THE STUDY ON ESTHETIC APPEARANCE OF RECONSTRUCTED PINNA IN MICROTIA

Dissertation submitted in partial fulfillment of the requirements for the degree of

M.Ch. (Plastic Surgery)

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CERTIFICATE

This is to certify that the dissertation entitled "**THE STUDY ON ESTHETIC APPEARANCE OF RECONSTRUCTED PINNA IN MICROTIA**" was done under our supervision and is the bonafide work of **Dr.G.GOPALAN**. It is submitted in partial fulfillment of the requirement for the M.Ch. Plastic Surgery examination.

Dr.Kalavathy Ponniraivan, B.Sc., M.D.,
The Dean
Madras Medical College,
Chennai – 600 003.

Prof.M.P.Namasivayam,
M.S., M.Ch.,
Professor and Head of the Department
Department of Plastic Reconstrutive
and Facio-Maxillary Surgery.
Madras Medical College
Chennai – 600 003.

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CONTENTS

THE STUDY ON ESTHETIC APPEARANCE OF RECONSTRUCTED PINNA IN MICROTIA.

INTRODUCTION

Microtia is a cogenital malformation characterized by total or partial absence of the whole auricle or any of its components, varying from a small auricle to total absence (Anotia). Microtia is the most common congenital anomaly of auricle. Reconstruction of the microtia ear represents one of the most demanding challenges in reconstructive surgery. Total auricular reconstruction with autogenous costal cartilage is one of the greatest technical feats that a reconstructive surgeon may encounter. An inherent understanding of sculpture and design influence the success of surgery. In this study we had followed Dr. Brent four stage pinna reconstruction techniques and we had analysised ethestic appearance pinna reconstruction in fifteen cases.

AIM AND OBJECTIVE OF THE STUDY

To study on esthetic component of reconstructed of pinna in our microtia cases.

To create an acceptable facsimile of an ear of the proper size, position and orientation to other facial features.

REVIEW OF LITERATURE

History

Ear reconstruction was first referred to in the susruta samphita (bhishagratha, 1907) in which the use of a cheekflap was suggested for repairing the earlobe. In 1597 tagliacozzi described repair of both upper and lower ear deformity with retroauricular flaps. In 1845 dieffenbach reported the repair of the middle third of the ear with an advancement flap. This technique may occasionally have application today.

Early surgical attention focused mainly on traumatic deformities. However, by the end of the nineteenth century surgeons began to address congenital defects in particular prominent ears in 1881 by ely.

The concept of microtia repair had its beginnings in 1920 when Gillies buried carved costal cartilage under mastoid skin and subsequently separated it from the head with a cervical flap. Pierce in 1930 modified this method by lining the new sulcus with a skin graft and building the helix with a repaired more than 30 microtic ears using maternal ear cartilage. These were found to have progressively resorbed (converse, 1977).

In 1948 peer turned to autogenous rib cartilage which he ingeniously diced and placed in a vitallium ear mold beneath abdominal skin. After five months he retrieved the banked mold opened it, and harvested the framework of cartilage chips. Which had united by scar tissue that had grown through the fenestrations, of the mold, the framework's matrical scar contracted and shape withered, this technique led to a wave of enthusiasm for ear surgery, which again turned to allograft cartilage.

Experiencing the same frustration as other (Kirkram, 1940; Brown and associates, 1947 Pierce, Klab under and Brobst, 1952; Dupertuis and Musgrave, 1959).Stephenson in 1952 used preserved rib cartilage to produce excellent results, but later reported progressive resorption of the same cartilage framework's (Stephenson in 1955).

A major breakthrough came in 1959, when tanzer rekindled the use of autogenous rib cartilage, which he carved in a solid block.

In an effort to circumvent extensive surgical procedure, cronin 1966 introduced silicone ear framework's, but found that like other in organic implants (e.g. polyster nylon mesh,Teflon) they suffered a high incidence of extrusion. (In 1969 Curtin and Bader, Lynch and associates 1972).In 1974 cronin minimized this problem by providing fascia lata or galeal and fascial

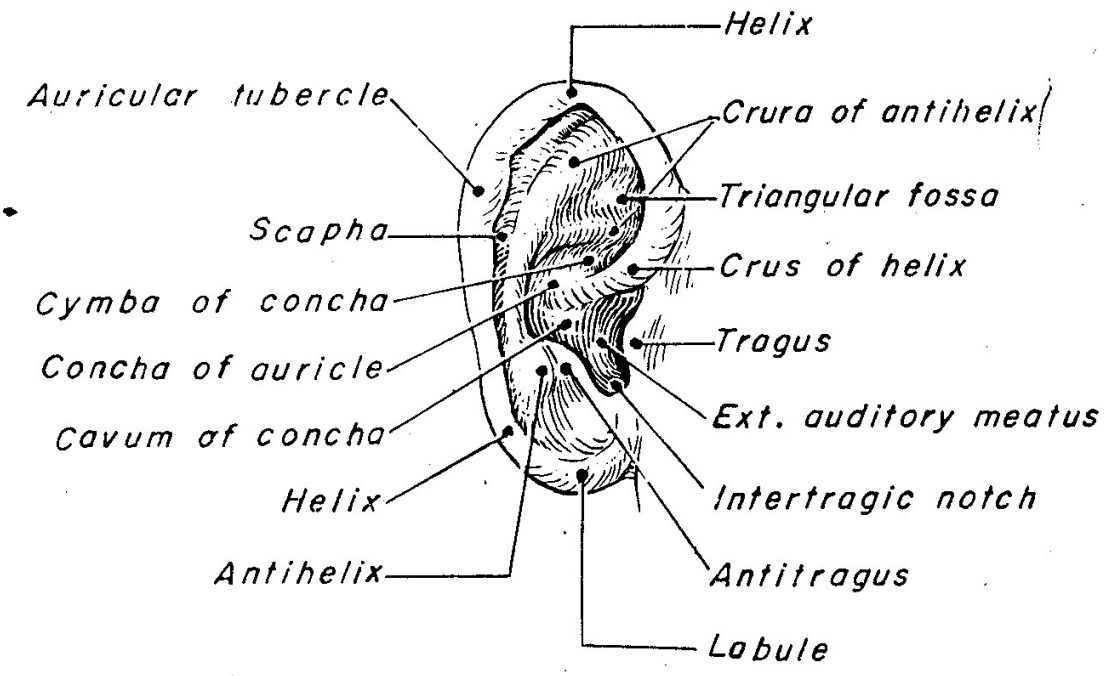
flaps for extra autogenous rim coverage, but later, when he found that the alloplastic framework still extruded.

Autogenous cartilage remain the most reliable material that produces results with the least complication (Tanzer 1971, Fukuda 1974, Dr. Brent 1980). Further more rib cartilage provide the most substantial source for fabricating a total ear framework. Although contralateral conchal cartilage has been used for this purpose (Gorney, Murphy and Falces, 1971 Davis 1972) it seems best to reserve auricular cartilage for reparing partial ear defects, for which considerably less tissue bulk is needed.

ANATOMY OF THE AURICLE

The ear is difficult to reproduce surgically because it is made up of a complexly convolute frame of delicate elastic cartilage surrounded by a thin skin envelope. Various part of anatomy of the auricle was shown 1 – 1 diagram. Blood supply of pinna comes from the superficial temporal and post auricular at arteries.

ANATOMY OF AURICLE



The sensory supply is chiefly derived from greater auricular nerve the upper portions of the ear are supplied by the lesser occipital and auriculotemporal nerves. Whereas the conchal region is supplied by a vagal nerve branch.

EMBRYOLOGY EAR

Tissues of both the middle and external ear are derived chiefly from first (Mandibular) second (Hyoid) branchial arches. The auricle itself is formed from six hillock's of tissue that lies along these arches and are first seen in

the five week embryo.

On the other hand, the inner ear first appears at three weeks and is derived from tissues of distinctly separative ectodermal origin. This explains why it is usually spared the developmental mishap that almost invariably involves the middle ear of micro tic patients.

ETIOLOGY OF MICROTIA

Incidence

According to an extensive study conduced by Grabb (1965). Microtia occurs once in every 6000 births. But in India as high as one in 900 to 1200.

Hereditary Factors

Both dominant and recessive characteristics have been revealed in deafness associated with several auricular abnormalities Konigsmark (1969). Ear deformities frequently recur in families of patients with mandibulofacial dysostosis (Treacher Collins Syndrome) (Rogers, 1964).

Hanhart 1949 reported a severe form of microtia associated with cleft or high palate in 10 percent of family members studied and Tanzer in 1979 found

that approximately 26 present of his series of 43 patients with microtia had relatives with evidence of the first and second branchial arch syndrome (Cranifacial microsomia).

In a thorough intensive survey of 96 families of their 171 microtic patients, Takahashi and Maeda (1982) ruled out chromosomal aberrations, concluding that inheritance must be multifactorial and that there is a 5.7% risk of recurrence.

Specific Factors

Mckenizia and Craig (1955) theorized that tissue ischemia resulting from an obliterated stapedial artery is cause of development auricular abnormalities. The occurrence of deafness and occasional microtia resulting from rubella during the first trimester of pregnancy is well known. Three cases of microtia that resulted from the mothers ingestion of the tranquilizer thalidomide.

ASSOCIATED DEFORMITIES AND SYNDROMES

Embryologic development dictates that the microtic ear is usually accompanied by middle ear abnormalities. In full blown, classic microtia it is

usual to find canal atresia and ossicular abnormalities. The middle ear deformity may range from diminished canal caliber and minor ossicular abnormalities to fused, hypoplastic ossicles and failure of mastoid pneumatization. Significant percentage of microtic patients exhibit deficient facial components that originate from mandibular and hyoid branchial arches. The most complete genetic expression of this condition includes defect of the external and middle ear; hypoplasia of the mandibular, maxillary, zygomatic and temporal bones, macrostomia and lateral facial clefts; paresis of the facial nerve and atrophy of the facial muscle parotid gland (May 1962). In 1983 Claybaugh and Hoopes showed that the palatal muscles are rarely spared in this syndrome. Urogenital tract abnormalities are increased in the presence of microtia (Longehecker, Ryan and Vincent, 1965).

Isoda Okuda et al also reported a case of connective tissue nerves associated with seborrheic keratosis – like eruption, atrophic scar alopecia and microtia.

Gupta, Pattonm et al in 1995 reported a large family with congenital microtia, auditory meatal atresia and conductive deafness. The pedigree suggest autosomal dominant inheritance with variable expression and low penetrance. The family is unique because the set of otologic anomalies in five generation was associated with renal cysts in one of the affected members

suggesting that his oto – renal (or) syndrome may represent a variable expression of branchio oto-renal (BOR) syndrome.

Samson G et al in 1995 reported a case of lateral facial cleft, cleft lip and palate anophthalmia, microtia, clavicular agenesis and asternia.

In 1994 verloes, et al also reported a case. HMC syndrome (Hypertelorism – microtia – clefting) as a rare autosomal recessive disease.

Harris et al reported anotia and microtia are equally often associated with other malformation and shows other similar epidermiological characteristics. In unilateral cases, the right side is more frequently malformed than the left side, especially when the ear malformation is isolated. There is male excess, most pronounced in isolated forms. Among associated malformations, facial clefts and cardiac defects are the most common ones (each about 30% of infants with associated malformation), followed by anophthalmia or microphthalmia (14%) limb reduction defects or severe renal malformation (11%) and holopresencephaly (7%).

