One Stage Reconstruction of the Post-Human Bite Lost Helical Rim

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Abstract

Human bites of the ear accounting for 67% of that involving the head and neck. The extent of injury is often underestimated, and the wound is undertreated. The primary treatment goals are infection prevention, minimize possible soft tissue deformity, prevent serious wound complications and finally, reaching healing with good cosmesis.

In contrast to congenital ear deformities, little effort has been given to formulate an algorithm for analysis and treatment of acquired partial auricular defects. The complexity of these defects may be challenging for the reconstructive surgeon. The reconstructive surgeon must adequately assess the defect, catalog the missing components, and delineate the tissues available for reconstruction. Numerous techniques have been described as a result of the inadequacy of any single technique to meet such a challenge. The reconstruction of the partial helical defects must contain both structural (skeletal) support and soft-tissue coverage.

Key Words: Human bite lost – Helical rim.

Introduction

HUMAN bites are thought to be the third most frequent (mammalian bite) after dog and cat bites [1]. Human bites of the ear accounting for 67% of that involving the head and neck [2]. The extent of injury is often underestimated and the wound is undertreated. The primary treatment goals are infection prevention, minimize possible soft tissue deformity, prevent serious wound complications and finally, reaching healing with good cosmetic result or good healing to prepare the area for secondary reconstruction [3,4,5].

In contrast to congenital ear deformities, little effort has been given to formulate an algorithm for analysis and treatment of partial auricular defects following human bites. The prominent position of the helix makes it susceptible to bite injury much more than other parts of the auricle. The defect is always complex involving not only the skin, but also the cartilaginous framework [6].

The reconstructive surgeon must adequately assess the helical defect, determine the missing components and delineate the tissues available for reconstruction. Numerous techniques have been described as a result of the inadequacy of any single technique to meet such a challenge. The reconstruction of the partial helical defects must contain both structural (skeletal) support and soft-tissue coverage [7].

Up-till-now, the reconstruction of partial helical defects following human bites was not included in a single published clinical study. In this article, the author presents results in patients who were exposed to human bite trauma to their auricles with subsequent partial defects of the helix and one stage reconstruction by means of cartilage grafts, temporoparietal fascia flap and partial-thickness skin grafts.

Patients and Methods

Twelve patients with post human bite partial auricular defects involving the helical rim presented to the out-patient clinic of Plastic surgery in Assiut University Hospital between August of 2006 and July of 2008. Eight patients were male and four were females, their mean age was 24.3 years (range between 12 to 32 years). The characteristics of the defects are summarized in Table (1). Two patients presented after healing of the injury and ten patients presented early after the injury. The mean time elapsed between injury and reconstruction was 16 months (range, 6 to 27 months).

Care of the wound:

Surgical debridement was done in 3 patients, local care by dressings and topical antiseptic ointments was done in 7 patients and topical use of anti-scar creams was done in all patients after healing including those 2 presented after healing of their wounds. Prophylactic systemic antibiotics
were used in 6 patients with flared inflammation of the injured site.

**Assessment of the defect:**

A digital photography of the contra-lateral normal ear was taken and the mirror image of this photograph was obtained. The mirror image was then superimposed over the lateral view of the damaged ear, enabling assessment of the ear defect area compared with the total normal ear area. The anatomical locations of helical losses were as follows: Upper third in 6 patients, middle one-third in two patients and lower two-thirds of the helix in four patients.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Sex</th>
<th>Anatomical region</th>
<th>Time of presentation</th>
<th>Prophylactic antibiotic</th>
<th>Further surgery</th>
<th>Secondary Surgery</th>
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<tr>
<td>1</td>
<td>12</td>
<td>Male</td>
<td>Upper 1/3</td>
<td>Early</td>
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<td>Pedicle debulking</td>
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<td>2</td>
<td>24</td>
<td>Female</td>
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<td>Early</td>
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<td>Debridement</td>
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<td>29</td>
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<td>Upper 1/3</td>
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<td>Scar revision</td>
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<td>6</td>
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<td>7</td>
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<td>8</td>
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**Operative technique:**

A preoperative tracing of the cartilage framework of the contralateral normal ear was made over a transparent radiographic film. The defect was determined preoperatively by subtracting the area of the injured ear from this pattern. The remaining model, which mimicked the real defect area, was sterilized for intraoperative use.

