Microtia reconstruction: our experiences of first 10 cases in Bangladesh

M.S. Khondoker[a], R. Awwal[b], M.M. Sarker[c], S.H. Khundkar[d]

Summary:

Varying degrees of congenital ear deformity (microtia) occurs 1 in about 8000 to 10,000 live births. One of the greatest challenges in plastic surgery is total auricular reconstruction as it demands precise technique as well as artistic creativity. In Bangladesh, recent advancement in the technique of carving and sculpting rib cartilage and better training for achieving finer anatomic details has given a break through in the surgical management of deformed ear.

Between January 2009 and January 2010, total ear reconstruction was done with a two-stage method using autogenous costal cartilage in the Department of Plastic Surgery, Dhaka Medical College Hospital, Dhaka. In the first stage, lobule rotation, fabrication of the cartilage framework and its implantation were performed. In the second stage, elevation of the auricle and formation of the tragus were done. A total of 10 cases with microtia comprising different age group have been operated. All of them underwent stage I operation; among them 8 patients went through stage II procedure while the other 2 are waiting for the same. Results: 10 patients, ranging in age between 8 and 25 years, were operated on using autogenous costal cartilage between 2009 and 2010. Six patients were males and four were females. Unilateral microtia was present in all of these patients (7 right, 3 left). Eight cases were with Grade III microtia; the remaining 2 cases presented with Grade II microtia. The follow-up period was one month to one year. Seven among 8 cases presented acceptable ear contour after second stage ear reconstruction. The cranioauricular angle of the reconstructed ears was also similar to that of the opposite ears. Unfavourable result was deformation of the constructed helix which occurred in one case.

Though it is impossible to reconstruct an ear that appears exactly as the opposite one, the new ears which were made were of correct size and in normal position with impressive finer three dimensional details that achieved patient's satisfaction as well as surgeon's professional gratification.

Key words: Microtia, Two stage auricular reconstruction, Autologous costochondral cartilage

a. Dr. Md. Sazzad Khondoker, MS(G. Surgery), FCPS(Surgery), MS(Plastic Surgery), Associate Professor, Department of Plastic Surgery, Dhaka Medical College and Hospital.

b. Dr. Rayhana Awwal, FCPS, FRCS(Ed), MS(Plastic) Assistant Professor, Department of Plastic Surgery, Dhaka Medical College and Hospital.

c. Mst. Masuma Sarker, Assistant Registrar, Department of Plastic Surgery, Dhaka Medical College and Hospital.

d. Prof. Shafquat Hussain Khundkar, FCPS (Surgery), FICS(Plastic Surgery), Professor and Head of Department of Plastic Surgery, Dhaka Medical College and Hospital

Address of Correspondence : Dr. Md. Sazzad Khondoker, Associate Professor, Department of Plastic Surgery, Dhaka Medical College and Hospital.
Tel: 88-02-9128658, Mobile: 01713 063263
E-mail: skhondoker@yahoo.com

Introduction:

Why should we have pinnae? Only to wear glasses? The immediate visibility of their absence, made the external ears essential for the maintenance of human aesthetics. Absence or deformation of an ear has very significant emotional impact. Patients with congenital microtia and their families equally feel the emotional impact of absent ears[1] (Fig: 1).

Congenital microtia reconstration is complocated & challenging. Betwen Jan 2009 and Jan 2010 ten cases of congenital microtia have been treated with two stage surgical method in the Dept. of Plastic Surgery of Dhaka Medical College Hospital.

Clinical Data:

10 cases were treated; of there 6 male & 4 female. Average age was 11 (8-25).

Operative technique:

Preoperative planning:

Detailed preoperative planning was done before each operation for determining the correct position and finer carving of the framework for the new ear. A pattern for the construct is made by placing a large piece of X-ray film against the normal ear and tracing its anatomic landmarks. (Fig: 2). The template is then reversed and made several millimetres smaller throughout to accommodate the thickness of the skin cover. In case of hemifacial microsomia, the location of the fabricated ear was adjusted in proportion to the degree of facial hypoplasia.

Fig -1 : Right Sided Microtia.

