

AURICULAR RECONSTRUCTION BY COSTAL CARTILAGE GRAFT IN BASRAH PROVINCE

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Abstract

Auricular reconstruction represents a meticulous reconstructive and aesthetic problem to the plastic surgeon. One of the greatest challenges in facial plastic surgery is total ear reconstruction. The ability to reconstruct a fully satisfactory complete external ear has for centuries been an elusive goal. The most promising field of advances with the hope of eventually clinical utility lies in the realm of bioengineering with cultured cartilage.

To date, no perfect material has been found to substitute for the sharply elastic cartilage normally present in ear, the matter of total auricular reconstruction remain very complex, Prosthetic restoration is not favored by most but does remain available option for many patients. Tissue engineers have waited to create a precise three dimensional auricular reconstruction neocartilage.

Ten patients were operated upon for auricular reconstruction in Basrah Alsader Teaching Hospital. The operation had 2 stages: First stage, creation and implantation of framework cartilage graft, which harvested from the 6th, 7th & 8th ribs. The second stage, was detachment of the constructed auricles ear lobe transposition and post auricular sulcus was defined by separating the constructed auricle from the head covering the under surface with a thick split thickness skin graft.

The success rate was 90% with good and satisfactory result except in one case; there was infection with loss of the cartilage.

Introduction

One of the greatest challenge in facial plastic surgery is total ear reconstruction. The ability to reconstruct a satisfactory complete external ear has for centuries been an elusive goal. The most promising field of advances with the hope of eventually clinical utility lie in the realm of bioengineering with cultured cartilage¹.

At the age of 5 years, the normal ear is 85% of adult size and can be used as a reference. The reconstructed ear continues to grow, albeit at a reduced pace. The other major determinant of timing is waiting for the costal cartilage to be large enough to take a graft from;

this is usually achieved when the child is about 6 years old. There has been a tendency to wait longer, from 7 to 10 years old depending on the exact technique.

The surgery consists of a variable number of stages depending on the exact technique: the 'classical' Tanzer techniques are three-stages. Alternative techniques are the Brent and the Nagata. The choice of technique depends in part on the size of the ear that is present. The ear is often left for at least six months between stages to allow the blood supply to be re-established.²

As reconstruction of this type of framework needs a well developed chest wall, it's recommended that the auricular reconstruction is attempted after the age of 8 years¹. Framework that maintain the structural and biological properties of native cartilage when implanted into an immune competent animal model. The design of fabricated framework is one of the most important factors affecting the final aesthetic outcome. The alternatives for auricular reconstruction include autologous costal cartilage grafting, prosthesis, reconstruction with osseointegrated implant or the use of alloplastic framework as porous polyethylene¹.

Auricular reconstruction by autologous costal cartilage graft was first describe by Gillies in 1920³, however the technique of auricular reconstruction most favored by majority of plastic surgeon these days is that of Brent⁴, who followed the original concept of Tanzer⁵ Loss of framework detail during healing due to small hematomas and infection⁶ decreased by injection of fibrin glue immediately prior to skin closure has been suggested to create stability and skin adhesion to the frame work and hematoma prevention⁷.

The external ear is a critical component of the overall asthetic balance and contour of the face. It's characteristic three-dimensional topography consist of interrelated link width and lateral projection, such that even slight alteration in the size shape, location, or

position of the ear are easily recognize, specially when compared with an opposite (normal ear).

The auricle itself is formed from consistently located, precisely oriented topographic (peaks and valleys) and may in fact represent the most detailed structure of the body. For these reasons surgical reconstruction of the auricle is challenging and time consuming endeavor⁴.

The aim of this study is to evaluate a method for ear reconstruction by costal cartilage graft for total loss of loss of the auricle in congenital or traumatic cases.

Patients and methods

Ten patients were operated on for auricular reconstruction in Plastic unit of Basrah Al-Sader Teaching Hospital during the period 2006-2008.

Pre operative preparation: Full history of the trauma was obtained, history of suggestive associated anomalies in cases of congenital microtia, psychological evaluation of the patient was done and evaluation of associated hearing problems. Preoperative design and planning of cartilage framework was performed. The size, measurement and position of the ear were done by tracing an x-ray film pattern of the normal opposite ear. This pattern later sterilized by formaldehyde vapor, and the location is equidistant with the contra lateral side as shown in fig.1.

