

Augmentation rhinoplasty using olecranon bone graft

ABSTRACT

Background: Correction of saddle nose deformity is one of the most frequently sought surgeries by patients seeking rhinoplasty in Asian countries. Nasal dorsal augmentation always requires graft material to achieve the desired result. Various autologous grafts and alloplastic materials have been described in the literature with their advantages and disadvantages. We report our study on the use of olecranon bone graft for augmentation rhinoplasty in severe saddle nose deformity and discuss our experience with it.

Materials and Methods: In this observational study, 12 patients who underwent dorsal nasal augmentation using olecranon bone graft from August 2011 to December 2020 were studied. All ten patients with congenital deformity underwent graft insertion through a closed rhinoplasty approach, whereas two patients with posttraumatic deformity were operated through old scars over the nasal dorsum. The graft was fixed with screws at nasion in both posttraumatic cases. All the patients were evaluated postoperatively at regular intervals for graft resorption by clinical photographs and X-ray nasal bone.

Results: The age ranged from 20 years to 48 years. No immediate complications related to graft placement were noted. One patient had a hairline fracture of the ulna at the donor site on the 3rd postoperative day which was managed conservatively with a cast. The mean follow-up period was 2 years. No nasal dorsum projection loss or signs of bone resorption were observed for up to 5 years after surgery. One patient with posttraumatic deformity required removal of fixation screw which got exposed after 2 years of surgery.

Conclusion: Olecranon bone graft is a suitable material for nasal dorsal augmentation in severe saddle nose deformity because of ease of harvest and minimal donor area morbidity. The appropriate thickness of the cortex of the olecranon process allows custom molding and provides resistance to resorption in long term, thereby giving a desirable outcome.

Keywords: Augmentation rhinoplasty, olecranon bone graft, saddle nose

INTRODUCTION

The saddle nose is one of the most common nasal deformities in patients seeking rhinoplasty in Asian countries.^[1] The saddle nose deformity is described as a loss of projection of osteocartilaginous and/or bony structure of nasal dorsum. It can be congenital or secondary to posttraumatic or iatrogenic causes. It affects both the functional and esthetic perspectives of the patient. The goal of surgery in such a patient would be to establish a smooth and symmetric nasal dorsum. The surgery should not only improve the esthetics of the patient but also improve function. Nasal dorsal augmentation surgery always requires graft material to achieve a desirable result.

With the evolution in the management of nasal deformities, various autogenous grafts, as well as alloplastic materials,


have been described for augmentation rhinoplasty. Although alloplastic materials provided a good alternative, various associated complications such as thinning of the skin over implant, extrusion, infection, displacement, and translucency

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of implant have been reported.^[2] Autologous grafts such as costal cartilage and rib graft, split calvarial bone graft, and iliac crest bone graft have been used effectively in dorsal nasal augmentation, however, patients are reluctant due to donor site morbidity and fear due to its proximity to vital organs.^[3] Olecranon bone graft, commonly used in upper limb reconstruction, can be used for dorsal nasal augmentation. It is easily harvested and has minimal donor site morbidity. Single cortex thickness of the graft provides resistance to long-term bone resorption and thus provides reliable esthetic outcome.^[4] The aim of our study was to evaluate the role of olecranon bone graft in the correction of saddle nose deformity.

MATERIALS AND METHODS

This observational study was conducted at a rural-based tertiary care center. Necessary approval was obtained from the ethical committee of the institute for the study. The patients with saddle nose deformity above the age of 18 years who underwent olecranon bone grafting for dorsal nasal augmentation were included in the study. A total of 12 patients underwent olecranon bone grafting for dorsal nasal augmentation from August 2011 to December 2020. Etiology was a congenital deformity in ten patients and posttraumatic due to facial fractures in two patients. Ten patients with congenital deformity presented for cosmetic improvement of the nasal dorsum. In both the patients with posttraumatic deformity, a secondary correction was done.

All ten patients with congenital deformity were operated through a closed rhinoplasty incision (intercartilaginous incision). Both the patients with posttraumatic deformity were operated through incisions in previous scars. The adequate subcutaneous and subperiosteal pocket was dissected after infiltration of nasal dorsum with lignocaine 2% with adrenaline 1:200,000. Harvested olecranon bone graft was inserted after adequate trimming and smoothing of margins. Incisions were closed after confirming hemostasis. None of the patients underwent additional procedures such as septoplasty, nasal tip, or alar base correction. Both nasal cavities were packed and the bone graft was stabilized by applying an external nasal splint. In both cases of posttraumatic deformity, a bone graft was fixed at the root of the nose using a single screw. Nasal packing was continued for 48 h and an external nasal splint for 14 days.