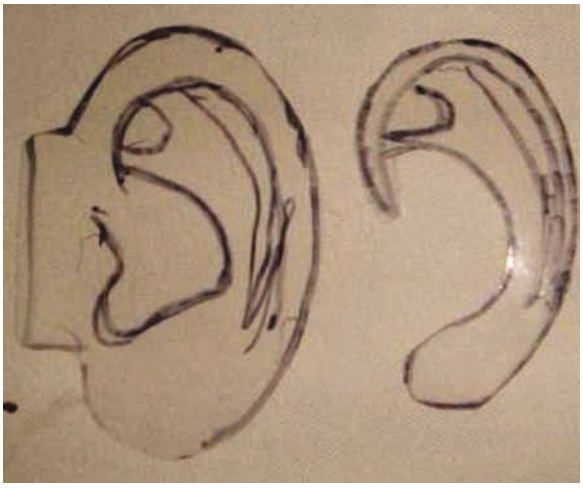

Fig -2 : Pattern of cartilage framework.

Fig -3 : Incision mark for cartilage harvest on contralateral chest of the side of microtia.

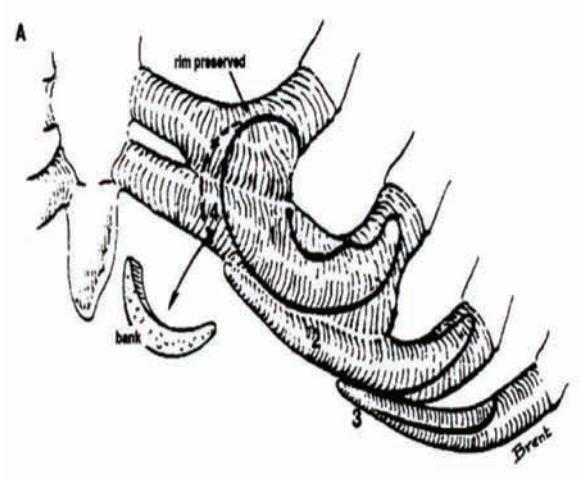

Fig -4: Harvest plan on 6th, 7th & 8th costal cartilages.

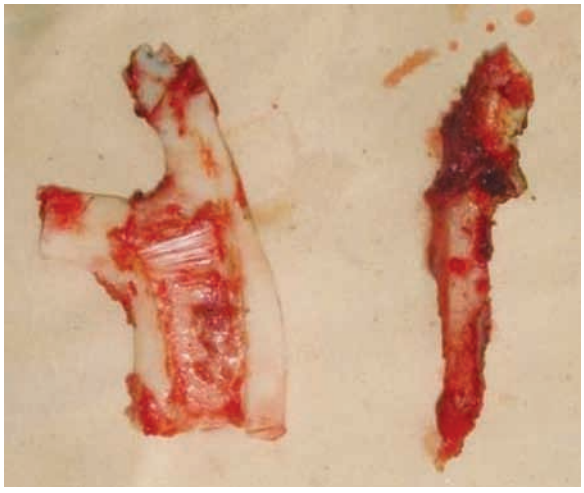

Fig -5 : Harvested cartilage blocks.

First stage:
Harvesting costochondral cartilage:
At first a contralateral transverse incision was made over 6th intercostal space or in case of female along the inframammary line to expose the 6th,7th and 8th costochondral cartilages (Fig-3&4). A cartilage block was cut according to the pattern without disturbing the cross-hatched area between 6 and 7 ribs (Fig:5). Preserved perichondrium would grow and fill the donor space. 8th rib was removed without preserving the perichondrium. Extreme precaution was taken not to injure the pleura during rib harvesting.

Fig -6: Sculpting instruments.


Fig -7: Completed framework befor insertion.

Framework Carving:
Meticulous technique was followed for sculpting framework. The pattern was fixed over the cartilage block with two pins and then the outline was cut according to the pattern. Inside edge of helical rim and triangular fossa were marked out and excavation was done in scapha and triangular fossa until the cartilage was removed through the back of the framework. Holes through the framework permitted better fixation of overlying skin, thus preserving finer details (Fig: 7). Edges of lobule, antitrgus, antihelix, and posterior margin of helical rim were carefully rounded to final shape. Pattern of helical rim was drawn on the 8th rib and carved accordingly. Helical rim piece was then fixed over the ear framework with four/five 5-0 nylon sutures. Carving process usually took 45 minutes altogether.


Fig-8: Planning of position of the sculptered framework.

