

One-stage Osseointegrated Implant, Abutment, and Loading for an Auricular Prosthesis

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Summary: The field of auricular reconstruction has witnessed significant advancements aimed at improving patient outcomes and streamlining treatment processes. Traditionally, complex reconstructions using autologous tissue or synthetic scaffolding have been utilized to address congenital malformations or acquired deformities of the pinna. However, such methods often involve multiple procedures and carry the risk of donor-site morbidity and complications. Osseointegrated implants offer a promising alternative, leveraging techniques derived from dental implantology to achieve stable fixation of alloplastic materials within the mastoid bone. Variations in surgical techniques, including the 1-stage and 2-stage processes, have been explored to optimize treatment protocols. We report the “ear in a day” technique, presenting a novel approach where implantation, abutment, and prosthesis placement are accomplished within the same surgery. This innovative strategy offers early functional restoration while minimizing patient discomfort and treatment duration. However, meticulous patient selection, preoperative planning, and interdisciplinary collaboration are imperative to ensure the success and safety of immediate loading techniques. Vigilant postoperative monitoring and adherence to follow-up appointments are essential for detecting and addressing potential complications promptly. The ear in a day method represents a promising advancement in auricular prosthetic implantation, underscoring the importance of a comprehensive, patient-centered approach in craniofacial reconstruction. (*Plast Reconstr Surg Glob Open* 2025;13:e6638; doi: [10.1097/GOX.0000000000006638](https://doi.org/10.1097/GOX.0000000000006638); Published online 17 March 2025.)

INTRODUCTION

In the setting of congenital malformation or acquired deformity of the pinna, surgical reconstruction and hearing rehabilitation often are offered to improve aesthetics and function. Traditionally, these defects have been treated with complex reconstructions that require 2–4 separate procedures using autologous tissue, such as skin and costal cartilage grafts.¹ Designing an ear structure from rib cartilage was initially described by Tanzer in 1959 and is not without its complications. Even after modifications of the initial method, complication rates vary from 0% to 72.9% including morbidity at the donor site.² To

mitigate donor site complications, the use of porous polyethylene material as scaffolding was introduced in 1991.³

Using osseointegrated implants to retain an auricular prosthesis is an alternative method to autologous reconstruction. It was initially described as the “clinically asymptomatic rigid fixation of alloplastic materials” in the bone to eventually achieve functional loading.⁴ Derived from dental implantology, where they revolutionized tooth replacement, osseointegration techniques have been adapted to craniofacial reconstruction. The breakthrough in ear prostheses was made with the introduction of modern silicones and then evolved tremendously with advances in the movie industry.¹

To create a perfect prosthesis, adequate preoperative planning and education is needed. The anaplastologist initially utilizes laser surface scanning, image processing of computed tomography data, and rapid prototyping with 3-dimensional printing. The surgical placement of osseointegrated implants may require 1 or 2 surgical stages.⁵

The 2-stage process involves a sequential approach where the implant is initially placed in the mastoid, followed by a period of healing and osseointegration. After 3–6 months, the patient is taken back to the operating

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Received for publication August 8, 2024; accepted February 3, 2025.

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DOI: [10.1097/GOX.0000000000006638](https://doi.org/10.1097/GOX.0000000000006638)

Disclosure statements are at the end of this article, following the correspondence information.

room for debulking of the subcutaneous tissue and abutment placement. Conversely, in the 1-stage process, the implant and abutment are placed simultaneously during a single surgical procedure, reducing overall treatment time. Nonetheless, the 1-stage procedure still requires a period of 3–4 months postoperative for osseointegration before loading of the prosthesis.⁵

We describe, the “ear in a day” method, where implantation, abutment and prosthesis placement are done in the same procedure, in 1 day. This would deliver a functional prosthesis for the patient without the need for a revision surgery or a time of latency for osseointegration.

IDEA PRESENTATION

We report on a 49-year-old man, initially presenting with traumatic anotia following ear avulsion. He was taken to the operating room for a same-day osseointegration procedure. The surgery was performed similar to a 1-stage technique.

We note that the patient was presented all options for reconstruction including staged autologous cartilage, porous polyethylene reconstruction, external prosthetics, and osseointegrated prosthetics. The patient desired the appearance of a prosthetic and avoidance of multiple procedures but did not want to deal with adhesive.

The patient’s auricular defect site and postauricular region were anesthetized with lidocaine and epinephrine 1:100,000. The incision and site of implant placements were marked out using a pre-made implant guide. With the template in place, methylene blue was injected down to the bone at each of the implant sites, to serve as indicators for implant placement after soft-tissue dissection was complete. Flaps were elevated anteriorly to the bony ear canal, posteriorly to expose the mastoid, and inferiorly to the mastoid tip. Then, the implants were placed into the mastoid bone (Fig. 1). A pilot drill with a 4-mm spacer was used to make the first osteotomy at 2000 rpm. The 4-mm widening drill was then used in the cortical bone before inserting the implant. Four 4.5 × 4mm Southern MSC

Takeaways

Question: Can a functional auricular prosthesis be provided to patients with traumatic ear loss in a single surgery, avoiding multiple procedures and extended recovery times?

