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(CASE STUDY)

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Total auricular amputation salvage: A case report on the retro auricular pocket technique and review of alternative approaches

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Abstract

Management of auricular amputation presents significant reconstructive challenges, requiring a delicate balance between aesthetic outcomes and tissue preservation. We present a case demonstrating successful implementation of the retro auricular pocket technique for auricular reattachment. A 29-year-old male patient presented to our emergency department with complete auricular amputation following a car accident. Initial examination revealed a clean amputation with preserved auricular architecture. The amputated segment was managed according to standard preservation protocols. Following careful evaluation, we elected to utilize the retroauricular pocket technique as described by Mladick et al., rather than microvascular reconstruction. Surgical Technique and Management: The procedure involved meticulous deepithelialization of the amputated cartilage, followed by precise reattachment to the amputation stump and subsequent burial in a retroauricular skin pocket. The postoperative protocol included broad-spectrum intravenous antibiotics, systematic anticoagulation, and careful monitoring of tissue perfusion.

Outcome: The patient demonstrated excellent graft uptake with satisfactory aesthetic results. Follow-up at 3 months showed maintained auricular architecture with acceptable cosmetic appearance. This case highlights the efficacy of the retroauricular pocket technique as a viable alternative to microvascular reconstruction in selected cases of auricular amputation. The technique's success relies on maximizing the nutrient-tissue interface while preserving options for future reconstruction if needed.

Keywords: Auricular amputation; Ear reconstruction; Retroauricular pocket technique; Surgical reconstruction; Case report

1 Introduction

The surgical management of auricular amputations continues to present significant technical challenges in the fields of otolaryngology and plastic surgery. Optimal outcomes necessitate an integrated therapeutic approach, incorporating systematic antimicrobial prophylaxis, anticoagulation protocols, and controlled reperfusion techniques. Critical to surgical planning is the preservation of local tissue architecture, which maintains viable reconstructive alternatives should primary replantation prove unsuccessful. The paramount objective remains achieving superior aesthetic outcomes while maintaining surgical reversibility.

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2 Case Presentation

A 29-year-old male patient presented to the emergency department of our hospital with an amputation of his left ear six hours following a road traffic accident. On the initial examination, the auricle was found to be severed. The amputated auricle was sutured by approximation stitches in the local emergency before he was transported to our emergency (Figure 1). The amputated auricle included most of the anatomic auricular cartilage, extending from one-half of the lobe to two-thirds of the helix and antihelix with missing skin and cartilage (Figure 1). Although the auditory canal was preserved, the appearance of both the mastoid region skin and the amputated auricle was good.

Under local anesthesia, we detached the amputated ear. The amputated stump was thoroughly cleaned with normal saline and povidone-iodine 10%, and hemostasis was achieved (Figures 2). The amputated segment of the auricle was cleaned with saline and placed in a bottle filled with saline and lidocaine in the refrigerator while preparing the patient for surgery. The patient was otherwise stable, with no other injuries. He had no prior medical conditions or surgical history. He immediately started on intravenous antibiotics (amoxicillin-clavulanic acid 1g every 8 hours and ceftriaxone 500mg every 12 hours).

Figure 1 Initial view of traumatic defect

Figure 2 Amputation stump after cleaning and hemostasis

Emergency surgical procedure was planned under general anesthesia. During surgery, the amputated segment of the auricle was cleaned thoroughly and denuded of its skin. Perichondrium was left in place (Figure 3). There was significant bleeding from the wound margins, and the edges showed signs of crushing and congestion. An incision and undermining of the skin of the left mastoid region extending to the temporal area were carried out, thereby raising and advancing a flap whose width was equal to that of the amputated auricle. By placing the ear in its original site, it could be covered with this flap (Figure 5). The denuded portion was then sutured to the remaining cartilage of the amputated stump using 5-0 Prolene simple stitches and buried in the postauricular skin pocket, which was sutured to the wound edge.

The flap was kept tensionless, and a mini vacuum drain was left in place for 3 days to allow the skin to adhere to the cartilage (Figure 4). This allowed the cartilage to maintain its blood supply from the overlying skin cover, and staged reconstruction was planned for later.