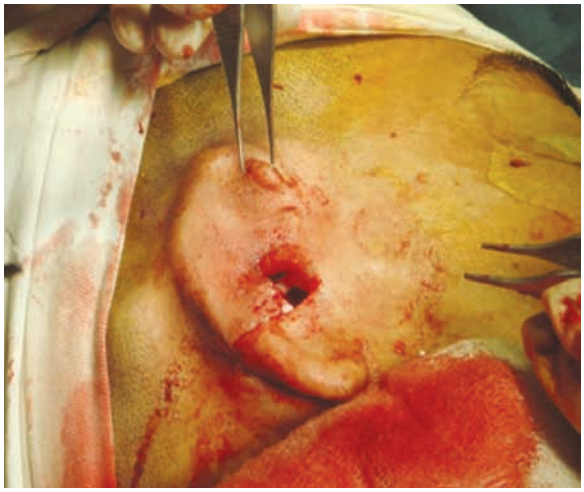
Fig -9: Framework in subcutaneous pocket.

Lobule transposition and Implantation of framework:

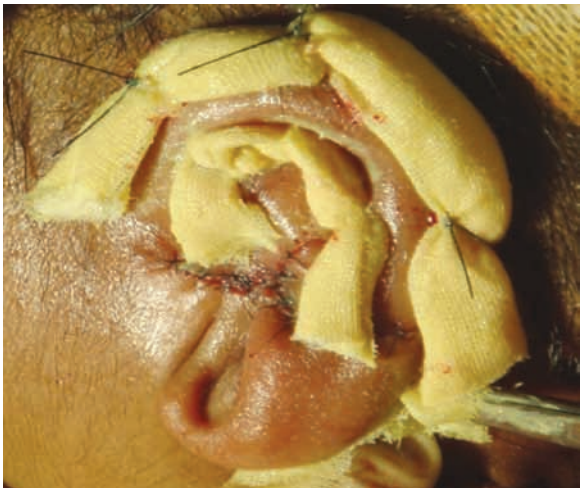

Fig -10: Placement of stents sutured in position.

Fig -11: Incision plan for second stage surgery.

We choose framework implantation and lobule transposition in the same stage because incision for lobule transfer gives a greater access for framework implantation. Correct position of completed ear outline was marked out and the lower half of the microtic vestiges was rotated as lobule to the new position (Fig: 8). The rudimentary ear cartilage from the upper pole was removed. The banked cartilage was first placed, the framework is then placed in a subcutaneous pocket (Fig: 9). A small silicon suction drain tube was secured in place. Stents made of rolled

Fig -12: Full thickness skin graft in place.

Fig -13 : Final outcome.

petroleum gauge were sutured into position with 4-0 prolene, snug enough to hold the skin to undermined framework but not so tightly as to compromise circulation (Fig: 10). A bulky soft pressure dressing was given.

Second stage :

The second surgery was performed 5 to 6 months after the first surgery. Skin incisions were made 2 mm outside of the posterior margin of the auricle (Fig: 11) and the framework was elevated with care not to expose the cartilage. The banked piece of cartilage was then removed. A pocket was created under the ear framework and the ear was supported away from the head with the banked

cartilage. Scalp skin was then undermined and advanced anteriorly to reduce the wound size. The skin defect behind the ear framework was covered with a full thickness skin graft (Fig: 12).

Results :

A total of 10 patients with microtia and ranging between 8 and 25 years were treated from 2009 to 2010. Six patients were males and four patients were females. Unilateral microtia was present in all of these patients. There was a predominance of the right side in unilateral cases with 7 patients in contrast to 3 left-sided patients. Eight subjects exhibited the classic sausage-shaped lobule type deformity; the remaining 2 cases presented cocket- shell deformity. The follow-up period was one month to one year. Associated clinically manifested hemifacial microsomia was present in 3 patients.

Fig -14 : Final outcome.

After ear reconstruction, 8 cases presented acceptable ear contour (Fig-13 & 14). One case showed deformation of the constructed helix. The deformed cartilage of the helix was trimmed and reshaped during second stage operation. The reconstructed ears of one individual lacked detail because of thick fibrous tissue between the skin flap and the cartilage framework. Haematoma formation may have contributed to these complications.

