Journal of Cranio-Maxillo-Facial Surgery xxx (2018) 1–6

Contents lists available at ScienceDirect

Journal of Cranio-Maxillo-Facial Surgery

journal homepage: www.jcmfs.com

A new technique for transcutaneous fixation of the costal cartilage block utilized in reconstructed ear elevation for microtia

So Young Kim [a], Sun-June Park [b], Kap Sung Oh [b, *]

[a] Department of Plastic and Reconstructive Surgery, Inje University Sanggye Paik Hospital, Inje University School of Medicine, Seoul, Republic of Korea
[b] Department of Plastic Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Republic of Korea

ARTICLE INFO

Article history:
Paper received 29 August 2017
Accepted 24 January 2018
Available online xxx

Keywords:
Microtia
Auricular elevation
Transcutaneous fixation

ABSTRACT

Purpose: With the aim of implementing good projection of the three-dimensional frame (auriculo-cephalic angle) and maintaining projection, a significant issue during the stage of auricular elevation for avoiding the potential for dislodging the cartilage blocks remains. Herein we present an innovative and technically simple method of transcutaneous fixation of the costal cartilage block during the stage of auricular elevation.

Materials and methods: After elevation of ear frame from the basement, two suspension stitches on the surface of the elevated ear were used to fix the embedding cartilage block into the auriculo-cephalic sulcus at the upper (bifurcation point of the anti-helix where the inferior and superior crus meet to form the triangular fossa) and lower (projection point of the concha wall, parallel to the level of the tragus) ones. A loop of suture was placed through a dermal anchor, ear frame, and piece of the cartilage block.

Results: Among a total of 50 patients, 94% achieved 'excellent' and 'good' outcomes in terms of auricular symmetry. Likewise, 86% (n = 43) of patients achieved 'excellent' and 'good' outcomes in terms of projection in postoperative 6- month follow-up. There were no instances of significant cartilage or knot exposure or absorption of the embedded cartilage blocks.

Conclusion: The technique of transcutaneous fixation of cartilage blocks for ear elevation described in this study was associated with excellent outcomes, producing stable clinical results based on our long-term experience with ear reconstruction.

1. Introduction

Ear reconstruction in microtia patients is one of the most difficult challenges in plastic surgery. Among the several established methods for auricle reconstruction in microtia, elevation of the framework and construction of the retro-auricular sulcus is usually conducted simultaneously as part of the final step, with the aim of implementing good projection of the three-dimensional frame (auriculo-cephalic angle) and maintaining projection. To achieve these goals, various materials, both autologous and artificial, have been embedded into soft tissues of the posterior surface of the auricular framework. Among these materials, a cartilage wedge block or blocks are most commonly used for firm elevation of the reconstructed ear for several reasons; these include the availability of a remnant cartilage block from the frame fabrication stage, and the relatively low risk of complications such as infection and exposure compared to that associated with alloplastic materials.

In the method established by Brent, a wedge or semi-lunar-shaped cartilage block is grafted to the posterior aspect of the conchal region of the implanted ear frame and subsequently fixed behind the elevated ear (Brent, 1999). However, there is a potential problem with this method, in that the cartilage block can become displaced through slippage, resulting in an unsatisfactory ear projection. To reduce the probability of this adverse event, Nagata modified the semi-lunar shape of the cartilage block into a concave shape including rectangular configuration in the cross-sectional view, which can be elaborately placed into the conchal region

* Corresponding author. Department of Plastic Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, 81 Irwon-ro, Gangnam-gu, Seoul 06351, Republic of Korea. Fax: +82 2 3410 0036.
E-mail address: kapsung.oh@samsung.com (K.S. Oh).

https://doi.org/10.1016/j.jcms.2018.01.017
1010-5182/

and the mastoid surface (Nagata, 1994). Generally, one or two small cartilage block remnants are banked underneath the chest incision after the framework fabrication. However, in Nagata's method, the amount of cartilage required to create the precisely fitted concave block may require patients to undergo a second operation to harvest additional rib cartilage (Brent, 2002). Given these concerns, a significant issue during the stage of auricular elevation for maintaining good projection and avoiding the potential for dislodging the cartilage blocks remains, and rigid fixation of small cartilage blocks is considered essential. In the present study, we present an innovative and technically simple method for transcutaneous fixation of the costal cartilage block, and investigate the surgical outcomes of this method during the stage of auricular elevation.

2. Materials and Methods

The present study describes the experience of a single surgeon, the senior author of the present study, who, since January 2001, has performed more than 650 microtia reconstructions with an autologous rib cartilage graft. In order to compare reconstructed ears with normal ears, cases of bilateral microtia and hemifacial microsomia were excluded. To increase homogeneity of the study population, patients who underwent the tissue expander insertion prior to the auricular elevation and received the primary reconstruction in other centers and visited our clinic for unfavorable results of it were excluded.

The reconstructions were typically performed using a two-stage method, which consisted of implantation of a carved costal cartilage framework and lobule transposition in the first stage, and an auricular elevation of the framework in second stage. In the second stage of auricular elevation, we routinely used two banked costal cartilage blocks to cover the superficial temporal fascia pedicled by the superficial temporal vessels and full-thickness skin grafts, generally at least 6 months after implantation of the framework. Traditionally (before 2016), costal cartilage blocks were usually fixed directly to the innermost region of the auriculo-cephalic angle on the posterior surface of the framework, similar to Nagata's method (Nagata, 1994) (Fig. 1). Since January 2016, the authors have changed the fixation method in auricular elevation surgery to the transcutaneous fixation technique.

