

The fade of postauricular sulcus after microtia reconstruction with overly expanded mastoid skin

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ABSTRACT

Introduction: Tissue expansion offers sensate tissue of similar color, texture and thickness to be utilized to cover the defect areas. However, expanded flap contraction may become an important factor affecting the stability and long-term results of some special reconstructions such as microtia repair. The presented case was postauricular sulcus of an ear reconstructed with overly expanded mastoid skin, showing the long term effect of flap contraction on it. **Case Report:** A six-year-old girl was presented to our clinic with a complain of right microtic ear. Reconstruction of the microtia was planned, using a tissue expander and autogenous cartilage frame. A 110-ml expander was inserted under the mastoid skin. When volume of expander reached 135 ml, it was removed and cartilage framework was inserted into the pocket and lobule was transposed to the lower pole of the ear. In the early postoperative period, there were significant edema and hyperemia in the reconstructed ear. However, abundant flap tissue appeared both the anterior and posterior surfaces of the ear. In the follow-up period of 15 months, the depth of postauricular sulcus gradually decreased in the upper two-thirds of it. **Conclusion:** Coverage of auricular cartilage framework by using only expanded mastoid skin eliminates the necessity of the use of postauricular facial flap and additional

skin graft, but it poses a risk for contraction in the flap reducing the depth of postauricular sulcus.

Keywords: Flap contraction, Microtia, Postauricular sulcus, Tissue expansion

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INTRODUCTION

Tissue expansion is a major reconstructive modality in daily clinical practice of plastic surgery. It offers sensate tissue of similar color, texture, and thickness to be utilized to cover the defect areas. Therefore, it has widely used in the treatment of giant congenital nevi, reconstruction of scars causing from burns and traumas, releasing of contractures and alopecia treatment [1]. Recently, it has gained popularity in the reconstruction of microtia, depending on the reports of successful results and clinical experience with a large number of cases [2–4]. Well known complications of tissue expansion may occur preoperatively during the tissue expansion, intraoperatively while flap preparation and advancement are making or postoperatively, affecting the goals of the procedure. Hematoma, infection, expander exposure, flap ischemia and perforation due to percutaneous stabbing may be considered the most frequently occurring major complications in the process of tissue expansion [1]. However, a minor complication,

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expanded flap contraction may become an important factor affecting the stability and long-term results of some special reconstructions such as microtia repair. As flap contraction begins with the removal of expander and continues until wound healing completes, it interacts constantly with the shape and projection of reconstructed ear in the postoperative period. Presented here was postauricular sulcus of an ear reconstructed with overly expanded mastoid skin, showing the long-term effect of flap contraction on it.

CASE REPORT

A six-year-old girl was presented to our clinic complaining of right microtic ear. On examination, it was observed that she had a lobule type microtia. For the reconstruction of her microtia, tissue expansion was planned to cover autogenous cartilage frame within three stage. The first stage was placement of a rectangular tissue expander under the mastoid skin. The second stage consisted of removal of expander, placement of autogenous cartilage frame and lobule transposition. The final stage was tragus and concha reconstruction.

In the first operation, an approximately 2 cm incision was made into the remnants of microtic ear. Then subcutaneous dissection started under the mastoid region including hairless skin and hair bearing scalp to create a sufficient pocket for the implantation of expander. After meticulous hemostasis, a 110 ml quadrangular shaped expander was inserted and its valve was placed beneath the temporal skin. A negative pressure drain was also applied to the pocket. Ten days later, expander inflation started and was carried out once a week using 10–15 ml saline solution injection each time. When volume of expander reached 135 ml, expansion was finished and one month interval was given to provide a static phase for expansion (Figure 1).

In the second operation, seventh and eighth right costal cartilages were harvested and carved. Main block, helix and antihelix were created, and then a crescent shaped cartilage was added beneath the anterior margin of the main block to enhance projection of the frame. Afterwards, expander was removed and capsule of the flap was trimmed to reduce the magnitude of possible flap contraction. Cartilage framework was inserted into the pocket and anterior and posterior skin surfaces of the reconstructed ear were anchored each other continuously on the three lines where were scaphal sulcus, conchal scaphal margin and deep conchal area. The last suture line was located between the deep concha and the deepest area of post auricular sulcus (Figure 2). These sutures fixed the ear to the fascia of the mastoid region and avoided collecting blood and seroma between the skin and cartilage. After the transposition of lobul, a suction drain was placed into the pocket.

