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The 'WiFi' otoplasty : Combined concentric posterior microchondrectomies and sutures for correction of prominent ears

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Summary *Background:* Prominent ears are by far the most common congenital ear deformity. Many techniques have been described using one or a combination of 3 basic methods: cartilage cutting, cartilage weakening and pure cartilage shaping techniques. The ideal otoplasty technique should yield a natural correction of the deformity, with low recurrence rates and with little risk of complications.
Methods: A new cartilage shaping technique using closing wedge concentric microchondrectomies through an entirely posterior approach is presented. Between 2006 and 2017, 200 bilateral otoplasties using this 'WiFi' pattern technique were performed. This technique combined with Mustarde sutures is based on the excision of concentric partial thickness cartilage wedges designed in the pattern of the WiFi symbol.
Results: There were no major complications such as anterior skin necrosis and no returns to theatre for infections or haematomas. 3 patients (1.5%) had complete recurrence of the deformity and 10 patients (5%) had to undergo a minor revision for recurrence at the upper pole. 5 patients have had exposure of the end of the permanent upper pole scapho-temporal suture more than 3 months after surgery requiring simple outpatient suture trimming/removal without any recurrence of results. Palpable or bridging sutures were present upon clinical examination in 10 patients (5%) but did not require revision surgery.
Conclusions: Here, we describe a fast, safe and reliable technique for otoplasty with no need for extensive dissection, which is applicable to the full range of deformity.

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Introduction

Prominent ears are the most common congenital deformity of the ear, affecting almost 5% of the population.[1] The deformity results from two basic congenital deficiencies of the ear: an overdeveloped conchal bowl and/or an underdeveloped antihelical fold, resulting in the three commonly listed signs of prominent ears: conchal height excess, absence/weakness of antihelical fold and a conchoscaphal angle greater than 90°.[2] Frequently more than one of these deformities are present and any surgical technique used for correction of prominent ears should therefore be versatile enough to correct each aspect. The goals of the procedure have been described by McDowell in 1968[3] as 1) correction of the protruding upper third of the ear, 2) visible helix beyond the antihelical fold in frontal view, 3) a smooth and regular helical line, 4) no distortion of the postauricular sulcus, 5) no overcorrection and 6) symmetrical results with no more than 3 mm difference between both ears.

Until now, hundreds of techniques have been described for correction of prominent ears. These vary from cartilage-sparing techniques with only sutures, to scoring cartilage or cartilage cutting and excision techniques, and combinations of these. The ideal otoplasty technique should yield a natural result according to McDowell's goals, with low recurrence rates and involve as little risk of anterior skin necrosis as possible. Here we present a new technique that uses a novel method of cartilage shaping supplemented with traditional mattress and conchamastoid sutures.

Patients and methods

Patients

Between 2006 and 2017, 200 patients underwent bilateral otoplasty by either the senior author (AG) at the Melbourne Institute of Plastic Surgery, Melbourne, Australia or by the junior author (BH) at the University hospital Brussels, Belgium. The average age of patients at the time of surgery was 11.8 years (range 5–36 years), the male to female ratio was 117/83. All patients were followed-up at 1 week, 6 weeks and 6 months postoperatively and then discharged unless otherwise indicated. The mean follow-up term was 6.45 months (range 1.5–24 months). Since only patients with bilateral prominent ears were included, all other congenital ear deformities such as cup ears or constricted ears were excluded. All operations were performed under general anaesthesia.

Operative technique

First, the location of the desired antihelical fold extending into the superior crus is marked as a single line marking the peak of the fold and the borders of the fold with two dotted lines (Figure 1A). To assess the need for conchal bowl excision, we developed a meatal occlusion test. The effect of the conchamastoid sutures on the diameter of the external acoustic meatus is mimicked by manually pushing the concha backwards against the mastoid. If more than one third of the meatus is occluded by this manoeuvre, a conchal bowl reduction should be considered in place of conchamastoid sutures to avoid meatal occlusion. The conchal bowl, antihelical fold, posterior surface and the mastoid region are infiltrated with 10 ml of ropivacaine 0.75% with adrenaline 1:200000 per side (in paediatric cases this dose is adjusted accordingly).

A gentle hourglass shaped postauricular skin incision is designed to leave the scar in the postauricular sulcus. This skin can either be resected or de-epithelialized to serve as a posteriorly based flap to cover the knots of the sutures as previously described,[4] or simply be excised. The postauricular skin is then lifted off the perichondrium in the subcutaneous plane with tenotomy scissors and diathermy, almost to the level of the helical rim. Posteriorly, 3 different pockets to expose mastoid or temporal fascia are dissected with tenotomy scissors spreading longitudinally to avoid damage to the posterior branch of the great auricular nerve: 2 towards the mastoid fascia superior and inferior to the auricularis posterior muscle and 1 more superiorly towards the temporal fascia (Figure 1B). Medially and laterally at three different locations along the marked desired antihelical fold, a 16-gauge straight Keith needle dipped in surgical ink is pierced through the anterior skin, to transpose the location and borders of the curvature of the desired antihelical fold to the exposed posterior cartilage of the ear.

Within the boundary of these markings, 2–3 concentric grooves are made on the posterior surface of the ear in a pattern that resembles a 'WiFi' symbol (Figure 1C). These grooves are made with the tip of a 15-blade gouging perpendicular to the cutting edge of the blade and pushing side to side in gouging motion with light pressure, so that a small wedge is scooped out of the posterior cartilage surface as opposed to previously described techniques of posterior scoring. Care should be taken not to cut the entire thickness of cartilage as this will result in a visible sharp edge on the anterior surface of the ear and may excessively weaken the cartilage; the surgeon's non-dominant index finger is therefore placed in the concha to better evaluate the depth of the wedge excisions. Cartilage is not excised in between the linear chondrectomies. When the wedge excision approaches the anterior perichondrium, the cartilage colour changes to a slightly darker colour (from white to grey) indicating the gouge is almost full thickness through cartilage at which point the carving is ceased. These 2–3 grooves/wedges in a concentric pattern are best described as closing wedge concentric microchondrectomies narrow at their greatest depth and widest at their most superficial aspect. It is imperative to avoid penetrating full thickness through cartilage at any point and the colour change to grey/white from white is an easy end point indicator even for a surgeon learning this method. Perichondrium is not removed on the posterior surface in order to preserve blood supply over this area and to lead to more efficient scarification to take over from the function of the sutures used to fold back the antihelix.

Next, two to three Mustarde-type mattress 3/0 Ethibond or 3/0 Prolene (either is sufficient but must be on a taper needle to avoid the suture cutting through cartilage) are placed (Figure 1D) to fold back the antihelix. Subsequently, two conchamastoid sutures are placed superior and inferior to the auricularis posterior muscle (Figure 1E). Two sutures are preferable to avoid changing the axis of the ear if a single suture is used. Since the wedge microchondrectomies are not full thickness, cartilage weakening is reduced or