Journal of Experimental and Clinical Medicine
http://dergipark.ulakbim.gov.tr/omujecm

Clinical Research

J. Exp. Clin. Med., 2016; 33(4): 205-209
doi: 10.5835/jecm.omu.33.04.005

"Intra Scaphal Opposing Sutures" for Stahl's ear correction

Caglayan Yagmur[a], Ilhami Oguzhan Aydogdu[b], Osman Kelahmetoglu[c*], Ismail Kucuker[a], Ibrahim Alper Aksakal[b], Ahmet Demir[a]

[a] *Department of Plastic, Reconstructive and Aesthetic Surgery, Medical Faculty, Ondokuz Mayis University, Samsun, Turkey*
[b] *Department of Plastic, Reconstructive and Aesthetic Surgery, Samsun Research and Education Hospital, Samsun, Turkey*
[c] *Department of Plastic, Reconstructive and Aesthetic Surgery, Medical Faculty, Bezmialem Vakif University, Istanbul, Turkey*

ARTICLE INFO

Article History
Received 01 / 06 / 2016
Accepted 13 / 08 / 2016

*** Correspondence to:**
Osman Kelahmetoglu
Department of Plastic, Reconstructive and Aesthetic Surgery,
Medical Faculty,
Bezmialem Vakif University,
Istanbul, Turkey
e-mail: osmankelahmetoglu@gmail.com

Keywords:
Opposing suture
Stahl's ear deformity
Suture
Technique

ABSTRACT

Stahl's ear deformity is a rare congenital abnormality and is characterized with the presence of an abnormal third crus in the upper pole of the auricle. Although various techniques are advised, there is no standard surgical correction option. In this study, we have tried to show a new suture method to able to correct Stahl's ear deformity as a more practical and less invasive way. This study includes 4 patients and 4 ears having Stahl ear deformity that was corrected by "Intra Scaphal Opposing Sutures". The patients were followed up for 12 months with clinical examination and photography. Patient satisfaction was good with favorable results. Suturing techniques are common procedure for Stahl's ear correction. They can be used alone or in combination with excision, scoring and/or reshaping techniques. The main advantages of our technique are: using a smaller posterior incision, limited dissection and less destruction without performing any excision. Stahl's ear correction with Intra Scaphal Opposing Sutures may offer a practical and stable solution in selected cases, especially with minor presence of aberrant third crus.

1. Introduction

Stahl's ear deformity, defined by Stahl in the 19th century, is a rare congenital abnormality and characterized with the presence of an abnormal 3rd crus in the upper pole of the auricle. It is common in Asian populations, being especially even more common among the Japanese (Aki et al., 2000). Although it was suggested to be a genetically inherited deformity, this has not be proven (Binder, 1889). Its presentation is bilateral in approximately 20% of the cases (Nakajima et al., 1984; Furnas, 1989; Steven et al., 2001). According to a well-accepted theory, it is caused by a disorder during embryologic development of the helix and scapha during the first three months of development (Skoog, 1974; Fischl, 1976; Yamada and Fukuda, 1980; Yotsuyanagi et al., 1999).

Yamada and Fukuda (1980) have classified Stahl's ear deformity into four types:
Type 1: The third crus has a sharp ridge and extends posterosuperiorly from antihelix.
Type 2: Rounded third crus extends posterosuperiorly from antihelix.
Type 3: Broad, two folded third crus extends posterosuperiorly from antihelix.
Type 4: Third crus extends posteroinferiorly from antihelix crura.

Like other deformities consisting of partial malformations of the external ear, there are no standard surgical corrections for Stahl's ear deformity. Described methods include cartilage excision, reshaping of the cartilage, scoring and suture techniques (Furukawa et al., 1985; Sugino et al., 1989; Noguchi et al., 1994). In this article we have tried to present a novel suture technique by which we were able to correct Stahl's ear deformity in a more practical and less invasive way.

2. Patients and method

This study included four patients (one male and three females). The patients' ages were between 18 and 56 (mean age 29.5). A total of 4 ears of 4 patients were operated on between 2012 and 2015.

The authors were aware of the Code of Ethics of the World Medical Association (Declaration of Helsinki) which was printed in the British Medical Journal (18 July 1964). Informed consent was obtained for each patient before surgery.

