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Prosthetic Rehabilitation of Bilateral Ear Defects in a Burn Patient Using Combined Mechanical and Chemical Retention: A Case Report

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Keywords

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Abstract

Background: Bilateral auricular loss in burn patients presents significant esthetic and psychological challenges. Prosthetic rehabilitation offers a non-surgical alternative for restoring form and confidence.

Case Report: A 29-year-old female with bilateral ear loss due to burn trauma was rehabilitated using customized silicone ear prostheses. Impressions were made using irreversible hydrocolloid (alginate) (Tropicalgin®, Zhermack, Italy), and casts were poured with Type III dental stone (Kalabhai Kalstone, India). Wax patterns were sculpted, flasked, and processed with medical-grade silicone (A-2186, Factor II Inc., USA) using intrinsic and extrinsic stains for color matching. Retention was achieved through a combination of mechanical (headband) and chemical (adhesive) methods.

Conclusion: The combination of mechanical and chemical retention offered a simple, non-invasive, and esthetic solution for bilateral ear rehabilitation in burn patients.

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Introduction

Burn injuries, particularly those resulting from traumatic events such as suicide attempts, are among the most physically and emotionally devastating injuries a person can endure. The aftermath of such injuries is often not only marked by intense physical pain but also by profound psychological, emotional, and social repercussions.[1] In burn patients, disfigurement and functional impairments can significantly alter their quality of life. When the burns result in the loss of highly visible structures such as the face and ears, the impact is often more significant. The face, as the primary medium of expression, and the ears, which are integral to both esthetic appearance and auditory function,

are essential for a person's identity.[1,2] The loss of these body parts due to burns can lead to diminished self-esteem, altered social interactions, and long-term psychological distress, further complicating the recovery process.

For patients who have suffered such traumatic burns, particularly those affecting the ear region, prosthetic rehabilitation plays an essential role in restoring both functionality and physical appearance.3 Prosthetic ear restoration is critical for burn victims who have lost one or both ears, as these structures are not only key to facial esthetics but also important for balance, hearing, and overall social interaction. However, reconstructing such delicate and complex body parts using prostheses presents several challenges.[4,6] Prosthetic ear devices must accurately replicate the natural shape, texture, and color of the ear while ensuring a secure fit.4 The difficulty is compounded when both ears are lost, as prosthetic rehabilitation requires meticulous attention to anatomical symmetry, retention, and the creation of a functional, lifelike replacement.[5,6]

The fabrication of auricular prostheses is an individualized process that requires careful planning, precision, and customization. The materials used in ear prosthetics must be flexible, durable, and biocompatible to ensure the prosthesis is comfortable and long-lasting for the patient. Silicone is widely recognized as the material of choice for auricular prostheses due to its excellent ability to mimic the natural texture, flexibility, and translucency of human skin. Additionally, silicone is biocompatible, meaning it is safe for long-term use against the skin without causing adverse reactions, which is especially crucial for burn patients who may have sensitive or scarred skin. Silicone's color-matching capabilities also make it ideal for replicating skin tones that may be irregular due to burn scars or healing tissues. For burn patients, this ability to match the skin's texture and color is essential in restoring the patient's esthetic appearance and reducing the psychological impact of disfigurement.[4,6]

Beyond material selection, another significant challenge in ear prosthetics is the retention of the prosthesis. In traditional methods, ear prostheses are retained using adhesives, magnets, or surgically implanted anchors. Adhesive retention, though widely used, has limitations, especially for burn patients with sensitive skin or scar tissue.[7] The adhesives may irritate the skin, causing discomfort and reducing their effectiveness over time. Magnet-based retention relies on surgically placed implants, which, while effective, require additional invasive procedures, posing risks for patients who may already have compromised skin integrity from burns. For cases where conventional methods of retention are unsuitable or inadequate, more innovative solutions are required.[7,8]

This case report discusses the prosthetic rehabilitation of a 29-year-old female patient who suffered bilateral ear loss due to traumatic burns resulting from a suicide attempt. The approach involved using both mechanical and chemical retention methods to create an accurate, stable, and functional ear prosthesis.

