



Constricted Ear, a Sub-Diagnosed Abnormality: Results of the Surgical Treatment from Public Hospital in Mexico

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Abstract

Aim: To report the results in post-operative patients with diagnosis of constricted ear undergoing auricular reconstruction according to the classification of Tanzer for the constricted ear in the South Central Hospital of High Specialty.

Material and Methods: We included patients who underwent auricular reconstruction for diagnosis of constricted ear, March 2015 to March 2016, before doing the reconstruction we identified the Tanzer classification of the constricted ear, the same surgeon, in a single surgical time, with or without costal cartilage. We then evaluated this using subjective results analysis of the anatomy in the upper third using the Likert scale we then evaluated this; a week, a month, three, six and twelve months.

Results: In one year the study involved a total of five patients, six ear surgeries, mean age 12.8 years, 3 patients' male (60%) 2 female patients (40%), 50% with constricted ear Tanzer IIB, 80% was used with costal cartilage, hassle-free, 40% (2) required a second intervention to perform otoplasty and further symmetry of the contralateral ear. The follow up was in 12 months with 100%, 40% had good results and excellent results were shown in 60%.

Conclusion: The constricted ear is a congenital abnormality sub diagnosed in our country, which required an individualized assessment to determine the reconstructive with satisfactory results in the long-term treatment, without requiring a second surgical procedure.

Keywords: Congenital microtia; Constricted ear; External ear; Ear auricle; Cartilage; Congenital abnormalities

Introduction

The auricular pavilion is formed from six mesenchymal proliferations located at the dorsal ends of the first and second pharyngeal arches, surrounding the first pharyngeal cleft between the fifth and ninth week [1]. The fusion of these atrial prominences is complicated; therefore it is not uncommon for developmental malformations to occur [1,2].

The external ear and the external auditory canal are very sensitive to exposure to drugs such as streptomycin, thalidomide and salicylates during the first trimester causing agenesis or atresia of these two structures [3]. McKenzie report that the cause of atrial development abnormalities is ischemia of the uterine tissue, the result of an obliteration of the steroid artery, or hemorrhage of local tissues [4].

In Mexico, the epidemiological registry and surveillance of external congenital malformations reported a prevalence of microtia of 7.37/10,000 live and dead births during 2010 [5].

Microtia is classified according to the affected anatomical area, one of them is the constricted ear that affects the upper third and corresponds to Tanzer classification IV A [6,7].

In 1975 Tanzer classified the constricted ears into [8]:

- I. Collapse of the helix only.
- II. a) Deficiency of the scale, superior crura, and triangular fossa that in turn was creating collapse of the superior helix, resulting in a loss of vertical height; protrusion and fold (cover form).

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Figure 1: 11 year old patient with right constricted ear Tanzer IIB.

Surgical treatment does not require skin grafting to expand the atrial margin.

b) Same clinical characteristics as IIa, and without antihelix and crura, with considerable reduction in height. Surgical treatment requires skin grafting to expand the atrial margin.

III. Anterior fixation of the helix near the lobe, the atrium is bag-shaped and the ear usually has a low implantation.

The constricted ear is a group of atrial anomalies of the upper third of the ear, which appear to look like the edge of the ear has been tightened like a cord [7,8]. It has four characteristics: Cap shape, a decrease in vertical height of the ear, protrusion and low position of the ear. Atrial reconstruction depends on the degree of severity of hypoplasia [8,9].

In relation to surgery, the only difference between an ear of a newborn and an adult is that the newborn the cartilage is more malleable and soft [10,11]. The anatomy is the same; it has 85% of the development of an adult's ear at the age of three years [11,12]. The width of the ear is approximately 55% to 60% of the height [13].

In atrial reconstruction, the experimental and clinical use of the autologous costal cartilage reported by Pierce in the early 1930s marked a new technique. And despite numerous materials have been used for the reconstruction of the atrial framework, autologous cartilage is considered the standard material [14].

Through this descriptive study, we sought to report the postoperative results of atrial reconstruction in patients who were diagnosed as having a constricted ear in the Pemex Hospital, from the period 01 March 2016 to 01 March 2017, underwent surgical reconstruction with or without the use of cartilage autologous sack according to the evaluation and classification of Tanzer for constricted ear [8].

Materials and Methods

In order to carry out this work, prior approval was obtained from the ethics and research committee of the Central South High Specialty Hospital PEMEX. Handling the personal data of the patients in a confidential manner, and having the surgical authorization through an informed consent is an essential requirement.

All patients with congenital atrial malformation were included within the classification of constricted ear [8], both genders and all age groups, who had accepted by informed consent to receive



Figure 2: Trans-operative atrial reconstruction with autologous costal cartilage by anterior approach.



Figure 3: Immediate postoperative reconstruction with costal cartilage in constricted ear Tanzer IIB.

reconstructive surgical treatment. The same surgeon and assistant performed this procedure during the period from March 2015 to March 2016.

Patients diagnosed with this type of microtia were sub-classified in groups according to the classification of constricted ear, Tanzer in I, IIa, IIb or III and according to this classification, the use of autologous costal cartilage was assessed, whether or not to be harvested during reconstruction [8].

