ISSN: 3033-3555

Review Article

Journal of Stomatology & Dental Research

Preservation Otoplasty

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Received: August 04, 2025; **Accepted:** August 12, 2025; **Published:** August 20, 2025

ABSTRACT

Auricular anomalies can present a wide spectrum, ranging from mild deformities to severe malformations that not only impact the ear's shape but may also impair auditory function. These conditions often lead to emotional challenges and self-esteem issues in affected patients. Numerous otological abnormalities have been anatomically classified, prompting the development of various corrective techniques. Approaches to treating auricular malformations range from traditional and more invasive methods, often associated with higher patient morbidity, to newer and minimally invasive otoplasty techniques introduced in recent years. Recognizing the need to provide patients with a definitive solution while minimizing the complications linked to conventional otoplasty, we propose a novel technique called "Preservation Otoplasty."

Evidence Based on medicine: Level V

Keywords: Otoplasty, Perichondritis, Conchomastoid Angle, Hydrodissection, Retroauricular

Introduction

Anomalies pertaining to the auricular region may exhibit considerable variation, from minor deformities to more severe malformations that can affect both shape and auditory function, often causing significant emotional distress and self-esteem issues in patients [1]. Various otological anomalies have been anatomically described, leading to the development of techniques to address them. The literature outlines the historical progression of ear repair surgeries, starting with Ely in 1881, followed by Converse in 1955 and Mustardè in 1962. It subsequently mentions Furnas in 1968, who introduced an otoplasty procedure using permanent sutures along the conchomastoid region to correct protruding ear deformities [1-3]. Conventional otoplasty is not free of adverse events and comorbidities such as loss of structural support due to large cartilage resections, iatrogenic auricular deformities, asymmetry caused by perichondritis, necrosis, unpredictable scarring processes, a higher probability of infection, and increased inflammation due to greater dissection of the soft tissues and skin incision and excision [4,5].

Procedure

The first step for otoplasty using the preservation technique is to assess the ear's anatomy, focusing on factors such as the conchomastoid angle, auriculocephalic angle, conchoscaphoid angle, and the depth of the conchal bowl. These measurements provide a quantitative foundation to determine the precise degree of modification required to achieve an aesthetically favorable result in the ear's anatomy. After taking these measurements, precise preoperative markings are made to identify key anatomical landmarks that will assist during the surgery and allow the eventual modification of the ear structure to be objectively evaluated using the sparing sutures applied to the cartilage (Figure 1). For the surgery, the patient should be positioned lying flat (supine) on the operating table. Aseptic techniques are rigorously followed. Local anesthesia with vasoconstrictors, such as lidocaine with epinephrine (1:100,000), is administered at the planned incision sites to promote anesthesia, hemostasis, and hydrodissection.

Citation: Mentone A, Esposito E, Funaro M, Santorelli A. Preservation Otoplasty. J Stoma Dent Res. 2025. 3(3): 1-5. DOI: doi.org/10.61440/JSDR.2025.v3.29

Figure 1: Retroauricular design

Regarding the surgical approach and exposure, a retroauricular incision is made following the previously marked landmarks. A cutaneous flap is excised, with both retroauricular ends precisely aligned at the retroauricular crease, respecting natural folds to minimize visible scarring. Blunt dissection is then performed through the subcutaneous tissue layers with the aim of reducing edema formation and undesired fibrosis, meticulously elevating the skin flaps to expose the underlying auricular cartilage. Subsequently, a dissection of the retroauricular region is performed until the mastoid fascia is exposed. Careful attention is given to preserving the integrity of neurovascular structures, including the posterior auricular artery.

For the technique of reshaping the cartilage, various methods may be utilized depending on the specific anatomical deformity and the desired aesthetic outcome. In our approach, we opt not to employ cartilage scoring but rather to use cartilage-sparing sutures. A design can be created to delineate the cartilage boundaries, thereby facilitating the insertion points and direction of the sutures to achieve the desired movement depending on each patient's morphology. Following the completion of dissection and hemostasis, gentle pressure is applied to shape the intended antihelical fold. Two mattress sutures are then placed using resorbable sutures on the conchal, antihelical, and helix cartilage. The first suture is a 2/0 PDS, anchoring the concha cartilage to the mastoid fascia while preserving the alignment of the upper auricular margin (Figure 2a and 2b). In cases requiring additional support, a second concha-mastoid suture may be applied to reinforce the newly formed contours of the cartilage (Figure 3). Following this, a 3/0 PDS mattress suture is placed at the transition zone between the antihelix and helix cartilages (Figure 4). This suture serves to refine the antihelical fold and achieve a seamless integration of the upper ear with the rest of the auricular structure. These sutures are securely anchored to the dissected mastoid fascia, effectively enhancing the antihelical fold, reducing conchal hypertrophy, and optimizing the auriculocephalic angle. The main reason why it is called preservation otoplasty is that we preserve the cartilage structures; instead of cutting or excising them, our technique modifies them through sutures.