Delloh clahbaugh et al also document the high incidence of hemipalatal plasy among microtia patient. Partial innervation of the lavatory veli palatini muscle by the VII cranial nerve and origin of this muscle from the second

bronchial arch, are suggested as the basis of the inclusion of hemipalatal palsy in hemifacial microsomia.

In 1988 Ziotogora et al microtia infants with chromosomal trisomy was reported.

In 1990 Wolach et al reported skin mastocytosis with short stature, conductive hearing loss with microtia, orstauik et al also reported familial cases of microtia and meatal atresia mainly on righted ear in a grandfather, his daughter and grand daughter autosomal dominant inheritance with variable expressivity.

Walker – Warburg syndrome (Gershoni – Barnch et al) is lethal, autosomal recessive disorder characterized by anomalies of the central nervous system and eye typical findings include hydrocephalus, agyria, retinal dysplasia cerebellar dysgehesis, anterior chamber dysgenesis and encephalocele, congenital glaucoma, congenital muscular dystrophy. Elevation of muscle enzymes was consistent with the diagnosis of walker Warburg syndrome.

Michel's anomaly, type I microtia and microdontia with associated congenital sensori neural hearing loss.

Cohan – B temple et al described bilateral microtia, absent patellae, short stature, poor weight gain, other skeletal anomalies included habitual dislocation of the elbow, slender ribs and long bones, abnormal modeling of the glenoid fossae with hooked clavivles and clinodactyly.

Bixler syndrome is a rare condition of autosomal recessive inheritance with association of hypertelorism microtia and cleft lip and palate described by Amiet et al in 2001.

In 2001 McDonald et al described on maternal first cousings with bilateral microtia micrognathia, cleft palate and hematologic findings of Diamond Blackfan anesmia. Balci et al described familial microtia in four generation with variable expressivity and incomplete penetrance in association with type I syndactyly.

In 2003, Schweitzer et al described Johnson McMillin syndrome is inherited in an autosomal dominant pattern, with alopecia, anosmia, conductive hearing loss, microtia and atresia of external auditory canal, hypogonadotrophic – hypogonadism, congenital heart defect, cleft palate mental retardation, and chonal stenosis.

CLASSIFICATION OF AURICULAR DEFECTS

Rorgers Classification

1. Microtia
2. LOP ear i.e., folding or deficiency of the superior helix and scapha
3. CUP or constricted ear, with a deep concha and deficiency of the superior helix and antihelical crura
4. prominent or protruding ear.

Clinical classification of auricular defects TANZER

I. Anotia

II. Complete hypoplasia (microtia)

A – with atresia of external auditory canal.

B – without atersia of external auditory canal

III. Hypoplasia of middle third of auricle

IV. Hypoplasia of superior third of auricle

A – Constricted (Cup and Lop)ear

B – Cryptotia

C – Hypoplasia of entire superior third

V. Prominent ear

Classification of microtia by MARX

Grade I The auricle is small and the different structures of each part of the ear are recognizable

Grade II The ear is smaller than normal, but the auricular remnant retains some structural resemblance to helix in its configuration

Grade III The auricular configuration is absent and only a narrow remnant or irregular ridge of tissue. Containing a small amount of cartilage is present. The very rare cases of complete absence of the auricle or anotia are included in Grade III.

Various method in reconstruction microtic ear

TANZER

Four stage method of reconstruction

FIRST STAGE : THE TRANSPOSITION OF THE LOBULE

At the first operation, the lobule is elevated on an inferiorly based pedicle, leaving the superior nubbin of native cartilage intact. The lobule is rotated posteriorly until its inferior border lies opposite to contour line. While lobule is maintained in this position, the location of the transverse incision for the reception of the lobule is marked and the lobule is inserted.

SECOND STAGE

THE FABRICATION AND IMPLANTATION OF THE COSTAL CARTILAGE FRAMEWORK

Two months later the surgeon expose the costal cartilage of the sixth, seventh and eighth ribs of the opposite chest wall through a transverse incision. The sixth and seventh rib can be taken out with the base block and eighth rib can be removed separately. The base block is cut out, leaving one post of cartilage attached as a handle until the carving has been completed and the concavities of the triangular fossa and scapha are excavated with wood carving tools. The eighth rib is next carved in the form of helix. Then the helix affixes to base block with several mattress suture of fine steel wire.

A pocket is next prepared for the reception of the frame work by excising the vertical scar and undermining the skin within the contour line, at a level well below the subdermal plexus. The cartilage assembly is then buried

in a subcutaneous pocket. The skin is snugged into the helical sulcus with mattress suture, which are tied over gauze pledgets.

THIRD STAGE

CREATION OF CEPHALOAURICULARS SULCUS.

Four months later, the ear is brought out from the side of the head, and the defect is lined with a thick, splint thickness graft from the upper thigh. Before the graft is applied, the posterior margin of the defect is advanced anteriorly and sutured vis – a vis the rim of the auricle to minimize the visible portion of the graft.

FOURTH STAGE:

The construction of the tragus and conchal cavity. A 'U' shaped incision is deepened almost to the mastoid periosteum and the flap is undermined well into the preauricular region, creating a pocket into which the 'U' shaped flap can be rolled on itself to form a tragus. The flap is held in this inverted position by three mattress suture which emerge from the pocket into the preauricular region. Where they are tied one gauze pledgets.

A full thickness skin graft from the opposite cephaloauriculo sulcus is sutured to the flap edge before it is inverted, furnishing a lining for the posterior wall of the pseudomeatus and for the conchal floor.

BRENT TECHNIQUE:

FOUR STAGE OF PINNA RECONSTRUCTION

This technique is similar to that of tanzer although with a slightly varied sequence.

FIRST STAGE

FRAMEWORK FABRICATION AND FRAMEWORK IMPLANTATION.

The contralateral sixth, and seventh and eight costal cartilage are usually harvested. The contruct base is formed by the synchondrosis of the sixth and seventh cartilages, eighth rib is used to fabricate the helical element which is then attached to the base. The construct is placed into a subcutaneous pocket through an incision at the posterior inferior border of the vestige. By placing the framework in the first stage under a virgin skin envelope and using a virgin skin envelope and using a high profile construction this technique will maximize definition of the reconstruction while minimizing the risk of vascular compromise of the skin flap. This is advantage of Brent's technique to compare with Tanzer's technique. Suction drain beneath and adjacent to the framework are used to occlude the overlying skin flap to the construct and thus achieve the defining relief of the ear form.

SECOND STAGE

Lobule Transposition

Lobule transposition is the second stage in Brent's technique. He

believes it is safer and easier to position the lobular remnant around an established construct. This stage is performed several months after the initial cartilage grafting. The lobule is rotated and often filleted to receive the end of the framework.

THIRD STAGE

Creation of cephaloauricular sulcus.

The construct is elevated in the third stage to achieve projection of the helical rim. An incision is made several millimeters from the margin of the rim, and dissection is carried over the capsule of the posterior surface of the construct until the correct amount of projection is achieved. The ear position is stabilised by placing a piece of banked costal cartilage posteriorly beneath the framework in a fascial pocket. The retroauricular scalp is then advanced to minimize visible scarring. The remaining postauricular defect is closed with a “medium thick” split thickness skin graft from groin.

FOURTH STAGE:

Tragus construction conchal excavation and symmetry adjustment.

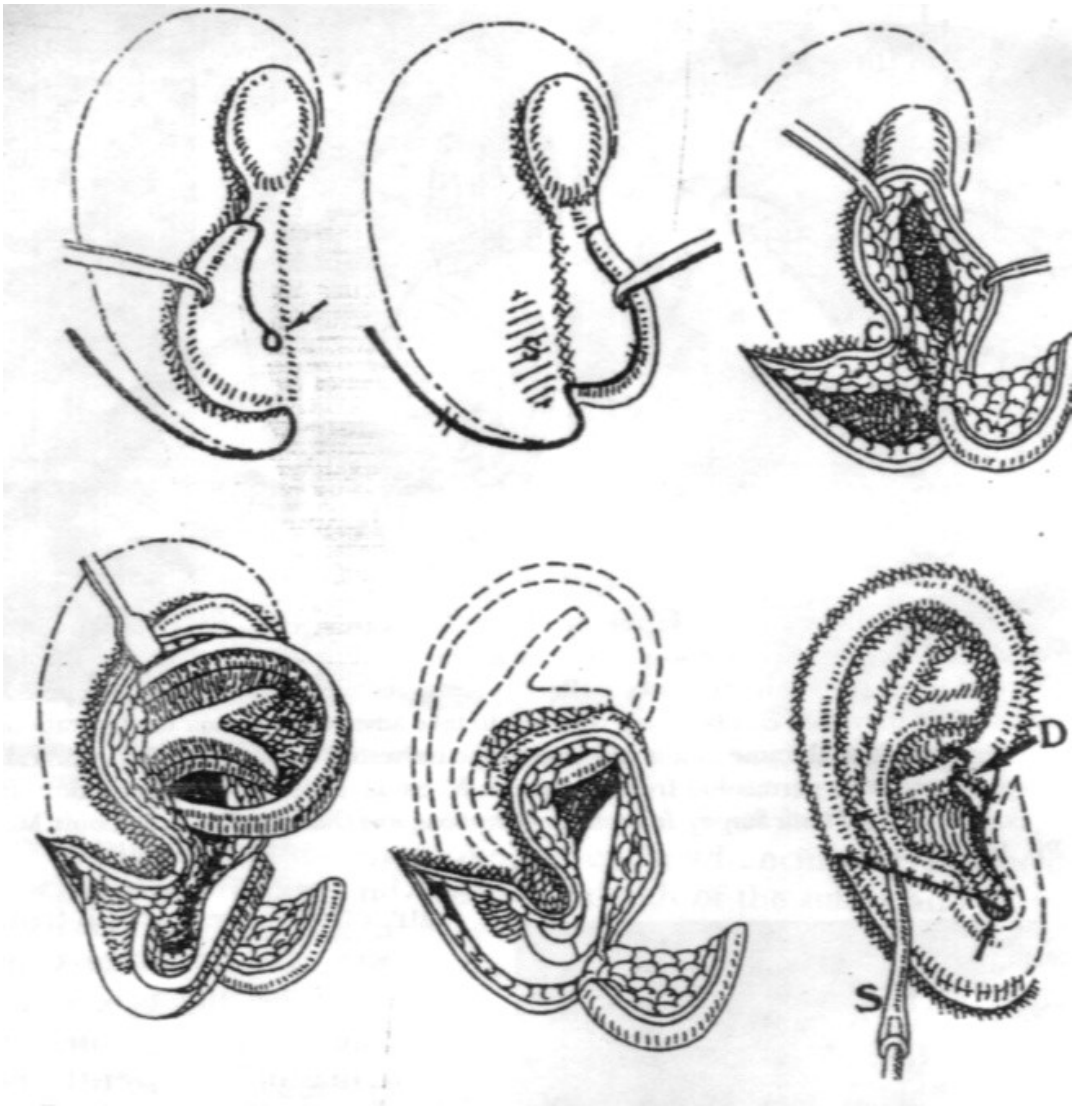
The tragus is formed using a composite skin cartilage graft from contralateral conchal vault through an anterior approach. A ‘J’ shaped incision

is fashioned along the posterior tragal margin and the composite graft is inserted and positioned so that it produces both projection of neotragus and cavitation of the retrotragal hollow. The subcutaneous tissue are then excavated to deepen the conchal bowl. In patients with bilateral microtia, Brent recommends the use of an anteriorly base conchal flap similar to the technique described by kirkham. The most recent modification of Brent's technique include incorporating a small cartilage additional to the framework, as noted above, to create a tragus and laser hair removal of scalp flaps before commencement of the ear reconstruction.

