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# Combined Mustardé and Furnas type otoplasty with minimal conchal cartilage excision

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ABSTRACT

Objective: We aimed to evaluate the complication rate and satisfaction status of patients who underwent otoplasty with the combined Mustardé and Furnas sutures with minimal medial conchal cartilage excision.

Materials and Methods: Forty-four ears of 22 patients, operated for prominent ear deformity were retrospectively included in the study. Patients were called for follow-up at various time intervals. At the sixth month, the patient and parents were asked to rate their satisfaction with the operation on a scale of 1-10 and noted.

Results: The mean age of the patients was 8.09±2.72 years. The antihelix was created with Mustardé technique, minimal medial conchal excisions were performed, two conchamastoid sutures were placed with Furnas technique. The mean follow-up period was 23.86±11.97 months. Complications developed in 4 of 44 ears (9%). Major complication rate was 4.5%. Two patients (4.5%) had suture extrusion in one ear. None of the patients scored lower than 7 in the satisfaction questionnaire.

Conclusion: Otoplasty with a combination of cartilage-sparing techniques has low complication, revision, and high satisfaction rates. Minimal medial conchal cartilage excision in addition to this technique is beneficial in reducing the conchamastoid tension and does not increase the risk of complications.

Keywords: Prominent ears, Otoplasty, Antihelix, Mustardé, Furnas

## 1. INTRODUCTION

Prominent ear deformity is a condition of excessive visibility of the ear, which occurs most commonly due to absence or underdevelopment of the antihelix, less frequently due to overdevelopment of the conchal cartilage, and more rarely due to overdevelopment of the lobule [1]. Deformity occurs when these anatomical changes occur alone or together or less frequently with the addition of conditions such as excessive concha and mastoid angle, excessive protrusion of the mastoid process, overdevelopment of the helix tail, and outward bending of the upper part of the auricle [2]. Prominent ear deformity is observed with a frequency of 5% in the population and similar rates have been reported in men and women [1,2]. Prominent ear deformity is inherited as autosomal dominant [2]. Although, it is not worried much by families, it may cause social and psychological problems during adolescence when the child starts school, participates in social life, and becomes more aware of the changes in his/her body. Especially, in the early years of primary school, these children may often be exposed to peer bullying. Parents who are disturbed by this situation apply for the treatment of their children. Prominent ear correction surgery is called otoplasty. The most appropriate age for otoplasty is after the age of 5, which is the preschool period when the growth and shape of the ear cartilage is largely completed [2]. Completion of the treatment in the preschool period prevents psychological trauma to the child and facilitates adaptation to social life.

Although, hundreds of surgical techniques have been proposed in the treatment of prominent ear deformity, there is not a single universally accepted technique yet [1,2]. Surgical techniques are categorized under two main headings: 1 – Cartilage cutting techniques in which the cartilage is shaped by cutting the cartilage and removing parts, 2 – Cartilage sparing techniques in which the cartilage is shaped by suturing without making an incision in the cartilage. It is accepted that shaping the ear only with sutures without making an incision in the cartilage

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reduces the complication rate. In 1963, Mustardé proposed a technique to create a natural-looking antihelix using horizontal matrix sutures without incision to the cartilage [3]. In 1968, Furnas published a technique in which he sutured the concha to the mastoid periosteum with conchamastoid sutures without making an incision in the concha [4]. Today, the combined use of these two techniques is accepted by many surgeons and has become widespread worldwide.

In this study, we aimed to retrospectively evaluate the complication rate and satisfaction status of patients who underwent otoplasty with the combined Mustardé and Furnas sutures with minimal medial conchal cartilage excision and to discuss the results.

