

AURICULAR RECONSTRUCTION USING EXPANDER FOLLOWED BY MEDPOR IMPLANT IN POST-TRAUMATIC AMPUTATIONS

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Abstract: External ear is a three-dimensional structure with a high degree of complexity that continues to challenge plastic surgeons in their quest to reconstruct it. Many techniques were developed during time in the attempt to reconstruct the ears, from ancient local flaps, passing through costal rib cartilage, firstly described in the mid-last-century and still perfected until today, and reaching to alloplastic implants and even tissue engineering, nowadays. Several recent studies have been conducted regarding the use of porous polyethylene implants known as Medpor in auricular reconstruction of different etiologies. In the following paper, we present a post-traumatic total ear reconstruction using tissue expander in combination with Medpor implants.

INTRODUCTION

Total ear reconstruction still represents a challenging theme for plastic surgeons taking into consideration its complex three-dimensional structure.

Many techniques were developed along time in the attempt to reconstruct the external ear, from ancient local flaps described for the first time in the VIth century B.C by Susruta, passing through costal rib cartilage reconstructions proposed for the first time by Gillies in 1937, then perfected by Tanzer in 1959 and his follower student Brent, reaching to alloplastic silicon implants, firstly described by Cronin in 1966 and even tissue engineering and chondrocyte cultures, today.

Several recent studies have been conducted regarding the use of porous polyethylene implants known as Medpor in auricular reconstruction of different etiologies.

PURPOSE

The main goal of any reconstructive surgery is not only the aesthetic outcome, but also to increase the patients' quality of life and to reduce the associated morbidities of such procedures.

In this paper, we propose an interesting and simple reconstructive procedure.

METHODS

Auricular reconstruction was done in a "two-step-method": in the first step, we introduced a 75 cc elliptical tissue expander in the subcutaneous mastoid region, then in the second one, we removed the expander and inserted a single piece, a Medpor implant.

RESULTS

A 36-year-old male patient presented to our emergency department on the 10th of May 2010 for a left external ear avulsion after a road traffic accident several hours earlier. The following investigations were done: skull and chest X-rays, abdominal ultrasound, and after interdisciplinary consultations by neurosurgery, general surgery and plastic surgery departments, the patient was admitted to plastic surgery

ward, with the following diagnosis "Road traffic accident. Craniofacial concussion. Traumatic avulsion of the left external ear. Left thoracic contusion". Upon admission, blood tests were done, electrocardiogram (ECG) with no modifications, antitetanos vaccination was also administered.

Patient's history shows no significance to the case, from the general examination, we retain spontaneous pain during breathing movements in the left chest wall, but with no other pathological signs. Local exam shows a contused wound in the left temporal region, with soft tissue defect of 5/3 cm and left ear amputation, the tragus was still in its place and the amputated fragment was missing.

After finishing the clinical and paraclinical tests, the patient was taken to the operating room and under general anesthesia, excision, debridement and wound rinsing with antibiotic solution were done, followed by suturing the wound.

The follow-up after surgery was good under daily dressing, antibiotic, anti-inflammatory, and gastric protection medication. The patient was discharged 48 hours later, and returned after 12 days for suture material removal and further evaluation. At that moment, we presented him the possibility of ear reconstruction, and after presenting the variety of choices, with advantages and disadvantages, we opted together for the use of expander and Medpor implant.

Ten months after the initial trauma, the patient presented for the first stage of reconstruction surgery, namely the insertion of an elliptical tissue expander of 75 cc in the mastoid region. At preparation, measurements and drawings were designed on the region to be expanded. Under general anesthesia, an incision is made in the left mastoid region parallel to the hair line 8 cm away from the aural meatus, fine supra-fascia temporalis dissection is done creating a pocket for the expander to be placed in, and keeping the subcutaneous fat layer as intact as we could.

After the inset of the 75 cc elliptical tissue expander filled with 30 ml normal saline, we sutured the wound, then injected further 20 ml normal saline, bringing it to a total of 50cc. Follow-up after surgery was good under daily dressing, antibiotic, anti-inflammatory, and gastric protection medication.

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CLINICAL ASPECTS

The patient was discharged 72 hours later, and returned after 12 days for suture material removal.

