TOTAL EAR RECONSTRUCTION WITH MONOBLOCK CARTILAGE AND TEMPOROPARIETAL FASCIA
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ABSTRACT: BACKGROUND: Microtia is a congenital ear deformity with incidence of 1:6000. Anotia can be of traumatic origin also. It is one of the greatest challenges to the plastic surgeon to reconstruct the ear from autologous material. Various developments have occurred in the ear reconstruction from the era of Tanzer. It can be done in a single stage or multiple stages. Single stage ear reconstruction require technical precision, avoids multiple admission of the patient. MATERIAL AND METHOD: Between 2007 to 2013 six cases of total ear reconstruction was done in two stage method using autologus coastal cartilage in the department of M.K.C.G medical college by a single surgeon. In the first stage lobule rotation, fabrication of the cartilaginous framework and its implantation were performed. In the second stage elevation of the auricle and formation of tragus was done. All of them underwent stage 1 procedure among them 2 had not turned up for staged 2 procedure. RESULTS: 4 were females and 2 were male. 4 had congenital microtia and two were traumatic amputation of the ear. All had unilateral microtia. The follow up was done for up to 1 year. CONCLUSION: One patient had lost follow up.5 patient had unacceptable ear. Though it is impossible to reconstruct ear that appear exactly the same as opposite ear, the new ears which were made of correct size and in normal position. KEYWORDS: Microtia, Single stage ear reconstruction.

INTRODUCTION: Gilles first used rib cartilage for reconstruction of auricular framework in 1920. The modern era of auricular reconstruction begin with Tanzer(¹) who reintroduced the technique of autologous coastal cartilage grafts as method of auricular reconstruction. Brent(²,³,⁴,⁵) described four stage technique. Nagata(⁶,⁷,⁸,⁹,¹⁰) developed a more complex two stage technique which require more cartilage and construction of higher profile, more detailed framework than Brent technique. Firmin further modified her technique. Silastic framework is also used for total ear reconstruction. But it has higher chance of extrusion. More recently porous polyethylene has also been described. Auricular prosthesis is another option. But it requires introduction of titanium osseointegrated fixture.

We are describing our experience of 6 cases of ear reconstruction between 2007 to 2013 performed by a single surgeon. Between 2007 to 2013 six cases of total ear reconstruction was done in two stage method using autologus coastal cartilage in the department of M.K.C.G medical college by a single surgeon. In the first stage lobule rotation, fabrication of the cartilaginous framework and its implantation were performed. In the second stage elevation of the auricle and formation of tragus was done. All of them underwent stage 1 procedure among them 2 had not turned up for stage 2 procedure.4 were females and 2 were male. 4 had congenital microtia and two were traumatic amputation of the ear. All had unilateral microtia.
Operative Technique: The patients were examined in standing and location of ear lobule on the normal side is transferred to the affected side. The normal ear was treated in clear X ray film and sterilized. Using the tracing additional template was made. A template of desired framework was made approximately 3 to 4 mm shorter and narrower than the eventual ear. (Fig. 1). Cartilage was harvested from synchondrotic two rib cartilage. Single block was carved (Fig. 2) to form helical rim and other parts of auricle. Temporoparietal fascia was harvested as standard manner. The cartilage block was completely wrapped in a Temporoparietal fascia in a vest over pant fashion. (Fig. 3) Thick skin graft was applied over the fascia. Layered closure was done. Suction drain was given. Dressing change was done after 5 days.

Fig. 1: Templates with harvested cartilage

Fig. 2: Carved cartilage

Fig. 2: Temporoparietal Fascia Covering Cartilage Framework

Fig. 3: Pre op

Fig. 5: Post op
RESULTS: None of our patient had absorption of the cartilage. All patients had ear with acceptable length and position.

DISCUSSION: The stages of auricular reconstruction depend on the severity of the deformity, the position and quality of the microtic elements, and the surgeon’s preference. The exact sequence of operations is less important than following the operative plan and carefully tailoring the procedures to the specific anatomic deformity.

Tanzer(1) initially described a four-stage reconstruction in 1971: Rotation of the lobule into a transverse position, Fabrication and placement of a costal cartilage framework, Elevation of the ear from the side of the head and Construction of a tragus and concal cavity.

Tanzer subsequently combined the first two to complete the reconstruction in three stages but noted that when extensive mobilization of the lobule was necessary, such as in cases of marked apposition or an extremely small remnant, the four-stage reconstruction was a better option.

Additional operative stages to create a tunnel and for final closure is also needed when middle ear reconstruction is contemplated.