NAGATA TECHNIQUE

Nagata's technique involve two stages. It was first introduced in 1993 and has undergone several technical refinements, depending on the type of microtia present (i.e. lobular, small concha, conchal anotia, low hairline). In addition to the helix, crura, antihelix and conchal elements, this technique provide for the incisura intertragica and the tragus as key elements in the reconstruction.

NAGATA TECHNIQUE



FIRST STAGE

In the first stage, the rib cartilage frame work, which incorporates a tragal components is placed in a subcutaneous pocket and the lobule is transposed. This first stage thus roughly corresponds to the first three stages in Brent's sequence. In contrast to the three contralateral costal cartilage segments used in the Brent technique, Nagata harvest the ipsilateral costal cartilage segments. Nagata harvest the ipsilateral costal cartilage of the sixth, seventh, eighth and ninth ribs. The total perichondrium is left insitu except for the junctional region of the sixth and seventh costal cartilages. Nagata constructs the framework base into three "floors" with each floor representing different elevation. The cymba and cavum concha form the base; the crus helices, the fossa triangularis, and the scapha form the second level; and the helix, antihelix, tragus and antitragus the top level. The base frame is constructed from the sixth and seventh costal cartilages. The helix and crus helices are constructed from eighth costal cartilage. The ninth costal cartilage is used to construct the superior crus, inferior crus, and antihelix. The cartilage constructed is assemble using fine gauge wire sutures.

Nagata uses the skin of the posterior lobule and mastoid to cover the conchal aspect of the construct. By converting the 'V' shaped posterior lobule

incision used by Tanzer into a ‘W’, he also increase the surface area of skin available to cover the framework. This also permit lobule transposition, obviating the need for a conchal skin graft. The skin incision separates the lobule into three skin flap; anterior, posterior lobular skin flaps and anterior tragal flap. A 2mm circular portion of skin is removed from the inferior portion of the anterior lobule / trachal incision. A subcutaneous pocket is dissected through the access provided by the posterior lobule incision. Vestigial cartilage remnants are removed carefully so as to not damage the subdermal plexus of the flaps. In lobule type microtia, the central portion of the posterior skin flap remains attached by means of a subcutaneous pedicle to augment its blood supply. After creation and placement of the cartilage framework, the posterior flap is advanced and sutured to the tragal flap. The small circular skin defect that created at the inferior point of this juncture sutured. Forming a closure cone (inverted dog ear), which represents the incisura intertragica. Bolster affixed with mattress suture are used to approximate the skin flaps to the framework. These are left in place for 2 weeks.

SECOND STAGE

Six months after the first stage, the construct is elevated using a cresent shaped piece of cartilage harvested from the fifthe rib through the previous

chest wall incision. The skin around the construct is incised 5mm posterior to construct the framework is elevated and held in this position by wedging and the carved, crescent shaped cartilage graft into a position that substitute for a posterior conchal wall. A temporoparietal fascia flap is then elevated and tunneled. Subcutaneously to cover the posterior surface of the cartilage graft and reconstructed auricle and mastoid surface. The retroauricular skin is advanced toward the ear to minimize visible scarring and the posterior aspect of the construct is closed with skin graft, which is secured with a tie over the bolster in a manner similar to that of Brent. Nagata prefers a split thickness graft harvested freehand from the occipital scalp for this purpose.

Nagata emphasized the need for a deep, high - definition framework to create a good tragus, which he believes is the weak link in most contemporary ear reconstructions. In addition, he reasons that carving the crus helix into the base frame ensures a more realistic and smooth curve of the helix as it joins the lobule. By eliminating the need for conchal excavation, his technique results in a more natural and deeper conchal bowl.

Despite the excellent appearance of Nagata's ear reconstructions, a number of criticisms have arisen from others who have attempted to adopt his techniques. These stem from the vascular compromise of the peri-lobular flaps, most especially, the posterior flap. In his original description of 36

cases, Nagata described no complications, but in the hands of others, flap necrosis has approached 14 percent) The stresses inflicted on the skin envelope during the first stage of the Nagata technique would seem to be greater than with the Brent technique, because of the relatively higher framework relief and the incisional compromise of skin circulation attendant to the lobule trans position. Nagata suggests preserving a subcutaneous pedicle to the posterior skin flap to avert this complication, but others doubt that this effectively increases the flap's blood supply. I / Some think that the sacrifice of posterior ear lobe skin to provide additional lining for the tragus reconstruction also compromises the natural shape and contour of the lobule, thereby diminishing the natural appearance of the reconstruction. Brent has argued that the refinement of Nagata's tragal reconstruction is less than the of a composite skin / cartilage graft, yet Brent recently begun incorporating a tragal component into his framework for bilateral microtia cases.

Although all techniques using autologous costal cartilage produce a permanent anterior chest wall deformity, the amount of cost cartilage harvested by Nagata (the sixth through ninth costal cartilages) is considerable an result in a significant, chest wall deformity. Nagata emphasizes that the degree of chest deformity can be minimized if the perichondrium is left intact at the site of harvest to allow for cartilage regeneration. This, however would seem to have a greater likelihood a success in children than in adults.

Some have argued that the relatively greater amount of cartilage used by Nagata to achieve high relief in his reconstructions produced unnaturally thick ears. Nagata believes that natural appearing reconstructed auricles are obtained by carving the posterior margin base frame of the fabricated framework resulting in the attainment of a thin and normal reconstructed auricle. Partial resorption and the piecemeal components of the framework may also lead to the late development of contour irregularities, although the relatively shown follow-up on patients in Nagata. Published series is insufficient to derive any definite conclusions as to long-term stability. Nevertheless using his current two-stage method, which now exceeds 600 cases with a maximum follow-up of 14 years, Nagata reports no untoward problems or complications with cartilage resorption or framework distortion.

Nagata's use of wire sutures to assemble his cartilage framework has been criticized because of the high (8 percent) extrusion rate. Observed by others using this technique. Nagata argues that this problem does not occur if the subcutaneous pedicle of the posterior flap in properly constructed and the loop portion of the wire suture is embedded into the substance of the anterior surface of the frame work, as he describes in original article. Finally, the use of a temporal fascial flap in every case seems somewhat excessive, with its attendant risks of scalp scarring, temporal hair thinning, and the sullying of a potential reconstructive lifeboat. Even though the temporoparietal fascia flap

is used during the second-stage auricular reconstruction (auricular projection) in all cases, Nagata encounters that the deep termporal fascia is preserved and remains a potential source of vascularized soft tissue for use in salvage operations.

Although Nagata‘s two-stage technique holds a certain advantage over Brent’s three-stage or four—stage technique in the number of operations used, as in most abbreviated approaches used in reconstruction surgery, Some vulnerability may exist in the ability to achieve precise consistent results by all users.

RECONSTRUCTION OF MICROTIA USING TISSUE EXPANDER

Neuman first applied the concept of tissue expansion to ear reconstruction and, through this less than successful experience, introduced the idea of expansion to the field of surgery. The lack of success that Neuman experienced allowed further ideas of tissue expansion to lay dormant until Radovan 14 demonstrated that the technique was indeed useful clinically. Brent was then the first to report the successful use of tissue expansion in reconstruction of the ear. He pointed out that supple skin coverage is often as important as the cartilage framework in ear reconstruction; however, he did little to promote the use of tissue expansion, because the limited amount of skin gained did not obviated the need for later elevation of the helical rim.

The initial successful case of ear reconstruction using tissue expansion reported by Brent in the second of his classic articles on ear reconstruction pointed out the concerns and dilemmas surrounding the use of expansion. The case selected was one in which initial excision of the vestige had resulted in a shortage of skin as well as restriction of skin elasticity because of the previous scars. Following 3 weeks of expansion using a 30-cc expander, Brent pointed out that “Although an almost superabundant amount of skin was obtained by this method, a surprisingly thick capsule already had developed on the implant’s removal. Hence, this necessitated deepening the sulcus in a secondary procedure to obtain pronounced helical definition.’’ Brent went on to recommend the use of the temporoparietal fascial flap because in this area skin was deficient, the hairline was low, and scar was present.

Advantages of expansion such as minor donor site defect, similar color and skin texture, and near-normal sensation are well demonstrated, a critical analysis would seem to point out a number more disadvantage than advantages to the techniques described.

Most authors agree that an expander with a remote injection reservoir is preferable to one with an incorporated valve, a low-profile remote reservoir type expander with a somewhat crescentic configuration (either 60 or 75 cc fill volume).

A review of reported cases will also demonstrate a variation in the approach used to place the tissue expander. Hata et al use an incision in the temporal region 5 cm into the scalp and they dissected pocket just large enough for the expander. They have, in addition, used a separate incision for placement of the reservoir. Their dissection appears to be just above the superficial temporal fascia and beneath the sight of the planned ear. Sasaki has used an incision anterior to the hairline and advocates centering the expander beneath the skin that will make up the upper pole of the ear rather than expanding the skin beneath the lobular remnant itself.

Although not all surgeons agree on the need to excise the capsule overlying the expander prior to placement of the cartilage framework, most would agree with Brent's initial observation that the cap limits the flexibility of the skin flap even when the flap is relatively thin (also observed in nasal reconstruction using expanded forehead skin). Failure to remove the capsule may significantly blunt the details of even the best framework and may be responsible for later contraction of skin with loss of some of the sulcus depth experienced by Hara et al, who apparently do not remove the capsule from the skin flap.

Stage I - Implantation of tissue expander into subdermal pocket through preaurcular incision.

Stage II - Removal of tissue expander and frame work fabrication, placement of framework.

Stage III - Elevation of the auricle as routine manner.

Stage IV – Rotation of the lobule

RECONSTRUCTION OF MICROTIA USING SILASTIC FRAME

The use silastic frame is the first described by cronin.

FIRST STAGE

The lobule is transposed by a 'Z' plasty procedure (as described by Tanzer). Deformed cartilage is removed and a pocket of generous size is dissected. The prosthesis is inserted into subdermal pocket, wound is carefully closed, suction is applied through the polyethelene tube, resolving in close approximation of the skin flaps to the contour of the framework.

SECOND STAGE:

Three months later, an incision is made around the implant superiorly and posteriorly about 3mm beyond the margin of the implant the ear is dissected from the side of the head. Being extremely careful not to exposure the silastic should gross exposure occur the ear should be replaced

immediately and another attempt delayed for several weeks. The wound is reduced in size by taking multiple in interrupted sutured through the cut edge of the scalp and through the fascia in the middle of the wound, thereby advancing the scalp edge as the sutured are tied. Pattern made of the back of the ear and the mastoid area are used to take two free full thickness skin graft from such area as the inner side of the arm or the inguinal region. Free full thickness skin graft give more protection to the foreign implant than a split graft would, and there is less ‘Secondary contracture to pull the ear flat against the head. The sutures are left long and tied over a bolster, holding the ear at the proper angle to the head.

