Evaluation and comparison of two different cartilage-sparing techniques in 356 otoplasties performed in children

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Background **Prominent ear is the most common deformity of the external ear. Although hundreds of surgical otoplasty techniques have been described, none of them has proved enough advantage over others to become the gold standard in this field. In this study, we evaluated the results of a cohort of 188 patients operated with two different cartilage-sparing otoplasty techniques.**

Patients and methods **A total of 356 otoplasties were performed in 188 patients, between January 2012 and November 2016. Two different techniques were utilized in two different groups: a modified-Mustardé otoplasty and a modified-Furnas technique. Postoperative follow-ups were performed at week 1, and at 1 and 6 months and at 1 year. Complications were recorded and compared between both techniques. The success rate was measured according to McDowells' criteria.**

Results **A total of 356 ears were operated in 188 patients (85 men; 103 women; mean age 9.97; range: 6–15 years). In all, 105 patients underwent modified-Mustarde otoplasty, and 83 were operated utilizing a modified-Furnas technique. Success rates ranged from 90 to 100% depending on the technique utilized. No significative differences were observed in the incidence of complications and success rates.**

Conclusion **None of the compared otoplasty techniques showed better results than the other. Notwithstanding, otoplasty shows to be an effective treatment with high success rates (independent of the technique utilized) for patients with prominent ears.** ***Ann Pediatr Surg*** **14:143–145 © 2018 Annals of Pediatric Surgery.**

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Introduction

Prominent ear is the most common deformity of the external ear, with estimated prevalence rates of 5% [1]. Although this aesthetic alteration causes no physical limitations, its psychological and social impact may affect social development and persist in later stages of life [2]. One particular study demonstrated that 40% of adolescents with problem behaviours had auricular deformities [3]. Hundreds of surgical techniques for prominent ear correction have been described; however, none of them has managed to become the gold standard [4]. Notwithstanding, this lack of a uniformly accepted technique does not seem to have affected satisfaction with surgical outcomes, as patient and parent satisfaction rates persist high regardless of the technique utilized [1,2]. Otoplasty is one of the few extensively accepted cosmetic procedures to be performed in children for purely aesthetic reasons [5]. Despite the wide amount of studies focused on the description of new techniques and their high success rates, few studies focus on the incidence of complications [6]. In addition, few studies focus solely on the paediatric population [3,6].

In this study, we present the results of 356 paediatric otoplasties performed between 2012 and 2016 in our service with two different techniques. The latter analysis focuses on the evaluation of complication incidence, and its possible association with the surgical technique utilized.

Patients and methods

This study included 356 ears of 188 patients operated in our Paediatric Plastic Surgery Department from January 2012 to November 2016. Prior to surgery, a detailed clinical history was undertaken for each patient to investigate any other possible reason for the deformity, wound healing tendencies and connective tissue diseases. Patients and parents with detected psychological problems had psychiatric consultations. No surgery was performed to any children that did not show concern about the shape or size of their ears, even if their parents wanted their child to be operated. Routine anaesthesia examinations were performed before the surgery. Clinical examinations were performed preoperatively and postoperatively, 1 week after surgery and at months 1, 6 and 12 after the surgery, to evaluate the results and complication incidence. During examinations, the presence of conchal hypertrophy, absence of an antihelix fold and auricular-mastoid angles were recorded. Patients with constricted ears, large ears requiring reduction manoeuvers and Stahl's ears were excluded. Two types of otoplasty techniques were applied, according to the preference of each one of our two paediatric plastic surgeons. The success rate was measured 1 year after the surgery, according to the otoplasty surgery objectives determined by McDowell, which are recovery of ear prominence, viewing the antihelix behind the helix on an anterior perspective, creating a smooth helix and achieving bilateral symmetry relieving patients' complaints [7]. Sutures utilized for Furnas

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and Mustarde stitches, and closing sutures were recorded. Complications were evaluated during the 1 year follow-up, including wound dehiscence, haematoma, infection, exposed sutures, recurrence and keloids. As regards statistical analysis, χ^2-test was applied to compare complication incidence with the two different surgical techniques utilized. No ethical approval was required for the performance of this retrospective case series review. Consent to submit has been received explicitly from all coauthors, as well as from the Head of the Paediatric Plastic Surgery section of our institution. Informed consent was obtained from all patients before taking pictures of them.

Surgical technique

All operations were performed under general anaesthesia. An injection of bupivacaine with adrenalin was applied in the posterior side of the ear 15 min before the surgery.

Modified-Mustardé technique

First, an hourglass-shaped incision was made behind the ear, marking a minimal skin resection area. Cartilage was exposed through a subperichondrial plane. When necessary, cartilage resection and cartilage weakening with a rasp or cartilage scoring with a scalpel were performed. Cartilage weakening was made from a posterior approach, without performing new incisions. Three needles were passed to mark the desired shape of the antihelical fold and the locations where sutures would be placed. Three Mustardé mattress sutures were applied with 4.0 Prolene stitches for antihelical fold marking. Conchal setback sutures were utilized in cases with important ear separation. A simple continuous suture with 5.0 Monosyn (Braun; Barcelona, Spain) was utilized for wound closure.

