RESEARCH PAPER

# 2nd stage Microtia Reconstruction, the Still Unsolved Problem in Plastic Surgery

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**ABSTRACT**

**Introduction** The prevalence of microtia is high among population, two stage costochondral reconstruction using Nagata technique is widely accepted.The 1st stage include rib harvesting ,framework fabrication and insetting into ear pocket adherent to the scalp. The 2nd stage includes elevation of the previously carved framework to create post auricular sulcus. Many techniques were described. Till now especially in middle east we didn't reach for the 100% symmetry to the normal ear as most cases of microtia are unilateral . Even for the 2nd stage for creation of post auricular sulcus we have issues like projection asymmetry , thick frame ,flap or graft failure or even reoperating for the unsatisfactory results .

**Keywords**：Microtia, STSG, Nagata, mastoid area and auricular reconstruction.

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## Introduction

Microtia is a congenital hypoplastic malformation of the pinna, ranging in severity from slight auricular diminution to total absence of the external ear. Anotia is the most severe form and is characterized by complete failure of auricular and lobular formation. Microtia is often unilateral and results in noticeable auricular asymmetry [1].
Across cohorts, microtia shows a male predominance (often ~60% male) and is unilateral in ~80–90% of cases, more often affecting the right ear. These patterns are consistent across Finland, the Netherlands, and multinational reviews **[ 2 ]** .

External auditory canal atresia/stenosis frequently accompanies microtia; broader associations include craniofacial microsomia (OAVS), and, less commonly, cardiac and vertebral anomalies. Contemporary series and systematic work confirm these links and emphasize that external ear canal atresia is the most common accompanying phenotype **[ 3 ] .**

A survey conducted in 2019 in 22 major plastic surgery centers in Egypt described that the provision of care for microtia atresia patients is clearly disjointed. Specifically, 65 % of centers treat less than 10 patients per year and 90 % of centers have multiple reconstructive surgeons performing ear reconstructions, and only 25 % use a multi-disciplinary team approach in these centers **[ 4 ] .**

The predominance of conductive hearing loss underscores the functional burden of microtia, which is often the presenting concern prompting parents to seek medical advice and genetic counseling. The frequent association with syndromic conditions adds complexity to the clinical picture, increasing diagnostic, therapeutic, and counseling demands **[ 5 ]** .

Nagata proposed a classification scheme of descriptive terms, including anotia, lobule-type, concha-type, and small concha-type( fig 1) **[ 6 ]** .
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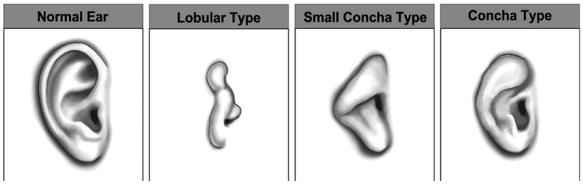


***Figure 1 Nagata classification of auricular anomalies*[ 6 ]** .

The surgical technique described described by Nagata is a modification of the 4 stage technique to 2-stage technique only . The main leading microtia surgeons all over the world use the 2 stage technique nowadays with some modifications by Siegert , Firmin and Marchac **[ 7 ]** .

1st stage address the rib harvesting and framework fabrication is done and also rempval of remnant cartilage in the ear and placing the frame inside the ear pocket and the ear almost always is fixes to the scalp and need 2nd stage later on after about 6 months to be operated for creation of post auricular sulcus **[ 8 ]** .

Nagata usually harvests contralateral ( Firmin prefer the ipsilateral ribs )sixth to ninth rib cartilage without perichondrium. Harvesting rib cartilage without perichondrium is a much safer technique than harvesting with perichondrium, because of one more layer of protection. Also, it is more likely to obtain the regeneration of cartilage/bone matrix. The Nagata technique uses the leftover small pieces of cartilage; if relatively large pieces are left, they could be banked for the second-stage elevation, if the pieces are small, cartilage is diced into tiny pieces, and placed inside the sutured perichondrial pocket. This filling of cartilage helps the regeneration of the cartilage. **[ 8 ]** .

The second-stage operation is typically done after 6 months . An incision is made around the framework, and the ear is elevated. The position of the lobule and any irregularities of soft tissue overlying the framework can be adjusted as needed during this stage. The banked cartilage from the chest is retrieved to create a wedge **[ 9 ]** .

**Fermin The four types (Stage-2 elevation options)**

Type A "Modified Nagata": cartilage wedge + temproparietal fascia ( TPF) flap + split thickness skin graft ( STSG) .

Type B elevation "Brent-style" elevation with STSG only (no cartilaginous component). Done when the frame has an average projection .

Type C Mastoid (retroauricular) fascial flap + cartilage + STSG. good option but the vascularity was questionable .

Type D “Tunnel” technique (cartilage in tunnels) + STSG, no large flap. avoided the need for large flaps . **[ 10 ]** .

The formation of hematoma or seroma under the posterior flap or graft can result in flap congestion leading to potential downstream partial skin necrosis, graft failure, and infection. To prevent excess hematoma or seroma, careful hemostasis, low-suction drains and bolsters which evenly applied and molded to the contours of the framework (avoiding "spikes" behind the posterior flap or graft) must be employed **[ 11 ]** .

Partial skin or fascial flap necrosis can potentially lead to cartilage exposure, most commonly at the distal edges of random-pattern posterior fascial flaps and along the tight curves of the newly created post-auricular sulcus. Underlying factors contributing to exposure include uneven bolster pressure, poor vascular supply, sharp edges on the framework and excessive tension on posterior skin **[ 12 ]** .

Loss of projection and sulcus blunting is usually seen as a shallow post-auricular sulcus or an auriculocephalic angle < 20° and often necessitates revision. The presence of independent risk factors such as hemifacial microsomia and canalplasty performed (≤ 12 months) before elevation does complicate the situation. In the worst-case scenario, loss of projection is due to lack of posterior support (scar tissue contracture or inadequate soft-tissue vascular coverage) **[ 13 ]** .

Preventive and corrective strategies include modest or slight over-elevation at surgery to account for scar contracture, cartilage wedges or blocks which are quite stable (via tunneling, wiring), and vascular coverage (temporoparietal fascia or robust retroauricular fascia), and postoperative ear-splinting for weeks to months to ensure an auriculocephalic angle **[ 14 ]** .

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