SINGLE STAGE TOTAL EAR RECONSTRUCTION

Single stage ear reconstruction have been used primarily for the reconstruction of partial defect such as superior helix or lobule. Current technique for single size total ear reconstruction involve the fabrication of a cartilage framework, followed by coverage using, fascial flaps and skin grafts. External stents are commonly used to maintain contour.

PROBLEMS ENCOUNTERED IN THE RECONSTRUCTION

HAIR

The low hairline in many microtic patients necessitates placement of a

portion of the cartilage framework beneath hair-bearing scalp. This results in hair growth on the construct, which substantially detracts from the final result. More over, the hair-bearing scalp is thicker and contours less well to the underlying framework, thereby compromising the fine definitions that might otherwise have been achieved through the use of a thinner flap. Use of the scalp in ear reconstruction may also lead to inflammation/infection complications from in grown hair, keratin accumulation, maceration, and difficulties with hygiene. To address these problems, many surgeons recommend manual depilation although this technique has been shown to induce circulatory problems in the flaps, leading to necrosis and increased scarring. Brent has recommended electrolysis or resurfacing the area with a skin graft. Recent attempts preoperative laser depilation are promising but have not withstood the rigors of critical, long-term analysis. Using the temporoparietal fascia, three dimensional framework, a cartilage block, and an ultra-delicate split-thickness scalp graft to precisely position the reconstructed ear and reposition the hairline.

MATERIAL AND METHODS

The present the study on esthetic appearance of reconstructed pinna in microtia was done in the Department of Plastic, Reconstructive and Facio-Maxillary surgery, Madras Medical College and Hospital, Chennai during July 2003 to June 2005 and all the cases were regularly followed up in the outpatient department of plastic surgery at 2 months intervals upto August 2005.

Inclusion criteria are

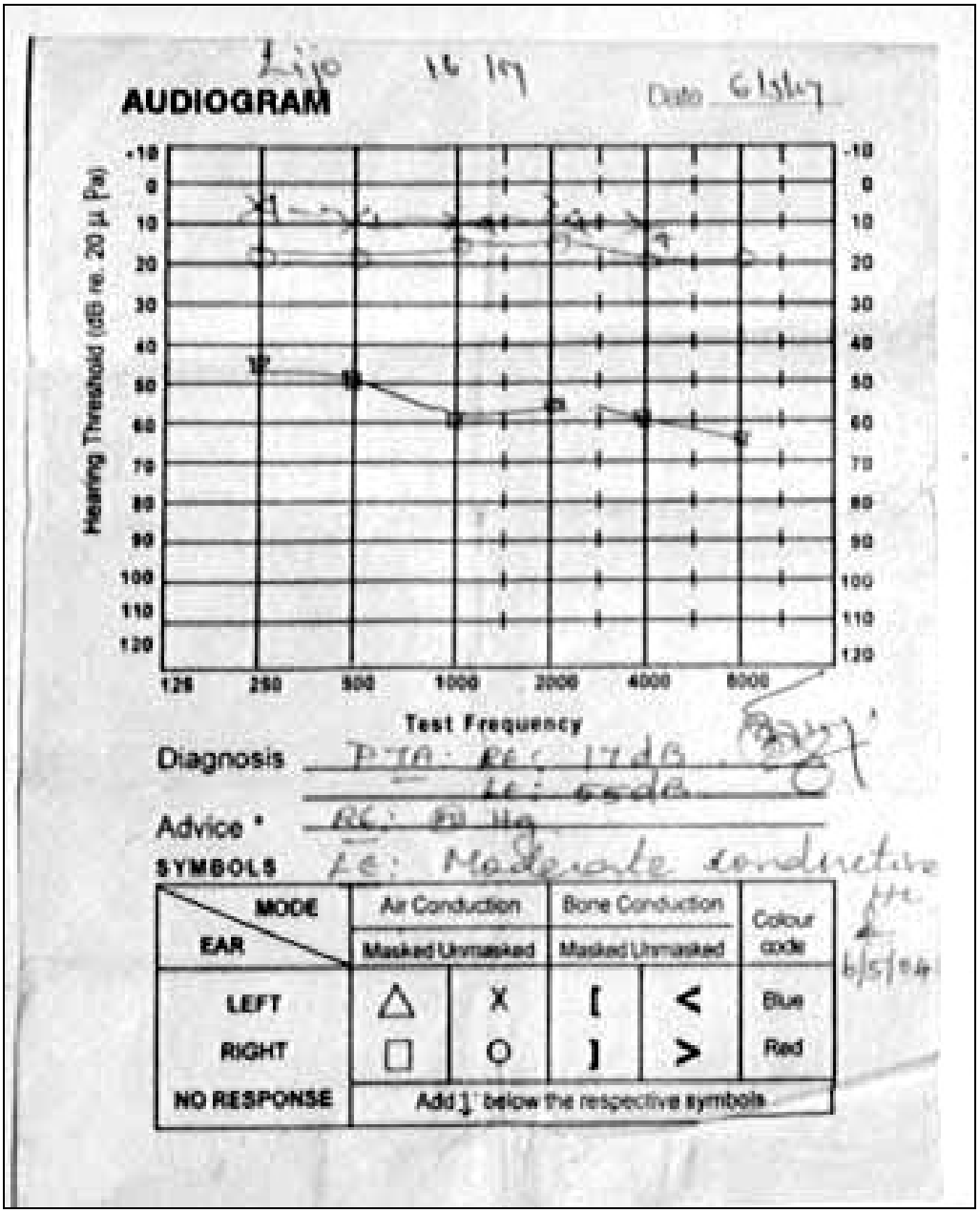
1. Microtia type II A and Type II – B (Tanzer classification)
2. Either Sex
3. Age group 6 years to 30 years.

Exclu0sion Criteria

1. Microtia associated with syndrome (Treacher Collin Syndrome, Hemifacial Microsomia)

2. Age below 6 years and above 30 years.

PREOPERATIVE INVESTIGATION



AUDIOGRAM

Date 6/5/17

Hearing Threshold (dB re. 20 µ Pa)

-10 0 10 20 30 40 50 60 70 80 90 100 110 120

125 250 500 1000 2000 4000 8000

Test Frequency

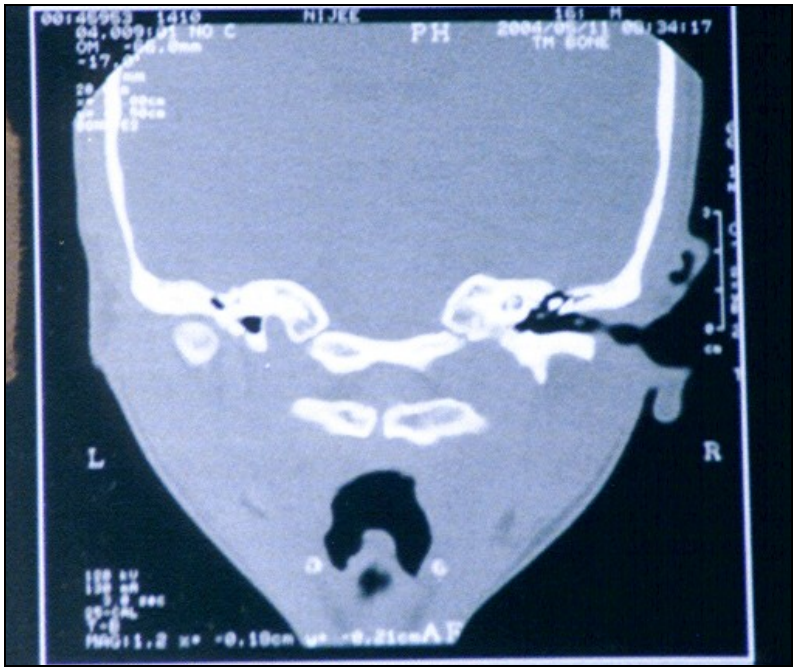
Diagnosis P.T.A: RE: 17dB
LE: 65dB

Advice * RE: WNL
LE: Moderate conductive HL

SYMBOLS

MODE / EAR	Air Conduction		Bone Conduction		Colour code
	Masked	Unmasked	Masked	Unmasked	
LEFT	△	X	[	<	Blue
RIGHT	□	O	]	>	Red
NO RESPONSE	Add ↓ below the respective symbols				

CT SCAN TEMPORAL BONE



All the patients were investigated in the outpatient department by complete haemogram including haemoglobin percentage, total count, differential count, bleeding time, clotting time platelet count, and urine examination for albumin, sugar X – ray chest, ECG, Blood grouping, pure tone audiogram for evaluation of hearing loss, CT Scan temporal bone both side.

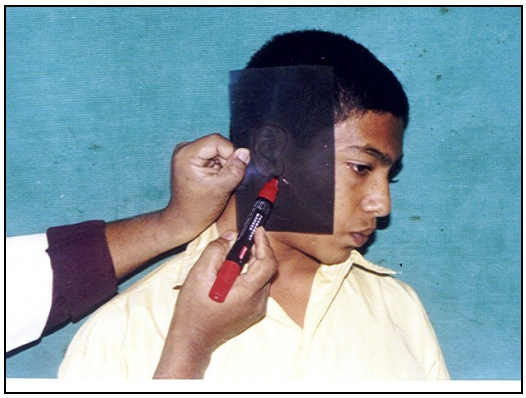
METHODS:

Preoperative consultation:

During the initial consultant, surgical expectations and psychologic considerations should be discussed with the patient and family. During the consultation the discomforts and inconvenience of the surgery should be described, including the expected chest pain, the length of time that dressing must be worn and the need for limited, activities for four to six weeks. The risk and possible complications of the surgery are thoroughly discussed.

PRE OPERATIVE

PREOPERATIVE PLANNING



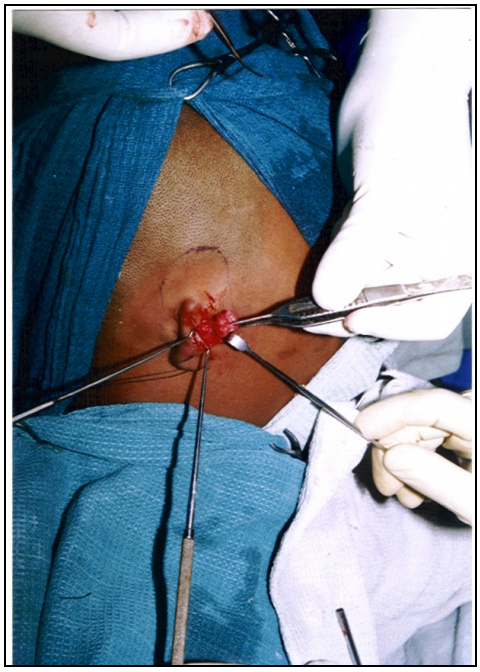
Preoperative planning and preparation:

All the patients were admitted one day prior to surgery, preoperative study photographs are obtained and an X – ray film pattern is traced from the opposite normal ear. This pattern is reversed and the framework pattern is designed for the new ear. After sterilization, these patterns serve as guidelines for frame work fabrication at the time surgery.

The location of the reconstructed ear is predetermined by first noting the topographic relationship of the opposite normal ear with facial features and then duplicating its position at the proposed reconstruction site from the side it should be noted that the ear's axis is roughly parallel to the nasal profile. Finally the distance between lateral canthus and the normal helical root is noted and recorded.

