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Short Communication

Otoplasty: experience with a modification using a drill, and literature review

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Abstract

More than 200 techniques have been described for correction of prominent ears, indicating that there is no single, widely accepted procedure that has been adopted by most surgeons. This article presents a simplified surgical method for correction of prominent ears. One hundred and twenty-eight otoplasties were performed on 70 patients using the described technique. The main modification of the technique was the use of a diamond burr drill to thin the cartilage posteriorly. Good aesthetic results were obtained in most patients.

Key words: Ear, External; Plastic Surgery; Abnormalities, Congenital

Introduction

Prominent ears are the most common congenital deformity in the head and neck region, with an incidence of about 5 per cent in Caucasians.[1] Prominent ears are usually not associated with any other abnormalities or syndromes but may be considered an aesthetic handicap.[2]

Prominent ears may cause considerable emotional disturbance in children, usually due to ridicule by schoolmates. There is an average difference of about 5 mm between the length of a fully developed ear and that of a nine-year-old child.[3] Therefore, in order to avoid emotional disturbances, which can lead to the development of personality disorder, surgical correction of prominent ears should preferably be performed at or before the start of schooling.

Although Sushruta (a seventh century BC Indian surgeon) and Tagliacozzi (a sixteenth century Italian surgeon) described otoplasty techniques, the modern era of otoplasty can be traced to 1848, when the term 'otoplastik' was first used by Dieffenbach in his description of the repair of microtia.[1] In 1881, Ely performed and published an otoplasty technique using an anterior approach.[4] He removed a full thickness strip of the auricle, but this left a visible scar along the line of the antihelix on either side of the pinna. Keen modified the same technique by leaving the anterior skin bridge intact to prevent a noticeable scar.[1]

A posterior auricular incision was first published by Morestin in 1903.[4] After this, many attempts were made to correct prominent ears by using various antihelical and conchal cartilage excisions using this posterior approach. In the 1940s, attempts were made to weaken the cartilage by mechanically thinning or partially incising it. In 1947, McEvitt made parallel incisions in the posterior cartilage plane,[5] whereas Tanzer, in 1962, anchored the antihelical plica with a permanent suture, in addition to McEvitt parallel incisions.[6] In the 1960s, Mustarde used permanent retention sutures in a combined technique with a fusiform skin excision to recreate the antihelical fold. In 1963, Stenstrom scored the anterior part of the conchal cartilage to create an antihelix through a posterior incision.[7] In 1968, Furnas described a procedure which consisted of securing the concha to the mastoid periosteum posteriorly, thereby decreasing the concha-scaphoid angle.[8] In 1967, Kaye[9] used mattress sutures placed in the auricular cartilage through small anterior incisions. In 1994, Johnson emphasized the placement of oblique sutures to control the final curve and shape of the antihelix, performed through a posterior approach.[10] Weerda described, in 1979, a modification of the Mustarde technique using a diamond drill.[11] However, an ideal technique to correct protruding ears has not yet been established.

The objective of this paper is to share the senior author's (PRD) experience of a technique of otoplasty using a diamond drill, used over the past 23 years with very good long term results. The technique is easy to learn and master, with minimal post-operative morbidity.

Surgical technique

The operation is performed under general anaesthesia. The line along which the antihelix is to be created is marked with methylene blue (Figure 1). The cranial surface of the pinna is infiltrated with 2 per cent lignocaine with 1:80 000 adrenaline. Keeping the methylene blue markings as the middle reference point, a spindle-shaped incision is made. This spindle-shaped skin is excised from the posterior surface of the pinna (Figure 2). The perichondrium on the exposed posterior surface is incised along the previously marked methylene blue line. The perichondrium is elevated off the cartilage for about 5 mm on either sides of the incision (Figure 3). The exposed cartilage is thinned using a 2 mm diamond burr over a width of 5 mm along the markings for the antihelix (Figure 4). The end point of the drilling is the pinkish hue of the lateral surface. The aim should be to leave a very thin layer of the cartilage over the

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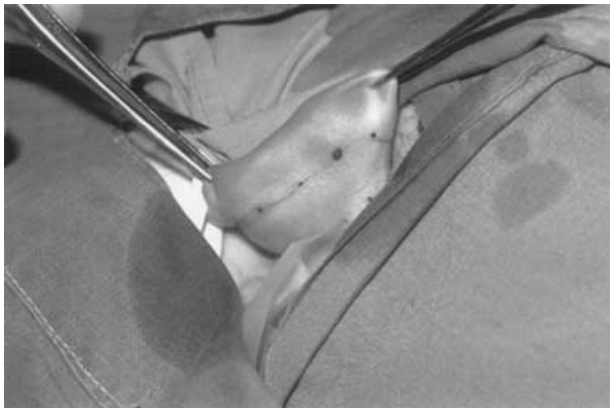

FIG. 1
Antihelix to be created marked with methylene blue.