In addition, independent variables were reported such as: age, gender, affected side, and the type of presentation, if it was isolated or syndromic; as well as this we seek to report dependent variables: If there was secondary surgical intervention, the follow-up in months, complications related to the surgical procedure, and whether or not costal cartilage was used for reconstruction.

Surgical technique

The single-time surgical for the reconstruction technique described by the Tanzer group II [8]; when the helix fold is found, a distinction must be made between cases where manually the edge of the helix can be forced to return to its normal form and cases where returning to normal form is prevented by collapse and adherence of the cartilage, in fact this may be due to the lack of superior crushing of the antihelix to support the edge of the helix. The approach is through an anterior incision in the skin within the edge of the helix (Figure 1),

Table 1: Dependent and independent variables results.

Gender	Age (years)	Affected side	Clinic presentation	Complications	Secondary surgery	Use Costal cartilage	Follow (months)
F	12	R	Isolate	N	N	Y	12
M	25	R	Isolate	N	Y	Y	12
F	11	R	Isolate	N	N	Y	12
M	13	R	Syndromatic	N	Y	Y	12
M	3	B	Isolate	N	N	N	12

F: Female; M: Male; R: Right; B: Bilateral; N: Not; Y: Yes



Figure 4: Pre operative patient constricted ear Tanzer IIA.

or in the posterior part of the atrial pavilion, in order to mobilize the skin in the region of the scale until the upper part of the antihelix is fully exposed.

The above approach is convenient because the resulting scar is hidden well within the edge of the helix. The height of the costal graft can be chosen by the edge of the helix, the overall shape and the height of the ear is equal to the non-deformed side (Figure 2). The costal cartilage supports the edge of the helix and prevents sinking, it is harvested from the fifth rib through an infra-breast incision of 2 cm to 3 cm, which, should be thinned to 1.5 mm.

The already molded costal cartilage is fixed to the edge of the helix with two 6/0 nylon sutures and with the second pair of sutures, the transition of the antihelix and the lower crura. The skin is closed with 5/0 nylon. This is then left covered with gauze impregnated with petrolatum and non-oppressive bandages for 24 h, no drains are left (Figure 3).

In cases where the fold can be corrected manually (Tanzer IIA), the costal cartilage excision is not necessary (Figure 4), depending on the case of adhesion, the approach is anterior or posterior, the excision can be in the form of a crescent, though if it presents a deformed scale it is then necessary to mobilize the edge of the helix to a more cephalic position. The antihelix and/or flake is then molded, fixing them with 6/0 nylon points, and then facing the skin with 5/0 nylon (Figure 5).

Post-operative follow-up was given a week for point removal, as well as surgical wound evaluation, one month, three, six and twelve months respectively for photographic control; where the results were evaluated by subjective analysis of the anatomy of the upper third by aesthetic subunits of said region according to the following variables:

- Donor site
- Definition of the helix
- Definition of the antihelix



Figure 5: Immediate postoperative patient figure 4 by posterior approach, reconstruction without costal cartilage.

- Scale
- Triangular pit
- Ear position

This subjective evaluation was carried out by three plastic surgeons assigned to the Plastic and Reconstructive Surgery service outside the surgical procedure, this was achieved through questionnaires with a Likert scale: 1. Bad result, 2. Regular result, 3. Good result, 4. Excellent result; in the period of time aforementioned.

Results

Five patients (3 men, 2 women) were intervened in a period of one year; average age of 12.8 years (3 to 25 years); affected side: right in 4 patients (80%), bilateral in 1 (20%); a total of 6 operated ears, with isolated presentation in 4 (80%) and syndromatic in 1 (20% Kabuki syndrome), secondary surgeries in 2 patients (40%) after 12 months for contralateral symmetry (Otoplasty); In 4 patients (80%), a rib graft was used for reconstruction (Figure 2). 100% of the patients were followed up at 12 months, and no complications were reported in any (Table 1).

The results of the subjective evaluation of the photographic controls using the Likert scale according to the 12-month and follow-up (Table 2), concludes as an excellent result in 3 patients (60%) shows good 2 of the patients (40%) (Figure 6).

Of the 6 ears intervened (Figure 1); 3 (50%) of the ears were classified as Tanzer IIB (Figure 1), 2 (33%) as Tanzer IIA (Figure 4) and 1 (17%) as Tanzer III (Graphic 1).

Discussion

The constricted ear (Microtia type IV) is an anomaly that affects



Figure 6: Control at 12 months of patient with Tanzer IIB with result evaluated as excellent.

the upper third of the auricular pavilion; the anatomical variants are complex in most cases [8], so the reconstructive results depend on the initial assessment to determine the type of surgical treatment that merits [4].

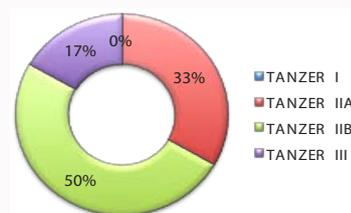
In our entity this type of atrial malformation in most cases is not treated, because it does not have a severe clinical presentation, since we are not diagnosing an anotia (Microtia Tanzer I) or a Microtia Tanzer IIA that are clinically more severe.