All the cases surgery was done under general general anaesthesia with orotracheal intubation.

FIRST STAGE AURICLE RECONSTRUCTION
SUBDERMAL POCKET CREATION

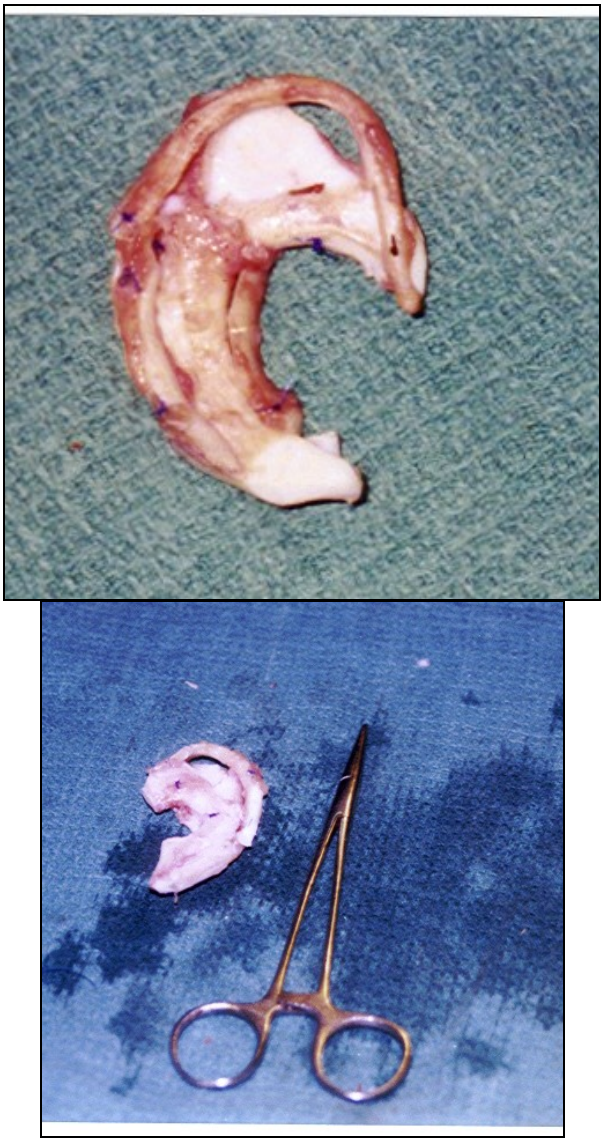


First Stage of Reconstruction

The rib cartilage are removed through a horizontal incision which is made just above contralateral side costal margin. After division of the external oblique and rectus muscle, the film pattern is placed on the exposed cartilage to determine the necessary extent of rib resection. The helical rim is fashioned separately with cartilage from eighth rib excision of this cartilage facilitates access to the synchondrotic region of the sixth and seventh ribs, which supplies a sufficient block to carve the frame work body.

After removal of the cartilage, the wound is flushed with saline and the anaesthesiologist is asked to provide positive pressure to the lungs. Layer closure of the wound is performed. We prefer a subcuticular suture for wound closure so as to avoid suture marks.

FRAMEWORK FABRICATION



Frame Work Fabrication

The carving is done with no.15 scalpel. The solid base block is carved from sixth and seventh segments and their synchondroses. The helical rim is made from the eighth cartilage and then sewn to the base block. Additional layer of cartilage can be added to form antihelix. The basic ear silhonette is carved from synchondrosis sixth, seventh rib. The helical rim fixed to base plate with 5.0 prolene.

IMPLANTATION OF FRAMEWORK

Framework Implantation:

Through a small preauricular incision anterior to auricular vestige, a thin flap is raised by sharp dissection, care being taken to preserve the subdermal plexus the skin is dissected from the gnarled, native cartilage remnant which excised and discarded. Insertion of the framework into the cutaneous pocket takes up the valuable skin slack that was created when the native cartilage remnant was remove. To attain skin coaptation, we use negative suction drain. The dressing is applied that accurately confirm to the convolutions of newly created auricle.

CASES OF CARTILAGE IMPLANTATION

SECOND STAGE OF AURICLE RECONSTRUCTION ROTATION EAR LOBULE

SECOND STAGE

Rotation of the lobule after two months later, we make half ‘Z’ plasty incision over upper pole lobule and transpose a narrow, inferiorly based triangular flap, filleted to receive the lower end of the framework.

THIRD STAGE OF AURICLE RECONSTRUCTION
CREATION OF CEPHALO AURICULAR SULCUS

THIRD STAGE

Creation of Cephaloaruicular Sulcus

Three month later after initial surgery ear cartilage elevation was done. An incision is made 5mm behind the rim and leaving behind adequate soft tissue over the posterior surface cartilage frame work and framework is elevated until the correct amount of projection is achieved. The retroauricular skin is advanced into the newly created sulcus and full thickness skin graft from groin is applied over the postauricular defect. To secure the graft, the sutures are left long and tied over a gauze bolster dressing.

FOURTH STAGE OF AURICLE RECONSTRUCTION
Deepening of Concha, Formation of Tragus

FOURTH STAGE

Tragus Construction Concha Excavation.

The tragus is formed using a composite skin cartilage graft from contralateral conchal vault through an anterior approach. A ‘J’ shaped incision is fashioned along the posterior trugal margin and the composite graft is inserted and positioned so that it produces both projection of the neotragus and cavitation of the retrotragal hollow. The subcutaneous tissue are then excavated to deepen the conchal bowl.

Postoperatively for 6 months we advised to wear postural acrylic splint for maintaing cephaloauricular sulcus.

RECONSTRUCTION OF MICTOTIA USING TISSUE EXPANDER

OBSERVATIONS AND RESULTS

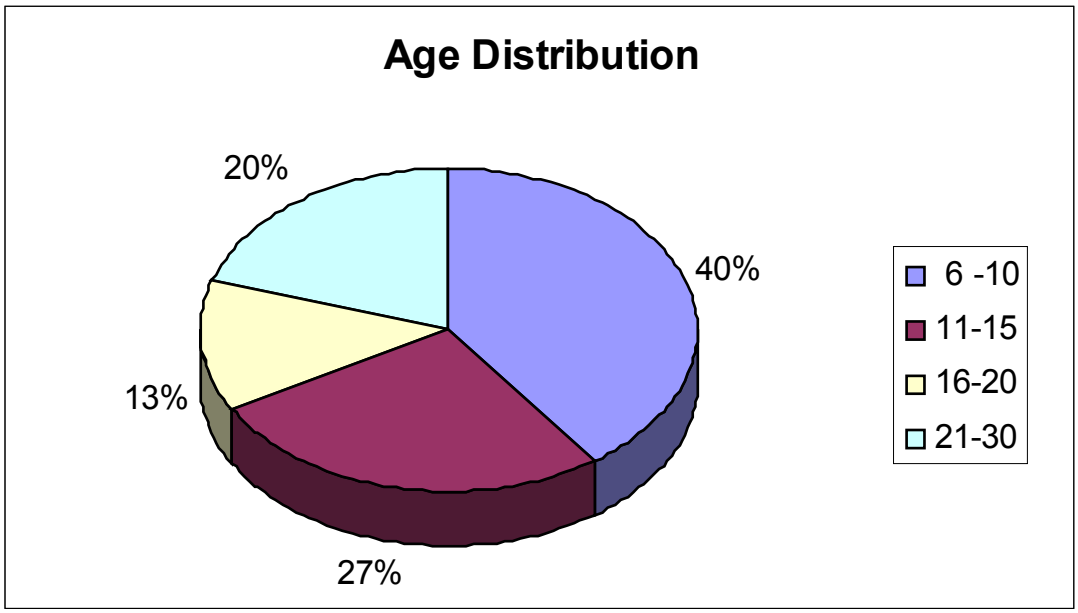
The present study consisted of fifteen cases of microtia II A (complete hypoplasia auricle with absence external auditory canal). All patients had undergone four stage pinna reconstruction in the department of plastic surgery July 2003 to August 2005.

I. Age Distribution

Patients were selected is the 6 – 30 years age group their age distribution were as follows

Table I: Age Distribution

Age in years	No of Patients	Percentage
6 – 10	6	40%
11 – 15	4	27%
16 – 20	2	13%
21 – 30	3	20%

