Case Report

Major Deformity of the Saddle Nose and Reconstruction using RIB Graft: Rhinoplasty a Case Report

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Abstract

Facial injuries, such as those sustained in motor vehicle accidents, sports-related injuries, and altercations, often cause trauma to the nose. Therefore, one of the most frequent causes of patients seeking consultation in the doctor's office is posttraumatic nasal deformity. Depending on the kind of nasal deformity, this may lead to issues with appearance and functionality. A significant quantity of tissue must be harvested for grafting in complex reconstructive rhinoplasty. In cases when there is inadequate septal cartilage, autogenously costochondral and auricular cartilage is widely regarded as the ideal grafting material. This research aimed to discuss our experience and outline our method for using costal cartilage grafts in saddle nose patients (severe nasal abnormalities) with inadequate septal cartilage the best material for reconstructing severe saddle noses is cartilage. There are no chances of cross-infection, little morbidity at the donor site, quick harvesting, an abundance of supply, and ease of carving and sculpting. Warping is a drawback, but it can typically be avoided by paying close attention to technique, and it's usually simple to fix with a small adjustment when needed. It can withstand infection, is typically dimensionally stable, and will heal without completely losing the graft in cases when exposure results from wound disintegration

Keywords: Cartilage, Complex reconstructive rhinoplasty, Costal nasal reconstruction.

Introduction

One of the most frequent causes of patients seeking a rhinoplasty is post-trauma nasal malformation. The post-injury functional and cosmetic problems may lead to a patient seeking therapy who might not have otherwise thought to contemplate surgery. As a result, these people may have different expectations than those who receive rhinoplasties only for aesthetic purposes. Correction of posttraumatic nasal abnormalities necessitates consideration of multiple anatomical circumstances and faults. As a result, the rhinoplasty surgeon must possess the necessary arsenal of skills to effectively treat and cure the abnormalities associated with traumatic noses. The saddle nose deformity and crooked nose deformity are two of the more difficult issues to treat in the posttraumatic nose. There is a discussion of the essential elements of managing these issues.[1]

Saddle nose

One of the most feared outcomes of nasal injuries is the saddle nose deformity. The etiology is usually an untreated septal hematoma that becomes infectious, forms an abscess, and resorbs septal cartilage. This abnormality can be avoided with prompt hematoma evacuation and diagnosis. Nonetheless, the natural history frequently follows a slow and steady course once it is formed. A noticeable scooped look on lateral view and an illusion of excessive width on frontal view result from the severe lack of dorsal septal cartilage. Functionally, there may also be airway impairment due to internal lining synechiae or collapsing ULCs.[1]

Classification of saddle nose

Stage 1. Minimal saddle nose depression above the septum caused by a loss of septal support and a modest retraction of the base of the columella is referred to as a minimal saddle nose; tip projection and rotation are unaffected.[2]

Stage 2. Moderate saddle nose a moderate saddle nose is associated with a more pronounced dorsal recession, but not more than 5 mm. It causes a loss of septal support, which may have an impact on how the triangle cartilages, the tip, or even

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the columella are anatomically related. From every angle, the nose appears flattened. At this point, the tip may exhibit decreased projection and/or cephalic rotation, which needs to be considered.[2]

Stage 3. Major saddle nose Severe lack of cartilaginous and bone support is correlated with major saddle nose. Columellar retrusion results from a loss of cartilaginous septum height, whereas the amputation of the middle third of the nose's bony arch causes a substantial retraction of the nasal mucosa.[2] A shorter nose appears due to a reduction in tip projection and a wider nostril. In terms of functionality, this deformity modifies the external and internal nasal valves (the nostrils become larger and flatter as a result of the collapse of septal support) (Figure 1).[2]

To provide support for the nasal dorsum and tip, fresh tissue must be implanted to correct the deformities caused by the absence or loss of the nasal septum. Over several centuries, a vast array of graft materials have been employed and abandoned, but there are currently numerous substitutes in use, such as autogenous bone or cartilage grafts, xenografts, allografts (such as lyophilized or irradiated cartilage), and alloplastic materials.[3]

Each of these materials has benefits and drawbacks, and the surgeon's personal preferences seem to play a big role in the selection process. The downside of alloplastic materials is the possibility of loss from early or late extrusion or infection due to the weakening of the soft tissues covering them. Both xenografts and allografts run the danger of resorption and cross infection in addition to the same issues. Since autogenous bone can resorb and give the reconstruction a stiff, unnatural feel, autogenous cartilage is our material of choice because it has none of these drawbacks.[3]

