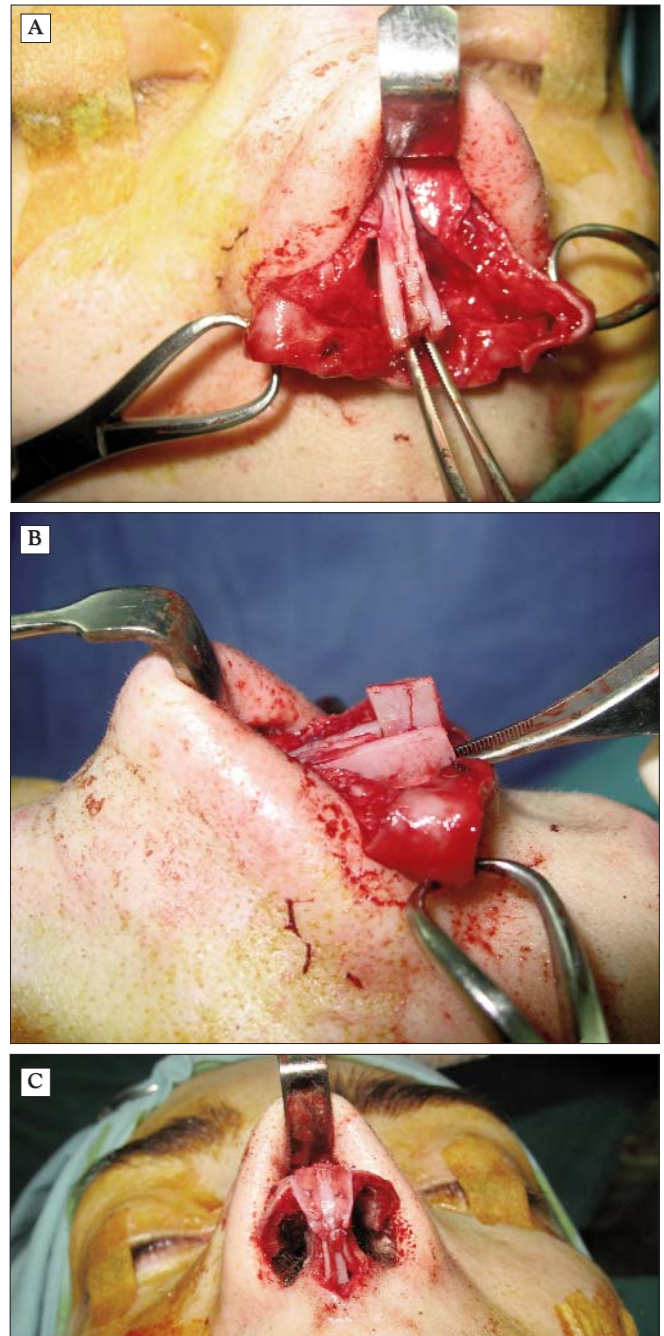


Figure 3. Intraoperative views (A) columellar strut placed between crus medialis ready to be fixed (B) dorsal graft split at the distal end and fixed to the columellar strut (C) crus medialis advanced onto the columellar strut

For small - to medium size saddles, septum or auricle cartilage may suffice with minimal donor-site morbidity. In large saddles with loss of nasal bones, there is often need of more material, thus the choice usually lies between iliac or calvarial bone graft, which may resorb, costal cartilage graft which may warp or a synthetic material which may extrude. Although the conchal bowl contains cartilage with a range of contours which can be used to replace most of the parts of the upper and lower lateral cartilage (20,21), conchal cartilage