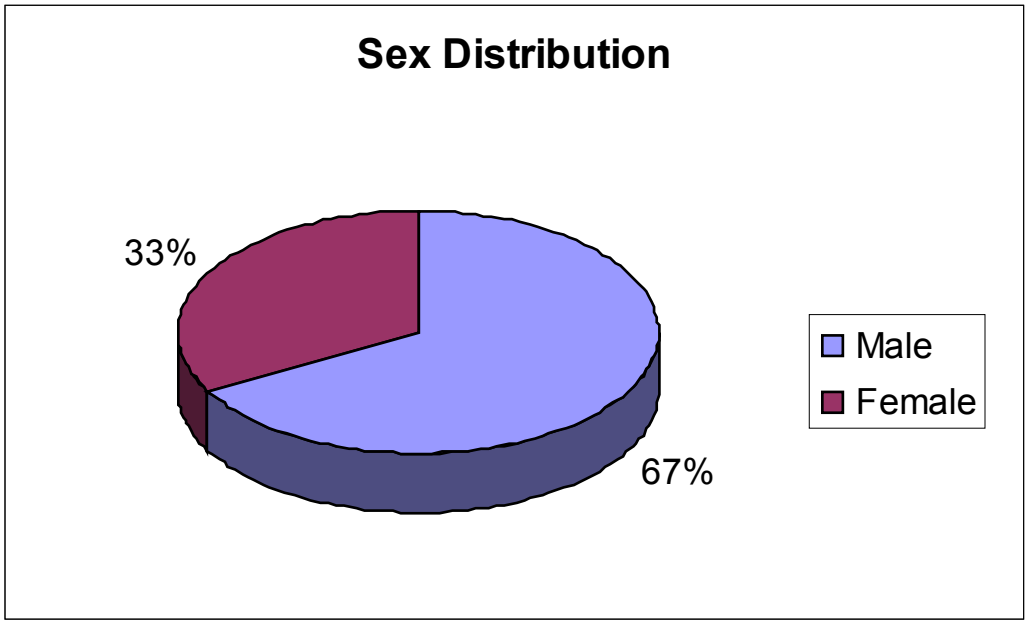


II. Sex Distribution

Male : Female ratio 10 : 5

Table II – Sex Distribution

Sex of the Patients	No	Percentage
Male	10	67%
Female	5	33%

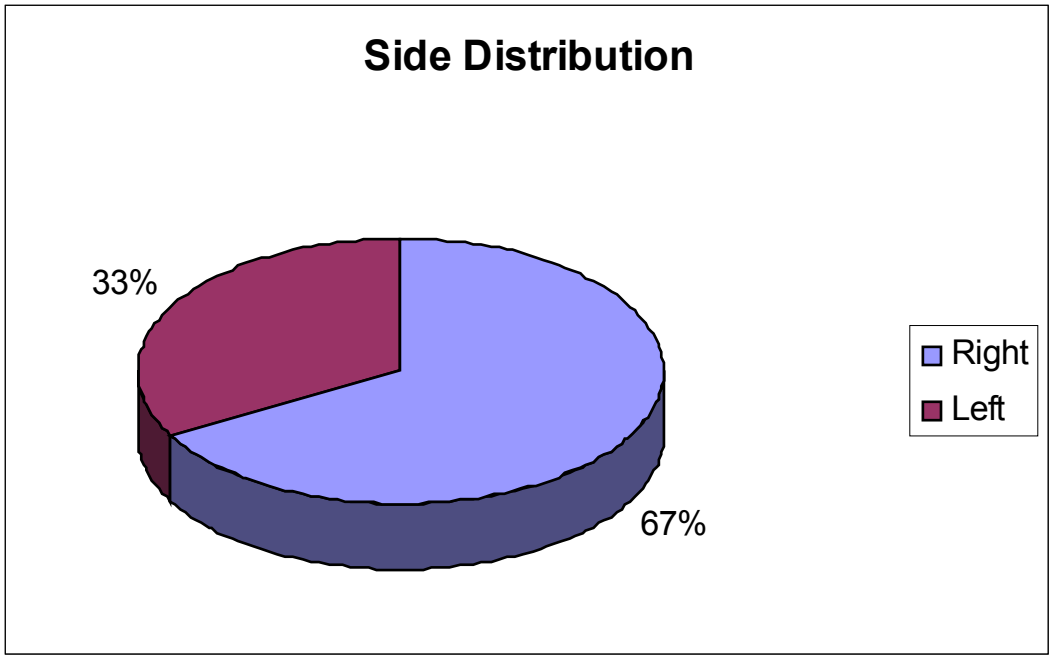


III Side

Right Side: Left Side 10 : 5

Table III Side Distribution

Side	No	Percentage
Right	10	67%
Left	5	33%

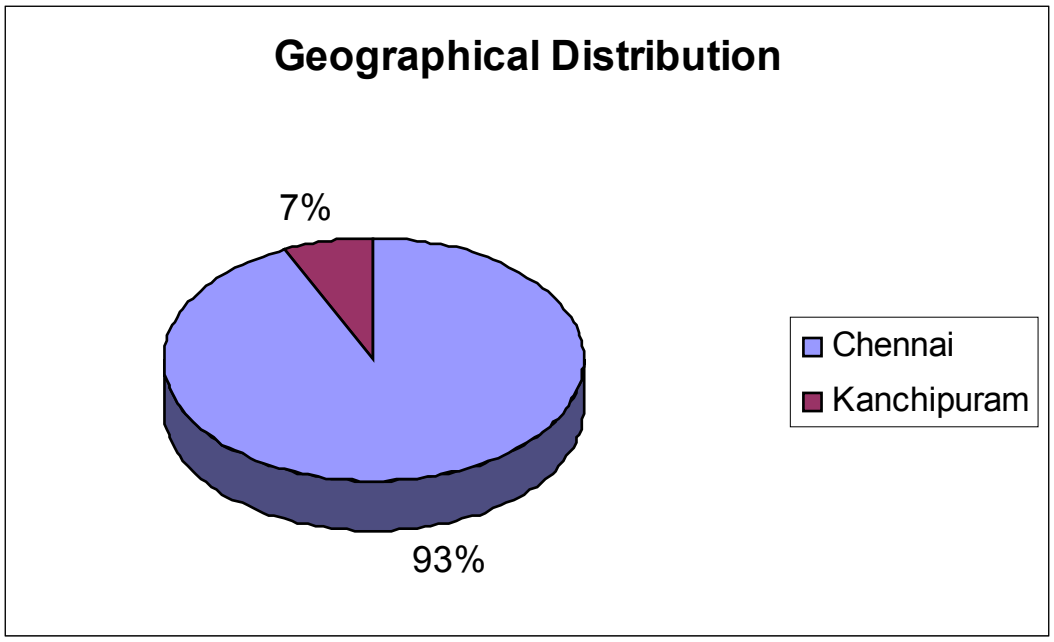


IV Geographical distribution

Geographical distribution was noted to study the distribution and to access the feasibility of the patient to come regularly for follow-up and in case the patient did not turn up on the expected date, letters were send reminding the patient to return for follow up.

Table IV Geographical Distribution

Patient Native Place	No	Percentage
Chennai	14	93%
Kanchipuram	1	7%



V Socioeconomic Status

Most of the patients are belong to lower middle socioeconomic group. Most of patients parents were unware about pinna reconstruction.

VI Type of Microtia

According to Tanzer

Type – II A

Complete hypoplasia auricle with atresia external auditory canal.

According to Marx Classification.

Grade – III :

The auricular configuration is absent and only a narrow remnant or irregular ridge of tissue, containing a small amount of cartilage is present/

VII Symptomatology of patients

All the patients had complaint of malformed and distorted abnormally placed pinna and hard of hearing on the affected side of ear.

Table – V Symptomatology

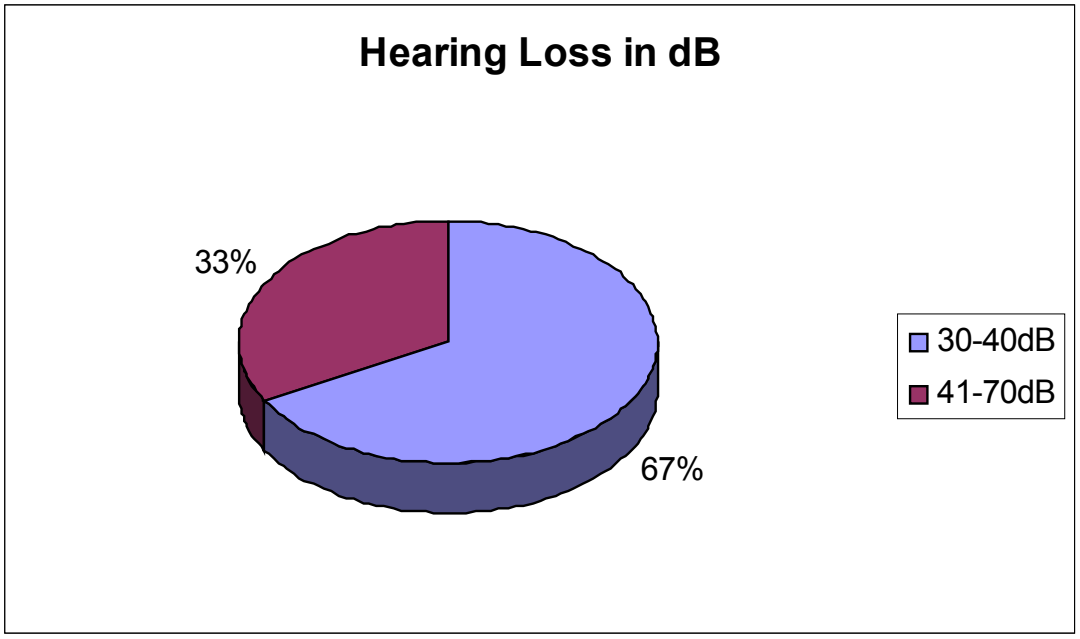
Symptomatology	No	Percentage
Malformed pinna	15	100%
Hard of Hearing	15	100%

VII Audiology Status

All the patients had undergone E.N.T. evaluation and pure tone audiometry preoperatively. Pure tone audiogram was done in speech frequency at 250Hz, 500Hz, 1KHz and 2KHz. Most of the patients had moderate to severe conductive hearing loss.

Table VI Hearing loss is dB

PTA Hearing Loss in dB	No	Percentage
30 to 40 dB	10	67%
41 – 70 dB	5	33%

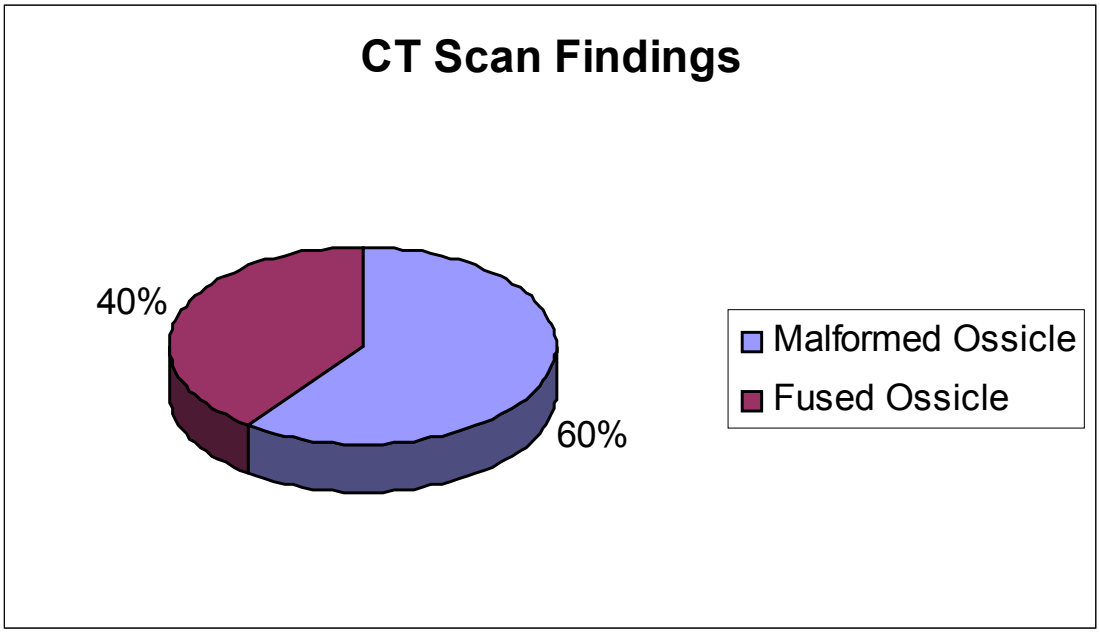


VIII CT Scan Finding

All the patients were undergone CT Scan of the Temporal bone both side.

Table VII – CT Scan Findings

Finding of the middle ear	No	Percentage
Malformed Ossicle	8	60%
Fused Ossicle	6	40%



IX Stages of Pinna Reconstruction

All the patients were undergone four stage pinna reconstruction.

First stage: Frame work fabrication and implantation frame work.

Second Stage: Transposition ear lobule

Third stage: Creation of cephaloauricular sulcus.

Fourth stage: Tragus construction,

Conchal Excavation

X Post Operative analysis of Reconstructed Pinna

1. Ear length
2. Breath
3. Ear Protrusion
4. Ear Inclination
5. Ear Location

1. Ear Length

The maximum length of the auricle measure along their long axis by use of a sliding caliper.

Table VIII Ear Length

Age of the Patients	Average Height of Reconstructed auricular
6 – 10	55mm
11 – 15	58mm
16 – 20	60mm
21 – 30	67mm

2. Ear Breadth

The maximum width of the auricle measured between the helical insertion and the most posteriorly placed point of the helical rim by a sliding caliper.