In cases of severe deformity, costal cartilage is the preferred option when strong structural support is needed. This is a viable, living graft that can withstand infection and the dehiscence of any surrounding wounds. There is a large supply at a donor site with very little morbidity. In most situations, it has good dimensional stability, is easily shaped, and can be made to overcome its sporadic inclination to warp. It has the inherent stiffness and strength to support the nasal dorsum and tip securely, but it also has a natural feel and degree of movement that somewhat resembles the cartilaginous portion of the nose's natural flexibility.[3]

Case Report

A 22-year-old man presented saddle nose deformity due to a post-traumatic event. Due to reduced projection and cephalic rotation of the tip, the almost total amputation of the middle and superior thirds of the nose created the appearance of a short nose. To redefine the height and projection of the nose, this patient underwent surgery using a rib graft.

Surgical procedure

Under all aseptic condition patient shifted in OT, draping and painting was done (Figure 1). Oral intubation was done under general anesthesia. After marking, incision was given using pre-existing laceration. Nasal dorsum/redix was exposed, pre-existing plates and screws removed. Rip graft harvested from medial end of 7th rib on the right side of chest (Figure 2) cartilaginous graft secured over nasal dorsum with 6-hole or 4-hole titanium plate. Closure done in layer with (3-0) vicryl and (5-0) proline over nasal region. Closure was done over chest region with (4-0) nylon. Follow-up was done after 1 and 3 months (Figures 3 and 4).

Discussion

To treat minimal saddle nose, we employ the extracorporeal rhinoplasty approach with a cartilaginous framework design. Although crooked nose was the initial indication for this technique, we have discovered that it yields satisfactory outcomes for this particular form of saddle nose.[1] To treat minimal saddle nose, we employ the extracorporeal rhinoplasty approach with a cartilaginous framework design. Although crooked nose was the initial indication for this technique, we have discovered that it yields satisfactory outcomes for this particular form of saddle nose.[1]

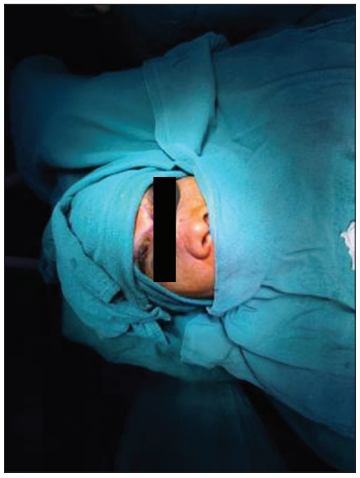

Figure 1: Frontal view of saddle nose

Figure 2: Rib graft from 7th rib

Figure 3: Post-operative frontal view

Figure 4: Post-operative bird's view

The first topic of discussion is the materials utilized for rebuilding in saddle nose correction. We use cartilage from the septum, concha, or ribs, depending on the shape and quantity of grafts needed. Cartilage is a readily harvested material that can be easily modeled to form very large grafts to fill large defects or fine, anatomical grafts to correct superficial irregularities.[2]

The drawbacks of a costal cartilage graft include the need for a second incision, obvious scars, and discomfort following surgery, warping, and fixation issues.[3] We made a 3–4-cm, gently curved incision on the right thorax, about 5 mm above the inframammary fold, to harvest costal cartilage grafts.[3]

The resorption, warping, and donor site morbidity of costal cartilage make it challenging to use. We believe that the benefits of utilizing autogenous material – a living graft that is resistant to infection and wound dehiscence and can withstand postoperative exposure – outweigh any possible drawbacks. Autogenous material is also long-term well-tolerated.[3]

The majority of authors, including Daniel, favor treating mild saddle nose with a septal graft, which has proven to be effective. Our data, however, indicate that saddle nose is rarely an isolated deformity. Moreover, our procedure can be employed to treat retractions of the base of the columella as well as some related septal abnormalities.[4]

The large concentration of strongly negatively charged glycosaminoglycans linked to the proteoglycan molecules of the extracellular solid matrix may result in cartilage swelling following any kind of grafting or surgery. The abundance of negatively charged groups found in glycosaminoglycans draws more cations into the tissue, causing an imbalance in the concentration of ions inside and outside the tissue. Osmotic pressure rises as a result of this imbalance, and the ensuing inclination to swell causes changes in dimensions.[5]

This nasomaxillary growth is a result of trauma, and damage to this region may result in nasomaxillary structural hypoplasia. The cartilaginous and bony pyramids are both significantly depressed in large saddle nose abnormalities, and the collumella is short and retracted. For the restoration of nasal shape in saddle nose abnormalities, autogenous tissues such as autologous bone or cartilage grafts, cartilage homografts, and alloplastic materials have been described. Autogenous costal cartilage has been effectively utilized to enhance midfacial, columellar, and septal deficits because to its ability to retain volume over time with low resorption and ease of sculpting.[6]

