

Stage II auriculoplasty with the nagata technique approach in microtia case

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Abstract

This paper provides a detailed case study of Stage II auriculoplasty using the Nagata technique on a patient with grade III dextral microtia. The paper describes the patient's clinical history, including the initial diagnosis and surgical procedures, which included auriculoplasty and the use of costal cartilage for ear reconstruction. The patient's physical status was classified as ASA I during the pre-operative assessment, indicating that general anesthesia was appropriate. The intraoperative examination results verified the presence of microtia dextra grade III. The report emphasizes the importance of extensive pre-operative evaluations, as well as the Nagata technique's efficacy in improving functional and cosmetic outcomes in patients with congenital auricular abnormalities.

Keywords: Microtia; Auriculoplasty; Nagata Technique; Congenital ear defects; Surgical intervention

1. Introduction

A number of conditions that affect the embryonic auricular cartilages throughout their development can lead to congenital abnormalities of the auricle. The severity and functional damage of these defects vary, and surgery may or may not be necessary.¹ Furthermore, these anomalies are typically discovered alone, however they may be linked to other congenital diseases.² Microtia is a congenital defect in the auricle, ranging from an underdeveloped ear with a normal shape to an underdeveloped ear with an abnormal shape, or even the absence of the auricle itself. Between 0.8 to 4.53 cases of microtia occur for per 10,000 live births. In addition to factors such as race and genetic susceptibility, maternal exposure to teratogens, diabetes and anemia are known risk factors.^{3,4}

Microtia treatment generally involves early intervention with hearing aids and ear reconstruction, usually starting between 6 to 8 years of age. Ear reconstruction involves implanting an auricle skeleton to create a new auricle. Traditionally, this involves using the patient's own tissue, usually taken from the ribs (autologous reconstruction). However, the alternative involves using an alloplastic framework made of porous polyethylene (PPE), such as MedPor®.⁵ Each reconstruction technique has its own complications. Autologous reconstruction can lead to pneumothorax, infection, exposure, skeletal size changes and lobule necrosis. In contrast, alloplastic reconstruction can result in hematoma, infection, exposure and flap loss. Some surgeons prefer the latter due to the shorter learning curve, no risk of pneumothorax, and the possibility to perform the procedure at a younger age. However, autologous auricle reconstruction remains the gold standard.⁶

2. Case Report

Patient with initials NNS, female, 22 years old, Balinese ethnicity, Karangasem address. The patient was referred from Balimed Karangasem Hospital with grade III dextral microtia. Patients with complaints of imperfectly shaped right ear and difficulty hearing in the right ear since childhood. History of stage I auriculoplasty surgery on February 24, 2023 and currently plans to continue stage II auriculoplasty.

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Figure 1 Right ear of the patient post-operative auriculoplasty stage I

A physical examination revealed that the patient was in a fairly unwell state overall, with axillary temperature 36.5°C, body weight of 52 kg, blood pressure of 110/70 mmHg, pulse of 72 beats per minute, respiration of 20 beats per minute, and *compos mentis* consciousness. The left ear's ear examination was normal. Since the auricle in the right ear was grafted, external acoustic canal was challenging to assess. Nasal examination revealed no abnormalities. Throat examination found no abnormalities.

The patient's laboratory results are within normal limits, showing a white blood cell count of $11.23 \times 10^3/\mu\text{L}$, hemoglobin level of 14.10 g/dL, and platelet count of $311 \times 10^3/\mu\text{L}$. Coagulation parameters, including prothrombin time (10.2 seconds), international normalized ratio (0.89), and activated partial thromboplastin time (26.4 seconds), are all within the normal range. Additionally, the random blood sugar level is 75 mg/dL, indicating normal glucose levels. These findings suggest no significant abnormalities in blood count, coagulation, or blood sugar levels. The results of thoracic X-ray examination were within normal limits.



Figure 2 PA thoracic X-ray

The patient was diagnosed with grade III dextral microtia following auriculoplasty dextral stage I + post extraction of costae cartilage transplant based on history taking, physical examination, and supportive examination. Auriculoplasty stage II is scheduled for August 18th, 2023. The patient was sent to TS Anesthesia for surgical feasibility after undergoing a thorough pre-operative laboratory evaluation. According to the findings of the TS anesthesia consultation, the patient's physical state was ASA I. A stage II auriculoplasty was carried out under general anesthesia on August 18th, 2023. The costae framework is firmly in place, and microtia dextraa grade III was discovered intraoperatively.



