

# Bipedicled expanded flap of the auricular remnant for helix reconstruction in microtia patients with severe comorbidities

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## Case Series

PLASTIC SURGERY



**Abstract:** Microtia represents a complex variety of malformations of the internal and external ear. There are different therapeutic alternatives for the reconstruction of the external ear (autologous rib cartilage graft or the use of prostheses). These techniques vary according to the number of interventions necessary for the final result. Patients with severe comorbidities are contraindicated for reconstruction with rib cartilage graft and thus require other options such as implants or flaps. We are presenting a new technique (bipedicle expanded flap of the auricular remnant for helix) in a series of successful cases (7 patients) with severe comorbidities, with enough tissue left so external ear reconstruction can be performed, with no grafts needed and with low probability of complications using tissues surrounding the remnant ear.

**Keywords:** Microtia, bipedicle flap, helix reconstruction.

## Introduction

Rib cartilage is the most commonly used option to reconstruct microtia. However, many acute and chronic complications have been described. Patients with life-threatening disease are contraindicated for reconstruction with rib cartilage graft and thus require other options such as external or internal implants. These have greatly increased in popularity in recent years but present some complications, and the cost is an important factor to consider.

## Methods

We hypothesized that some patients have sufficient remnant auricular tissue to be intraoperatively expanded, lifted as a bipedicle flap, and repositioned to create a new helix. This was indicated in seven such patients with microtia and life-threatening illness without any alternative for reconstruction, on whom we report herein.

Seven patients (two with cardiomyopathy with limited function, three severe bronchopulmonary dysplasia and two with hemophilia) with microtia from 10 to 14 years old. Six male and one female patient presented microtia type 2-3. Informed consent was granted by the family who understood alternative options for reconstructing the ear, that BEFAR is a new technique, the risks and that this new method has limited results. The ethical committee of the hospital

approved BEFAR use on one patient, after six months follow up the approved its use in more patients. After complete clinical and laboratory exams, the surgery was performed under general and local anesthesia.

The remnant was left as a bipedicle flap with 5mm proximal and distal base. After resecting the cartilage remnant and closing the donor area with absorbable sutures, we performed gentle flap expansion by hand for 5 minutes and retro-positioned the anterior and posterior skin.

The wound site was covered with gauze and bandage for one week. This procedure was performed in less than an hour with minimal bleeding. This first patient underwent this surgery in 2015, and up of the seven patients was between 6 months and 4 years.

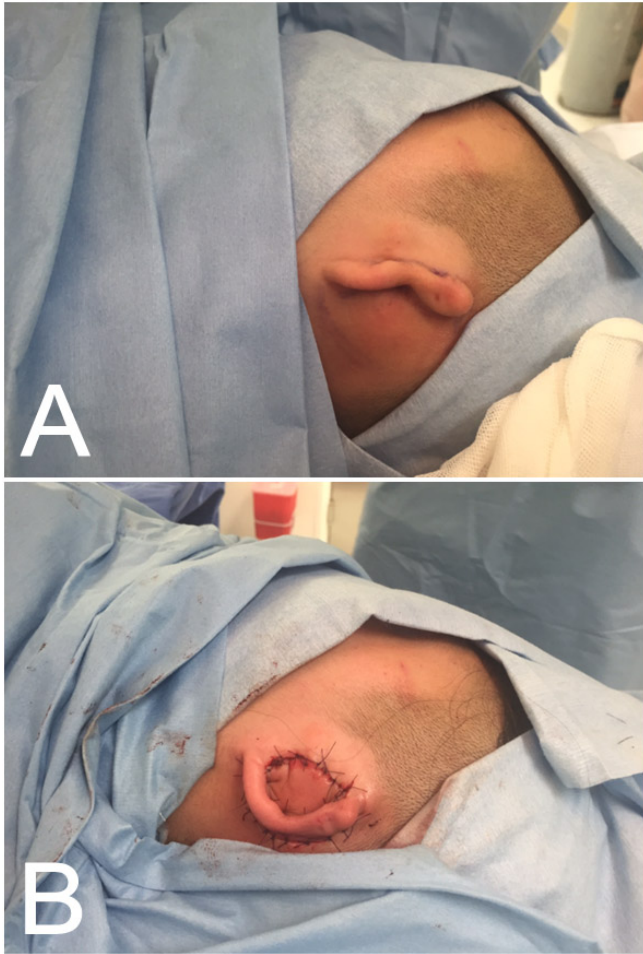
The follow-up of the patients was in the immediate postoperative period, after one week and finally after 1 month comparing the preoperative appearance with the postoperative result with acceptable results.