Findings: This case report describes a 49-year-old man with traumatic anotia who underwent the “ear in a day” procedure, involving simultaneous implantation, abutment, and prosthesis placement. The surgery was successful, with no wound complications, and achieved satisfactory aesthetics after prosthesis adjustment, demonstrating the feasibility of immediate loading.

Meaning: The ear in a day approach presents a promising single-stage solution for auricular reconstruction, enhancing patient satisfaction while reducing surgical interventions and recovery time.

implants IET4 were placed with no touch technique. The middle 2 were covered with cover screws, because they would be with a 2-stage technique, and torqued to 25 N cm. The most superior and inferior implant screws were secured at greater than 50 N cm. Therefore, only implants with greater than 50 N cm torque were relied upon to magnetize to the auricular prosthetic.

We then proceeded to debulk and thin the skin flaps to allow adequate exposure of the superior and inferior implants and placed two 8-mm magnetic abutments. Tacking sutures were placed with 4-0 PDS from the skin to the periosteum to secure the skin around the exposed implants. Finally, the auricular surgical prosthesis was attached using the 2 magnetic attachments.

The patient was discharged home with the prosthetic ear in place. It is important to note that our patient missed several postoperative appointments and presented later with the magnets skewed within the ear silicone prosthesis from their original position. The patient was followed up for up to a month; the wound healed well without wound



Fig. 1. Intraoperative pictures showing (A) osseointegrated screws into the cortical bone of the mastoid. B, The mold created by the prosthodontist, used intraoperatively.

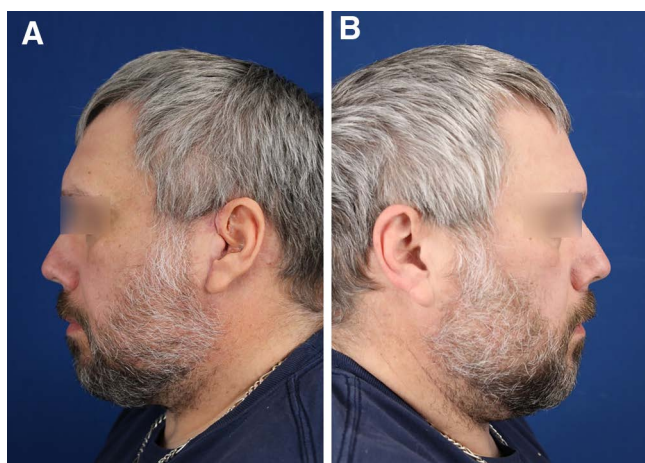


Fig. 2. Profile view of patient showing bilateral ears. A, Left ear, post-operative result after wound healing. B, Right, opposite, normal ear.

dehiscence or infection. There were no signs of implant extrusion or skin breakdown. At his postoperative appointment, the prosthesis magnets were readjusted to fit properly (Fig. 2). No modifications were made to the implants or the patient's wound.

DISCUSSION

Our initial working hypothesis derives from dental implants and suggests that osseointegration and implant loading might be able to be achieved more rapidly than otherwise observed. Studies in both sheep and human patients have shown that immediate loading of dental implants did not interfere with osseointegration but potentially induced osteoneogenesis.⁶ Further studies showed a positive correlation between primary implant stability and insertional torque. When compared with 1-stage procedures with delayed loading, randomized control trials did not find advantages to delayed loading even with prolonged follow-up. In fact, patients in the immediately loaded group were significantly more satisfied.⁷

This technique is very promising and ensures early patient satisfaction while saving the patient from another procedure under general anesthesia. Proper patient selection for this procedure is imperative. The patient needs to be properly worked up by both the otolaryngologist and anaplastologist. Good candidates for immediate loading include patients with a thick cortical mastoid bone and without a history of irradiation to the area. Additionally, patient-related factors that have been shown to impede healing include smoking, diabetes, vitamin D status, and dyslipidemia.⁸

Intraoperatively, studies generally do not recommend immediately loading the implants when the primary stability is lower than an insertion torque value of 10 N cm and a resonance frequency analysis value of 60.⁶ Placement should be done as conservatively as possible, with the least amount of drilling to maintain bone stability and promote osseointegration and irrigation utilized at the appropriate

moments of drilling.⁹ A review looking at the parameters affecting immediate loading of a dental implant can be extrapolated to auricular surgery. This found that the state of the bone, conditions of loading, surgical technique, and implant type directly affect the success of loading.¹⁰

Finally, the patient should adhere to every postoperative follow-up to allow the physicians to pinpoint any issues that might arise and remedy them. It is important to mention that the ear in a day requires a multidisciplinary approach for adequate selection, planning, execution, and monitoring.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

PATIENT CONSENT

The patient provided written consent for the use of his image.

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