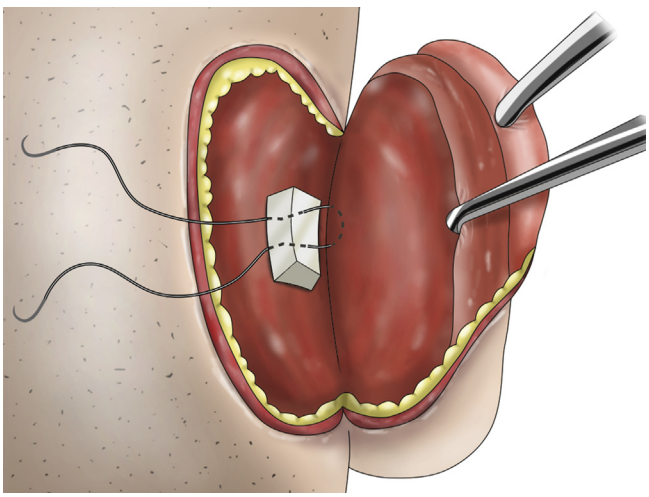

Fig. 1. Traditional method for direct fixation of cartilage block to the innermost region of the auriculo-cephalic angle on the posterior surface of the framework.

2.1. Surgical techniques for transcutaneous fixation of cartilage blocks

After the ear framework was appropriately elevated from the basement, two fixation points on the surface of the elevated ear were used to fix the embedding cartilage block into the auriculo-cephalic sulcus in order to firmly secure the structure. The upper point is typically placed at the bifurcation point of the anti-helix where the inferior and superior crus meet to form the triangular fossa. This point is particularly important, as it is where eyeglasses rest and is thus responsible for maintaining them in a horizontal plane and at a symmetrical level. The second point was placed at the projection point of the concha wall, parallel to the level of the tragus. This point was nearly equivalent to the location of the eminentia conchae, which Nagata emphasized as being the crucial point for ear elevation (Nagata, 1994) (Fig. 2).

At each fixation point, dermal anchoring sutures were performed with a 5-mm gap by passing one of the double-armed 4-0 non-absorbable Prolene needles with thread dermally from one puncture mark to another. Then two suspension stiches with a straightened needle were driven into the same trajectory hole, where dermal anchoring sutures were out, and vertically passed through the skin and ear framework toward the cartilage block and reoriented vertically for passing two points of the cartilage block. Care was taken during the procedure to enter the skin through the same holes so that the suture remained buried internally. By means of this process, a loop of suture was placed through a dermal anchor, ear frame, and piece of the cartilage block. Next, the two needle arms of the thread were curved and fed through the basement of the posterior sulcus in each point and tied together to the other suture end to complete a buried horizontal mattress (Fig. 3).

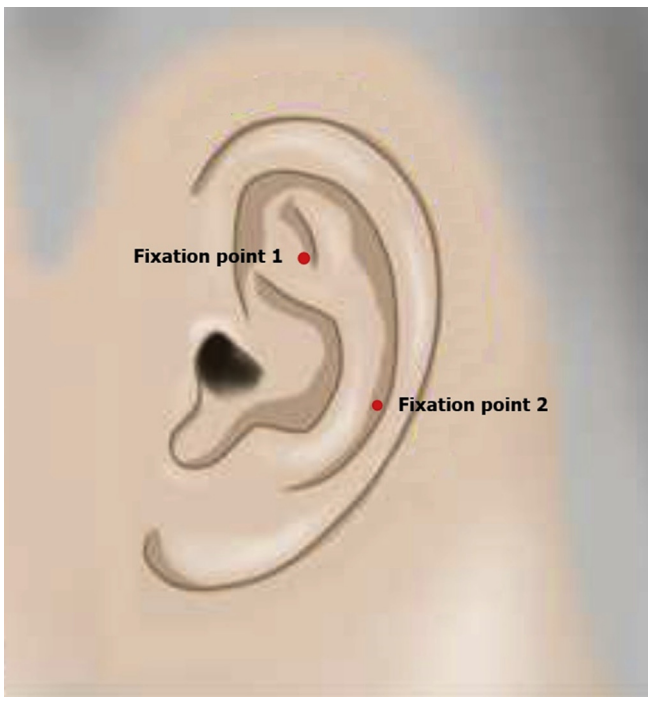

Fig. 2. Location for the two fixation points of the cartilage block in an elevated ear frame. Fixation point 1 is at the bifurcation point of the anti-helix where the inferior and superior crus meet to form the triangular fossa. Fixation point 2 is at the level of the projection point of the concha wall, which is parallel to the level of the tragus.

Please cite this article in press as: Kim SY, et al., A new technique for transcutaneous fixation of the costal cartilage block utilized in reconstructed ear elevation for microtia, Journal of Cranio-Maxillo-Facial Surgery (2018), https://doi.org/10.1016/j.jcms.2018.01.017