

Reconstruction of saddle nose deformity with calvarial bone graft

Samad Ghiasi

Abstract

Objective: To evaluate the efficacy of calvarial bone in the reconstruction of saddle nose deformity.

Methods: The cross-sectional study was conducted at the Plastic Surgery Unit of Imam Reza Hospital, Tabriz University of Medical Sciences, Iran, from July 2004 to October 2009. It comprised 19 patients who underwent saddle nose deformity reconstruction with calvarial bone graft. All patients were operated upon under general anaesthesia. They were followed up periodically.

Results: The patients followed up for 25 to 61 months for an average period of 39.2 ± 4.3 months. In 14 (74%) patients the result of the surgical intervention was excellent, while in 5 (26%) it was acceptable. All patients were satisfied and there was not displacement, absorption, distortion or infection of the graft.

Conclusion: Calvarial bone graft is a viable option for the reconstruction of saddle nose deformity, especially in severe cases.

Keywords: Saddle nose deformity, Calvarial bone graft. (JPMA 63: 483; 2013)

Introduction

Saddle nose deformity is seen in patients who lose support of the nasal framework with subsequent collapse. Various causes could be the result of this deformity that include traumatic, congenital, iatrogenic (secondary to overzealous reduction of nasal dorsum, drug abuse, infection and granulomatous diseases).^{1,2} The loss of support may involve the bony and cartilaginous dorsum. Saddle nose is one of the most challenging deformities in the sphere of rhinoplasty surgery. Various materials as graft could be used to manage the deformity. These include autogenous cartilage (septum, rib, auricular), bone (rib, iliac, cranial, mastoid) and fascia, turbinate bone, homograft (cartilage, bone, temporalis fascia, acellular dermis) heterologous and synthetic (Gore-tex, Medpore, silastic, proplast, polyamide mesh, Supramid, Mersilene, Vicryl).²⁻⁷ Heterograft material, such as bovine cartilage and bone, are used less frequently because of resorption. Alar swing procedure could be used for the correction of minor supratip depressions.⁸ In mild saddle deformity, cartilaginous augmentation of the nasal dorsum is useful, but if a greater augmentation is required, the autogenous bone is used.⁹

Patients and Methods

The cross-sectional study comprised patients admitted to the Plastic Surgery section of Imam Reza Hospital, Tabriz University of Medical Sciences, Iran, for the treatment of saddle nose deformity between July 2004 and October 2009.

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Department of Otolaryngology, Tabriz University of Medical Sciences, Iran.

Correspondence: Email: ghiasis2000@yahoo.com

All patients were operated upon under general endotracheal anaesthesia. The soft tissue and periostum over the nasal dorsum were raised and a limited pocket was made to lodge the graft. The bone of calvaria marked in the parietal area of the skull and drilled by cutting bur was detached by fine osteotome (Figure-1). The graft was shaped to reproduce the contour of a



Figure-1: Harvesting the graft from parietal area of the skull.

normal dorsum. This dorsal nasal bone graft was introduced through inter-cartilaginous incision in the endonasal approach and marginal incision in the open approach. The graft was placed in a stable manner without any rocking. It was fitted in the concavity of saddle deformity and fixation to immobilise the graft was not performed. In some cases, cartilage was used as columellar strut graft to increase tip support. All incisions were sutured and antibiotic-impregnated strip gauze was inserted into the anterior nasal cavities. A dorsal splint was placed and secured with adhesive dressing. Peri-operative broad-spectrum antibiotic was given. Nasal packing and the nasal splint were removed on the second and seventh post-operative day. After haemostasis, the donor site was closed without drains.

Results

Of the total 19 patients, 11 (57.89%) were males and 8 (42.10%) females ranging in age from 21 to 62 years, (mean: 33 ± 6.2 years).

The etiology of deformity was iatrogenic in 5 (26.31%) patients — over-resection of the nasal hump in 3 (60%)



Figure-2: Patient with pre- and post-surgical saddle nose: frontal and lateral views.

cases, and due to radical submucous resection of the nasal septum in 2 (40%). In 8 (42.10%) patients, the etiology was traumatic; septal abscess in 4 (21.05%); and unknown in 2 (10.52%).

Post-operative followup was done for 25 to 61 months with an average duration of 39.2 ± 4.3 months. Systematic followup included monitoring the contour movement, volume loss and any complications. Stable, aesthetically satisfactory nasal projection was achieved in all cases (Figure-2). The aesthetic appearance of the nasal profile remained stable. In 14 (74%) patients, the result of the reconstruction was excellent, and in 5 (26%) patients it was acceptable. All the patients were satisfied with the results. There was no exposure, displacement, absorption, distortion or infection of the graft. There was no donor site complications either.

Discussion

Various materials have been employed for nasal contour restoration. The use of synthetic material offers several advantages, including ready availability in numerous shapes and sizes, as well as lack of donor site morbidity.⁹ However, these materials are commonly associated with malposition, infection and extrusion.¹⁰ A study reported high success rate in primary rhinoplasty with porous polyethylene implants. Complication rate was between 3% and 4%.⁷

Septal cartilage is useful in minimal defect. Rib cartilage has been used and it allows a greater degree of augmentation than septal cartilage. If not curved carefully they have a tendency to curl, thus giving the nose a twisted appearance.^{9,11} Rib cartilage harvesting is technically difficult and has a risk of pneumothorax. Advantages of cartilaginous augmentation are that cartilage does not require contact with the nasal bony framework to survive and immobilisation is also not a prerequisite to successful grafting. The biological nature of cartilage is unpredictable and warping and curling, especially with rib grafts, has commonly been observed.⁹

Auricular cartilage is curved and must be straightened, and it is not easy to shape.⁵ In cases of severe nasal dorsal collapse, structural auricular cartilage grafts may not be sufficient. When encountered, cranial bone or autogenous rib grafts may be used.¹⁰

Researchers used lower turbinate bone graft to treat saddle nose deformities. It was cheap, and safe, ready to use and not time-consuming. Besides, there was no donor area deformity and no additional donor site morbidity. It enlarged the airway passage to prevent nasal airway obstruction.⁴ But complete resection of inferior turbinate

could lead to 'Empty Nose Syndrome.'

In 1982 Tessier¹² was the first to popularise the use of autogenous calvarial graft as free graft in facial reconstruction. The calvarial bone is an autogenous membranous bone graft such as the mastoid bone and has many advantages compared to the iliac crest graft, which is an endochondrial bone. Membranous calvarial bone differs from endochondrial bone in its embryological origin. Resorption rate of calvarial bone is very low compared to the iliac crest bone or other grafts. A study has not reported any case of resorption of calvarial bone graft after a mean followup of four years, while 13.5% of the iliac crest graft had been absorbed within five years of the surgery.¹³ In terms of resorption, calvarial graft seems to be an ideal support graft, with relatively rare morbidity of donor site when harvested by experienced hands. Pre-operatively in all patients, a cranial computed tomography scan was performed. This helps estimate the exact thickness of the cranial vault. Calvarial graft is contraindicated in case of monocortical vault.

Today heterograft material such as bovine cartilage and bone are used infrequently because of resorption.²

We used calvarial bone graft because of its advantages: donor site is near the nose; no morbidity (pain, scar) at donor site; complete fixation in the nasal dorsum; mild convexity of graft is similar to the convexity of the nasal dorsum; firm enough to maintain the nasal dorsal profile.

Conclusion

Because of its resorption characteristics, aesthetic results and easy extraction, the calvarial bone graft occupies an

increasingly important place in the indications for nasal bone graft. Comparing other graft materials, the calvarial bone had excellent result with no complications.

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