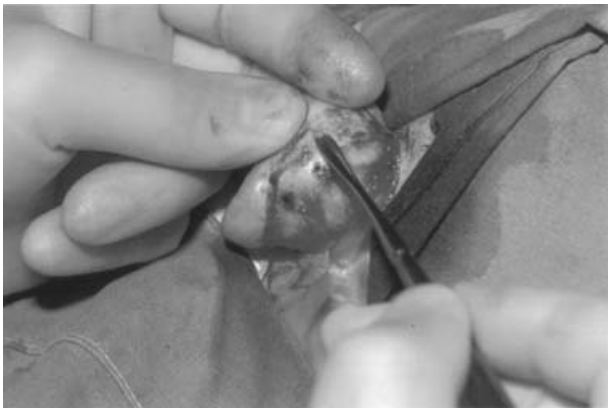

FIG. 3
Elevating perichondrium off the cartilage.

perichondrium on the lateral side. Care should also be taken not to thin the superior crus too much in order to avoid a sharp ridge. At this stage, the perichondrial flaps on the posterior surface are sutured with 3.0 undyed Vicryl (Ethicn, Berkshire, UK) interrupted sutures to create the missing antihelix (Figure 5). The contours are checked continuously while suturing. The skin edges are then sutured with 3.0 undyed Vicryl interrupted mattress sutures. Overcorrection of the deformity is desirable at the end of the operation (Figure 6). Cotton wool soaked with acriflavin is moulded into the contours on both surfaces of the pinna. A turban dressing is applied after ensuring adequate padding to prevent haematoma formation. The dressing is removed after one week. After this, patients are advised to use a bandage at night for three weeks.

Results

Using this technique, 128 otoplasties in 70 patients have been performed from 1980 to 2003. Of these patient, 38 were male and 32 female. The average patient age was 11 years. Unilateral otoplasty was performed in 12 patients and bilateral in 58. Pre-operative assessment included the state of the antihelical fold, the condition of the conchal bowl, the plane of the lobule, and the quality and spring of the auricular cartilage. Pre- and post-operative photographs were taken of all patients. Unilateral otoplasty was performed if the asymmetry between the right and left ear was found to be remarkable. All the patients had no other deformity apart from protruding ears. Follow up was for a minimum of 12 months. On review, none of the patients reported any major post-operative complications. One patient had a keloid formation. No cases of perichondritis or wound dehiscence were noted. Of these 128 otoplasties, good results were obtained in 126 ears. Only two ears required revision surgery.

Discussion

Otoplasty is an artistic exercise in creating the proper form and dimension of the ear. The goal of otoplasty is to produce symmetrical, natural-looking ears with no obvious signs of surgery.

A variety of techniques are available to shape the auricular cartilage that forms the framework of the ear. The basic requisite for good results is controlling the position and degree of folding of the antihelix. Otoplasty techniques can be divided, in general, into cartilage-sparing and cartilage-cutting methods.

The cartilage-sparing methods enable the surgeon to avoid disrupting the structural integrity of the ear. Of these techniques, Mustarde[12] and Furnas[13] concha-mastoid sutures are the most commonly described. The Mustarde technique is one of the most commonly used methods for creation of the antihelical fold in cases of prominent ear deformity. An aspect of this procedure which can be

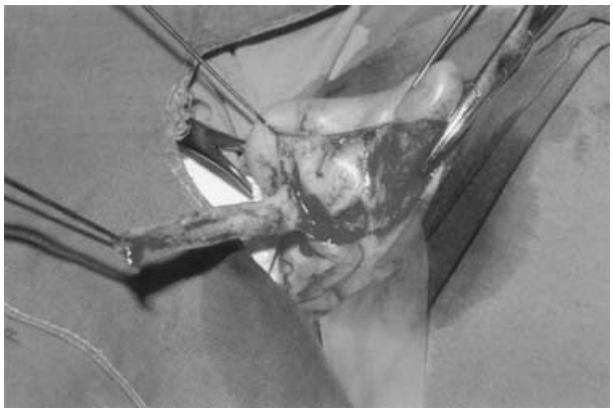

FIG. 2
Spindle shaped skin excised from posterior surface.

