

# Otoplasty: a modified Chong-Chet technique with positive long-term results

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## Abstract

**Background:** In the last few decades, many techniques have been developed to correct prominent ear deformities. Modified Chong-Chet otoplasty represents a new and improved classical Chong-Chet procedure for prominent ear surgery. This study evaluates and compares the long-term results of standard Chong-Chet otoplasty with the modified technique.

**Methods:** A retrospective study was conducted on patients undergoing otoplasty at the Special Hospital S-tetik Banja Luka between January 17, 2017, and February 5, 2019. The total number of patients undergoing the procedure was 129. The first group (48 patients) underwent otoplasty using the Chong-Chet technique, while the second group (81 patients) underwent a modified Chong-Chet procedure. All patients were randomly selected on the condition that the antihelix was absent.

The data were processed and analyzed using the Statistical Package for the Social Sciences version 24 using nonparametric tests ( $\chi^2$  test, Mann-Whitney *U* test and Kruskal-Wallis test).

**Results:** Every second patient was satisfied (19 patients were partially satisfied and five patients were completely satisfied) with the results of the classical Chong-Chet technique. Seven patients were neither satisfied nor dissatisfied, while 17 patients were dissatisfied (11 patients were completely dissatisfied and 6 patients were mostly dissatisfied). As for the modified method, on average, nine out of 10 patients (73 or 90.1%) were satisfied, of which 49 patients (60.5%) were completely satisfied and 24 patients (29.6%) were mostly satisfied.

The statistical significance was  $P < .05$ .

Research results point to the modified Chong-Chet technique being a significant improvement to the classical method.

**Conclusion:** Modified Chong-Chet technique increases the number of positive long-term results and significantly improves the standard method.

**Abbreviations:** et al = (lat. et alia) and others, ie = (lat. id est) that is.

**Keywords:** Chong-Chet anterior scoring technique, otoplasty, prominent ear

## 1. Introduction

There are over 200 different successful methods of prominent ear surgery, and this number is constantly growing. Therefore, it is very difficult to invent a new otoplasty technique that has neither been applied nor described previously.<sup>[1-3]</sup> Knowledge of the anatomy and topography of the auricle and the surgeon's

approach to creativity<sup>[4,5]</sup> are crucially important in choosing the appropriate method to correct prominent ears. Although there are many different techniques, they are not equally successful, as indicated by the number of repeated procedures.<sup>[6]</sup> The greatest weaknesses of most techniques refer to the consistency of the long-term results, since the auricle might spring back, to a greater

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The authors have no conflicts of interest to disclose.

All relevant data are within the paper and its Supporting Information files.

All data generated or analyzed during this study are included in this published article [and its supplementary information files]. The datasets generated during and/or analyzed during the current study are not publicly available, but are available from the corresponding author on reasonable request.

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or lesser extent, to its original shape long after the procedure. That was the main reason for the development and use of the modified Chong-Chet technique in our practice, ie, to lower the number of recurrences of an absent anti helical fold observed in the extended period of time after the surgery. In the case of prominent ears, procedures are mainly reduced to folding the auricle in the antihelical region, ie, creating a new antihelix and reducing the angle between the mastoid and the plane of the auricle. One of the best-known techniques for creating a new antihelix is the Chong-Chet anterior scoring technique,<sup>[7]</sup> which we modified by additional elevation of the perichondrium in that area and its additional fixation, which contributed to obtaining good long-term results.

## 2. Material and methods

We conducted a retrospective study on patients undergoing otoplasty at the Special Hospital S-tetik Banja Luka between January 17, 2017, and February 5, 2019. The total number of patients included in this study was 129. Study participants were chosen based on lack of development or underdevelopment of the antihelix, while patients with other indications for the procedure, which include increase in the cephaloauricular angle and excessive conchal cartilage, were excluded from the study. The selection of participants was fully randomized regardless of their gender or age. One group of 48 patients underwent otoplasty using Chong-Chet technique, while the other group of 81 patients underwent a modified otoplasty technique, implying an additional separation of the perichondrium and a thin layer of the subcutaneous tissue from the back of the auricle, which was additionally tightened with sutures. In both groups, an anti-helical fold was absent. We tracked the results immediately after the surgery, ie, on the seventh day after surgery, 1 month, and 1 year after the surgery. In addition to taking photos before and after the surgery, and a year after the surgery, we used a scale of 1 to 5 to evaluate results (ie, with "completely dissatisfied", "mostly dissatisfied", "neither satisfied nor dissatisfied", "partially satisfied", and "completely satisfied" with the result of the surgery) with 1 being completely dissatisfied and 5 being completely satisfied.

