

Case Report

The management of auricular defect using retroauricular flap

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ABSTRACT

Management of auricular defect is still a challenge for reconstructive plastic surgeons. The complexity of anatomy and shape will make the reconstruction complicated. It is also inevitable that choosing the right donor to close the defect that resembles the original contour is one of the success indicators of any ear reconstruction. There are wide selections of techniques for the management of auricular defect. Retroauricular flap is one of the best choices in auricular reconstruction due to its vascular richness, low of failure rate, similarity of tissue contour and the ease of closing the donor-site defect primarily. This article reported three cases of auricular defect with various causes: crushed injury, human bite, and tumor excision. Two stages of surgeries were performed on all three patients. After sufficient debridement, the ear defect is planted beneath retroauriculomastoid dermis. The second stage, three weeks from the first surgery, the donor flap is separated from it host. One week follow up after the second stage surgery, all of the post-operative wounds showed no signs of infection, minimal scar formation and has satisfied aesthetic outcomes. The retroauricular flap has the advantages of simple dissection, low failure rate and has a good shape, texture, color for a very good aesthetic results. This flap may be considered as a good solution in the management of auricular defect and a flap bank for ear reconstruction.

Keywords: Auricular reconstruction, Ear amputation, Ear defect, Ear reconstruction, Retroauricular flap

INTRODUCTION

Auricular prime role in contributing to the facial symmetry, presence of cartilage, direct exposure to external forces makes it as a vulnerable organ for defect formations. There are different causes for auricular defects including traffic accidents, tumor excision, bites, sports injuries, falls and burns.¹⁻³ Absence of some parts of the auricular or ear is a considerable aesthetic problem. If it is not properly managed at the time of initial insult, it can be disfigured for patients and may require multiple procedures for repair which can often cause the patient severe psychological distress.⁴⁻⁶ Every year, more than one million patients in the developed world undergo some kinds of procedures involving cartilage reconstruction.^{7,8} Auricular reconstruction surgery is a challenging plastic procedure that requires great expertise and expert knowledge of the various techniques

available.³ The complexity of anatomy and shape will make the reconstruction complicated. To ensure a successful ear reconstruction with satisfactory aesthetic results, needs to put attention in manipulation and availability of well-vascularized functioning tissue such as decreased tension at the site of reconstruction to ensure tissue vitality, aesthetic considerations and patient expectations as the psychosocial benefits. At times the amputee may be lost and this will be more difficult to reconstruct. The plan will depend on the remaining auricular components and its neighboring available tissue.⁹⁻¹¹

There are wide selection of techniques for management of auricular defect.^{9,3} The defect can be managed by reconstructive plastic surgery technique, from primary repair, local flaps and regional flaps, skin graft, insertion of autogenous rib cartilage framework under the skin, or

using prostheses made of synthetic material.⁹ Extensive injuries often involve multistage procedures for optimal repair. It is not uncommon to report that the higher complexity of a technique is directly proportional to the higher failure rate of a procedure.^{4,10}

Retroauricular skin flaps is one of the simplest and widely used in regional flaps that considered an ideal skin bank that perfectly matches close to the defect in terms of color, texture, provide a well-vascularized environment for ear reconstruction and has low rate of failures.^{9,3} The skin in the retroauricular area is relatively relaxed, the donor site can be closed with minimal tension. The donor site scar is acceptable and can be concealed by hair.³ In this study, authors presented three cases auricular defect caused by crushed injury, human bite, and soft tissue tumor with two stages of reconstruction using retroauricular flap technique at Mangusada Hospital, Badung, Bali.

CASE REPORT

Case 1

A 52 year-old male presented to the emergency department with 1 day history of motorcycle accident. He was fully awake but noted to have right auricular crushed injury. No other injury was identified clinically and radiologically. On ear examination, there was some parts of skin and cartilage of scaphoid fossa, helix and anti-helix were missing (Figure 1). No entry wound was visible, no hearing disturbance and no active bleeding. The patient remained haemodynamically stable and was taken to the operating room for auricular reconstruction under general anaesthesia.



Figure 1: Initial defect on the right ear. Missing some parts of skin and cartilage of scaphoid fossa, helix and anti-helix.

Prophylactic procedures including anti-tetanus and antibiotic one hour before surgery were administered. The remaining auricle was debrided, irrigated with normal saline and the recipient side was prepared (Figure 2). Incision was made at retroauricular area, undermined and formed a pocket that suits the size of recipient site. Some of retroauricular skin were elevated to form a skin flap and advanced to cover auricular defects anteriorly. The skin were sutured appositionally with multiple interrupted 5-0 nylon sutures.