FIG. 4
Cartilage thinned with diamond burr drill.

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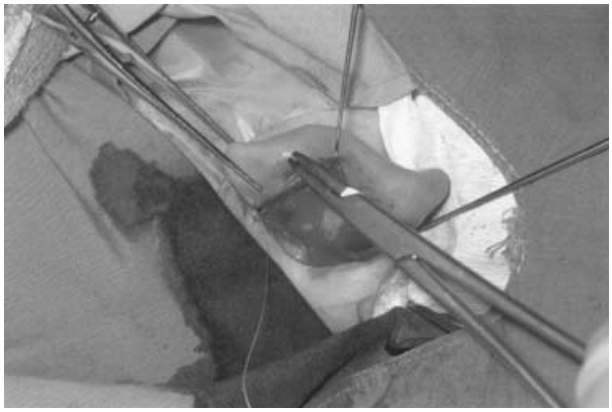

FIG. 5
Interrupted sutures to create antihelix.

difficult to perform is the precise tightening of the cartilage-conforming sutures. Because the surgeon's attention is directed laterally to achieve the desired antihelical shape, tightening the sutures medially is generally performed without direct exposure. This manoeuvre is awkward and creates a risk of under-correction due to tying the knots too loosely, because of soft tissue entrapment and the tendency for the cartilage to unfold.[14] Pain may result from nonabsorbable sutures pricking the dermis from beneath.[15] Post-auricular suture extrusion may also result.[16] Messner and Crysdale, observing patients treated using the Mustarde technique for at least one year following surgery, found that the final ear position returned to within 3 mm of the pre-operative state in up to 40 per cent of ears.[17] Tan found that, following placement of Mustarde sutures alone, 24 per cent of patients required re-operation for recurrent deformities.[18]

The other major group of otoplasty techniques is the cartilage-cutting methods, of which the anterior scoring method is most commonly used.[19,20] Scoring facilitates the bending of the cartilage, but it may cause painful and unattractive ridging if performed too aggressively. Calder and Nassan observed that eight per cent of ears treated with anterior scoring retained some residual deformity.[20] Cutting the auricular cartilage subjects the antihelix to irreversible, unpredictable distortion by wound contraction forces.[1] There has been increasing criticism of the anterior scoring method because of unacceptably high complication rates (24 per cent), especially for training grade surgeons.[21] These complications arise due to anterior dissection causing anterior haematoma, which may lead to anterior skin necrosis. Chondritis may follow secondary to haematoma and infection, and this may result in irreparable cartilage irregularities.[22,23]

The technique we describe, using a drill to thin the auricular cartilage posteriorly, seems to be a more delicate approach. Thinning of the cartilage by drilling softens the cartilage spring and allows accurate shaping which can be held in a stable position by mattress sutures. This is a safe and controlled technique; one can stop drilling when the desired result has been achieved. The technique represents a middle path between cartilage-sparing and cartilage-cutting techniques and thus avoids the complications associated with both.

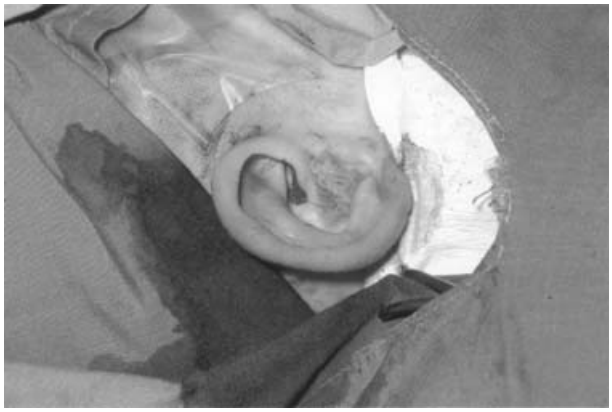

FIG. 6
Overcorrection desirable at end of operation.

Conclusions

The technique of otoplasty described, using a drill to thin the auricular cartilage, is safe and easy to learn and to perform. It has few complications and has reproducible cosmetic results. The long term results are very good, and it can be used as a standard technique.

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