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## Results

Outcomes were very good for patients (100%) and good for family members (85%) without significant complications. Patients restored normal activities after three weeks. No ischemic necrosis or infections occurred. The most common complication

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**Figure 1.** A. Preoperative appearance of a boy with microtia, it was planned a bipedicle expanded flap of the auricular remnant (BEFAR) for helix reconstruction. B. Postoperative appearance of after the BEFAR helix reconstruction.

was a 15% shorter auricle compared with contralateral ear, perhaps due to limited expansion and preclusion of promoting ischemia. In future cases, greater expansion and bigger helices may be warranted.

One patient presented hypertrophy of the helix and another patient presented a 1cm hypertrophic scar. The new helices have a good aspect, good projection and continuity. The tissue in and around the surgical site is suitable for future surgery if the patient desires. Despite the limited results herein, these cases demonstrate that using the remnant is a good option for reconstructing a helix.

**Discussion**

Microtia is a common deformity of varying grades that represents important social, medical and economical repercussions. Helix reconstruction is a significant challenge with a variety of surgical options for restoration (flaps, cartilage rib graft, external o internal implants, tissue expansion, etc.).<sup>1,9,18</sup>

The most common technique to reconstruct the ear is with a graft of rib cartilage.



**Figure 2.** A. Preoperative appearance of a patient with microtia with operative marks for BEFAR helix reconstruction. B. Postoperative appearance after the BEFAR helix reconstruction. It is notorious the helix projection after the procedure.

The morbidity of this is well known, and the complication rate is around 16% in the donor area and auricle. Complications of the donor area include pain, pathological scar, limited pulmonary function, thoracic deformity, length of surgery, pleural perforation, pneumothorax, atelectasis, pleural tear and scoliosis. Complications in the auricle area include asymmetry, infection, hematoma, extrusion and incomplete correction.<sup>2,7,10,13-15</sup>

Thus, more conservative techniques have advanced; less aggressive surgeries, some using splints or implants, has improved results.<sup>3,11,17</sup> The morbidity and mortality after traumatic rib fracture



**Figure 3.** A. Preoperative appearance of a patient with microtia with operative marks for BEFAR helix reconstruction. The marks delimit the area where the bipedicle expanded flap was harvested. This microtia had a better helix projection. B. Postoperative appearance after the BEFAR helix reconstruction. The stitches were removed and this was the appearance after one month of the procedure.

and the limited ventilation after chest trauma are well described, and pain reduction improves patient ventilation.<sup>4,5</sup> Computed tomography (CT) evaluation diagnoses more than 70% of thoracic deformities as a complication of the donor area after rib cartilage harvesting. This affects not only image but also ventilatory mechanics.<sup>6,16</sup> The removal of three ribs impairs the expansion of the thorax upon inspiration by 10 to 40%. Furthermore, cartilage harvesting is contraindicated in some patients with microtia and life-threatening illness such as severe cardiomyopathy

or limited pulmonary function.<sup>8</sup> Using the auricular remnant to reconstruct the helix, concha, tragus, and lobule is increasing popularity.<sup>19,20</sup> Herein we proposed a novel technique with a bipedicle expanded flap of the auricular remnant to form the helix.

### Conclusion

The purpose of this paper is to present a new technique to create the helix during microtia. Our hospital (Hospital Infantil de Mexico Dr Federico Gomez) only receives patients with severe disease with complication. It is also a public institution, so they attended patients and family are economically underprivileged and many of our patients have life-threatening illnesses. Reconstruction of the helix with rib cartilage was therefore contraindicated in some patients, and our hospital does not use implants because of the cost.

We therefore hypothesized that use of intraoperative BEFAR will produce an acceptable helix reconstruction. This is an easy surgery, taking less than an hour with minimal trauma, a good projection of the helix and leave healthy tissue in the auricle area for a second stage surgery or further revisions.

We furthermore believe that in future cases we will be able to achieve more expansion and a taller new helix, because in the first case we limited the procedure to protect circulation of the flap and never have problems with it in the future.

This represents a novel approach to helix reconstruction.

### Conflicts of interest

None.

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**Figure 4.** A. Preoperative appearance of another boy with microtia with operative marks for BEFAR helix reconstruction. B. Postoperative appearance of the boy in Figure 7, after the BEFAR helix reconstruction. This patient had a low grade microtia achieving adequate helix projection and appearance. C. One month postoperative appearance of the boy in Figure 7, after the BEFAR helix reconstruction and after the stitches were removed.

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