Case Report

A 29-year-old female patient presented with bilateral ear defects due to traumatic burns sustained in an attempted suicide. The burns resulted in the complete loss of both ears, leaving only small portions of soft tissue remaining bilaterally. Given the patient's young age and the emotional and psychological impact of the injury, a prosthetic rehabilitation plan was developed to restore esthetics and function.

1. Preliminary assessment and planning: On initial evaluation the defect topography and residual soft-tissue undercuts on both auricular sites were carefully inspected to determine possible anatomic retention and to plan the prosthetic approach; symmetry reference points were identified and recorded to guide subsequent sculpting and positioning.

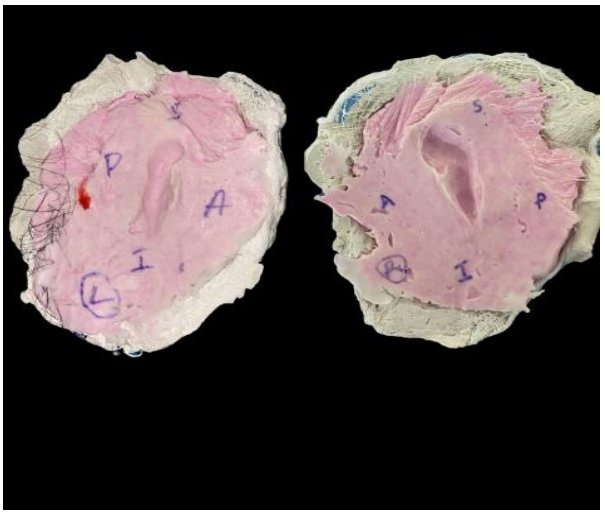

Figure 1: Impression of the ear defect sites using alginate impression, stabilized with Plaster of Paris to capture intricate details and ensure accurate orientation for the trial model.

2. Impression making and support: The auricular areas were coated with a thin layer of petroleum jelly and an irreversible hydrocolloid impression (Tropicalgin®, Zhermack, Italy) was taken gently over the scarred tissues to avoid pressure; the hydrocolloid impression was immediately backed and reinforced with Plaster of Paris (Kaldent®, India) to stabilize the record — alginate was selected over silicone because of its better adaptability and lower displacement forces on fragile, post-burn tissues.
3. Cast fabrication and orientation: The impressions were poured in Type III dental stone (Kalabhai Kalstone, India) to obtain accurate defect casts; once set, the casts were trimmed and key anatomical landmarks and midline/symmetry markings were made to ensure correct orientation and bilateral correspondence during wax trialing.
4. Wax pattern base and sculpting: A thin acrylic base plate was fabricated using clear heat-cured acrylic resin (DPI Heat Cure, India) to provide a stable foundation; modelling wax (Y-Dents®, India) was then sculpted on this base to recreate auricular contours guided by anthropometric proportions and the contralateral landmarks, producing a lifelike wax trial that respected the limited remaining tissue. (Figure 2)

Figure 2: Fabrication of the ear wax pattern on a thin acrylic plate, shaped to replicate the anatomical form of the ear, with chemical adhesives used for retention.(2A) Wax trial done on the patient. (2B) Final recontouring done. The wax pattern is then invested in a conventional flask using the two-pour technique to create the mold. (2C)

5. Retention strategy and rationale: Retention was planned as a combined approach — mechanical retention via a custom headband and supplementary chemical retention using a silicone adhesive (Pros-Aide®, ADM Tronics, USA); the clay sculpting/impression method was avoided because the patient's scarred, irregular surface and fragile tissue would risk distortion or trauma during clay manipulation.
6. Flasking, dewaxing and mold preparation: The confirmed wax patterns were invested using a two-pour flasking technique to maximize dimensional accuracy and prevent displacement; after conventional dewaxing in boiling water, the prepared mold was inspected and retention features (orientation keys, holes) were verified before silicone packing. (Figure 3)