## 2. MATERIALS and METHODS

Forty-four ears of 22 patients who were admitted to tertiary care city hospital between 2017 and 2022 for prominent ear deformity, who were operated by the same surgeon, with absent or underdeveloped antihelix and excessive conchal depth were retrospectively included in the study. The study protocol was approved by the Istanbul Goztepe Prof. Dr. Suleyman Yalcin City Hospital Clinical Studies Ethics Committee (approval number: 2023/0576). The ages of the patients ranged from 6 to 16 years. Patients with incomplete clinical data, who underwent revision surgery or in whom antihelix was created with cartilage incisions were excluded. When the patients presented for surgery, detailed anamnesis was taken and a complete otolaryngologic examination was performed. Patients were questioned about comorbidities, tendency to bleeding and hypertrophic scar formation. After detailed preoperative blood tests and anesthesia examination, written surgical consent was obtained from the patients' parents.

### *Surgical Technique*

Before surgery, anterior, posterior, and lateral photographs of the patients were taken and the anatomical features of the auricle such as the absence of antihelix and excessive conchal depth were evaluated and surgical planning was made. All patients were operated by the same surgeon under general anesthesia. During surgery, the patient was covered by following the rules of asepsis-antisepsis. The auricle was noted by measuring the distances between the auricular rim and mastoid from four points. The auricle posterior and anterior skin was infiltrated with 20 mg/ml lidocaine hydrochloride and 0.0125 mg/ml epinephrine. An antihelix was created anteriorly with two 2/0 silk guide sutures. Posteriorly, an hourglass-shaped incision of 4-4.5 cm in length was made without approaching the edges more than 1 cm and the skin and subcutaneous tissue were removed. The skin was elevated towards the anterior edge of the auricle. An antihelix was created with 3 horizontal matrix sutures using 4/0 polypropylene monofilament suture with Mustardé technique. Care was taken to ensure that the sutures remained anteriorly under the skin and above the perichondrium to be strong and not cut the cartilage. No filing, weakening, or incision was applied to the cartilage during antihelix formation. After antihelix formation, the anterior silk guide sutures were cut and removed. Minimal medial conchal cartilage excision was performed in a half-moon shape from the upper and lower parts of the conchal cartilage, away from the external auditory canal, to reduce the tension between the auricle and the mastoid bone. Two conchamastoid sutures were placed between the concha and mastoid periosteum with 4/0 polypropylene monofilament suture using Furnas technique. Bleeding was controlled with bipolar cautery and the skin was sutured intradermally with 5/0 absorbable monofilament polyglecaprone 25 sutures. Before the end of the operation, the points measured preoperatively were measured again and the amount of correction was noted, and if there was asymmetry between the two ears, intervention was performed. Nitrofurazone-impregnated, saline-soaked sterile cottons were placed on the anterior surface of the auricle, conchal cavity, antitragus edges and postauricular sulcus to prevent hematoma formation and to support the newly created auricula shape. The ear was covered with sterile gases and tightly closed with the mastoid dressing that we use in tympanoplasty operations. On the first postoperative day, the dressings were opened to check for hematoma or ischemia at the wound site and the patient was discharged if there was no problem. The patient was called for follow-up every 2 days and the dressing was renewed for one week. Amoxicillin clavulanic acid as antibiotic and paracetamol as painkiller were given for one week. At the end of the first week, the dressing was removed, and the patient was advised to wear an elastic ear bandage or a tennis headband as much as possible during the day and all night long for one month. Patients were called for follow-up at the first, third, sixth, and twelfth postoperative months. To evaluate the patient's satisfaction at the sixth month, the patient and his/her parents were asked to rate their satisfaction with the operation on a scale of 1-10, with 1-2=very bad, 3-4=bad, 5-6= acceptable, 7-8=good, 9-10=very good, and noted.