The vascular pedicle of the temporoparietal flap was marked preoperatively by use of Doppler ultrasound. After an incision at the temporal region, the scalp flaps were elevated from the underlying temporoparietal fascia flap. The temporoparietal vessels supplying the temporoparietal fascia flap were identified and kept intact. The edges of the flap were incised and the temporoparietal fascia flap was elevated. The defective area of the auricle was prepared and the scar tissue was totally removed.

The harvested contralateral conchal cartilage or costal cartilage graft was carved to the shape of the defect using the template as a guide. The cartilage framework was sutured to the exposed edges of the auricular cartilage skeleton using 5-0 Prolene sutures. The sharp edges of the cartilage grafts were rounded.

The temporoparietal fascia flap was delivered by means of a post-auricular subcutaneous tunnel for coverage of the cartilage graft. The infolded fascial flap edges were sutured to the subcutaneous tissue to decrease the risk of exposure of the cartilage. Finally, the flap was covered by a thick split-thickness skin graft taken from the antro-lateral thigh region.

Clinical assessment of the final after follow-up of the patients for 6 to 12 months was performed by the evaluation of the shape, size and overall natural appearance of the reconstructed helix. Patient satisfaction was also assessed. One patient, 12 year-old, was lost for late follow-up and photography as he travelled abroad shortly after the reconstruction.

**Case Reports:**

Case 1:

27 year-old male patient presented late after complete healing with loss of the upper one third of the helix because of a human bite. Contra-lateral
conchal cartilage graft was harvested, pedicled temporoparietal fascia flap was applied and covered by thin split-thickness skin graft from the medial aspect of the arm finally applied external coverage. Postoperative view of the patient shown at 12 months Figs. (1-4).

Case 2:
20 year-old male patient presented late after complete healing with loss of the upper one third of the helix because of a human bite. Costal cartilage graft was harvested; pedicled temporoparietal fascia flap was applied and covered by thin split-thickness skin graft from the medial aspect of the arm finally applied external coverage. Early postoperative view of the patient shown at 1 month Figs. (5-6).

Case 3:
12 year-old male patient presented late after complete healing with loss of the upper one third of the helix because of a human bite. Costal cartilage graft was harvested; pedicled temporoparietal fascia flap was applied and covered by thin split-thickness skin graft from the medial aspect of the arm finally applied external coverage. Immediate postoperative view of the patient is shown at 2 weeks because the patient lost for follow-up as he travelled abroad Figs. (7-8).

Case 4:
32 year-old female presented early after human bite injury with loss of the lower two thirds of the helix. Primary surgical debridement was done, prophylactic systemic broad-spectrum antibiotic was given to her and daily wound dressing with topical antiseptic ointment until complete healing obtained followed by topical scar control for 8 months. Costal cartilage graft was harvested; pedicled temporoparietal fascia flap was applied and covered by thin split-thickness skin graft from the antero-lateral aspect of the thigh finally applied as external coverage. Immediate postoperative view of the patient is shown at one week and late post-operative view shown after 12 months of continuous follow-up Figs. (9-11).

Fig. (1): Pre-operative.
Fig. (2): Early post-operative.
Fig. (3): Late Post-operative.
Fig. (4): The other normal auricle.
Fig. (5): Pre-operative.

Fig. (6): Early post-operative result.

Fig. (7): Pre-operative.

Fig. (8): Immediate post-operative.

Fig. (9): The defect.

Fig. (10): One week post-operatively.
Results

The symmetry of the reconstructed ears, in terms of shape and size, was satisfactory for all cases. Cosmetic appearance was acceptable, with a slight color mismatch of the reconstructed portion of the ear. Scars were also a problem. A more satisfactory appearance of skin color and texture were achieved in 4 patients who were complied with the long post-operative care skin grafts were obtained from the medial arm region. Neither skeletal collapse nor flattening of the helical rim was seen in any of the patients. The height of the helical rim was restored sufficiently in one patient who had complete helical loss. In the other patients, restoration and definition of the helix at the upper and mid parts were achieved by using the costal cartilage grafts that were shaped to the patterns of the defects. Minor revision included de-bulking of the pedicle in one early patient at the post auricular area 3 months postoperatively and junctional scar revision was done late in 3 patients. No additional complications were encountered in the other patients Table (1).