Figure 2: Debrided remaining auricle.

The sutures were removed on postoperative day 7, no tissue necrosis were observed (Figure 3).



Figure 3: A) The right auricle before sutures removal. B) The right auricle after sutures removal.

The patient underwent second stage procedure 18 days after the first surgery. On examination there were no inflammation, ischemia or skin necrosis. The auricle was released, closed primarily by sutures and the auricular structure-like was restored (Figure 4).



Figure 4: A) Anterior view of post-released retroauricular flap. B) Retroauricular view of post-released retroauricular flap.

The patient had a good recovery 7 days after the second stage surgery (Figure 5). Skin sutures were removed and it showed to have a good outcomes with minimal swelling. The donor area has an excellent healing as well as cosmetic outcome. No infection developed, and the patient was adequately satisfied with the final results of reconstruction.



Figure 5: A) Anterior view of 7 days post-released retroauricular flap. B) Retroauricular view of 7 days post-released retroauricular flap.

Case 2

A 52 year-old compos mentis male presented to the emergency department with 20 minutes history of bitten by a mentally ill person with a good general condition. On physical examination, there was right auricular defect with some parts of skin and cartilage of scaphoid fossa, helix, antihelix and some part of lobule were missing (Figure 6).

No entry wound was visible, no hearing disturbance and no active bleeding. The patient remained haemodynamically stable and was taken to the operating room for auricular reconstruction under general anaesthesia.

Prophylactic procedures were administered before the surgery. After irrigated with normal saline and debrided, the amputated auricle wash then planted into the pocket of retroauricular flap as in the previous case. The first stage suture were removed 7 days later and no tissue necrosis were observed (Figure 7).



Figure 6: Initial defect on the right ear. Missing some parts of skin and cartilage of scaphoid fossa, helix, antihelix and some part of lobule. Debrided remaining auricle.



Figure 7: The right auricle 7 days after the first stage. Some sutures removal.

The patient underwent second stage procedure 18 days after the first stage surgery. The auricle was release from the pocket and then suture (Figure 8). Seven days after the second stage surgery, skin sutures were removed and its showed to have a good healing as well as cosmetic outcome. No infection development, minimal swelling and redness at the site surgery, and the patient was adequately satisfied (Figure 9).



Figure 8: A) Anterior view of post-released retroauricular flap. B) Retroauricular view of post-released retroauricular flap.

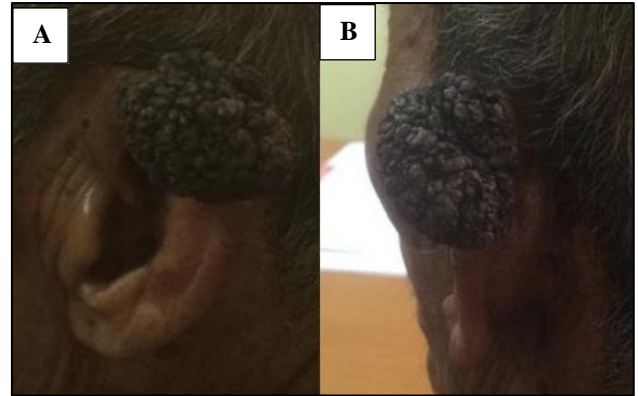


Figure 10: A) Anterior view of mass on the left ear. B) Retroauricular view of mass on the left ear.



Figure 9: Anterior view of 7 days post-released retroauricular flap.

Case 3

A 67 year-old male patient was referred to the department of plastic surgery with a black slowly growth mass at left auricle since ten years ago.

No history of mass pain, itchiness, bleeding, and discoloration. On physical examination there was an irregular, solid, immobile mass 2 x 2.5 x 3 in centimeters involving helix of auricle (Figure 10). The patient refused to do Pathological examination.

The patient was submitted to the operating room for mass excision under general anaesthesia. After the mass excision, there was cartilage exposed of the scapa, anterior and posterior helix of the auricle (Figure 11).

No cartilage involved noted. The exposed cartilage was then planted into the pocket of retroauricular flap (Figure 12).



Figure 11: Initial defect post soft tissue tumor excision on the left ear. Missing some parts skin of scapa, anterior and posterior helix of the auricle. A) Anterior view of exposed cartilage. B) Retroauricular view of exposed cartilage and retroauricular pocket.



Figure 12: The anterior view of left auricle before sutures removal. The original cartilage frame was still intake.