Surgical technique for olecranon bone graft harvest

A detailed informed written consent was taken for surgery. Under all aseptic precautions and tourniquet control, olecranon bone graft was harvested from nondominant

forearm before the commencement of nasal surgery. The arm was abducted and the elbow was kept in 90 flexion for proper access of the donor site. The incision site was marked over the subcutaneous part of the olecranon process over the proximal one-third of the posterior surface of the forearm and was infiltrated with 2% Xylocaine with adrenaline. A longitudinal incision was taken about 2 cm distal to the tip of the olecranon, 4–5 cm in length, depending on the length of the graft required. The origin of the deep flexor group of muscles and periosteum was divided longitudinally and the olecranon process was exposed. The length of the olecranon graft was measured according to the nasal defect and a single cortex bone graft was removed with a fissure burr [Figure 1]. Irregular margins of the graft were smoothed with a round burr. The graft was then placed in a moist saline gauze and closure of the elbow defect was done in layers. After closure, a crepe bandage was applied to the limb. The graft was transferred to subcutaneous and subperiosteal pocket created at nasal dorsum and immobilized by plaster splint applied externally for 2 weeks. Rigid fixation at nasion with screws was done in two posttraumatic cases.

Postoperatively, the plaster splint was kept in place over the dorsum of the nose for 2 weeks. At the donor site, suture removal was done at 7–10 days. All patients were given antibiotics and anti-inflammatory medications for 5 days postoperatively.

All the patients were evaluated postoperatively at regular intervals. Patients were monitored for graft resorption by clinical photographs and X-ray nasal bone.

RESULTS

A total of 12 patients underwent dorsal augmentation rhinoplasty using olecranon bone graft over a 10-year period. One patient was male and 11 patients were female. Closed

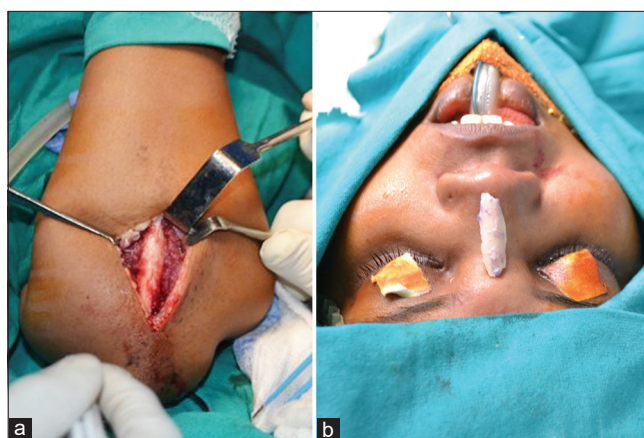


Figure 1: (a) Harvest of olecranon bone graft, (b) shaping of bone graft

rhinoplasty was performed in ten patients with congenital deformity. Two patients with posttraumatic deformity were operated through an old scar over the nose [Figure 2]. The age of patients varied from 20 years to 48 years. No immediate postoperative complications related to graft placement were seen. One patient presented with a hairline fracture of the ulna on the 3rd postoperative day which was managed conservatively with the above-elbow cast. Two patients complained of persistent pain for 2 weeks in the donor forearm, which was relieved by analgesics. The mean follow-up period was 2 years. No nasal dorsum projection loss or signs of bone resorption were observed for up to 5 years after surgery. Secondary rhinoplasty was not required in any of the cases. There was no graft displacement, graft extrusion, or resorption. One patient with posttraumatic deformity required removal of fixation screw which got exposed after 2 years of surgery. One patient developed a groove at the nasal tip between the domes of lower lateral cartilages at 3-year follow-up, probably due to scarring. It was corrected by camouflage using conchal cartilage as shield graft at the nasal tip. The clinical photographs and X-rays of representative cases are shown in Figure 3.

DISCUSSION

Augmentation of the dorsum of the nose is one of the most frequently sought nasal correction surgeries. Various congenital, traumatic, and iatrogenic etiologies are responsible for deficient or deformed nasal dorsum.^[5] This deficient or deformed osteocartilaginous dorsum needs correction usually with augmentation using graft material. Various autologous and alloplastic graft materials are used for dorsal nasal augmentation. Autologous grafts include septal cartilage, conchal cartilage, costal cartilage, bone grafts like

split calvarium, iliac crest, and rib.^[6,7] Alloplastic materials commonly used are silicone and high-density porous polyethylene (Medpor). Olecranon bone graft, commonly used in upper extremity reconstruction, can also be used in nasal dorsal augmentation because of its advantages like single cortex bone graft providing straight boat-shaped graft and minimal donor site morbidity.