Figure 3 View of the auricle was cleaned thoroughly and denuded of its skin. Perichondrium was left in place

Figure 4 Suture of the skin edges and placement of vacuum drain

In the second surgery, performed 2 months later under local anesthesia, the flap from the mastoid region was freed. The lateral portion of the skin flap was left attached to the cartilage, and the posterior/medial aspect was covered with split-thickness skin grafting and allowed to reepithelialize spontaneously over several weeks. We harvested only the superior part of the flap due to vascular security concerns (figure 6). A third surgery was performed after 6 weeks under local anesthesia to harvest the inferior part of the flap and to reconstruct the ear lobule (figure 8). The patient's progress was uneventful except for some areas of epitheliolysis on the lower portion. This lesion healed completely without sequelae.

Figure 5 a/The retroauricular pocket and placement of the cartilage. b,,c/:suture of the cartilage with the residual cartilage in the amputation stump

Three months postoperatively, the replanted auricle was completely integrated and the local anatomy restored. A follow-up photo (Figure 9) shows survival of the majority of the replanted segment with significant scarring in the postauricular area. Although the patient was satisfied with the result, due to suboptimal cosmesis of the auricle, he is scheduled for revision procedures later.

Figure 6 Superior liberation of the superior part of the ear 1 month after the first surgery a/the mastoid incision, b/the undermining of the skin flap with cartilage, c creation of the retro auricular space after the flap, d-e/skin graft of the new retro auricular space

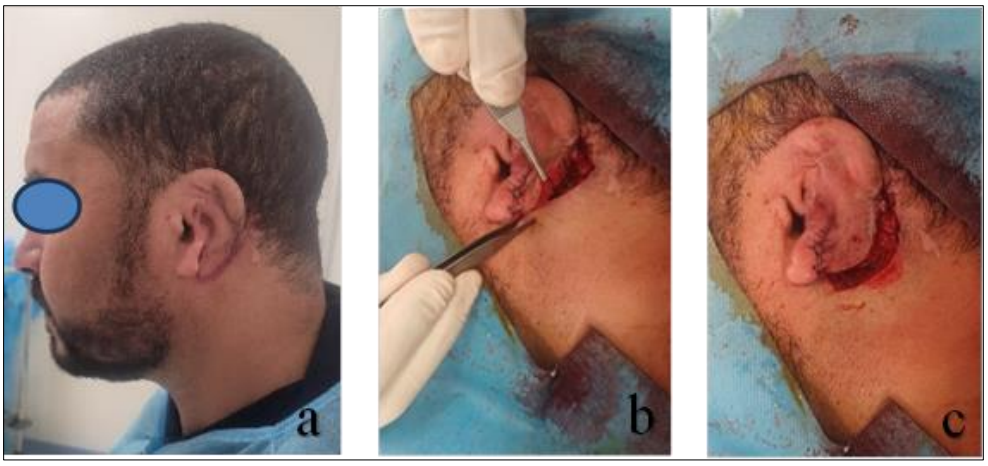

Figure 7 Patient 1 month after the liberation of the upper part of the ear a: posterior view, b-c/lateral view

Figure 8 The liberation of the lower part of the ear + lobule reconstruction: a/before surgery b-c/after reconstruction

Figure 9 Patient 3month after the last surgery: a: posterior view, b-c-d/lateral view

3 Discussion

Blood supply to the external ear and postauricular area primarily comes from the external carotid arteries' branches, specifically the superficial temporal and posterior auricular arteries. This intricate vascular network ensures adequate

perfusion and nourishment to the complex auricular anatomy, which is essential for both normal function and successful surgical interventions.

In ear replantation using the pocket technique, the avulsed portion survives through nutrient diffusion via the skin flap and temporoparietal fascia. This process leads to the formation of vascular channels between the grafted segment and the recipient area. The success of this technique heavily depends on the careful preservation of these vital tissue layers and their blood supply during the surgical procedure, as well as proper postoperative care to maintain optimal circulation. [1]

The first microsurgical ear replantation case was documented in 1980, proving to be a reliable method for treating traumatic ear amputation. Successful microsurgical revascularization involves three distinct techniques: vein grafts, primary vascular repair, and repair using pedicled superficial vessels of the head and neck region. Each of these approaches has its specific indications and advantages, with the choice depending on factors such as the nature of the injury, the condition of the local vessels, and the surgeon's expertise. [2, 3]