In the early postoperative period, there were significant edema and hyperemia in the reconstructed

ear, hiding the anatomical landmarks of cartilage frame. However, abundant flap tissue appeared both the anterior and posterior surfaces of the ear. Postauricular sulcus was deep enough (Figure 2). During the first month, edema subsided and prominences of frame became more apparent. Meanwhile, abundancy of flap lost due to the contraction of flap. At about two months after the intervention, all sutures removed. In the follow-up period of 15 months, the depth of postauricular sulcus gradually decreased in the upper two-thirds of it except for the back of lobule (Figure 3). In the postoperative 15 months, depth of sulcus remained only a few millimeters, needing postauricular sulcus reconstruction besides elevation of the ear from the mastoid region (Figure 4). The third stage of reconstruction involving tragus and concha reconstruction could not be performed, as parents of child did not want another intervention.



Figure 1: Appearance of expanded mastoid skin with a quadrangular shaped tissue expander.



Figure 2: Intraoperative view of reconstructed ear. Note that there was abundant flap tissue all around the ear (A) Lateral view and (B) Posterior view.

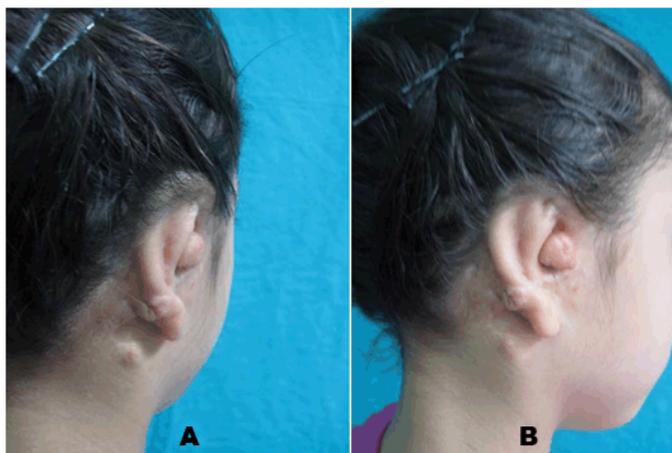


Figure 3: Appearance of the ear six months after the intervention. There was a decrease in the postauricular sulcus; however, its depth seemed to be enough (A) Posterior view and (B) Lateral view.



Figure 4: View of the ear 15 months after the intervention. Note that postauricular sulcus remained only a few millimeters in depth due to flap contraction, needing sulcus reconstruction (A) Lateral view and (B) Posterior view.

DISCUSSION

Tissue expansion of retroauricular skin has gained popularity in microtia reconstruction in the last years, as skin expansion can produce sufficient retroauricular skin which is needed for covering the cartilage framework. It is capable of eliminating or reducing the need for skin grafts, temporal fascia flaps and retroauricular fascial flaps, so many surgeons have increasingly preferred one of the tissue expansion methods of mastoid skin. Volume and shape of the tissue expander utilized in this region vary in accordance to the used techniques and the amount of skin needed for draping the cartilage frame. In some techniques, 50–90 ml expansion of skin may be considered as sufficient volume for reconstruction, as these use an additional postauricular facial flap to cover the posterior surface of the framework [5–7]. In the other

approaches, there is a need for the inflation of expander over 100 ml in order to drape the cartilage frame by using only expanded flap [8]. Whichever expansion method is used for increasing the postauricular skin, it provides an adequate, excellent-quality skin envelope for a successful ear reconstruction.