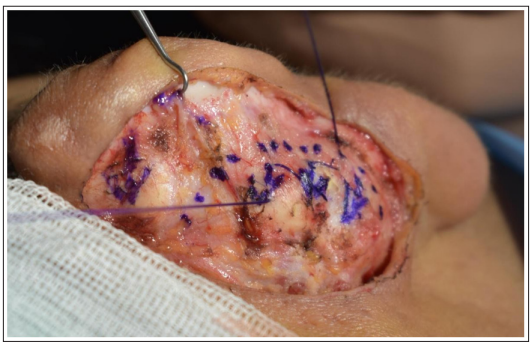

Figure 2a: Conchal cartilage mattress sutures.

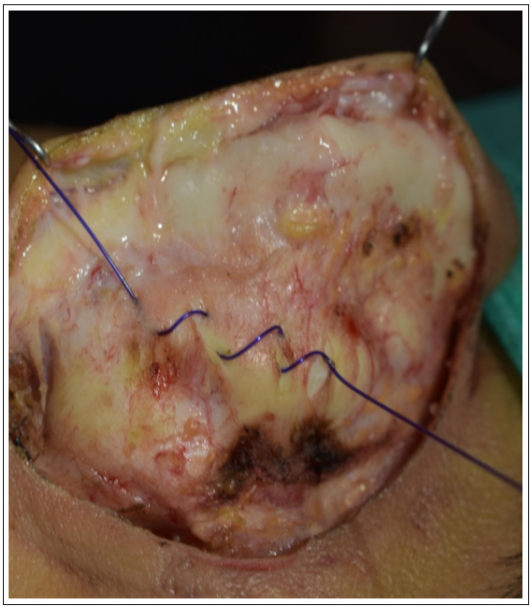

Figure 2b: Conchal cartilage mattress sutures.

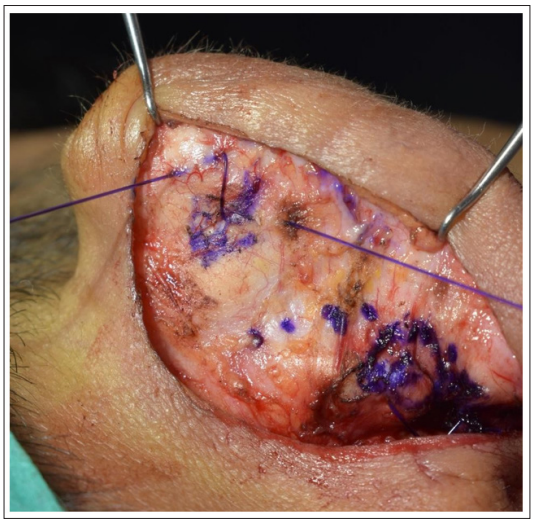

Figure 3: Antihelix-helix transition zone matress suture.

Figure 4: Patient before surgery and after 1 year surgery

Upon obtaining the desired correction, skin closure is performed with non-absorbable 4/0 Prolene sutures (Figure 5). Meticulous care is taken to ensure tension-free closure, thereby mitigating the risk of hypertrophic scar formation. The primary objective of these sutures is to decrease the angle between the helix, concha, and scalp to less than 35º, while concurrently reducing the helix-to-scalp distance to 1–1.2 cm in the upper third and 2–2.2 cm at the lobule. Post suture resorption, recurrence is effectively prevented, notwithstanding the cartilage's memory, due to the induced fibrosis and the performed skin resection.

Figure 5: Skin closure

Hemostasis is meticulously maintained throughout the procedure using electrocautery and bipolar cautery. Closed suction drains are not employed but may be placed temporarily to minimize postoperative hematoma formation and seroma accumulation.

Regarding the dressing, a compressive dressing is applied around the head to provide support and minimize postoperative edema. Custom-made retroauricular ear splints from thermoplastic materials or silicone, are fashioned to maintain the desired auricular position and contour during the initial healing phase. Furthermore, the patient will need to wear bandaging around the ears for the first two weeks. A postoperative care and monitoring protocol was developed in which analgesics and antibiotics are administered as per protocol. Close monitoring for signs of hematoma, infection, or wound dehiscence is essential. Follow-up appointments are scheduled to assess wound healing, remove sutures, and monitor long-term outcomes.

Potential complications, such as hematoma, infection, wound dehiscence, asymmetry, or unfavorable scarring, are promptly recognized and managed accordingly. Revision surgery may be indicated in cases of suboptimal outcomes or recurrent deformities. For our outcome assessment, the success of our otoplasty technique is evaluated based on objective measures of symmetry, proportion, and contour improvement, as well as subjective patient satisfaction scores. Long-term follow-up was settled at 2 months, 6 months, and 1 year after surgery, which has been essential to assess the stability and durability of surgical results. Patients who did not adhere to the scheduled follow-up appointments were excluded from the study. No immediately post-operative local and general complications are reported.

Normal values for the distance between the helix and the mastoid depend on the third of the ear being evaluated: in the upper third, the distance ranges from 10 to 12 mm; in the middle third, from 16 to 18 mm; and in the lower third, from 20 to 22 mm. Additionally, the normal auriculo-cephalic angle ranges between 20° and 30°. These parameters are considered standard reference values for postoperative evaluations. In follow-ups, cases were classified as stable if the auriculo-cephalic angle showed a change of ≤2° or if the distance between the helix and mastoid remained within a deviation of ≤2 mm. Recurrence was defined as an increase of more than 2° in the auriculo-cephalic angle or as an increase in the distance between the helix and mastoid exceeding 2 mm in the upper third (≥14 mm), middle third (≥20 mm), or lower third (≥24 mm), compared to the patient's immediate postoperative measurements.