The most significant addition to the literature of ear reconstruction in the last few years comes from Brent’s 2 decades of experience with 600 cases followed for a median 5 years. In a long-term retrospective analysis, Brent recounts his treatment plan, surgical technique, and perioperative management of the microtic deformity.(2)

Brent(3) prefers a four-stage technique consisting of the following order: Framework placement, Lobule transposition, Tragus construction and conchal Excavation and elevation of the ear framework with creation of the auriculocephalic sulcus.

Brent 4, 5 subsequently added tragal reconstruction as part of the initial framework fabrication and placement in some patients. He avoids repositioning vestigial remnants (earlobe) because the resultant scars can impair circulation and skin elasticity and render insertion of the three dimensional framework difficult.

Emphasized that the reconstructed ear will not project adequately unless a high-profile framework has been used. In cases of inadequate projection, or when the patient wears glasses or desires a well-defined auriculocephalic sulcus, a fourth stage is necessary to elevate the ear and release it with skin grafts. Occasionally, the middle two stages are reversed to accommodate the patient’s preferences.

Nagata(6-10) traced the evolution of a new method for reconstruction of the ear in microtia. Technical details are provided regarding construction of the costal cartilage framework, development of skin flaps for insertion and closure, and elevation of the constructed auricle. Indications for this approach in three different types of microtia—the lobule type, the concha type, and the small concha type are also presented.

Nagata’s two-stage technique consists of the following: Framework construction, insertion, Lobule transposition, tragus construction, and conchal excavation are all achieved during first operative stage.In the second stage ear elevation was done with placement of a
cartilage graft in the auriculocepalic sulcus which was then covered with a pedicled TPF flap and skin graft.

Unlike Brent, 5 Nagata 6 encountered no deformations or irregularities of the grafted framework and no infection or cartilage exposure in 36 patients followed for up to 7 years.

Park et al.(11) analyzed their experience with 122 TPF flaps for auricular reconstruction. The vascular anatomy was found to be variable among 93 flaps examined. The dominant blood supply was the superficial temporal artery in 82(88%) of the 93 flaps, the posterior auricular artery in eight (9%), and the occipital artery in three (3%). Venous drainage was similarly variable: the superficial temporal vein in 62(67%) flaps, the posterior auricular vein in 23(25%), the occipital vein in six (6%), and the diploic vein in two (2%).

A major criticism of Brent’s technique is the number of stages required to achieve the final result. Proponents of the Nagata technique have emphasized dissatisfaction with the appearance of Brent’s tragal reconstructions. In less experienced hands, the composite skin/cartilage grafts may contract, diminishing the retrotragal hollow and, sometimes, everting the tragus itself.

Brent’s technique has also been criticized for its lack of definition of the conchal bowl, the intertragic notch, and the contour of the antitragus. This criticism is underscored by the need for an additional step for conchal excavation to achieve the desired definition of ear anatomy. Without the construction of a complete crus helicis, the conchal cavity is not separated into its major components, the cymba and cavum conchae. In addition, skin grafts applied to the conchal bowl, if not taken from the opposite ear or adjacent scalp, may hyperpigment and thereby compromise the final appearance.

Effacement of the post auricular sulcus is a common sequela following elevation of the construct that can result in decreased projection of the reconstructed ear. This is largely due to contraction of the skin grafts. This problem may be minimized by the application of thicker skin grafts (Preferably full-thickness) or by advancing the post auricular skin to the depth of the sulcus and grafting only the posterior ear.

To achieve adequate helical rim formation brent has advised use of a floating rib over the cartilage block. Nagata has also used separate rib for helical rim. We have used a single block only and carved it to attain helical rim. We have used a single block from the synchondrotic region to avoid harvest of extra cartilage. Temporoparietal fascia has its own blood supply which prevents the cartilage absorption. None of our patients had any donor site morbidity. Two patients had mild discomfort which subsided with medication. None had any pneumothorax due to cartilage harvest. We have used suction drain in all the cases which prevented hematoma and allows better cooptation of the graft to the cartilage. Two of our patients had hyperpigmentation of the skin. But the ear was situated in the normal position and had acceptable projection. Reconstructed ear axis was parallel to nasal profile. Distance between lateral canthus and normal ears helical root was same on the reconstructed ear. Since we have not operated on any patient with craniofacial microsomia near normal profile was achieved. In pure microtia vestige to canthus distance mirrors the helical root to canthus distance of the normal opposite side. However in patients with severe hemifacial microsomia the vestige is much closure to the eye. If we place the new ears anterior margin at the vestige, the ear appears too close to the eye, if we use the distance between lateral canthus and helical root as a guide the reconstructed ear will be placed posteriorly.
CONCLUSION: Although our series is very small monoblock cartilage and temporoparietal coverage can give satisfying result.

REFERENCES:
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