Some of the defects of the upper third may be closed primarily with soft tissues only, but the use of cartilage is often needed to support. For small defects, the shell cartilage graft may be sufficient. However, for large defects, the Firmin rules are extremely useful: Defects that consist of 25% or more of the edge of the helix or if it involves more than two planes (if it involves antihelix plus helix or scale) they require support with costal cartilage since the cartilage Shell does not provide enough support in these cases [15].

In the constricted ear the main abnormality is the deficiency of the edge of the helix in the circumference of the scale, which is impacted [7]. The inadequate height of the constricted helix causes, forces the ear form a cup shape that protrudes from the head, resulting in a slightly small ear, so any attempt at otoplasty must be accompanied by increasing the height of the helix [16].

Modern atrial reconstruction has been credited to Tanzer, who through these detailed principles, techniques and critical evaluation of total atrial reconstruction using the autologous costal cartilage harvest, he marked the waters part of atrial reconstruction in 1959 by performing a atrial frame with an autologous costal cartilage block, its excellent results persisting to this day [14]. That is why we decided to treat the constricted ear by using costal grafting, if the case warranted it and according to its classification, when in the revise constricted ear the references does not have postoperative reports in the long term, and also in most publications that describe non-surgical treatments.

The time and selection of the surgical procedure should be performed when the patient has reached maturity, therefore with the appropriate development of the ear, also taking into account the burden of psychosocial stress caused by the deformity and flexibility of the atrial cartilage. To potentially minimize psychosocial stress, many surgeons recommend intervening before the infant begins to socialize; however, in many cases it is recommended to wait for the patient to be mature enough to be an active part of his recovery and



Graphic 1: Results in percentage according to the Tanzer classification for constricted ear: 50% (3) Tanzer IIB; 33% (2) Tanzer IIA; 17% (1) Tanzer III.

Table 2: Subjective evaluation results by Likert scale.

Patient	1 week	1 month	3 months	6 months	12 months
1	3	3	4	4	4
2	3	4	4	4	4
3	3	4	4	4	3
4	3	3	3	3	3
5 R	3	4	4	4	4
5 L	3	4	4	4	4

(1) Bad result; (2) Regular result; (3) Good result; (4) Excellent result; R: Right left

postoperative care. At three years of age the development of the ear has reached between 85% to 90%, so we decide to include all the ages of presentation in our work; however at 6 years the atrial cartilage begins to become rigid which makes it more difficult to mold the cartilage in the case of adult patients [13].

In the period of 1 year we intervened 5 patients with this diagnosis, so we consider that it is little known and under-diagnosed by first-contact doctors. It is unknown that if it is a sub-type of microtia which could be corrected surgically or with conformers according to the age and the clinical presentation.

The reconstructive surgical treatment for this congenital anomaly had not been reported in our country or in other publications. The most frequent clinical presentation of this case turned out to be Tanzer IIB [8], the right side being the most affected, this coincides with the reports of previous publications where reference is made that in the microtia of the right side in the most affected, corroborating that this subtype of microtia, the right side was the most affected.

On the other hand, if we follow the reconstructive protocol for constricted ear proposed by Tanzer [8], skin grafting should be used in types IIB or III, however it this was not necessary in any of our patients, however, it was necessary to recover the height, and the definition of the autologous costal graft antihelix in some of the patients.

In the cases that we are reporting in this study, the results in a year are good to excellent, with or without the placement of costal cartilage, which shows that the initial assessment is decisive for surgical planning and depending on the clinical trans-operative findings that we found, the use of a costal graft could be determined this way.

We have highlighted five patients who underwent surgery in a year with the diagnosis of a constricted ear, however we could of reported a higher incidence if we had done the diagnosis intentionally, this is because this is not often considered as a full ear abnormality therefore it goes unnoticed, undertaking this reconstructive procedure can achieve satisfactory results in just one surgery stage.

Conclusions

1. The human ear is indispensable for the definition of the face, being an important key to its natural, harmonious aesthetic appearance.
2. Reconstruction of the edge of the helix to a form of natural appearance is difficult.
3. The defects of the upper third are treated surgically according to their size and complexity.
4. If it is necessary to increase the height of the helix, the use of the costal cartilage is preferred since it has been proven to give aesthetically more satisfactory results in a single surgical visit, as opposed to only advancing or rotating flaps.
5. The constricted ear is a type of microtia (Microtia type IV), which affects the upper third of the auricular pavilion, which, being not as complex as an anotia sometimes goes unnoticed to offer a reconstructive surgical treatment.
6. In this study we report that the most common constricted ear sub type is the Tanzer IIb, the right side is the most affected, it occurs more frequently in the males, and in an isolated clinical way.
7. Each clinical presentation merits an individualized evaluation to define the reconstructive treatment with or without the use of a rib graft and thus obtains satisfactory long-term results, without the requirement a second surgical procedure.

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