To the question: "How satisfied are you with the results of your operation on a scale of 1 to 5?", Patients expressed the degree of their subjective satisfaction or dissatisfaction with the results of the procedure. In order to give the most objective assessment, during the survey (conducted one year after the operation), patients had an insight into all the photos taken thus far.

The data were processed and analyzed using statistical package for the social sciences version 24 using nonparametric tests ( $\chi^2$  test, Mann-Whitney *U* test, and Kruskal-Wallis test).

## 3. The classical Chong-Chet method

The classical Chong-Chet technique involves local anesthesia administration, ie, 0.5% lidocaine with 1:200,000 dilution of epinephrine. No sedation was administered to adult patients, but it was administered to pediatric patients. First, elliptical excision behind the ear was performed, and a 27-gauge needle was inserted along the front side of the proposed antihelix to mark the intended site on the cartilage. As soon as the surface was marked, we moved on to the incision of the cartilage from the end of the superior antihelix crus to the level of the tragus. The skin was then detached from the anterior cartilage in the antihelix region in the direction of the concha auriculæ, which was incised parallel

to the incision edge, and the newly formed antihelix was stabilized with 3, 4-0 Vicryl sutures. When the formation is completed, the wound is closed with a non-absorbable single suture<sup>[7]</sup> or a fast-absorbing suture.

## 4. Our modified Chong-Chet otoplasty method

This was similar to the original Chong-Chet technique. After injection of a local anesthetic, an elliptical incision was made behind the ear (the inner edge of the incision should be positioned in the groove between the scalp and the auricle), whereas the outer edge should be within the 1 cm incision line from the helix itself (Fig. 1).

After removing a thin layer of subcutaneous tissue, an incision was made through the subcutaneous layer and the auricular perichondrium so that the specified flap could be detached up to a few millimeters from the helical rim (Fig. 2).

The new antihelical fold was then punctured using a needle. The incision is made approximately 5 mm above the markings cutting the auricular cartilage from the superior crus of the antihelix to the level of the tragus. The anterior antihelical layer was then prepared, and the cartilage was folded backward to create a new antihelix. A 4-0 Vycryl absorbable suture was used for fixation of the cartilage at three levels, thus completing the formation of the antihelix (Fig. 3).

Furthermore, we pulled the elevated subcutaneous layer and the perichondrium inward and stitched it to the auricular cartilage at three levels (Figs. 4 and 5), and thus additionally secured the desired position of the antihelix and auricle.

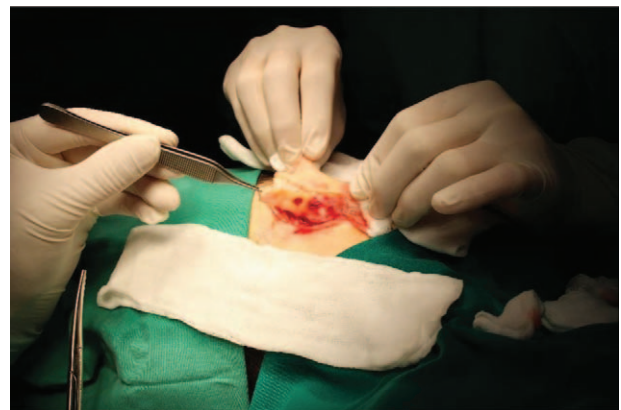


Figure 1. shows the tweezers holding the elliptical part of the skin and subcutaneous tissue of the posterior auricle.

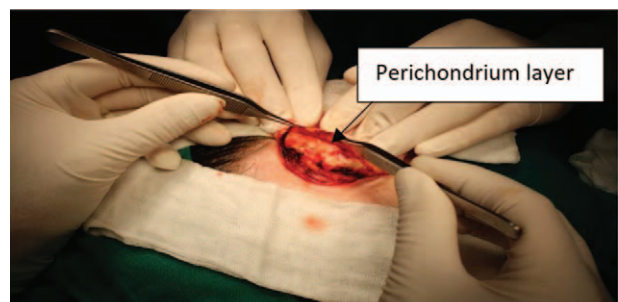


Figure 2. shows the perichondrial layer raised from the back of the auricle.



Figure 3. shows the folded cartilage, that is, a newly formed antihelix.