Table IX – Ear Breadth

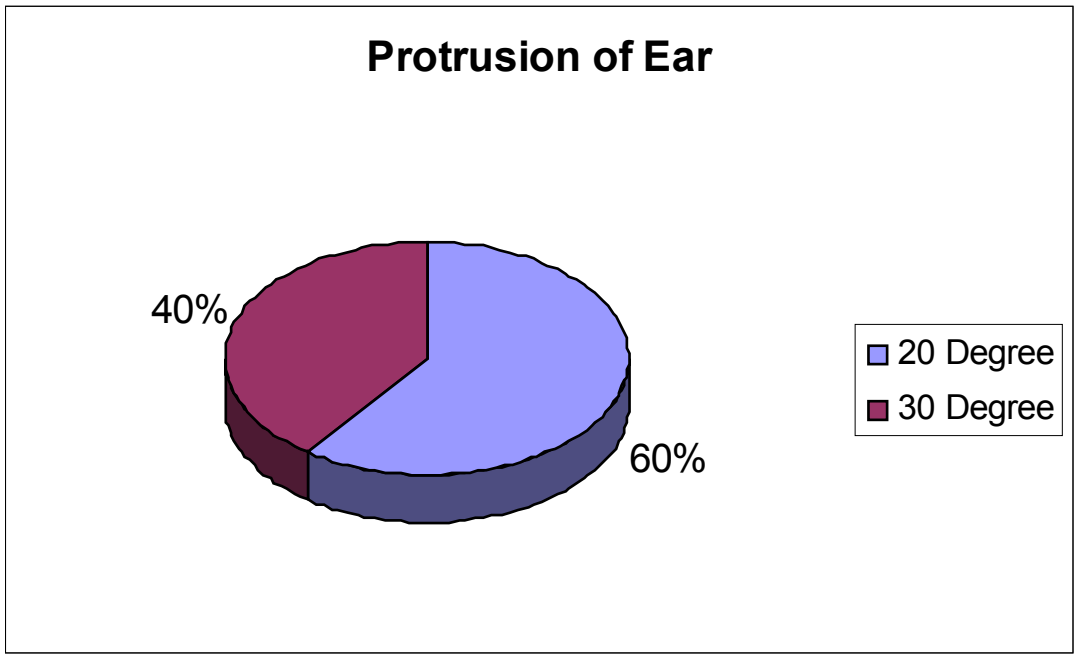
Age of the Patients	Average width of auricle
6 – 10	32mm
11 – 15	34mm
16 – 20	36mm
21 – 30	36mm

3.Ear Protrusion

The angle between the dorsal surface of the upper helical rim and mastoid plane, measured by transparent protractor. Method of measuring auricular protrusion a transparent protractor. With it base pressed firmly against the side of the head is placed at the level of the tip of the auricle with the zeromark above the otobasion superior. The protrusion of the auricle is read in degree.

Table X. Protrusion of Ears

Degree of Protrusion of ear	No	Percentage
20 Degree	8	60%
30 Degree	6	40%
> 30 Degree	Nil	0%

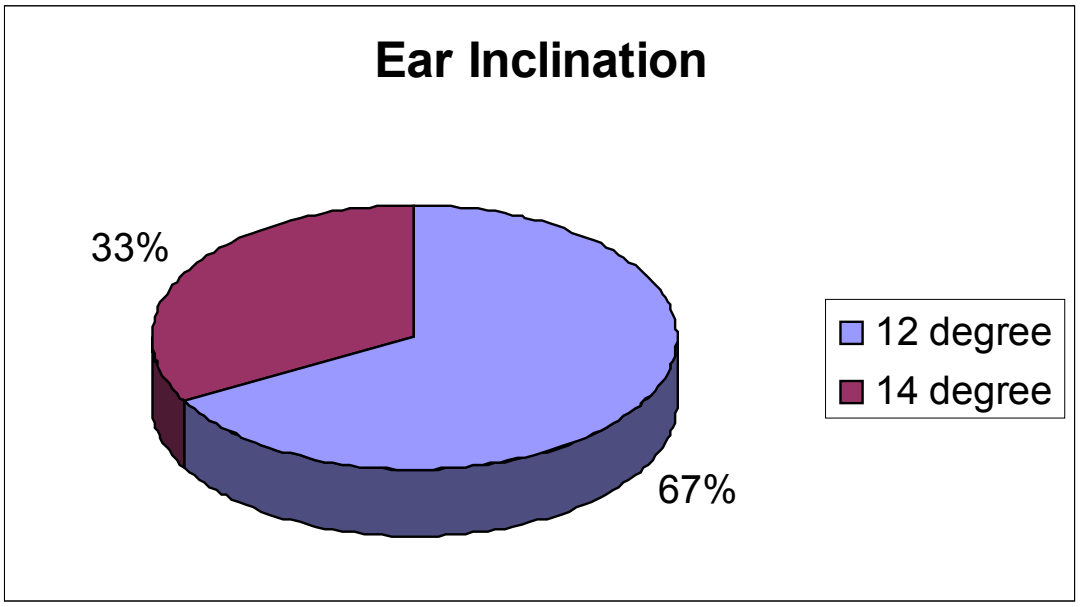


4. Ear Inclination

The angle between the medial longitudinal axis of the ear and the general line of the facial profile measured by the protractor. The general facial profile line is defined by the line connecting the most protruded points of the forehead and the chin. Methods of measuring the angle of inclination the angle between the long axis of the auricle and a line through the external auditary meatus, paralling the general facial profile line, is read in degree on a transparent protractor.

Table XI Ear Inclination

Degree of ear Inclination	No	Percentage
12 degree	10	67%
14 degree	5	33%



5. Ear Location :

The level of the on the head is determined from positions of its upper insertion (Otobasion Superius) and lower insertion (Otobasion inferius). The upper insertion is marked by the disappearance of anterior portion of the helix in the temporal skin. The attachment of the lobule to the skin of the face marks the lower insertion. The location of the auricle is determined by

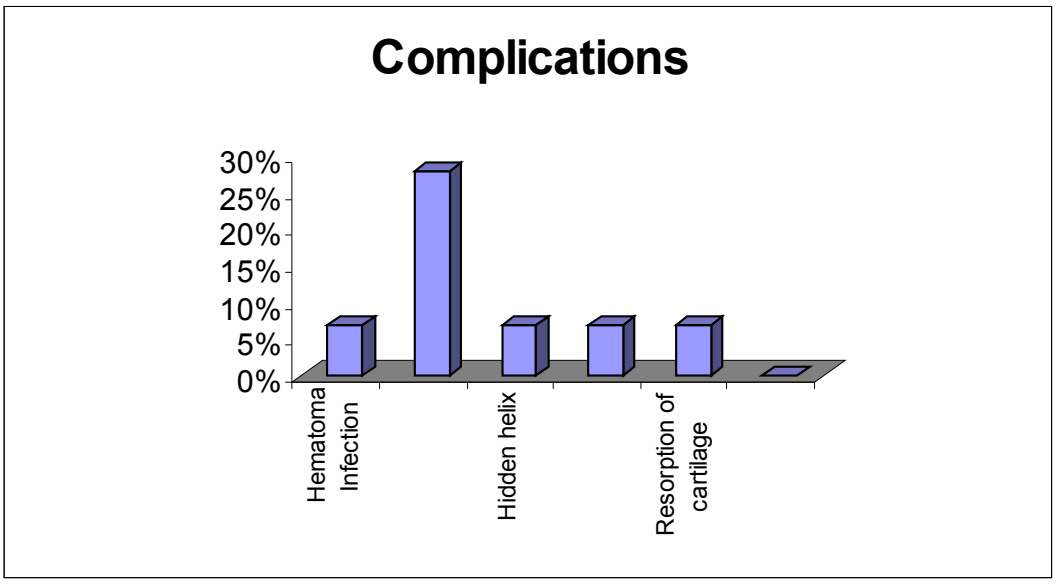
measuring the projective distance between the insertion of the auricle and the landmark on the nasal root (Nasion) at the base of the columella. Four cases 1cm excess cephald to nasion was reported our study.

Complications

In this study one patient had developed hematoma followed infection. We treated this patient with local antibiotic irrigation and pus culture and sensitivity, appropriate IV antibiotic. Four patients had post operatively malpositioned pinna. One patient had reported hidden helix. One patient had exposure to cartilage frame work which was covered by local small transposition skin flap. We observed resorption of the carilage framework for one patient, he did not come for subsequent procedure of elevation ear cartilage frame work for more than 8 months. For this patient we had harvest ipsilateral costal cartilage, framework fabrication and implantation frame work was done same site previous subdermal pocket subsequently. In our study no donor site morbidity (Chest wall) was reported.

Table XII Complications

Complication	No	Percentage
Hematoma Infection	1	7%
Malposition Reconstructed Pinna	4	28%
Hidden helix	1	7%
Frame work exposure	1	7%
Resorption of cartilage frame work	1	7%
Chest wall morbidity	0	0%



DISCUSSION

Microtia is the most common congenital anomaly of the auricle, commonly used the clinical classification of auricular defect by Tanzer. What we commonly encountered. Type II A Microtia (complete hypoplasia auricle with absence of external autitary canal or atresia of external auditary canal). Reconstruction of the microtia ear represents one of the most demanding challenges in reconstructive surgery.

For reconstruction of the microtic ear various techniques was described in literature. Tanzer advocated a four stage reconstruction is one of the old method of pinna reconstruction. In the first stage, the lobular remnant was transposed transversely to its correct anatomic position.

In the second stage, harvesting contralateral costal cartilage of 6^{th}, 7^{th}, 8^{th} ribs and framework fabrication and implantation cartilage framework into subdermal pocket. In the third stage elevation of cartilage frame work and advancement of postauricular skin and placement of a retroauricular full thickness skin graft. In fourth stage, tragus and conchal formation was done.

In this technique lobule transposition was done in first stage, so the risk of vascular compromise of the skin flap is more. This is the main disadvantage this technique.

Nagata's technique involve two stages. In the first stage harvesting ipsilatertal sixth, seventh, eighth and ninth ribs. Nagata constructs the framework base into three floors. Nagata uses 'W' shape skin incision separate the lobule into three skin flaps, posterior, anterior lobular skin flaps, and anterior trachal skin flap. Cartilage frame work is implanted in second stage. Six months after the frame work is elevated and a temporoparietal fascia flap elevated and tunneled subcutaneously to cover posterior surface of the cartilage graft. The retroaurcular skin is advanced cephaloauricular sulcus and posterior aspect of the cartilage was covered with a split thickness graft harvested from the occipital area. Main disadvantage this technique is vascular compromise perilobular flaps and produce permanent anterior chest wall deformity, and also produces unnaturally looking thick ears.

We had followed Brents four stage technique. All the cases preoperative planning was done one day prior to surgery. In the first stage: harvesting contralateral costal cartilage of sixth, seventh, eighth ribs frame work fabrication and implantation of framework into subdermal pocket through

preauricular incision was done. In second stage: Transposition lobule by half ‘Z’ plasty incision. Third stage: Frame work elevation and creation of the cephaloauricular sulcus. In fourth stage, Tragus construction, conchal excavation was done. In this technique the lobule is not repositioned in the first stage. By placing the framework in the first stage under a virgin skin envelope and using a high profile construct this technique will maximize definition of the reconstruction while minimizing the risk of vascular compromise of the skin flap. This is advantage that sets Brent’s technique apart from Tanzer’s and Nagata technique.

In our study one case developed hematoma and followed wound infection. The cause of hematoma and infection were the negative suction was not function properly. Postoperatively we treated this case with local irrigation antibiotic and pus culture and sensitivity and appropriate antibiotic. This was settled well. One patient reconstructed pinna was hidden behind the scalp because he was not used postoperatively the postural acrylic spinl properly.