All patients were followed up for at least 12 months with clinical examination and digital photography. Postoperative satisfaction was evaluated using visual analogue scale (VAS) scores (0-10, 0=worst imaginable surgical outcome, 10=best imaginable surgical outcome).

Statistical analysis

The data was analyzed using Numbers 2011 for Macintosh (Apple Inc., USA).

Surgical technique

The procedure was performed under local anesthesia combined with conscious sedation. The ear was anesthetized with a circumferential block using an equal-parts mixture of 1% lidocaine with 1:100,000 epinephrine and 0.24% bupivacaine with 1:200,000 epinephrine. Supplemental injections were given at the location of the posterior incision. No anterior incision was used. The projected position of the third crus from its margins and the junction points of it with helix and antihelix were marked with blue dye. A 2 cm post auricular incision to expose the posterior aspect was also marked. The marked junction points (4 in total) were also the points to introduce sutures. As a convenience, we have numbered the points from 1 to 4 to explain suture technique easily (Fig. 1).

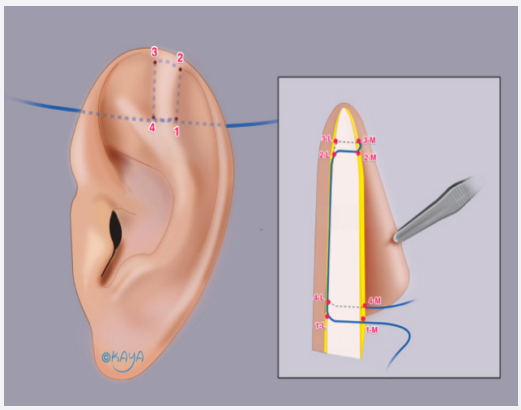

Fig. 1. Schematic views of locations of points. The view of the first suture (Original artwork by Sefa Ersan Kaya)

The cartilage of the upper pole was exposed posteriorly through a post auricular sulcus incision. The first suture was introduced medially from "point 1-M". It was delivered laterally from "point 1-L" and reinserted to be delivered from "point 2-L". After it was delivered from "point 2-L" it was reinserted to be delivered from "point 2-M". Then the suture passed from "point 3-M" and was delivered from "point 3-L". It is reinserted from the same point of "point 3-L" and delivered from "point 4-L". Finally the suture is passed from "point 4-L" to "point 4-M" to prepare for a knot. Traversing the sutures between points was made easily by using a 21 gauge needle during the process (Fig. 2).

Fig. 2. Intraoperative view, showing the sutures between points was made easy by using a 21 gauge needle during the process

This suture maneuver forms a direct force to bend the anterior convexity to a concave form. Then the same procedure beginning with point 2 to oppose the first one was performed (Fig. 3a). A posterior horizontal scoring can be made in variable levels to facilitate correction and then the sutures were stitched.

At the end of the procedure, the third cartilage was bent into a normal shape to deepen the scaphoid fossa and antihelical sulcus using two intra scaphal opposing sutures (Fig. 3b). All patients were followed up for at least 12 months with clinical examination and digital photography. Postoperative satisfaction was evaluated using VAS scores (0-10, 0=worst imaginable surgical outcome, 10=best imaginable surgical outcome).

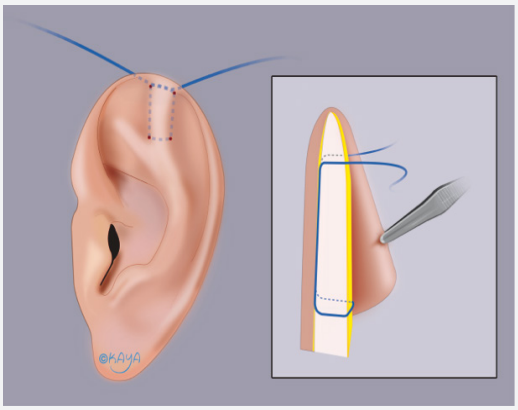

Fig. 3a. Schematic view of the second opposing suture (Original artwork by Sefa Ersan Kaya)