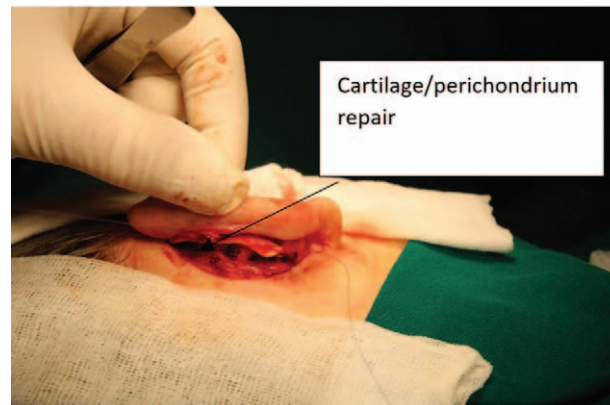


Figure 5. shows already placed suture mentioned in the Fig. 4.

After precise hemostasis, we closed the wound edges with a resorptive intradermal suture (5-0 Vycryl).

Due to the absence of an antihelical fold, the group of patients with prominent ears was treated using this method. We did not treat prominent ears in patients with a large angle between the scalp and the auricle, because in those cases, it was necessary to additionally pull the mattress sutures to the scalp.

### 5. Results

A retrospective study on patients undergoing otoplasty procedure during the period from January 17, 2017 to February 5, 2019 included 129 patients. 48 patients (37.2%) underwent otoplasty using Chong-Chet technique, and 81 patients (62.8%) underwent a modified otoplasty technique, implying an additional separation of the perichondrium and a thin layer of the subcutaneous tissue from the back of the auricle, which was additionally tightened and fixed with sutures.

There were no notable adverse events with an exception of one patient, from the group undergoing the classic procedure, who experienced postoperative bleeding which was appropriately treated and had no consequences.

After the surgery, there was a follow-up period with photo documentation seven days, one month, and a year after the

surgery, noting that patients were given a scale from 1 to 5 a year after the surgery to evaluate their satisfaction with the result of the procedure.

The vast majority of patients were female 93 (72.1%); of these, 30 female patients (62.5%) underwent the classical method, and 63 female patients (77.8%) underwent the modified method.

The Yates chi-squared test did not show any statistically significant differences ( $\chi^2=2.778$ ,  $df=1$ ,  $P=.096$ ) in sex compared with the surgery method.

Regardless of sex and surgery method, the average age of patients undergoing the retrospective study was 24.91 years (patients undergoing classical surgery: 25.72 and patients undergoing the modified method: 24.44). The average age of female patients undergoing the classical method was 25.07, and for whom the modified method was performed was 24.17 years, while the average age of male patients undergoing the classical method was 26.78, and the modified method was 25.39 years.

The Mann–Whitney *U* test did not present a statistically significant difference ( $z=-0.220$ ,  $P=.826$ ) in terms of the method used.

Patients expressed their satisfaction from 1 (completely dissatisfied) to 5 (completely satisfied) regarding the services provided and the method applied.

As for the classical procedure, 5 patients (10.4%) were completely satisfied, 19 (39.6%) were partially satisfied, 7 (14.6%) were neither satisfied nor dissatisfied, 6 (12.5%) were mostly dissatisfied and 11 (22.9%) were completely dissatisfied (Table 1). Number of re-operated patients was 15 (31.25%).

With regard to the modified procedure, 49 patients (60.5%) were completely satisfied, 24 (29.6%) were mostly satisfied, 3 (3.7%) were neither satisfied nor dissatisfied, 3 (3.7%) were mostly dissatisfied, and 2 (2.5%) were completely dissatisfied (Table 1). Number of re-operated patients was 5 (6.17%).

The  $\chi^2$  test showed a statistically significant difference ( $\chi^2=26,169$ ,  $df=2$ ,  $P=.000$ ) in patient satisfaction regarding the method applied (comprising completely and partially satisfied into the group “satisfied” and completely and partially dissatisfied into the group “dissatisfied”).

Measurement of patient satisfaction by age using the Kruskal–Wallis test showed a statistically significant difference ( $\chi^2=1.511$ ,  $df=4$ ,  $P=.825$ ) to neither women ( $\chi^2=2.79$ ,  $df=4$ ,  $P=.594$ ) nor men ( $\chi^2=2.186$ ,  $df=4$ ,  $P=.702$ ).

The average satisfaction rate for the modified procedure was 4.42, whereas for the classical operation, it was 3.02.



Figure 4. shows the suture placed between the raised perichondrium of the auricle and its inner part, which further secures the newly formed antihelix and prevents its return to its original position.