The patient had a good recovery 7 days after the second stage surgery (Figure 13). Skin sutures were removed and have a good outcomes with minimal swelling. The donor area has an excellent healing.



Figure 13: A) Anterior view of suture removal. B) Retroauricular view of suture removal.

DISCUSSION

The first and second patients came to the hospital was initially evaluated and managed according to the advance trauma life support procedures. Both of them had a normal primary survey (Airway, Breathing and Circulation) examination results, on the secondary survey examination there were ear defect. The third patient was came to the department of plastic surgery, planned for ear mass excision that will expose the cartilage and made it a challenge to close.¹²

We administered anti-tetanus prophylaxis at the first and second case, because these avulsed wound trauma were categorized as a containing devitalized, dirty wound and had unclear history booster within 10 years.¹³⁻¹⁵ On the third case, we didn't administer anti-tetanus prophylaxis, because the tumor excision wound defect is categorized as a sterile wound. We also used intravenous prophylactic antibiotic 1 gr of Ceftriaxone that is generally recommended for skin flora treatment twice per day in 3-5 days at pre and post reconstruction for all patients.¹⁵⁻¹⁷

The management continued with an elective reconstruction surgery in the ear defect in the operating room under general anaesthesia. A human bite and crush injury wound that categorized as a dirty wound have a relatively high risk of becoming infected, therefore intensive wound rinsing and cleaning is a mandatory. Devitalized wound edges are carefully excised. The remaining skin is then readapted.^{16,17}

All patients on this case reports were managed using two stages retroauricular flap of plastic reconstruction surgery technique. A flap is mainly effective for reconstruction in one third auricular defects, which connecting the auricular helix with the retroauricular tissue. In addition,

reconstruction for auricular defect cases is also chosen due to a wide defect (>2.5 cm), which no longer can be repaired by resection and primary closure (<1.5 cm), but should be done by flap techniques that include multi-stage reconstruction operations.^{4,8,18}

The retroauricular skin flap is ones of the technique that can be used to reconstruct an ear defect. This is a random-pattern flap with rich vascular supply based on branches of the posterior auricular, superficial temporal and occipital arteries. This technique uses retroauricular skin to cover the cartilage. It involves dermabrad and de-epithelializing the avulsed segment prior to reattachment to its original position.⁴ The use of a wide based pedicle will maximize the availability blood supply from the rich vascular retroauricular skin, thereby increasing the success rate of the reconstruction procedure.^{17,19}

The main disadvantage of this flap is the need for two stages to complete the procedure. The first stage is widely undermining the skin over the retroauricular region onto the mastoid and advancing that tissue to cover the posterior surface of the avulsed segment. Two to four weeks after allowing re-epithelialization, the segment is placed in the skin over the retroauricular region and a second-stage procedure will remove the repaired region from skin over the retroauricular. A retroauricular skin then raised, in which the reattached portion of the auricle is placed.^{4,17}

It is important to leave the flap for at least two weeks before dividing and detaching it from the retroauricular skin. This allows for adequate collateral revascularization, which is essential in preventing flap loss. The longer we leave the second procedure, the more amount of skin granulation will have taken place in the secondary defect.^{18,20,21} These two stages technique were suitable for all patients in these case reports. It was simple, stable and have an acceptable final aesthetic standard result even though there was no intact cartilage.

The third case result was the best among all cases, after skin sutures was removed, it showed a good recovery and outcomes with minimal swelling. There was cartilage intact, the ear defect was made by a sterile excision, planned with neat wound fringe, and followed direct closure using retroauricular flap technique, thus minimizing an inflammation of the wound excision defect at the surgery site after seven days evaluation when the second stage reconstruction was done. At the first and second case, there was some delay time from the accident, on the way to reach the hospital and until the time to do an elective surgery to close the defect, thus made a minimal inflammation of the wound excision defect at the surgery site after seven days evaluation when the second stage reconstruction was done.

Because the skin in the retroauricular is relatively relax, the donor site on all patients can be closed with little

tension by primary intention. It also had an excellent result with a hidden donor area so that the scar is not very noticeable.

CONCLUSION

The retroauricular flap is the most versatile option for partial ear defect reconstruction. This flap may be considered as a good solution in the management of auricular defect as a flap bank for ear reconstruction. It provides a simple approach for reconstructing any given partial ear defect. It is well vascularized, which make it safe to harvest. It does not cause a serious complication or sacrificing healthy tissue. The technique used in these case series provides acceptable results in the reconstruction of auricular defects.

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