These suture techniques provide structural integrity and long-term stability. Out of 65 patients treated with this technique from February 2022 to May 2023, we have encountered only 4 cases of infection, resulting in unilateral relapse to the previous condition (Table 1). These relapse cases were surgically treated at a subsequent stage using the same technique, without any complications.

Table 1: Procedure- related Adverse Events of 65 patients

Adverse events	Baseline	Day 60	95% CI Day 60	Day 180	95% CI Day 180	Day 365	95% CI Day 365
Perichondritis	0	0	--	0	--	0	--
Necrosis	0	0	--	0	--	0	--
Hypertrophic scar	0	4.62% (3/65)	(0.96, 12.88)	0	--	0	--
Infection	0	6.15% (4/65)	(0.31, 11.99)	0	--	0	--
Hematoma	0	0	--	0	--	0	--
Seroma	0	0	--	0	--	0	--
p-value	<0.032	0.670		<0.032		<0.032	

Other comorbidities, such as keloid formation, were observed in 3 patients and were effectively treated and resolved after 2 sessions of Kenacort 40mg/1ml infiltrations. The following images show patient before surgery and 1 year after surgery (Figure 4).

Discussion

Different techniques have been proposed to treat auricular malformations, ranging from well- known traditional methods involving more invasive approaches, which entail greater patient comorbidity, to minimally invasive otoplasties described recently. These newer procedures may have therapeutic limitations, either due to the approach or long-term outcomes in certain patients and clinical conditions. Faced with the need to improve and offer patients a definitive solution while simultaneously reducing the comorbidities associated with conventional otoplasty, we propose a new technique called "Preservation otoplasty". "Preservation Otoplasty" allows for a structural modification of the ear, while simultaneously respecting the soft tissues and flexible connective tissue, avoiding cartilage resections and extensive subchondral detachment, thereby reducing the probability of adverse events and comorbidities associated with conventional otoplasty, leading to a quicker recovery. The technique allows, through the modification of the sutures made, to alter the otological morphology and adapt significantly to the patient's needs [5,6].

Conclusion

In conclusion, Preservation Otoplasty represents a significant advancement in the treatment of auricular deformities, providing a less invasive approach with predictable outcomes and enhanced patient safety. While traditional techniques remain valuable in specific cases, the integration of this innovative method has the potential to redefine the standards of auricular aesthetic surgery (Table 2). We have created a comparative table of the different otoplasty techniques, detailing their technical differences as well as their advantages and disadvantages (Table 3).

Table 2: Comparison of otoplasty techniques based on invasiveness, aesthetic outcomes, complication risks, and clinical indications, highlighting the advantages of the innovative "Preservation Otoplasty" approach

Technique	Invasiveness	Aesthetic Results	Risk of Complications	Main Indications
Cartilage Resection	High	Moderate to Good	High	Severe deformities
Suture-Only	Low	Variable	low	Mild to moderate deformities
Comibed Techniques	Moderate	Good	Moderate	Moderate to severe deformities
Minimally Invasive Methods	Very Low	Natural, but Limited	Very Low	Mild cases
Preservation Otoplasty	Low	Natura and Personalized	Very Low	Broad range "of clinical conditions"

Table 3: Comparison of different otoplasty techniques, highlighting their respective advantages and disadvantages.

Technique	Basic principle	Advantages	Disadvantages	Indications
Cartilage Scoring (Mustardé)	Scoring or cutting the cartilage to weaken it, allowing reshaping with sutures.	Precise reshaping of the antihelical fold, long-lasting results, suitable for rigid cartilage.	Risk of surface irregularities, fibrosis, visible scarring, and is more invasive.	Ideal for poorly defined antihelical folds or thick cartilage.
Cartilage- Sparing (Furnas)	Uses sutures without cutting the cartilage, reshaping it via tension or anchoring.	Minimally invasive, lower fibrosis risk, preserves cartilage integrity.	Less effective for rigid or prominent cartilage, risk of recurrence.	Best for flexible cartilage or moderate ear prominence.
Preservation Otoplasty	Strategic sutures reshape cartilage without cutting or excising it	Preserves cartilage structure, minimally invasive, fewer complications.	Dependent on surgeon skill, results vary with cartilage elasticity.	Great for mild to moderate ear prominence; preferred by patients wanting conservative techniques.
Stenström Technique	Abrasion of the cartilage's anterior surface induces natural bending backward.	Durable results, effective for creating or enhancing the antihelical fold.	Risk of irregularities, requires high precision, potential for visible scarring.	Suitable for resistant cartilage or significant antihelical prominence.

Declaration of Author

The authors declare that they have no conflicts of interest to disclose.

This article does not contain any studies with human participants or animals performed by any of the authors.

For this type of study informed consent is not required.

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