**Table 1**  
**Sex, age, and patient satisfaction with the methods applied.**

	Total (n = 129) median, IQR or n (%)	Classic (n = 48, 37.2%)	Modified (n = 81, 62.8%)	P-value
Sex (female)	93 (72.1%)	30 (62.5%)	63 (77.8%)	.096*
Age	23, 14	23, 17	23, 12	.826†
Satisfaction				<b>.000</b> *
Completely dissatisfied	13 (10%)	11 (22.9%)	2 (2.5%)	.825‡
Mostly dissatisfied	9 (7%)	6 (12.5%)	3 (3.7%)	.594‡
Neither satisfied nor dissatisfied	10 (7.8%)	7 (14.6%)	3 (3.7%)	.702‡
Partially satisfied	43 (33.3%)	19 (39.6%)	24 (29.6%)	
Completely satisfied	54 (41.9%)	5 (10.4%)	49 (60.5%)	

Bold values signify the value's high statistical significance.

\*  $\chi^2$  test with Yates correction.

† Mann-Whitney U test.

‡ Kruskal-Wallis Test.

Figure 6 shows the result of the modified method of otoplasty which the patient was completely satisfied with, before the operation, as well as one month and a year after the operation (Fig. 6).

**6. Discussion**

The external ear has a very complex structure; therefore, a good preoperative assessment is very important when choosing the

right method.<sup>[8]</sup> Correction of protruding prominent ears is a routine intervention with many successful results.<sup>[7]</sup> The most common problem encountered during ear correction surgery is the absence of an antihelix and an increased angle between the auricle and the mastoid portion of the temporal bone (increased scaphomastoid angle). In our study, we focused on the underdevelopment or absence of the antihelix, meaning that the auricle no longer sits near the scalp, giving the impression of a prominent ear. Therefore, the patients with increased



**Figure 6.** shows the results of the modified otoplasty technique, in which the patient was completely satisfied, in order from top to bottom: before the surgery, a month, and a year after the surgery.

cephaloauricular angle, oversized conch, or some other defects were not included in this study.

There are many procedures describing the incision of the anterior side of the antihelix to make it weaker and to fix the antihelix in the desired position with additional postauricular fixation, which certainly contributes to a positive long-term result.<sup>[9]</sup> Some earlier bending methods without incision, such as the Mustardé-type cartilage bending, led to poorer results in the long run, because the cartilage would spring back to its initial position after some time. We noticed that further elevation of a thin layer of subcutaneous tissue with the perichondrium from the back of the auricle and its additional tightening toward the inner part of the auricle and its fixation to the cartilage enhanced the antihelical fold and prevented it from returning to its original position. Thinning of the cartilage as well as its dissection can lead to sharp edges that can be seen on the surface of the auricle.

Furnas described techniques using only nonabsorptive sutures to bend the cartilage without incision which may cause the cartilage to return to its original position due to the cartilage having its own memory and elasticity, additionally there is the possibility of deformation of the conchal part of the cartilage.<sup>[10,11]</sup>

Converse described a method of correcting and forming an antihelix using sutures and full-thickness cartilage cutting, which often led to cartilage recurrence and sharp cartilage edges on the front of the auricle being outlined and visible.<sup>[12–14]</sup>

Mustardé rounded the folds by tubing the cartilage with three to four non-absorbable silk mattress sutures.<sup>[15]</sup> Thus, even with the application of non-absorbable sutures, he did not have a stable result because the patient report showed that he had 7% cases of recurrence.

Stenström advised us to weaken the anterior side by slitting, as this weakens the elasticity of the cartilage with a tendency for the cartilage to bend toward the other side.<sup>[16]</sup>

Through our years of experience, we have seen two basic problems that can occur during prominent ear surgery if bending and forming a new antihelix are required: cartilage springing back to its initial position and delineating the edges of the cartilage if cut in full thickness and not dissected. Our study showed that the percentage of completely dissatisfied patients without additional perichondrium reinforcement and its fixation was 22.9%, while the percentage of dissatisfied patients with perichondrium reinforcement was significantly lower (2.5%). In the Christoph et al research the aesthetic result of otoplasty was rated as “very good” by 71.8% of patients and as “good” by 19.4% of patients; 6.9% of patients thought the result was “satisfactory” and 1.9% “unsatisfactory”. In this research the follow-up of 301 auricles was on average 6.25 years (range, 44–106 months). Here the percentage of cartilage recurrence, with additional antihelix reinforcement with three absorbing sutures and postauricular fixation, was complete in 2.3% of cases and partially in 8.6% of cases.<sup>[9]</sup>

Messner et al<sup>[17]</sup> asked patients to return for follow-up measurements a minimum of 1 year after surgery, where retrospective chart review showed a revision surgery rate of 3%.