Fig.1: Preoperative planning.



X-ray film frame pattern.

Operative details: First stage (Creation and implantation of cartilage graft framework): elevation of a thin skin flap over the non hair bearing auricular area through an anterior limited incision. Obtaining the costal cartilage through transverse or oblique incision over the 6th intercostals space , the x-ray pattern of the opposite ear was placed over the union between the 6th and 7th costal cartilage. The 8th cartilage was harvested to form the helical rim, 2-3 dimensional framework fabricated by using nagata forceps, the perichondrium was carefully preserved except when it

was necessarily excised during carving process, the base block was carved to create natural convolutions (scapha, antihelix and triangular fossa), the 8th cartilage was turned over and helical sulcus was carved in vertical side and then sutured to the base by 4-0 prolene , the base was fixed by 5-0 stainless steel wire. Framework implantation was done after creation of thin flap by limited anterior incision. Low negative suction was performed to position the skin flap and anchor the cartilage framework to reduce dead space and hematoma as demonstrated in fig.2.

Fig.2: First stage steps



Second stage: Detachment of the constructed auricle and ear lobe positioning. The post auricular sulcus defined by separating the constructed auricle from the scalp covering the under surface with a thick split thickness skin graft. Retro auricular skin was advanced into the newly

created sulcus and tie over dressing done to secure the graft. To augment the auricular elevation a sub facial mastoid pocket was created just behind the deepest point of the detached ear to harvest the cartilage wedge, graft banked in the pre auricular area as shown in fig.3.

Fig.3: Second stage; separation and skin graft.



Results

In this study ten patients were subjected for ear reconstruction (as shown in the following table). Most of the patients were at age of 10-20 years. The commonest type of ear loss was traumatic ear amputation. The result was good up to surgeon satisfaction in 7 cases out of ten. Complications were minimal as only one out of ten had loss of the cartilage. More than 70% of the patients and their family were satisfied by the results.

| | |
|--|--------|
| Age of the patients: | Number |
| 1-10 Years | 2 |
| 10-20 Years | 6 |
| 20-30 Years | 2 |
| Types of ear loss: | |
| Congenital | 2 |
| Partial amputation | 3 |
| Total amputation | 5 |
| Surgeon Satisfaction: | |
| Good | 7 |
| Fair | 2 |
| Poor | 1 |
| Complications: | |
| Exposed cartilage: Post auricular flap | 1 |
| Infection: Complete lose of cartilage | 1 |
| Patients & parents satisfaction: | |
| Not satisfied | 2 |
| Fair | 1 |
| Satisfied | 7 |

Discussion

A key to patient satisfaction with ear reconstruction is through counseling regarding the several facets unique to amputated ear, this would include fostering realistic expectation within the patients mind prior to surgery and appraising patients as to the probable need for multiple revision procedures, such preoperative counseling when coupled with thorough surgical planning and meticulous surgical technique usually produced acceptable results and satisfied patient method of reconstruction.⁸

Since Gillies³ introduced total auricular reconstruction using autologous costal cartilage graft in 1920 it was Tanzer⁵ in 1969 and Brent^{9,10} who made the greatest advancement in the field of ear reconstruction .they introduced the concept of multistage treatment which is now the stat of the art solution for ear

reconstruction. The most important factor affecting the asthetic outcome of the total auricular reconstruction with rib costal cartilage graft is the fabricated cartilage framework.

In this study we compared our result in term of final asthetic result a total of 10 auricular reconstruction were done in 10 patient autologous costal cartilage graft, 2 female & 8 male. Their age ranged from 8 to 30 years. Two congenital, 3 partial amputation & 5 total amputation. Seven cases right side& 3cases left side. The operation was done under general anesthesia, spending 4-6 hrs with each case. In comparison with other previous study, traumatic amputation was predominant 80% as shown in fig.4. The over all rate of ear complications was 20% which is more than the result of other studies¹¹⁻¹³

Fig.4: Partial traumatic rear amputation, pre & post operative



Ear reconstruction was performed in different age groups, however according to the result its recommended that reconstruction should be attempted at the age group of 8-10 years at this age the thoracic cage is usually developed to a degree that allows the formation of contour accentuated framework of an

adequate size which yield the best aesthetic result (90% in this study), these results come in accordance with the result of other studies^{14,15}. In this work reconstruction was attempted at older age, because of 80% of patient was traumatic amputation.

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