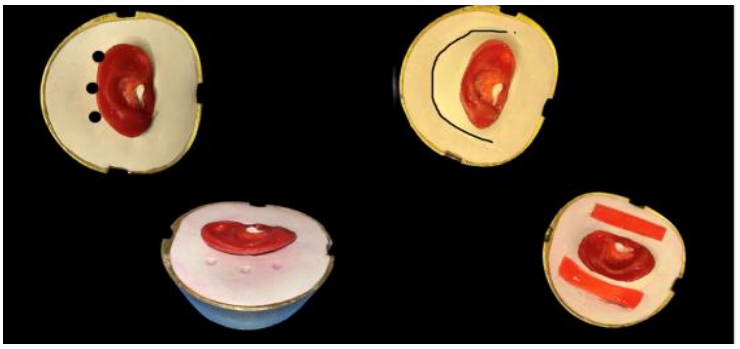

Figure 3: Retention holes placed in the flask to secure the wax pattern, with additional wax sheets used to prevent displacement. The flask is then heated for dewaxing, preparing the mold for silicone injection.

7. Silicone packing and curing: Medical-grade RTV silicone (A-2186, Factor II Inc., USA) was intrinsically stained using FI-Pigments (Factor II Inc., USA) to approximate the patient's skin tone, then packed into the mold and allowed to cure at room temperature for 24 hours to obtain a durable, flexible prosthetic form.
8. Finishing, extrinsic characterization and delivery: After deflasking the cured silicone, the prostheses were trimmed and refined with soft acrylic burs, (Figure 4) then extrinsically color-matched using the Cosmesil® kit (Technovent, UK) for fine surface shading; final prostheses were positioned and evaluated on the patient using the headband for mechanical support and Pros-Aide® adhesive for additional chemical retention, with adjustments made for comfort, fit, and color harmony prior to patient education and delivery. (Figure 5)

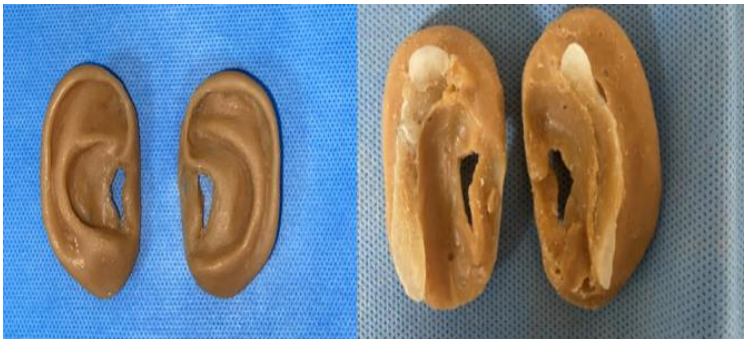

Figure 4: The ear prosthesis deflasked after curing, followed by careful trimming and finishing using soft acrylic burs to refine the shape and detail.

Figure 5: The final ear prosthesis delivered to the patient after trial fitting, ensuring proper fit and aesthetic alignment.

Discussion

Conventional techniques in ear prosthetics primarily rely on adhesive retention or implant-supported retention methods. Adhesive retention, while effective, can be less reliable in patients with sensitive or damaged skin, as seen in burn patients. Implant-supported methods, such as osseointegrated implants, offer strong retention but require invasive procedures, which may not be feasible for burn patients with compromised tissue. The combined use of mechanical and chemical retention in this case provided an effective alternative, offering stability without the need for surgical intervention.[6,8]

The methodology followed in this case ensured that the prosthesis was both functional and esthetically accurate. The clay method, though accurate for contour reproduction, was avoided due to the patient's fragile scar tissue and potential for distortion during handling. Alginate provided a more comfortable, pressure-free alternative.The careful impression-taking process, precise wax pattern fabrication, and strategic use of retention techniques ensured that the prosthesis would fit securely and naturally. 9 The two-pour flasking technique was essential in preventing displacement during processing, while intrinsic and extrinsic staining allowed for lifelike color matching. These steps were carefully executed to meet the patient's specific needs, ensuring a high-quality final product.[10]

