Microtia - How I do it?

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Introduction

Microtia is a major congenital anomaly of the external ear. It composes a spectrum of deformities from a grossly normal but small ear to absence of the auricle. There are several classification systems to describe microtia.

Tanzer classified microtia according to the description and location of the defect.

- **Type A**: an anotic ear.
- **Type B**: a completely hypoplastic ear with or without aural atresia.
- **Type C**: hypoplasia of the middle third of the auricle.
- **Type D**: hypoplasia of the superior third of the auricle.
- **A prominent ear** is classified as type E microtia

Melnick and Myranthropoulos noticed that the occurrence of major ear anomaly is 3 in 10,000. The incidence among Japanese is 1 in 4,000. Microtia is seen more commonly in males and on the right side.

Microtia may present as an independent anomaly or associate with other syndromes (Goldenhar syndrome and Treacher Collins syndrome). Thalidomide and isotretinoin can cause congenital deformities such as microtia.

Microtia is commonly associated with external ear canal atresia and middle ear anomaly. These result in conductive hearing loss. Its appearance also causes a lot of psychological impact on the affected children and their families. In Hong Kong, most children's vision has refractory problems. These affected children have difficulties in wearing spectacles.

Management

The affected children should be worked up to eliminate any associated syndromes. ENT surgeons should assess their hearing. If ear canal atresia is indicated for operation, it will be done after auricular reconstruction.

Previously, implantation of prosthetic framework was common. However, it was usually complicated with infection or protrusion of the implant. Currently, reconstruction can be performed with prosthesis replacement or costochondral graft.

A prosthetic ear is quite natural but not a part of the body. It is expansive for replacement. Although osteointegrated anchoring system can hold it securely, the risk of inadvertent dislodgement is still present. Also, it requires an operation to implant a titanium anchor within the drilled temporal bone.

Gillies first described burying carved rib cartilage under the scalp skin for total ear reconstruction in 1920. Tanzer re-emphasised the use of autogenous cartilage in staged operations in 1964. Brent described a series of more than 1200 cases of microtic ear reconstruction. He was the first to report the successful use of tissue expansion in reconstruction of the ear.

In the first consultation, I will discuss with their parents the options of reconstruction despite my preference is osteochondral graft reconstruction

Osteochondral Graft Reconstruction

The timing of osteochondral graft reconstruction can be started at the age of 6 because the normal ear is almost fully developed. Practically, the timing is also determined by body built of the child whether there is adequate cartilage for harvesting. Usually, the operations are performed at the age of 8-9.

I perform Osteochondral graft reconstruction in 3 stages with 3-6 month intervals.

- **First stage**: Excision of rudimentary cartilage + transposition of ear lobe + harvesting and implantation of cartilaginous framework
- **Second stage**: lateralisation of ‘auricle’ + tragus reconstruction
- **Third stage**: creation of concha

Pre-operative planning is for locating and duplicating the reconstructed ear. I use the radiographic film as a tool. I draw a horizontal line on the film and put onto both lateral canthi. Then, I mark the outline of the normal ear and the midline of the face. The film is folded in half in the midline and I then cut out the...
outline of the auricles. When this film is put onto the patient’s face, this will show the location and orientation of the reconstructed ear. If there is facial asymmetry, the final location will be adjusted accordingly. Another film is used to duplicate the details of an ear with the same size. Tanzer and Burton D. Brent also noticed most constructed ears grew at an even pace with the opposite normal ear.

Stage 1
For the benefit of the patient, team approach can minimise the operation time. One team deals with the recipient site by excision of remnant cartilage, rotation of the ear lobule and creation of a spacious pocket. The other team harvests, sculptures and implants the framework. My usual partners are Dr. Walter King, Dr. M.K. Tung, Dr. C.K .Or and Dr. K.H. Kwan.

The position of the ‘auricle’ is marked with the disinfected tailored radiographic film. The lobule is transposed to the proper position. The remnant is excised. The pocket is created by widely undermining of the thin skin flap.

I prefer harvesting costal cartilage from the ipsilateral side of the chest at the confluence of the 6th-7th ribs and the floating 8th rib. Most of the perichondrium will be preserved in the donor area to decrease the morbidity of the donor site and risk of pneumothorax. However, the perichondrium over the synchondrosis of the 6th and 7th ribs on the dermal side is undisturbed. This will maintain the sculptured framework in continuity.

The harvested cartilage is sculptured by gouge and surgical knife. The height of the antihelix is built with a strip of cartilage and fixed in position with 6/0 nylon.

The sculptured framework is implanted into the recipient site. Its tip is inserted into the lobule. It is fixed to the underlying tissue in proper position and orientation with several absorbable stitches. A suction drain is put under the framework. The wound is closed with nylon. The detail of the ‘auricle’ is maintained by suction force and gauze packing. Finally, bandage is applied.

Adequate analgesic and antibiotic are required. Usually, the child will leave the bed on D1-2. The Drain will be removed when there is minimal output.

Stage 2
A skin incision is made outside the rim. The ‘auricle’ is lifted away from the scalp. The banked cartilage is cut into a wedge 4mm high and 10mm long. It is inserted into the underlying soft tissue to keep the ‘auricle’ in anterior projection.

The outer edge of the incision is widely undermined and advanced into the wound. The residual raw surface is covered with skin graft. The grafted skin is harvested in full thickness in the groin region. Tie over dressing is applied.

The tragus is created with insertion of a small cube of cartilage via a separate incision.

Stage 3
The concha can be deepened. The skin flap is advanced to the tragus. The resulting wound is covered with full thickness skin graft which is harvested from the post-auricular surface of the normal ear. This stage is optional.

Conclusion
Total ear reconstruction with costochondral graft is a rewarding operation to the patients and surgeons.

It is an operation that demands experience and team spirit to share the work. Let the surgeon concentrate on the framework as a state-of-the-art procedure.

References

MCHK CME Programme Self-assessment Questions
Please read the article entitled “Microtia - How I do it? ” by Dr. Wai Hong WONG and complete the following self-assessment questions. Participants in the MCHK CME Programme will be awarded 1 CME credit under the Programme for returning completed answer sheets via fax (2865 0345) or by mail to the Federation Secretariat on or before 30 April 2009. Answers to questions will be provided in the next issue of The Hong Kong Medical Diary.

Questions 1-10: Please answer T (true) or F (false)

1. Microtia is a congenital ear anomaly with grossly deformed and small ear.
2. Microtia is nearly twice as frequent in boys as in girls.
3. Oral intake of vitamin A derivative during pregnancy is a cause of microtia.
4. Hearing loss of affected patient is due to inner ear anomaly.
5. Virgin skin at mastoid region is important for osteochondral graft reconstruction. Therefore, ear canal reconstruction should be delayed after auricular reconstruction.

6. Implantation of prosthetic framework can provide a natural and permanent result.

7. Osteointegrated enchoring system will change the trend of auricular reconstruction.

8. The technique of staged osteochondral graft operation is founded on Tanzer’s work.

9. Sculpturing cartilaginous framework of adult is more difficult because of ossification.

10. The reconstructed auricle should be planned with bigger size.

**ANSWER SHEET FOR APRIL 2009**

Please return the completed answer sheet to the Federation Secretariat on or before 30 April 2009 for documentation. 1 CME point will be awarded for answering the MCHK CME programme (for non-specialists) self-assessment questions.

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