Partial Avulsion of the Right Ear Treated with a Pocket Technique: A Case Report and Review of the Literature

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Received: 28 November 2012 / Accepted: 13 March 2013 / Published online: 10 April 2013
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Abstract Avulsive injuries to the ear are not common and are variable in presentation. This article describes a case of subtotal auricular avulsion treated utilizing a pocket. Other techniques used for these types of injuries are reviewed.

Keywords Partial avulsion · Ear · Pocket technique

Case Report

A 40 year old healthy male was brought to the emergency department after being struck by a motor vehicle. The patient had an avulsive injury to the right auricle. The avulsed ear was maintained in a bag of ice since the time of injury. The patient was taken to the operating room within 3 h of the injury for treatment.

The native defect extended from one half of the lobe to two-thirds of the helix and antihelix with missing skin and cartilage (Figs. 1, 2). The amputated auricle was pale and shrunken with ragged margins (Figs. 3, 4).

First the native ear and the avulsed portion were conservatively debrided.

The avulsed segment was anatomically aligned and secured to the native ear (Fig. 5). Next, a subcutaneous postauricular flap extending to the temporal area was elevated and advanced (Fig. 6) providing coverage of the

avulsed segment (Fig. 7). At conclusion a pressure dressing was applied.

The patient was transferred to another center for management of orthopedic injuries. Three weeks later the auricle was uncovered. Majority of the avulsed segment was viable, with moderate necrosis of the lobe. During the hospital stay the patient underwent two revision procedures to reconstruct the lobe and helix using local flaps (Figs. 8, 9).

A follow-up photo (Fig. 10) shows survival of majority of the replanted segment with significant scarring in the postauricular area. Because the cosmesis of the auricle was not ideal, attempts were made to contact the patient for revision procedures but the patient was lost to follow-up.

Literature Review

McDowell and others have used simple suturing to successfully reattach avulsed segments as composite grafts [1–4].

Baudet et al. reported a case of composite grafting of an avulsed segment where the posterior skin of the avulsed segment was removed to the perichondrium with the anterior skin left intact with fenestrations. The anterior skin and helix were sutured to a postauricular flap. A second procedure was performed to separate the ear and graft the posterior aspect [5]. Other surgeons have had success with similar techniques [6–8]. In 1971 Mladick et al. was the first to report a case of successful reattachment of a severed ear using the pocket principle [9]. The technique involved dermabrasion of the amputated segment, reattachment and burying beneath a postauricular flap. In 1973, they reported another successful case with a modification to “prevent crumpling of the defect”. The uncovering was also done at

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Fig. 1 Native ear showing defect extending from the helix to the lobe

2 weeks as opposed to 28 days like in the first case [10]. Park et al. made modifications to this technique with success [11]. Pribaz et al. applied Mladick's technique successfully in five of six cases [12]. Pribaz states that Mladick's technique is simple and reliable. However, he states that for complete avulsions microsurgical techniques are superior. For partial avulsion injuries he recommends microvascular replantation only if arterial and venous anastomoses are possible. He states that venous anastomosis is often not achievable in partial avulsions and recommends using a pocket technique in such cases [12, 13].

In 1980 Pennington et al. [14] were the first to report the successful microvascular replantation of an avulsed ear, and has had long term follow-up [15].

Steffen et al. [16] reviewed the 25 years of ear amputation cases since Pennington first described it. They classified injuries as total amputations, partial amputations and extended lacerations. Treatments were microsurgical, pocket principle, periauricular soft tissue flaps or composite grafts. The results were classified as full success, partial necrosis or total loss. For total amputations microvascular showed 18 (69 %) having full success, 5 (19 %) with partial necrosis and 3 (11.5 %) with total necrosis. Utilizing pocket techniques one (25 %) had full success, 2 (50 %) partial necrosis and one (25 %) total necrosis. Of the 9 cases of partial amputations treated with microvascular techniques four (44 %) had full success, four (44 %) had partial necrosis and one (11 %) had total necrosis. Utilizing the pocket technique six (60 %) were fully successful, three (30 %) had partial necrosis and one (10 %) total necrosis. Steffen concluded that micro surgically re anastomosed replantation is the best method for avulsive

Fig. 2 Close view of native defect showing exposed cartilage with a combination of stellate and ragged skin margins

Fig. 3 Anterior view of the avulsed pinna

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Fig. 4 Posterior view of the avulsed pinna

Fig. 5 Anatomical reattachment of the avulsed segment to the native auricle

injuries. However, microvascular techniques have been shown to have increased operating time and hospital stay [17]. In cases where venous outflow is not achieved the use of medicinal leeches is often necessary. When leeches are used, antibiotic prophylaxis against *Aeromonas hydrophila*

Fig. 6 Subcutaneous post auricular skin flap

is necessary. Significant blood loss is common often requiring transfusions, with one case requiring thirteen units of packed red blood cells [17–21].

Discussion

The robust blood supply to the external ear and postauricular area is primarily from the superficial temporal and posterior auricular arteries, of the external carotid artery [22]. In utilizing the pocket technique the mechanism of survival of the avulsed portion is likely by diffusion of nutrients anteriorly and posteriorly by the skin flap and temporoparietal fascia, respectively. This is then followed by the development of vascular channels between the grafted segment and the native site.

Conclusion

The surgeon treating these injuries should have an understanding of all possible reconstructive options. Because the literature is limited to case reports it is difficult to say which procedure, if any, is best for all cases. Therefore it is important to report these types of cases especially in regards to method of treatment and outcome.

This case report describes an injury treated with a pocket technique that resulted in survival of most of the

Fig. 7 Avulsed portion of the auricle secured beneath the post auricular skin flap

Fig. 8 Three weeks after the injury the avulsed portion is uncovered. Necrosis of the lobe is seen

avulsed segment. The postauricular pocket technique can be considered a treatment option in cases of partial avulsion of the auricle.

Fig. 9 Anterior aspect of the auricle shows debridement of the necrotic portion of the lobe

Fig. 10 Follow up photograph shows survival of the majority of the avulsed segment. Significant scarring is noted in the post auricular area. Topographical changes are evident along the helix portion. Local flaps used to reconstruct the lobe are evident

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