Figure 3 Marker creation and costae capture



Figure 4 Elevation and stitching



Figure 5 Skin flap and suturing

Postoperative follow-up, the patient complained of pain in the surgical wound. On the second postoperative day, the patient complained of minimal pain in the wound. No sign of infection was found on the surgical wound, the patient was planned to go home and be treated in a polyclinic. The patient received discharge drugs, including three 500 mg doses of paracetamol, two 500 mg doses of cefixime, and two 4 mg doses of methylprednisolone.

On August 22nd , 2023, the fourth postoperative day, the patient went to the ENT polyclinic. According to the patient, there were no complaints, the surgical site was attended to, and no indications of infection were discovered.

On August 25th , 2023, the 7th postoperative day, the depth gauze behind the ear was removed and aff hecting was performed.



Figure 6 Suture Removal and Wound Care

On September 1st , 2023, the 14th postoperative day, the surgical wound was well preserved and no signs of infection were found.



Figure 7 Well-preserved wound

The flap was kept in good condition, the costae framework was in place, and the surgical site had dried and healed three months after the procedure. The patient was referred to the Otology section and scheduled for both ossiculoplasty and canaloplasty.



Figure 8 The 90th postoperative day

3. Discussion

A class of congenital earlobe deformities known as microtia includes everything from small structural irregularities to the complete absence of an earlobe. With a male to female ratio of 2.5:1, microtia seems to be more prevalent in the male population. About 77-93% of patients with microtia have unilateral disease, with the right ear being affected in 60% of instances. In approximately 10% of cases, bilateral microtia develops. Congenital auditory atresia (CAA) is linked to more than two-thirds of cases of severe microtia or anotia.² In this case, a 22-year-old female patient presented with complaints of an incompletely shaped right ear and difficulty hearing in the right ear since childhood. Microtia refers to a group of congenital abnormalities of the auricle, which vary in severity from minor structural abnormalities to absence of the auricle (anotia). Currently, there is no agreement on the nomenclature that should be used to describe and classify this disease.^{5,7} Based on history taking, physical examination and supporting examination, the patient was diagnosed with grade III dextral microtia post auriculoplasty dextral stage I + post costae cartilage graft harvesting and was submitted for auriculopalstic stage II action plan. Even these deformities frequently occur with a normal exterior canal, this shouldn't lessen the concern of potential middle ear, inner ear, or facial nerve disorders.^{7,8} A temporoparietal skin flap and a retroauricular flap are two components of the Nagata approach for modified microtia restoration, which has been demonstrated to produce stable projection, symmetrical look, and excellent patient satisfaction. A uncommon kind of microtia that necessitates meticulous surgical planning and detection is small concha-type microtia.^{9,10,11}

Complications like facial nerve paresis may become more likely if the ear is surgically altered. Rare congenital abnormalities of the chest wall might appear at birth or later in infancy. Some congenital anomalies, including bilateral chest wall defects with the absence of skin and muscle layer at all, may be associated with microtia. Conservative management with daily care can lead to proper healing and closure of the defect. Prosthetic rehabilitation is indicated in cases where surgical reconstruction of the auricle is not possible. Patients who have significant sensorineural hearing loss with microtia or aural atresia may benefit from cochlear implant surgery. A successful outcome depends on proper pre-operative planning and counseling, which includes facial nerve monitoring and high-resolution computed tomography.^{8,12}

According to Quang, Ly et al, a modified method using a combined flap for auricle reconstruction in microtia patients showed several practical advantages, including stable projection, symmetrical appearance, and clear anatomy, resulting in high patient satisfaction. The combined flap technique showed a high survival rate of the reconstructed ear, with no cases of flap necrosis observed. This method also results in a low complication rate, such as inappropriate skin color, unacceptable thickness, or hair and stretch marks. The absence of hypertrophic scarring is another practical benefit of the combined flap method. This technique provides less contrasting skin color, contributing to a more natural appearance of the reconstructed earlobe. Overall, the practical implications of this paper suggest that a modified method using a combined flap can be an effective and reliable approach to achieving satisfactory results in auricle reconstruction for microtia patients.¹³

4. Conclusion

The Nagata technique is a surgical approach for auriculoplasty, particularly in microtia cases, where the auricle is underdeveloped or absent. This case report discusses a patient who underwent Stage II Auriculoplasty following comprehensive medical evaluation. The procedure involved costae retrieval, elevation suturing, and flap retrieval, with postoperative care emphasizing wound management and follow-up. Three months after surgery, the reconstruction

showed successful outcomes with a stable framework and healed wounds. Future plans included canaloplasty and ossiculoplasty. While the Nagata technique yields favorable results, individualized approaches and thorough doctor-patient discussions are crucial for optimal outcomes.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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