One of the more contentious parts of rhinoplasty is saddle nose correction. On this topic, numerous writers have already written reference studies, including Sheen, Tardy, Gunter, and Daniel. The goal of the present study was to explain appropriate treatment management based on a particular anatomical and functional analysis, not to make any novel claims.[6-8] It was suggested by Adams *et al*. to cut the graft from the middle portion of the costal cartilage to avoid warping. In every instance, we employed costal cartilage grafts that were made from the center portion of the costal graft.[8]

Donor site

The donor site for costal cartilage is associated with a low morbidity[9,10] that three thoracic deformities have been reported in young patients with sizable amounts of costal cartilage harvested, typically for microtia reconstruction. In this context, nasal reconstruction is typically performed on older patients, and one costal cartilage is typically sufficient for the reconstruction. Subperichondrial harvest, perichondrial tunnel preservation and repair, and, if necessary, reconstituting the rib using diced off cuts after the cartilage carving is finished have all been shown to yield excellent results at the donor site, and our experience reflects this well. It has been recommended to use costochondral grafts that incorporate costal cartilage, the costochondral junction, and bone. As opposed to a lower rib (C6 and below), where the abdominal wall muscles provide a "safety layer" deep to the perichondrium, a higher rib must be harvested where the pleura is directly deep to the perichondrium and periosteum on the deep surface of the rib, increasing the risk of pleural damage when compared to cartilage alone. The chance of a pneumothorax is incredibly minimal in spite of this.[9,10]

Costochondral graft

The use of a costochondral graft, consisting of cartilage for the lower two-thirds of the nose and bone for the upper third, has been reported frequently, though not always, in children with congenital deformity. In patients who are skeletally mature, there is little to no benefit to incorporating bone and costochondral junction, with the potential drawback of potential bone remodeling and/or resorption.[11,12] The rationale for costochondral graft in skeletally immature patients is the incorporation of the costochondral growth plate for nasal lengthening during subsequent facial growth. To minimize the risks associated with future growth, our policy is to hold off until skeletal maturity, or something approaching it. Overgrowth in the context of rhinoplasty and unanticipated growth of cardiochondral grafts in the context of facial development following temporomandibular joint restoration has both been documented. Although some studies show some growth in the costochondral graft, there is not enough data in the literature to back up the idea of "interceptive" rhinoplasty throughout growth or the ability of costochondral grafts to replicate natural nasal growth.[13-15]

Warping

When possible, sculpting the cartilage should be done symmetrically with regard to the rib cartilage segment to minimize the tendency for warping of the graft. This is a significant phenomenon that can occur within minutes of carving or develop over months or years. Intraoperative maneuvers can reduce or eliminate the early warping and are described above. During the sculpting process, the cartilage can be observed. If there is a propensity for the cartilage to distort, this can be countered by applying more battens to support the graft or by placing mattress sutures (stainless steel wires or no absorbable suture). A counterbalancing method has been devised that aims to equalize and reverse the warping forces.[16]

Resorption

One crucial aspect of any nasal graft is volume stability, and one benefit of using alloplastic materials is that their dimensions do not significantly vary after implantation. Even though it is not a viable material, homologous cartilage is prone to resorption; viable living bone or cartilage grafts are not exempt from this process. Even in the absence of issues such as infection or soft-tissue breakdown, normal bone is prone to remodeling and resorption. In non-stress bearing scenarios, like on-lay grafting, this propensity may be made worse by the lack of functional stimulation. Compared to cartilaginous bone, such as the ribs, membraneous bone, such as the calvarium, is less prone to resorption, and stiff anchoring may aid to lessen resorption.[5]

When it comes to soft-tissue dehiscence or infection, costal cartilage is a live graft that, once formed, has very little tendency to resorb. The recorded rates of volume loss range from 3 to 6%.[5] In our case, there is no resorption seen in the absence of infection.

Conclusion

When it comes to reconstructing severe saddle noses, costal cartilage is the best material. Cross-infections do not occur. Furthermore, there are few morbidities at the donor site, it is simple to collect, there is a plenty of it, and it is simple to carve and model. While warping is a drawback, it can generally be avoided by paying close attention to technique, and it is usually simple to rectify with modest adjustments when needed. It can withstand infection, is typically dimensionally stable, and heals without completely losing grafts in situations when exposure results from wound degradation.

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