Modified-Furnas technique

An hourglass-shaped incision was made behind the ear, marking an extensive skin resection area. Cartilage was exposed through a subperichondrial plane. When necessary, cartilage resection, cartilage weakening with a rasp or cartilage scoring with a scalpel were performed. Cartilage weakening was made from an anterior approach, through a new incision hidden under the helix. Two Furnas sutures (conchal setback sutures) with 4.0 Prolene were applied. No Mustardé sutures were utilized. A simple continuous suture with 4.0 Vycril rapid (Ethicon; Madrid, Spain) was utilized for wound closure.

After each of both techniques, celestoderm-soaked gauzes were placed in order to support the newly shaped area and control early postoperative bleeding and swelling. Dry gauzes were placed over the ear, and covered with a compressive headband. After the second day, the patients were allowed to take gauzes out and clean their wounds on a daily basis. Headbands were utilized for 3 weeks. Antibiotic was only administered during the surgery, no antibiotics were provided after surgery.

Results

In all, 188 patients underwent otoplasty in our Paediatric Plastic Surgery Department, of which 85 were men and 103 were women. Their age ranged from 6 to 15 years (average: 9.97 years). Primary surgery was performed in 168 patients, with 20 cases of secondary surgery from which 11 patients had been operated in our service, and nine at a different centre; 168 patients underwent bilateral otoplasty and 20 unilateral correction, resulting in 356 ears operated (Table 1). One hundred and five patients underwent modified-Mustardé otoplasty, and 83 were operated utilizing the modified-Furnas technique. As regards complications, our results are listed in Table 2. The two cases of local infection were treated by abscess drainage and oral antibiotics, requiring unilateral revision otoplasty in one case. Keloids were treated with serial intralesional triamcinolone infiltrations, requiring surgical excision in one case. No statistically significant differences were found in complication rates among the two surgical techniques. According to McDowells' criteria for the evaluation of otoplasty success [7], our success rates were 93% (98/105) in primary surgeries performed with the modified-Mustardé technique; 90% (75/83) with the modified-Furnas technique; and 100% in all secondary surgeries (Table 3).

Discussion

Numerous surgical techniques have been described to treat prominent ear deformity, generally divided into cartilage-cutting, cartilage-scoring and cartilage-sparing

Table 1 Demographic data

Demographics	
Sex	
Male	85
Female	105
Race	
Caucasian	186
Asian	2
Ears operated	356
Bilateral surgery	168
Unilateral surgery	20
Primary surgery	168
Secondary surgery	20

Table 2 Summary of complications

Complications	Modified Mustarde [*n* (%)]	Modified Furnas [*n* (%)]	*P*
Wound dehiscence	3 (6)	2 (4)	0.85
Recurrence	7 (13)	4 (7)	0.59
Keloid	4 (7)	4 (7)	0.73
Infection	1 (2)	1 (2)	0.86
Suture extrusion	8 (15)	6 (11)	0.88
Haematoma	0	0	–

Table 3 Ear anomalies and techniques performed

Variables	*n* = 188
Antihelix absence	
Mustardé	83
Furnas	51
Antihelix absence + conchal hypertrophy	
Mustardé + conchal resection	22
Furnas + conchal resection	32
Revision surgery	
Cartilage and skin resection	2
Mustardé sutures	5
Furnas sutures	9
Mustardé + Furnas sutures	4

techniques [8]. Notwithstanding, none of them has proven to be better than the rest in terms of complication or success rates. Thus, the choice of technique remains subject to surgeon preference [1].

Our experience led us to utilize techniques that combine cartilage-sparing techniques with cartilage-weakening procedures. Stiff and thick cartilage resists reshaping by the use of Mustardé sutures alone. In fact, relapse rates of nearly 100% have been reported when the cartilage is more than 3.1 mm thick in the triangular fossa [9]. Weakening cartilage with anterior scoring induces forming of a fibrocartilaginous cap that stabilizes the neoantihelix in its new position [10]. Moreover, by performing Mustardé or Furnas sutures in conjunction with anterior scoring, less aggressive scoring is required. The combination of both techniques allows control over the long-term result, avoiding the need for purposeful overcorrection and undercorrection [1].

In our study, none of the evaluated techniques showed better results than the other, in terms of complications or success rates. Both complications and success rates reported in our series rates coincide with the rates reported in the literature with the performance of other techniques [1,6]. No relation has been found between the suture material used and keloid formation, nor between the sutures used for closure and dehiscence rates.

Conclusion

Success rates in prominent ear correction surgery are elevated in experienced hands. In our study, the performance of a modified-Mustardé otoplasty technique showed similar results in terms of complications incidence and success rates than a modified-Furnas technique in a paediatric population. More studies with more extensive representation of different otoplasty techniques, and higher patient samples are required in order to clearly define the best otoplasty procedure among the existing ones.

Conflicts of interest

There are no conflicts of interest.

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