***Figure 1.*** *Preoperative (A1-2), 6th month (B) and 24th month (C1-2) postoperative photographs of our six-year-old girl patient (with the kind permission of her family).*

## 3. RESULTS

Of the patients included in the study, 10 were male and 12 were female. The mean age of the patients was 8.09±2.72 (range, 6-16) years. All patients had absence or weakness of antihelix and overdevelopment of the conchal cartilage. Under general anesthesia, for both ears of all patients, the antihelix was created with 3 horizontal matrix sutures using the Mustardé technique and minimal medial conchal excision was performed to reduce conchamastoid tension. In combination, two conchamastoid


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sutures were placed with Furnas technique. The mean follow-up period was 23.86±11.97 (range, 8-48) months. Complications developed in 4 of 44 ears (9%). As a major complication, keloid developed on the upper edge of both auricles in one patient in the late period (10th month). Major complication rate was 4.5%. This patient underwent revision surgery due to lack of response to intralesional steroid administration. Two patients (4.5%) had protruding polypropylene suture ends in one ear, one in the 13th month and the other in the 19th month. The sutures were removed under local anesthesia. One patient was found to have mild asymmetry in the sixth month and did not accept revision surgery because the patient' parents were satisfied. None of the patients scored lower than 7 in the satisfaction questionnaire performed at the sixth month. 13 patients and their parents scored 7-8 (good) and 9 patients and their parents scored 9-10 (very good). Considering these findings, patient satisfaction was evaluated as 100%.

## 4. DISCUSSION

Prominent ear deformity is the most common congenital anomaly in the head and neck region and although it does not cause functional loss, it may cause psychological trauma especially in children and thus lead to impaired adaptation to social life [1,2]. The more prominent appearance of the ears may cause children with prominent ears to attract more attention and be disturbed by other children. These children may be nicknamed because of prominent ears and may be exposed to peer bullying. The aim of otoplasty surgery is to make these prominent ears less visible and give them a natural appearance. Therefore, it is important that otoplasty surgery is performed before starting school. It has been reported in the literature that children and adults benefit psychologically and emotionally from otoplasty surgery [5,6].

Although, many surgical techniques have been used in otoplasty surgery, there is still no single, widely accepted effective technique [1,2]. Each ear should be analyzed individually, and treatment should be planned with the most appropriate technique or combination of techniques. It has been found that 95% of patients with prominent ear deformity have absent or underdeveloped antihelix or overdeveloped conchal cartilage [2]. In this study, cases in which antihelix formation was achieved with the Mustardé technique, minimal medial conchal excisions were performed and conchamastoid sutures were placed in combination with the Furnas technique were retrospectively reviewed in terms of patient satisfaction and complications. Major complications in otoplasty have been reported as large hematoma requiring drainage, wound dehiscence, tissue necrosis, wound infection requiring intravenous antibiotics and drainage, and major cosmetic deformity [2,7,8]. In this series, none of these complications were observed, only one patient developed keloids in two ears (4.5%), which did not respond to intralesional steroid treatment and excision was performed with revision surgery, and intraoperative corticosteroids were applied to the wound edges. Calder et al., reported the rate of keloid development as 2.1% in their series of 93 patients [8]. The reason for the high rate of keloid in our series was thought to be due to the small number of cases. In order to reduce the risk of keloid development, it has been recommended that excessive skin excision should be avoided, sutures should not be too taut, and the incision line should not be extended to the upper part of the auricle, which is the area where keloid development occurs most frequently [8-10]. In our case, keloid was thought to be caused by the incision line being close to the upper level of the auricle.