Four patients had malposition of pinna post operatively. one patient had postoperatively framework exposure, which was covered by local transposition skin flap. We have observed resorption of the cartilage

framework for one patient. The cause for framework resorption was this patient did not come for followup more than 8 months. Subsequently procedures cartilage elevation was not done. For this patient we had harvested ipsilateral side costal cartilage and again frame work fabrication and implantation framework into some subdermal pocket through preauricular incision was inserted. For one cases we used tissue expander to expand preauricular tissue due to scantiness of the skin tissue at the affected site. Main disadvantage using tissue expander was formation the thick fibrous capsule around implanted tissue expander prevents adequate skin drapping over the cartilage framework thereby obscuring its detail and negatively affecting the quality of the reconstruction.

A successful reconstructive effort necessarily follows a through evaluation of the external ear with assessment of the associated pathological finding and establishment of the status of the middle ear the appropriate sequence and timing of each operative stage must be individualized. The minimum safe number of operative stages needed to obtained the highest quality reconstruction is the goal all surgeons must strive to achieve. A number of different surgical techniques are available and each surgeon must consider the most appropriate for his skills and experience. Autologous cartilage framework, despite their potential for donor site complications, remain the accepted standard for external ear reconstruction.

Minimizing the number of operative stage and dissection over the framework will like optimize its anatomic definition and enhances the quality of the reconstruction. It must be remembered that the vascularity of the tissue adjacent the vestigial ear remnant is limited and over zealous dissection may result in disaster. In certain cases, it may well be better to use an additional operative stage to avoid compromise of the skin flaps than to risk complete loss of the reconstruction.

If middle ear reconstruction is included the creation of the canal and performance of the middle ear surgery is usually done in one or two stage thorough both conchal and postauricular and mastoid approaches. Even in the best of hand, this procedure carries a high complication rate, with frequent stenosis of the external auditory canal. Middle ear surgery is only indicated in bilateral middle ear deformity associated with microtia cases.

Dressing are a key adjunct to ear reconstructon pressure dressing may compromise the vascularity of the already taut overlying skin envelope resulting in skin necrosis and exposure of the framework. Pressure and bolster tube dressing should be avoided during framework placement stage. Suction drains have proved to be valuable in achieving flap coaption to the framework, but they must be precisely placed for optimal effect. Success of

suction drain is improved by careful, airtight closure of the surgical incisions. The drains must be monitored closely for clotting of the drain system so as to stifle the development of hematoma or seroma formation.

SUMMARY AND CONCLUSION

Management of microtia can be one of the most rewarding yet humbling challenges faced by the reconstructive surgreon. For 15 case microtia type – A we had followed total auricular reconstruction is with autologous cartilage and on modification of the methods of Brent. Our goals in auricular reconstruction of microtia are i) A satisfied patient, ii) proper positioning, iii) a pleasing size and contour. In ear reconstruction should be an ear that is sufficiently natural in appearance it will pass unnoticed by others. Current methods fall short of this goal, however, because of the transplanted autologous tissue, which are different from those in the normal ear. Even if perfect framework could be carved from costal cartilage, the ideal ear would still elude use because the thicker temporal mastoid skin would obscure the delicacy of the convolution what we have achieved as highly pointed out by the BRENT “An acceptable facsimile of ear” which is happily accepted by our patients and parents. As pointed out in our study, we have found out the caveats in the reconstruction of ear in our microtia patients. They are

(1) The skin in the auriculomastoid area thicker on par with neck skin.

(2) The amount fibrosis in the bed is also more in spite of adequate

hemostasis and sharp and gentle dissection.

(3) Cartilage volume available for framework is also relatively less.

Because of the above reasons the delicate carving of the fabricated costal cartilage framework is obscured and therefore the interhelicine groove and fossa on the external aspect are less pronounced.

To conclude that the highly complex nature of ear reconstruction places it in the higher echelons of reconstructive surgical procedures. The multidisciplinary issue surrounding congenital ear deformities. Combined with the technical expertise and experience necessary to satisfactorily conduct the surgery, suggest that these types of reconstruction should not he performed by surgeons unfamiliar with the technique optimal results can be only achieved through dedicated study and experience.

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PROFORMA

NAME	AGE	SEX
ADDRESS	I.P.NO.	P.S.NO.

COMPLAINTS:

1.
2.
3.
4.

ANTENATAL HISTORY:

1. ANY DRUG INTAKE
2. VIRAL INFECTION
3. EXPOSURE TO RADIATION

FAMILY HISTORY:

1. CONSANGUNITY
2. NON CONSANGUNITY
3. I' II' III DEGREE MARRIAGE
4. STATUS OF OTHER SIBLING

PAST HISTORY:

1. DIABETIC
2. HYPERTENSION
3. TUBERCULOSIS
4. LEPROSY
5. PREVIOUS H/O ANY SURGERY
6. PREVIOUS H/O ANY TRAUMA

GENERAL EXAMINATION:

1. BUILT
2. ANEMIC
3. ICTERUS
4. LYMPHADENOPATHY
5. ANY OTHER CONGENITTAL ANOMALIES

LOCAL EXAMINATION:

	RIGHT EAR	LEFT EAR
1. HELIX		
2. ANTI HELIX		

3. AURICULAR TUBERCLE

4. SCAPHA

5. CRUS OF HELIX

6. TRIANGULAR FOSSA

7. CYMBA OF CONCHA

8. CONCHA OF AURICLE

9. CAVUM OF CONCHA

10. TRAGUS

11. ANTI TRAGUS

12. INTER TRAGIC NOTCH

13. LOBULE

14. EXT. AUDITARY CANAL

15. POSITION OF PINNA

16. HAIRLINE LEVEL

17. MASTOID PROCESS

MEASUREMENT:

1. VERTICAL HEIGHT EAR

2. HORIZONTAL WIDTH EAR

3. CEPHALO AURICULO ANGLE

CEPHALOMETRY:

1. LATERAL CANTHUS TO ROOT HELIX

2. EXT. AUDITARY CANAL TO NASION

3. EXT. AUDITARY CANAL TO SUBNASALE

4. EXT. AUDITARY CANAL TO GONION

5. DISTANCE BETWEEN POGONION TO GONION

6. TOP OF SKULL TO CHIN.

TYPES:

A. CONGENITAL

I. ANOTIA

II. COMPLETE HYPOPLASIA OR MICROTIA

a) WITH ATRESIA OF EXTERNAL AUDITARY CANAL
b) WITHOUT ATRESIA OF EXTERNAL AUDITARY CANAL

III HYPOPLASIA OF MIDDLE THIRD OF AURICLE

IV HYPOPLASTA OF SUPERIOR THIRD OF AURICLE

a) CONSTRICTED (CUP AND LOP) EAR
b) CRYPTOTIA
c) HYPOPLASIA OF ENTIRE SUPERIOR THIRD.

V PROMINEM EAR

INVESTIGATION

1. Hb.TC, DC CT BT
2. Blood - Sugar
3. Blood - Urea
4. Serum - Creatinine
5. Urine - Sugar / Urine – Albumin
   - Sugar
6. X-Ray Chest
7. Blood Grouping
8. ECG
9. CT Scan Temporal Bone
10. Audiogram

SURGERIES

I Stage

II Stage

III Stage

IV Stage

COMPLICATION

1.
2.
3.
4.
5.

FOLLOW UP

I

II

III

IV

V

VI

FINAL RESULT

MASTER CHART

S. No.	Name	Age/ Sex	Place	PS No.	Audiogram Finding	Type Microtia	Side	CT Scan Finding	Date I Stage of Operation	Date II Stage of Operation	Date III Stage of Operation	Date IV Stage of Operation	Complications	
1	Gokul Raj	7/M	Ch	5251/03	Conductive hearing loss R – 40dB	Type IIA	(R)	Bil Middle ear ossicles side are malformed	(R) 20-7-03 (L) 6-01-04	(R)14-8-03 (L)18-2-04	(R)22-10-03 (L)16-5-04	(R) 18-11-03 (L) 10-6-04	Malposition of pinna (R) side	12-07
2	Jayakrishna	9/M	Ch	988/04	(L) conductive	Type IIA	(L)	Middle ear ossicles side	2-5-04	17-6-04	20-8-04	18-9-04	Haematoma infection	20-10

					hearing loss 30dB			are malformed						
3	Mohana Priya	8/F	Ch	785/04	(R) conductive hearing loss 40dB	Type IIA	(R)	Middle ear ossicles side are malformed	10-8-04	12-9-04	16-12-04	18-1-04	Nil	20-02
4	Arjun	22/ M	Ch	865/04	(R) conductive hearing loss 35dB	Type IIA	(R)	Middle ear ossicles side are malformed	13-8-04	15-9-04	19-12-04	24-1-05	Malposition of pinna	24-02
5	Supriya	71/F	Ch	5640/03	(R) conductive hearing loss 40dB	Type IIA	(R)	Middle ear ossicles side are malformed	10-10-03	12-11-03	1-2-04	10-03-04	Nil	12-04
6	Surendran	11/ M	Ch	1428/03	(R) conductive hearing loss 45dB	Type IIA	(R)	Middle ear ossicles side are fused	8-5-04	9-6-04	10-8-04	12-09-04	Nil	14-10
7	Dinakaran	27/ M	Ch	2072/04	(R) conductive hearing loss 30dB	Type IIA	(R)	Middle ear ossicles side are malformed	10-5-04	19-6-04	15-8-04	14-09-04	Frame work exposure (L)	16-10
8	Karthick	15/ M	Ch	1051/04	(R) conductive hearing loss 40dB	Type IIA	(L)	Middle ear ossicles side are fused	10-3-04	12-4-04	10-7-04	20-08-04	Nil	18-09

S. No.	Name	Age/ Sex	Place	PS No.	Audiogram Finding	Type Microtia	Side	CT Scan Finding	Date I Stage of Operation	Date II Stage of Operation	Date III Stage of Operation	Date IV Stage of Operation	Complications	
9	Premkumar	24/ M	Ch	5293/03	(L) side conductive hearing loss 40dB	Type IIA	(L)	Middle ear ossicles are malformed	10-05-03	12-06-03	10-08-03	12-09-03	Malposition of pinna	10-10
10	Sakthivel	17/ M	Ch	6374/03	(R) side conductive hearing loss 35dB	Type IIA	(R)	Middle ear ossicles are fused	05-06-03	13-07-03	12-09-03	14-10-03	Resorption of cartilage	11-11
11	Alakkia	7/F	Ch	4946/03	(L) side conductive hearing loss 40dB	Type IIA	(L)	Middle ear ossicles are fused	06-03-03	12-04-03	14-07-03	10-08-03	Nil	12-09
12	Sharmila	9/F	Ch	316/03	(R) side conductive hearing loss 35 dB	Type IIA	(R)	Middle ear ossicles are fused	02-01-03	04-02-03	06-03-03	12-04-03	Nil	14-05
13	Lalitha	12/F	Kan	927/03	(L) side conductive hearing loss 40dB	Type IIA	(L)	Middle ear ossicles are fused	06-01-03	08-02-03	10-03-03	10-04-03	Nil	12-05
14	Pooviarasi	12/F	Ch	1161/04	(R) side conductive hearing loss 40dB	Type IIA	(R)	Middle ear ossicles are malformed	06-06-04	10-07-04	10-09-04	14-10-04	Malposition of pinna	13-11
15	Lijo	16/ M	Ch	1020/04	(R) side conductive hearing loss	Type IIA	(R)	Middle ear ossicles are malformed	10-05-04	12-06-04	10-08-04	12-09-04	Nil	10-10