Figure 4. Postoperative result at 14 months (A) frontal view - dorsal aesthetic nasal lines are noticed; (b) three-quarters view; (C) and (D) profile views - nice dorsum profile is achieved, elongated nose, the naso-labial angle was brought to 100 degrees and the columella is visible 2 mm below the alar rim; (E) basal view- slight asymmetry of the nares, defined nasal tip

doesn't have enough strength to be used for support. Thus, rib cartilage remains the best option which was at our choice. Rib cartilage provides abundant material and is solid and strong enough to be used as support which should resist mechanical stress. It is easily carved and rarely resorbs. One disadvantage of rib cartilage is that it can twist or warp. Confluent ribs five and six or seven and eight are the usual ribs to harvest for nasal augmentation. To minimize warping, the graft should be carved symmetrically according to the laws of "balanced cross section" as stated by Gibson et al. (1958) (8) and any peri-

chondrium must be removed (22,23). To prevent warping of dorsal costal graft, osseocartilaginous fixation with an internal K-wire has been suggested (24). In elderly patients, costal cartilage ossifies and harvesting can be extremely difficult. Potential complications associated with costal cartilage grafts include pneumothorax, excessive postoperative pain, scarring.

Our case was a severe saddle nose with a total absence of septal support. A composite reconstruction was needed consisting of two parts: reestablishment of support followed by achieving the desired aesthetic contour. In such a severe

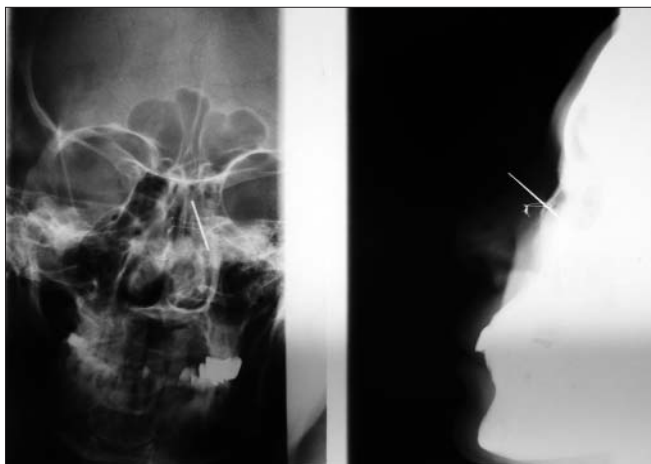


Figure 5. Postoperative Xray with percutaneous K wire and cerclage in place

deformity, the septal support is usually reconstructed using spreader grafts (which should be placed under the bony vault cephalically) and a septal strut, and the overlying aesthetic contour is provided by diced cartilage in fascia for the dorsum. We couldn't use the classic spreader grafts because we had no bony support to fix them on. The spreader grafts would have had no point of attachment on the very low and depressed radix. Instead, we chose to use a single stout piece for the dorsum which we could attach to the bony stump using a K wire and a cerclage. One piece of graft is, anyway, much more stable than two separate pieces. Because of the rather representative graft that we used, there was no need for an additional layer to remodel the contour, because with the graft we could achieve at the same time support and acceptable aesthetic dorsal nasal lines.

The augmented dorsum opened the external and internal nasal valves which improved the direction of the airflow, explaining the improvement of nasal breathing. In case the edges of the cartilaginous grafts are visible under the thin dorsal skin, the graft can be covered with a layer of temporalis (25) or retroauricular fascia. In our case the dorsum was smooth enough at the end of the operation and there was no need for any other covering layer. We didn't choose the osseous part of the rib to augment the dorsum because of its greater rate of resorption and its unnatural hardness and rigidity. We designed the dorsal graft wide enough to widen the internal nasal valve which was collapsed due to the absence of the upper lateral cartilages.

Conclusion

Augmentation of the dorsal profile can be a reconstructive challenge for a rhinology surgeon. Saddle noses are, doubtless, some of the most difficult cases in all of nasal surgery in which to achieve aesthetic and functional improvement. The important decision is whether to perform structural restoration or only cosmetic concealment, or both of them. Many surgeons appreciate the usefulness of autologous graft material for nasal

augmentation. Costal cartilage is practically the only material with sufficient strength and volume to achieve the reconstructive goals. It is very important for the surgeon to understand that reconstructing a solid foundation in a saddle nose is the basis of the treatment. The presented case is particular among saddle noses due to the fact that the dorsal defect was significant, so no nasal bones nor triangular cartilages were present on which a dorsal graft could be fixed. The challenge was finding an appropriate graft and mode of stabilization on a precarious bone support.

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