Complications of tissue expansion in the mastoid skin have been described clearly. Hematoma, exposure of tissue expander, dehiscence of incision, skin necrosis, extrusion of the stainless steel wire or sutures, infection, exposure of cartilage and hypertrophic scars have been mentioned in detail in many studies on microtia reconstruction with expansion, whose treatment modalities have also been well defined [7–10]. Although flap contraction is a well-known result of tissue expansion, its effect on the reconstructed ear has been less discussed in the studies among which only a few ones noted flap contraction in the texts [5–7]. There is no study including the cases of flap contraction after ear reconstruction in literature. In our opinion, flap contraction may be considered as a main factor being capable of changing the shape of ear with time, as it has a decreasing but continuous and long-term effect on the reconstructed ear. It has been shown that during expansion, although there is a 63% increase in expanded flap with a particular expander, this provides only a 30% increase after elevation and inset of the flap. This increase in flap dimensions can be provided for a three-month or four-month period. The 56% decrease in the flap probably results from contraction of the expanded skin [11]. Tissue expansion in the mastoid area is performed by using the general principles of tissue expansion except for the slow inflation and static phase to obtain enough skin expansion to drape cartilage framework. Chen reconstructed microtia using the expansion technique in combination with one month of consolidation phase to reduce the severity of flap contraction [8]. As a result, he did not note any signs of flap contraction. We used similar expansion method in which expander volume reached 135 ml, but encountered significant flap contracture decreasing the depth of cranioauricular sulcus.

Zhang reported 448 microtia ears reconstructed with expanded retroauricular skin and fascia flap. Although in his technique, expanded skin flap mainly draped the anterior surface of the framework, he mentioned the contracture of the thick fibrous capsule formed adjacent to the tissue expander. For the management of capsule fibrosis, in patients with thin capsule, partial resection at distal part of the flap was recommended and in cases with thick capsule, all capsular fibrous tissue was removed and separated from the subcutaneous tissue [5]. However, there was no information on the effect of flap contraction on the cases in the article. In the contrary, in our presented case, although all capsular tissue was removed, significant flap contraction occurred at the postauricular sulcus in the long-term follow-up. It seems that this intervention was not enough to prevent severe flap contraction.

Pan presented the experience in 368 patients with microtia [9]. Apart from our approach, in this study expanded skin flap covered the whole anterior surface of the cartilage framework and the fascial flap draped over the posterior surface of the cartilage frame. As a result, it was emphasized that reconstructed ears of four cases lacked detail because of thick fibrous tissue between the skin flap and the cartilage framework, which contributed to hematoma accumulation. In our opinion, this may be related to the flap contraction.

Xiaobo reported the experience on post-traumatic ear reconstruction using a postauricular fascial flap combined with an expanded skin flap in 91 cases and any knowledge was not given about flap contraction [12].

Dashan presented their technique in which an expanded skin flap to cover the anterior surface of the framework and the fascial flap for the posterior surface were used [6]. While there was no experience mentioned about flap contraction in this article, some technical recommendations were given for avoiding the contractile forces of expanded skin and facial flaps. The information suggest that expanded flap contraction may affect the reconstructed ear.

Jiang used the expanded skin flap and retroauricular fascia flap in microtia reconstruction and emphasized that if the reconstruction were to take place at 1st month, significant shrinkage would be noted, so allowing the additional month to sustain the expansion reduced the flap contraction [7]. This opinion suggested that the author has experience with expanded flap contraction as did we.

The expansion of postauricular skin provides abundant and excellent skin for microtia reconstruction; however, it is capable of leading some complications related to directly either rapid or slow contraction of the expanded flap. Early or rapid contraction of flap may cause difficulty in draping the cartilage frame in the operation, but slow contraction of flap occurring along the postoperative a few months, can distort the auricle shape, hide the prominence of frame or make contracture in the postauricular sulcus, affecting the final shape of the ear as well as the number of the revisions. It seems that magnitude of the flap contraction, determines the shape and projection of the ear and alters the depth of the cranioauricular sulcus when posterior surface of cartilage frame is covered by an expanded flap. A mild flap contraction results in good coverage of cartilage frame, moderate one makes ear structures less prominent and severe contraction which is possibly the least frequently occurring type of it, may cause distortion in the ear or insignificant view of ear structures or decrease in postauricular sulcus depth.

CONCLUSION

Coverage of auricular cartilage framework by using only expanded mastoid skin eliminates the necessity

of the use of postauricular facial flap and additional skin graft, but it poses a risk for contraction in the flap reducing the depth of postauricular sulcus.

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Author Contributions

Nazım Gümüş – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor of Submission

The corresponding author is the guarantor of submission.

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Conflict of Interest

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