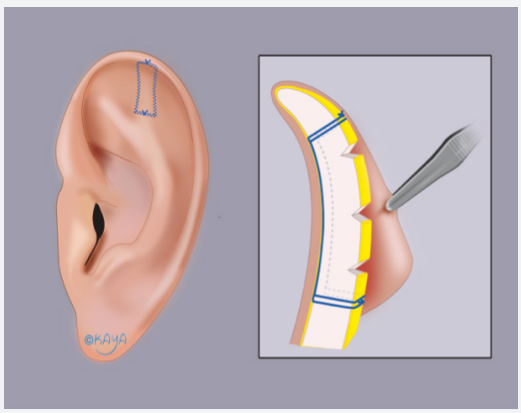

Fig. 3b. Schematic view of posterior scoring made and sutures tied (Original artwork by Sefa Ersan Kaya)

3. Results

Patients were evaluated after 12 months postoperatively. There were no wound healing problems, infection or recurrence. All patients' satisfaction was good with favorable results. The average VAS scores was 8±0.81.

Case 1

The male patient was a 56 year old otherwise healthy male with unilateral Stahl's ear deformity. Under local anesthesia, the described technique was applied for correction deformity. After 12 months, at the control visit the male patient revealed no problem with substantial correction achieved (Fig. 4).

Fig. 4. The male patient had unilateral Stahl's ear deformity. Postoperative view (12 months) of the male patient

Case 2

The female patient was 18 years old and had unilateral Stahl's ear deformity. The same method was also used for this patient. The patient had no problems with her postoperative 12 month control visit (Fig. 5).

Fig. 5. The female patient had unilateral Stahl's ear deformity. Postoperative 12 months view of the female patient.

3. Discussion

Stahl's ear deformity probably occurs as a cause of a developmental disorder in the helix and scaphoid fossa of the ear during the third month of embryologic development. Excessive pressure to developing ear cartilage or changes in the mother's uterus that cause abnormal growth of perichondrium are considered as other possible theories (Yotsuyanagi et al., 1999). As there is no standard technique to fix this deformity, various techniques were identified with variable success rates in the literature. Different techniques can be considered for different age groups. Auricular cartilage of a newborn baby is very soft and malleable. This is mainly caused by the increase of hyaluronic acid content of the extracellular matrix from the impact

of maternal estrogen (Kenny et al., 1973). Therefore pliable metal molds covered with resin can be used to shape the auricular cartilage of a baby during the neonatal period (Matsuo et al., 1984). When molding is performed early after birth, a good correction is possible. However, as estrogen levels decrease in time (in the 6th week, it decreases to similar levels of normal children) the malleability of the auricular cartilage decreases. Therefore external molding approach is not suitable for patients other than infants (Tan et al., 1997).

As for the surgical correction, wedge excision of the accessory crus in Stahl's ear deformity was first defined by Joseph in 1931 (Joseph, 1931). Yamada and Fukuda (1980) performed reshaping by using cartilage excision and suture. A reshaping approach combined with excision was also reported by Ono et al. (1996). The cartilage scoring technique on the other hand, was first defined by Furukawa in 1985.

Nakayama and Soeda (1986) obtained successful results by suturing abnormal crus to the temporal bone periosteum. Tsujiguchi and colleagues (1992) reported good results with cuts in different directions for the third crus and excision of the cartilage and reshaping. Excision of the third crus and application of it as a diced cartilage graft to restore shape was performed by Noguchi et al. (1994). In their technique they utilized an external mold to stabilize the grafted region and facilitate healing. Khan and colleagues (2010) described a double layered suturing technique and treated a patient complaining of Stahl's ear deformity. In their method a post-auricular sulcus incision was used and the cartilage of the upper pole was totally denuded. Then a technique of double row U shaped continuous sutures was used to correct the deformity.

Suturing techniques are not new for Stahl's ear correction. They are used alone or in combination with excision, scoring and/or reshaping techniques. The main advantages of our technique are; using a smaller posterior incision, limited dissection and less destruction without performing any excision. As our technique mainly depends on suturing, the procedure is reversible and more practical when compared to excisional techniques and strong enough to eliminate the third crus. On the other hand, during the application of our suture technique one must be cautious not to harm cartilage, especially during the stitching maneuver. More caution must be provided if cartilage scoring was performed. Another point is to select an appropriate suture material because colored suture materials may reflect color through the skin after application.

In conclusion, among other techniques, Intra Scaphal Opposing Sutures may offer a more practical and effective solution for Stahl's Ear correction especially in cases with minor presence of aberrant third crus.

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