Discussion

Human bites involve the head and neck approximately 20% of the time with the ear accounting for 67% of them. Human bite injuries to the auricle always present as avulsion highly-lacerated wounds with whole-thickness losses of different parts [8].

The techniques for reconstruction of partial helical rim defects may be placed into two main categories: (1) the circumference-reducing procedures that necessitate removal of healthy tissue and result in smaller asymmetric ears and (2) the techniques designed to maintain the volume of the ear by interposition of grafts, flaps, or both [9].

Although various operative techniques have been described to reconstruct partial defects of the ear, there is still controversy about the ideal method of reconstruction [10-13]. Composite flaps from the same or opposite ear have limited use in moderate to large defects exceeding one-third of the helix [14,15]. In the study group, reconstruction necessitates autologous or alloplastic replacement of missing framework.

Conchal cartilage grafts are the best choice for frameworking an upper third helix defects. Rib cartilage may be the best choice for larger defects especially in young patients exposed to human bite injuries [16]. The main disadvantage of using the cartilage is that it demands a high level of expertise to accurately carve a realistic framework. There is also added morbidity of a second operative site to supply the donor cartilage. Moreover, cartilage allografts, if used, may undergo a variable amount of resorption and carry the potential risk of transmissible viral agents [17].

Other surgeons prefer to use the Medpor implant to create a somewhat flexible framework of interconnecting pores as the rapid tissue ingrowth into its pores forms a stable complex resistant to infection, exposure and deformation by contractile forces. The major frequent disadvantage of the Medpor implant is its exposure risk [18,19].

Symmetrical auricles and natural appearing ears were achieved in all cases. In the long term, no cartilage graft distortion was seen that caused asymmetry of the auricle. Because the secondary deformities of microtia, such as soft and/or skeletal hypoplasia and low or unfavorable hairline, do not accompany acquired defects of the ear, the overall results of our patients are superior to total auricular reconstruction cases with microtia. Existence of native external meatus and natural anatomical localization of the auricle in acquired cases may give an additional natural appearance to the reconstructed ear [20].

Spontaneous exposure of the cartilage graft was not seen in any of our patients. This may be attributable to good coverage of the graft with a well vascularized temporoparietal fascia flap and strong stabilization of the graft between the remaining edges of the cartilaginous skeleton [21-24].

The superiority of the cartilage over the porous polyethylene implant for partial defects is that
because of its natural flexibility, its lower rate of exposure to the remaining framework, the liability for carving according to the defect and the low-cost of harvesting [25].

Skin color mismatch and scar problems of the reconstructed part is the major problem interfering with cosmetic outcome. A patchy appearance of the auricle may be a postsurgical complaint for some patients in the long run [26]. Aesthetically superior results can be achieved in auricles by using skin grafts from the medial arm region. Another alternative may be the use of the postauricular skin of the contralateral ear for anterior coverage of the temporoparietal fascia flap [27]. The long-term local care dramatically improves the appearance of the grafted site. Local flaps often become scarred and thick, lacking both flexibility and the ability to reflect the shape of the underlying framework. Moreover, local flaps cannot provide necessary tissue in some cases and need a combination of several flaps [28-32]. In contrast; the temporoparietal fascia flap is thin enough to reflect the shape of the reconstructed helix and provides adequate tissue coverage for all types of defects including the lower pole of the helix. The author did not encounter any problems related to soft-tissue coverage using the temporoparietal fascia flap. Bulkiness of the pedicle required minor revisions under local anesthesia in one early patient. Revision junctional scar was done late in 3 patients. Precise narrowing of the pedicle during the first procedure avoids this problem.

Conclusions:

Although acquired post-human bite partial helical reconstruction remains a challenge for the reconstructive surgeon, more favorable results can be achieved by combined use of the autologous cartilage grafts and the temporoparietal fascia flap. This technique not only results in a superior cosmetic outcome but also reduces the exposure rate associated with many alternative methods. The author recommends using this one-stage combined technique for reconstruction of various types of partial helical defects following human bites in adult patients. He also strongly recommends long-term topical local care of the skin graft over the temporoparietal fascia to eventually achieve pleasant aesthetically accepted results.

References