According to the literature, the degree of cartilage recurrence ranges from 10% to 15%.<sup>[18]</sup> Thus, Deleito et al<sup>[19]</sup>, who applied the combined Mustardé and Furnas method, reported that 77% of patients had good results, 18% were satisfied, while the rest of the patients sought revision. However, many data are based on short-term results (3–6 months).

In our study, we were limited by the number of patients included in the study, as well as the difference in the number of patients operated by the classical method compared to the modified method. Subjective assessment of the results of the study is also considered as one of the limitations. Additionally we were limited by the duration of monitoring of the long-term results, which was restricted to a period of 1 year.

## 7. Conclusions

The modified Chong-Chet method is very reliable when long-term postoperative outcomes are considered.

This was confirmed by a retrospective study conducted on patients undergoing otoplasty at the Special Hospital S-tetik Banja Luka.

Research results point to the modified Chong-Chet technique being a significant improvement to the classical method ratified by the increase of the number of positive long-term results.

## Author contributions

**Conceptualization:** Darko Jović.

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**Funding acquisition:** Darko Jović.

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**Methodology:** Darko Jović.

**Project administration:** Darko Jović.

**Resources:** Darko Jović.

**Software:** Ljubiša Preradović.

**Supervision:** Darko Jović.

**Validation:** Darko Jović.

**Visualization:** Darko Jović.

**Writing – original draft:** Darko Jović.

**Writing – review & editing:** Ljubiša Preradović, Aleksandar Gužijan.

## References

- [1] Johnson PE. Otoplasty: shaping the antihelix. *Aesthetic Plast Surg* 1994;18:71–4.
- [2] Ersen B. A modification of the posterior perichondrio-adipo-dermal flap for protruding ear correction: a customized technique. *Ann Plast Surg* 2019;83:500–6.
- [3] Sands BN, Adamson PA. Pediatric esthetic otoplasty. *Facial Plast Surg North Am* 2014;22:611–21.
- [4] Mazed AS, Blustrode NW. Refinements in otoplasty surgery: experience of 200 consecutive cases using cartilage-sparing technique. *Plast Reconstr Surg* 2019;144:72–80.
- [5] Schneider LA, Sidle MD. Cosmetic otoplasty. *Facial Plast Surg Clin North Am* 2018;26:19–29.
- [6] Stewart JK, Lancerotto L. Surgical otoplasty: an evidence-based approach to prominent ears correction. *Facial Plast Surg North Am* 2018;26:9–18.
- [7] Sivrioglu N, Irkoren S, Aksoy B, Copcu E. Chong-Chet anterior scoring technique for the correction of prominent ears: results in 30 patients. *Mod Plast Surg* 2012;02:39–42.
- [8] Sinno S, Chang JB, Thorne CH. Precision in otoplasty: combining reduction otoplasty with traditional otoplasty. *Plast Reconstr Surg* 2015;135:1342–8.
- [9] Wagner CS, Pabst G, Müller W, Linder T. Otoplasty using a modified anterior scoring technique: standardized measurements of long-term results. *Arch Facial Plast Surg* 2010;12:143–8.
- [10] Furnas D. Correction of prominent ears with multiple sutures. *Clin Plast Surg* 1978;5:491–5.
- [11] Jeffery S. Complications following correction of prominent ears: an audit review of 122 cases. *Br J Plast Surg* 1999;52:588–90.

- [12] Peker F, Celiköz B. Otoplasty: anterior scoring and posterior rolling technique in adults. *Aesthetic Plast Surg* 2002;26:267–73.
- [13] Adamson PA. Complications of otoplasty. *Ear Nose Throat J* 1985; 64:668–74.
- [14] Powell BW. The value of head dressings in the postoperative management of the prominent ear. *Br J Plast Surg* 1989;42:692–4.
- [15] Eryilmaz T, Ozmen S. External Mustarde suturae technique in otoplasty revisited: a report of 82 cases. *J Plast Surg Hand Surg* 2013; 47:324–7.
- [16] Stenstrom SJ. A simple operation for prominent ears. *Acta Otolaryngol* 1966;224:393.
- [17] Messner AH, Crysdales WS. Clinical protocol and long-term results. *Arch Otolaryngol Head Neck Surg* 1996;122:773–7.
- [18] Weerda H. *Surgery of the Auricle: Tumors-Trauma-Defects-Abnormalities*. New York: Thieme; 2007.
- [19] Deleito JM, Talwar R, Purrinos FG. Furnas-Mustarde combination technique for the treatment of the prominent pinna: our 17-year experience. *Otolaryngol Head Neck Surg* 2014;151:32–3.