Each graft material has its own merits and demerits. Autologous cartilage is the most commonly used graft material and remains the gold standard against which other materials are compared. Autologous graft materials incorporate well in surrounding tissues and are less prone to infection and extrusion.^[8] However, they are prone to resorption and are associated with donor site morbidities.^[9]

Nasal septal cartilage is one of the most frequently used materials for the augmentation of the nasal dorsum. It can be harvested from the same operative field and removal may be required for correction of septal deviation. Single or multiple layered grafts can be used. However, the quantity of graft may not be sufficient for severe saddle deformity or the septum may not be available in cases with posttraumatic deformity or secondary rhinoplasty.^[10] Conchal cartilage provides a small quantity of graft and is useful in cases where a minor improvement in dorsal contour is required.^[11] It has the disadvantage of being brittle, more curved, and less



Figure 2: A patient with posttraumatic nasal deformity secondary to old fronto-naso-orbito-ethmoid and maxilla fracture: (a) preoperative frontal view, (b) preoperative lateral view, (c) preoperative oblique view, (d) postoperative (4 years) frontal view, (e) postoperative lateral view, (f) postoperative oblique view showing well-defined prominent nasal dorsum



Figure 3: (A) A 23-year-old female patient: (a) preoperative frontal view, (b) preoperative lateral view, (c) preoperative oblique view, (d) postoperative (3 years) frontal view, (e) postoperative lateral view, (f) postoperative oblique view showing smooth, prominent nasal dorsum. (B) Radiological follow-up with X-ray nasal bone: (a) 1-year postoperative and (b) 3-year postoperative showing no bony resorption

rigid than septal cartilage.^[12] Autologous costal cartilage provides abundant graft material for severely deficient dorsum and permits graft contouring as per need. However, it is associated with unpredictable warping and may show resorption with time.^[13,14] Donor site morbidities include pain, scarring, and risk of pneumothorax.^[14]

Bone is a viable alternative to cartilage for augmentation of the nasal dorsum. Commonly used bone grafts are split calvarium, iliac crest, and rib. Harvest of calvarial bone graft is associated with less postoperative pain and less visible scarring as compared to costal cartilage.^[14] As it is a membranous bone, it is less prone to resorption.^[12] Its donor site complications such as dural tears, cerebral damage, and intracranial hemorrhage, though rare, limit its use. It may also be associated with donor site alopecia.^[14] Iliac crest bone graft is curved and more prone to resorption. Donor site morbidity includes perioperative pain, ambulatory restriction, and rarely abdominal wall hernia.

A large variety of alloplastic materials have been used for nasal dorsal augmentation. Commonly used materials are silicone and high-density porous polyethylene (Medpor). Advantages of alloplastic implants are ready availability, ease to contour, and absence of donor site morbidity.^[9] However, they are associated with a higher rate of complications such as infection and extrusion.^[15] Other complications reported are thinning of overlying skin, atrophy of underlying osteocartilaginous framework, and translucency of implant.^[2] Alloplastic implant use has been associated with shortening of the nose due to repeated infections and capsule formation.

Olecranon bone graft is suitable for the correction of severe saddle nose deformity. It is easy to harvest and is associated with minimal morbidity of the donor area. The thickness of the cortex of the graft allows the custom molding of the graft.^[3] Insertion of olecranon graft is performed such that cancellous surface of graft comes in contact with the nasal bone, thus allowing graft fixation. Rigid graft fixation results in long-lasting results without bony resorption. In our study, graft immobilization was performed in ten cases of congenital deformity with taping and plaster splint for 15 days, to avoid complications due to fixing screws. Adequate size of the subperiosteal pocket is essential for proper graft placement. Cosac *et al.*, in their study of nine patients with nasal dorsal augmentation with olecranon, used external micropore tape for 3 weeks to immobilize graft with no incidence of graft displacement or long-term resorption.^[16] In the present study, rigid fixation of graft with titanium screw was done in two patients with posttraumatic deformity as nasal dorsum was scarred and periosteum damaged. One patient required

removal of the screw which got exposed after 2 years of surgery. Gurley *et al.*, in their study of 32 patients with nasal augmentation with autogenous chondro-osseous rib graft with rigid internal fixation, reported removal of screws in almost two-thirds of patients due to skin erosion, palpability, and easy visibility.^[17]

Asian nose is characterized by low nasal dorsum and thick skin with sebaceous and sweat glands.^[18] In the presence of thick skin, scarring due to previous surgery, trauma, etc., the aim of reconstruction should be to provide nasal tip and dorsum stability. Therefore, a bone graft is a suitable choice because of its rigidity and stability over a long period.^[19]

CONCLUSION

The olecranon bone graft is a suitable choice of graft material for dorsal augmentation in severe saddle nose deformity. The harvest of graft is easy and donor area morbidity is minimal. The adequate thickness of the cortex allows custom molding and resists long-term graft resorption, thus providing predictable results.

Declaration of patient consent

The authors declare that they have obtained consent from patients. Patients have given their consent for their images and other clinical information to be reported in the journal. Patients understand that their names will not be published and due efforts will be made to conceal their identity but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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