Figure no. 1. Drawing the dissection area



Figure no. 2. Dissection of the pocket



Figure no. 3. One week after surgery



Tissue expansion started one week after the removal of suture material, to prevent dehiscence of the wound, and was done over a period of three months to a total volume of 130cc. The expanded tissue is left to mature for a period of another three months from the last expansion session.

Figure no. 4. Completed tissue expansion



In September 2011, the patient returned for the second stage of reconstruction, namely the removal of the expander and insertion of the single piece of Medpor implant). Detailed preoperative planning was done before operation to determine the correct position of the implant. Under general anesthesia incision was made on the preexisting scar from the premastoid region. Dissection and removal of the tissue expander after partial deflating of it, to ease its removal, minimal scoring and capsulotomy for a better compliance of the expanded tissue when wrapped around the implant. After that, we customized the single piece implant for this case, by excising its tragal portion, followed by inseting it in the created pocket and fixing it with prolene 2/0 to the mastoid area, after adjusting its position and inclination to achieve symmetry with the opposite side. Two active drains (1) were introduced pre and retro-prosthetic, to avoid hematoma formation and assure the best possible compliance around the implant. The drains were removed after

nine days with good local evolution, removal of the suture material on day 12. The patient was discharged with the indication to avoid cold exposure and local trauma.

Figure no. 5. Expander removal



Figure no. 6. Implant customized



Figure no. 7. Immediate post reconstruction aspect



Follow up and re-evaluation at six months and one year from the last surgery revealed good local evolution, clear definition of the reconstructed ear, a high degree of patient satisfaction and good surgeon satisfaction.

DISCUSSIONS

The auricular reconstruction had a high degree of definition without any complications after surgery and was stable during time.

Figure no. 8. a,b,c. One year follow-up aspect



Obtaining high quality ear reconstruction requires good quality covering tissues.

The techniques proposed by Tanzer (2), his follower Brent (3), and the ones described by Nagata (4) are generally accepted with various modifications and improvements, but we have to admit that they are multi-staged and complicated techniques with prolonged operating time, and multiple risks associated with morbidities of donor site such as pneumothorax, chest deformities (5,6) in children, multiple scars, some degrees of cartilage framework resorption (7-9), and the need to have significant experience and talent from the surgeon to be able to model and build a good cartilage framework.

The development of Medpor implants, combined with the use of tissue expanders contributed to simplifying these reconstructive procedures, Wellisz et al. (10) were the first to report, about 22 years ago, the use of Medpor in the reconstruction of the ear. Medpor has a porous structure that allows tissue ingrowth, thus reducing the risk of infection even when partial exposure appears.(11)

Tissue expansion in auricular reconstruction was taken into consideration in several techniques. Neumann (12) was the first to describe the use of expanders in auricular reconstruction in 1957, furthermore in obtaining glabrous expanded skin.(13) Park was the one who first used them in a subfascial plane targeting to obtain both expanded skin and fascia.(14) Leach et al. (15) undermined the subcutaneous fat lining tissue from the pockets he created and introduced the expander directly subdermal hoping to obtain a better compliance and ultimately a better definition.

We chose to preserve the subcutaneous tissue without undermining it at all, thus in our opinion reducing the risk of extrusion, and in order to achieve a better compliance of the expanded flap wrapped around the implant, we chose to do those fine capsulotomies - "scorings".

CONCLUSIONS

We conclude that positioning the expander in a suprafascial manner, preserving the subcutaneous tissue, followed by a slow expanding process and allocating enough time for expanded tissues to mature and stabilize (3-6 months) offers:

- A good definition, good projection reconstruction with enough coverage envelope of robust and stable quality.
- It simplifies auricular reconstruction, reduces operating time and diminishes the risk of extrusion.
- It preserves the use of temporo-parietal fascial flap to use as a salvage solution for the cases complicated with partial extrusions.
- It reduces the number of scars, thus reducing the disturbance in regional vascular supply.

Finally, we can suppose that in the several few years to come, the flagship of auricular reconstruction namely rib cartilage frameworks can be endangered by Medpor implants taking into consideration its promising results, an issue debated by Romo T 3rd et al.(16)

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