Minor complications in otoplasty have been reported as suture extrusion, hypertrophic scar, hypesthesia, irritation, pruritus, and suture abscess [2,7,8]. In two patients (4.5%), one in the 13th and the other in the 19th postoperative month, the sutures were removed under local anesthesia due to protrusion of the polypropylene suture ends in one ear, and no deformity occurred in these patients. The wound healed in one week with topical antibiotic ointment and no additional treatment was needed. With the increase in cartilage sparing suture techniques, the problem of suture extrusion has been a topic of discussion in the literature. The rate of suture extrusion has been reported as 0-22% in the literature [11]. Permanent sutures such as polypropylene and mercylene are used in suture techniques; extrusion of sutures may occur due to reasons such as foreign body reaction, infection, and skin thinness. Postauricular adipofascial flaps have been described to cover Furnas and Mustardé sutures with soft tissue to prevent suture extrusion. Horlock et al., reported no suture extrusion following the use of postauricular adipofascial flaps in a series of 51 cases [12] and Irkoren et al., reported no suture extrusion in a series of 100 cases [13]. Sinha and Richard [14] reported a suture extrusion rate of 2.64% in their series of 227 patients using adipofascial flaps. Boroditsky et al., reported a suture extrusion rate of 16.8%, a revision rate of 1.7% and a success rate of 97% in a series of 119 ears in which they did not use adipofascial flaps and performed otoplasty with the Mustardé technique with a follow-up period of 104 weeks [11]. They claimed that the suture extrusion rate was not high and was due to the long follow-up period. The suture extrusion rate of 4.5% in our series was considered low and reasonable.

In the literature, if antihelix and conchal correction is to be performed, it is recommended to perform conchal excision first, followed by helix surgery. Since, we think that it is more effective to create an antihelix to evaluate the conchamastoid tension without conchamastoid suturing, minimal medial excision of the concha was performed after the antihelix was created and conchamastoid sutures were placed. Cartilage-sparing suture techniques are thought to reduce the formation of major complications such as hematoma and necrosis compared to cartilage-cutting techniques [2,8,11]. In our series, suture techniques were combined with minimal medial conchal cartilage excision and no major complications occurred such as hematoma and necrosis. In this study, it was thought that the addition of small cartilage incisions and minimal cartilage excisions to reduce tension in addition to suture techniques would not increase the complication rate.

Cartilage sparing techniques and cartilage cutting techniques have been compared in the literature in various aspects and similar results have been reported with a complication rate of around 20% and a revision rate of 6-7% [11]. Cartilage sparing techniques are increasing in popularity due to their prevention of major early complications (postoperative hematoma and infection), no irreversible cartilage replacement and high patient/family satisfaction. In this series, the major complication rate was 4.5% and the total complication rate was 9%. Complication rates were low and consistent with the literature. One patient required major intervention due to keloid and 2 patients required minor intervention due to suture extrusion. All our patients reported that they were satisfied with the operation, and there was no need for revision surgery due to recurrence of the deformity or patient dissatisfaction. The results of our otoplasty series, which combined Mustardé and Furnas techniques with cartilage-sparing suture techniques and minimal medial conchal cartilage excision, were considered satisfactory. In the surgical series, symmetry between the ears was achieved in all but one patient (95.5%) and natural looking antihelix formation was achieved. The helix was visible behind the antihelix, the distance between the mastoid and the edge of the auricle was below 2 cm, and a natural ear appearance was achieved without obliterating the auricular sulcus. In the satisfaction scoring questionnaire we conducted at the sixth month, all our patients scored their satisfaction with the operation as good or very good and did not report any recurrence of deformity or residual deformity requiring revision.

## Conclusion

Otoplasty with a combination of cartilage-sparing suture techniques is a technique with low complications, low revision, and high satisfaction rates. Long-term complications such as suture extrusion can be corrected under local anesthesia in office conditions in a very short time and do not cause additional deformity. Minimal medial conchal cartilage excision in addition to this technique is beneficial in reducing the conchamastoid tension, does not increase the risk of complications and can be applied successfully. Large-scale studies are needed to support the findings of this study.

## Compliance with Ethical Standards

**Ethical Committee approval:** The study protocol was approved by the Istanbul Goztepe Prof. Dr. Suleyman Yalcin City Hospital Clinical Studies Ethics Committee (approval number: 2023/0576). Written surgical consent was obtained from the patients' parents. Consent for medical photography: The parent of one of the patients gave written consent for the photographs to be used in medical publication and he agreed for the images to be shown for teaching purposes.

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**Authors' contributions:** The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

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