Retention in maxillofacial prosthetics can be classified into four main types: anatomic, mechanical, chemical, and implant-retained. Anatomic retention utilizes soft tissue undercuts to aid in prosthesis stability, though its application is limited in cases such as post-burn defects where tissue pliability is compromised. Mechanical retention involves external aids like spectacles, head caps, or headbands that provide support and positioning for the prosthesis. Chemical retention depends on the use of adhesives, such as silicone- or acrylic-based glues, which adhere the prosthesis to the skin surface. Implant-retained prostheses employ magnets, bars, or clips attached to osseointegrated implants, offering superior stability and comfort. In the present case report,the combination of mechanical and chemical retention in the fabrication of ear prostheses represents an innovative approach to addressing the complex challenges posed by bilateral ear defects in burn patients. Mechanical retention, achieved using a headband, provided a stable base for the prosthesis, while chemical adhesives ensured the precise positioning of the wax pattern and final silicone prosthesis. This dual retention approach minimized the risks of prosthesis displacement, which is particularly important for patients with minimal remaining tissue for attachment.[7,10]

The advantages of various retention methods in maxillofacial prosthetics include their non-surgical and cost-effective nature, providing patients with an immediate esthetic improvement without the need for invasive procedures. These prostheses are also easily retrievable and simple to maintain, allowing for convenient daily use. Additionally, combining different modes of retention—such as mechanical and adhesive techniques—can significantly enhance overall stability, retention, and patient comfort. However, there are certain limitations to consider.[8,9] Adhesives may lose their bond strength due to perspiration or oily skin, reducing the duration of effective wear. Mechanical aids like headbands can interfere with hairstyles or restrict the use of eyewear, posing cosmetic and functional challenges. Moreover, the silicone materials used in these prostheses are prone to gradual degradation, necessitating periodic replacement every few years to maintain optimal esthetics and function.[10] Overall, combining mechanical and chemical retention offered an optimal balance of comfort, esthetics, and functionality without surgical intervention.

Conclusion

The combined use of mechanical and chemical retention in the rehabilitation of bilateral ear defects in burn patients offers a promising solution for prosthetic rehabilitation. This case demonstrates how innovative retention techniques can improve the fit, stability, and esthetics of ear prostheses, providing burn patients with a non-invasive alternative to surgical reconstruction. The methodology described ensures a high level of accuracy and functionality, restoring not only the physical appearance but also the psychological well-being of the patient. The case highlights the importance of personalized prosthetic care, tailored to the unique needs of each patient.

References

1. Jeschke MG, van Baar ME, Choudhry MA, et al. Burn injury. Nat Rev Dis Primers. 2020;6(1):11.
2. Chokshi SN, Powell CM, Gavrilova Y, et al. A narrative review of the history of burn-related depression and stress reactions. Medicina (Kaunas). 2022;58(10):1395. doi:10.3390 /medicina58101395.
3. Nguyen CM, Chandler R, Ratanshi I, Logsetty S. Burn management. In: Handbook of Burns. Vol 1. Cham: Springer; 2020:529-547.
4. Guttal SS, Shanbhag S, Kulkarni SS, Thakur SL. Rehabilitation of a missing ear with an implant-retained auricular prosthesis. J Indian Prosthodont Soc. 2015;15(1):70-75.
5. Chinnasamy A, Gopinath V, Jain AR. Ear prosthesis for postburn deformity. Case Rep Otolaryngol. 2018;2018:2689098.
6. Jovic T, Stewart K, Kon M, Whitaker I. Auricular reconstruction: A sociocultural, surgical and scientific perspective. J Plast Reconstr Aesthet Surg. 2020;73(9):e1-e10.
7. Gupta D, Thakkur R, Shah B. Implant-retained auricular prosthesis: Bringing back hope and smile. Natl J Maxillofac Surg. 2023;14(1):152-156.
8. Chung RWC, Siu A, Chu F, Chow TW. Magnet-retained auricular prosthesis with implant-supported composite bar: A clinical report. J Prosthet Dent. 2003;89(5):446-449.
9. Anulekha CK, Sravya DNS, Haripriya A, et al. Finger prosthesis: Uplifting life, one finger at a time. IP Ann Prosthodont Restor Dent. 2024;10:245-249.
10. Jazayeri HE, Kang S, Masri RM, et al. Advancements in craniofacial prosthesis fabrication: A narrative review. J Adv Prosthodont. 2018;10(6):430-439.