Complications related to ear reconstruction included infection and hypertrophic scars. To prevent infection oral cephalosporin was given to all patients for seven days after operation. Unfortunately one patient suffered from infection.

There was no flap necrosis, no exposure of the cartilage as well as no cartilage absorption. During harvesting of cartilage there were no complications like injury of pleura and tension pneumothorax. Donor site healing was excellent and on follow up of four patients after one year there was no chest wall deformity.

Discussion:

There are three main options that can be offered to the patient with microtia. First, there is always the possibility of doing nothing. Some, but very few, patients prefer not to undergo advanced surgery of any kind. Secondly, using non-autogenous material, e.g. the titanium screw-attached silicone prosthesis or auricular reconstruction with artificial materials such as Medpor, having concerns to be extruded with significant adverse consequences. Finally, despite multistage operation and potential for donor-site complications, reconstruction with autogenous cartilage framework remains the accepted standard for external ear reconstruction[2-6]. A variety of surgical methods have been developed for reconstruction of the external ear including tissue expansion. Sir Harold Gillies first described total ear reconstruction with autologous costochondral cartilage in 1920[1]. The basic technique for total reconstruction of the auricle was established by Tanzer[2] in 1959. Brent[3-4] has attained outstanding results in ear reconstruction utilising various modifications of detailed surgical techniques such as framework fabrication and tragus construction with chondrocutaneous composite grafts. Tanzer[2] and Brent[3-4] reported three-stage and four-stage techniques for ear reconstruction. Nagata[6-8]and Park[9,10] reported two-stage and single-stage techniques for ear reconstruction, respectively. Minimising the number of operative stages

and improving the carving techniques greatly improve patient satisfaction with early return to social life.

Timing of surgery for patients with congenital microtia remains a source of debate. The parents usually would like to have the malformation 'fixed' during the very early childhood but it requires mature costochondral cartilage for fine carving. Brent[3] opts to start reconstruction at around the age of 6. But for the patients of Bangladesh, 8 years of age is the optimum starting time to allow costochondral cartilage to grow sufficiently.

In conclusion, the current authors have reconstructed the auricle with a two-stage operative procedure. In the first stage, lobule rotation, fabrication of the cartilage framework and implantation of the framework were performed. In the second stage, elevation of the auricle and formation of the tragus were performed. The proposed method presented acceptable contour of the reconstructed auricle with few complications. Careful meticulous manipulation is necessary to create a natural contour of the ear and to reduce complications in all stages.

References:

1. Jiamei D, Jiake C, Hongxing Z, et al. *An investigation of psychological profiles and risk factors in congenital microtia patients.* J Plast Reconstr Aesthet Surg, 2008; 1: 37-43.
2. Tanzer RC. *Total reconstruction of the external ear.* Plast Reconstr Surg, 1959; 23: 1-15.
3. Brent B. *Auricular repair with autogenous rib cartilage grafts: two decades of experience with 600 cases.* Plast Reconstr Surg, 1992, 90: 355-74.
4. Brent B. *Technical advances in ear reconstruction with autogenous rib cartilage grafts: personal experience with 1200 cases.* Plast Reconstr Surg, 1999; 04: 319-34.
5. Firmin F. *Ear reconstruction in cases of typical microtia. Personal experience based on 352 microtic ear corrections.* Scand J Plast Reconstr Surg Hand Surg, 1998; 32: 35-47.
6. Nagata S. *Secondary reconstruction for unfavorable microtia results utilizing temporoparietal and innominate fascia flaps.* Plast Reconstr Surg, 1994; 94: 254-65 [discussion: 266e7].
7. Nagata S. *Modification of the stages in total reconstruction of the auricle: Part II. Grafting the three-dimensional costal cartilage framework for concha-type microtia.* Plast Reconstr Surg, 1994; 93: 231-42.
8. Nagata S. *Modification of the stages in total reconstruction of the auricle: Part III. Grafting the three-dimensional costal cartilage framework for small concha-type microtia.* Plast Reconstr Surg, 1994; 93: 243-53.
9. Park C, Lee TJ, Shin KS, et al. *A single-stage two-flap method of total ear reconstruction.* Plast Reconstr Surg, 1991; 88: 404-12.
10. Park C. *Subfascial expansion and expanded two-flap method for microtia reconsturction.* Plast Reconstr Surg, 2000; 106: 1473-87.