Prior to this widely used microsurgical technique, Mladick and colleagues introduced the retro auricular pocket principle for non-microsurgical ear reattachment in 1971. This method involved removing the epithelium from the amputated part, anatomically attaching it to the amputated stump, and burying it in a retro auricular skin flap pocket. [4] This approach provided a larger insertion area and greater contact surface with the vascular bed, enhancing the composite graft's chances of uptake and survival. The technique gained popularity due to its relative simplicity and reliability in cases where microsurgical repair wasn't feasible.

Park and colleagues developed another cartilage burial technique, where all skin except the helix area is removed from the graft. The exposed cartilage is placed between an anterior retro auricular flap and a posterior facial flap. This innovative approach maximizes the contact between the cartilage framework and the well-vascularized tissue beds, promoting better graft survival through enhanced nutrient diffusion. . [5]

Destro and Speranzini proposed an alternative technique where all skin except the concha is removed from the graft. The cartilage is perforated multiple times before being covered with a postauricular flap, requiring a second surgery to elevate the ear. These strategic perforations create additional channels for nutrient diffusion and neovascularization, while the staged approach allows for better tissue integration and aesthetic refinement. . [6]

Fernandes and Driscoll's experience demonstrated that porous polyethylene reconstruction of the pinna, particularly using Medpor, yields excellent cosmetic outcomes. They achieved notably good results through tissue expansion and expanded skin utilization. The porous nature of the material promotes tissue ingrowth and integration, while its malleability allows for precise shaping to match the contralateral ear's architecture. [7]

Lin and colleagues' research confirmed that microvascular replantation provides the best outcomes for amputated pinna reattachment, delivering superior cosmetic results. For patients lacking suitable vessels for micro anastomosis, they suggested various non-microsurgical alternatives, including temporoparietal fascia flaps, retro auricular pocket procedures, and staged costochondral cartilage reconstruction, based on the ear defect's size. Their comprehensive approach to treatment selection ensures optimal outcomes across a wide spectrum of auricular injuries. [8]

In a 25-year review of pinna reconstruction, Steffen and colleagues found that while microsurgical replantation delivers excellent aesthetic results, it demands intensive perioperative and postoperative care. They noted that pocket methods work well for partial amputations, while periauricular tissue flap repairs showed inconsistent results. Direct reattachment as composite grafts proved suitable only for lacerations without complete avulsion. This long-term study provides valuable insights into the relative merits and limitations of different reconstructive approaches. [9]

Reconstruction of amputated and lacerated auricles is also full of complications and pitfalls. Infections present as pain, inflammation, swelling, or tenderness more than 3 days postoperatively. Antibiotic treatment should be initiated promptly to avoid the development of suppurative chondritis. Chondritis appears as persistent edema, redness, and tenderness over the auricle. Hematomas are heralded by excessive pain or tenderness of the ear on the first or second postoperative day. Prompt exposure of the ear is needed. The facial nerve is at a greater risk for injury in the neonate and young child as it exits and courses more superficially due to the undeveloped mastoid process. Sutures, especially monofilament nonabsorbable sutures, may erode through the skin. Polyfilament sutures have less of a tendency for erosion but carry a higher rate of infection. Skin necrosis and loss can result from very superficial undermining of the skin flaps used in reconstruction, leading to circulatory impairment, desquamation, and atrophy. Pressure necrosis is

the most disastrous complication. All sutures must be placed with care to avoid pressure necrosis. Tight ear dressing should also be avoided to prevent this complication.

4 Conclusion

Microsurgical vessel anastomosis remains the superior technique for ear replantation, consistently delivering optimal aesthetic outcomes. When microvascular reconstruction is contraindicated due to insufficient vessel availability, alternative approaches must be considered. These include temporoparietal fascia flap coverage, retro auricular pocket techniques, and sequential costochondral cartilage reconstruction – each demonstrating efficacy proportional to defect dimensions. Modern synthetic implants, specifically porous polyethylene and Medpor, combined with tissue expansion protocols, have demonstrated notable success rates in auricular reconstruction.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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