

CASE STUDY

A Custom-made nasal prosthesis rehabilitation post total rhinectomy

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ABSTRACT

Sinonasal carcinoma (SNC) is a rare but aggressive malignancy often diagnosed at an advanced stage. Total rhinectomy, though potentially life-saving, results in significant functional and psychosocial impairments. This case highlights the use of a custom-made room temperature vulcanizing (RTV) silicone nasal prosthesis as a non-invasive rehabilitation option post-rhinectomy. A 50-year-old male presented with persistent nasal discharge and epistaxis. Imaging and biopsy confirmed high-grade non-intestinal type sinonasal adenocarcinoma, staged as T4aN0M0 (Stage IVA). The patient underwent total rhinectomy followed by radiotherapy. After sufficient healing, maxillofacial prosthetic rehabilitation was initiated. The nasal prosthesis was fabricated using RTV silicone and retained with eyeglasses. At one-month follow-up, the patient reported excellent prosthetic function, aesthetic satisfaction, and improved self-esteem, with no complications. This case demonstrates that custom-made nasal prostheses using RTV silicone can effectively restore aesthetics and function following total rhinectomy. It further underscores the importance of a multidisciplinary approach and individualized treatment planning in optimizing patient outcomes.

Keywords: maxillofacial prosthesis; nasal prosthesis; RTV silicone; sinonasal carcinoma; total rhinectomy

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INTRODUCTION

Sinonasal carcinoma (SNC) is a rare but aggressive malignancy, accounting for less than 1% of all cancers and around 3% of head and neck tumors. The most common histological types are squamous cell carcinoma and adenocarcinoma, particularly intestinal-type adenocarcinoma (ITAC), often linked to occupational exposure such as wood dust.¹

More than half of SNC cases are diagnosed at advanced stages (IVA or IVB), which is associated with poor prognosis despite aggressive treatment.² Total rhinectomy is often required for locally advanced tumors, especially T4a lesions, where complete nasal resection is necessary to achieve clear margins and minimize recurrence risk. Although potentially life-saving, this radical procedure results in the loss of nasal structures critical for respiration, olfaction, humidification,

and facial aesthetics, significantly affecting quality of life.³

Patients post-rhinectomy often face substantial psychosocial and functional burdens. Long-term quality of life has been shown to decline by over 30%, particularly in domains such as appearance, anxiety, and social interaction.⁴ Additionally, facial disfigurement and stigma contribute to psychological distress, with up to 70% of patients reporting body image issues or social withdrawal.⁵

Nasal prostheses provide a non-invasive option to restore facial symmetry, improve airflow, and enhance self-image. Custom-made prostheses, in particular, have shown marked improvements in patient satisfaction and psychosocial outcomes, often within months of use. RTV silicone, as the chosen material in this case, offers superior ease of manipulation, cost-effectiveness, and

realistic esthetic outcomes compared to other biomaterials, making it particularly suitable for cases requiring frequent adjustments or when surgical reconstruction is contraindicated. Given the patient's post-radiotherapy tissue condition, RTV was ideal for providing a flexible, reversible, and well-adapted prosthetic solution.⁶ This case report describes the comprehensive rehabilitation of a post-total rhinectomy patient using a custom-made room temperature vulcanizing (RTV) silicone nasal prosthesis.

METHODS

A 50-year-old man first presented at RSUD Dr. Sardjito approximately nine months prior to this report, with symptoms of persistent nasal discharge and episodes of epistaxis. Upon clinical examination, a mass was identified in the sinonasal region, raising concerns for a malignant process. Further investigation, including imaging and biopsy, confirmed the presence of a high-grade non-intestinal type sinonasal adenocarcinoma. Based on the clinical and pathological findings, the disease was staged as T4aN0M0, which corresponds to Stage IVA of sinonasal carcinoma (Figure 1).

Approximately eight months before this report, the ENT surgical team performed a total rhinectomy. The postoperative period was marked by moderate swelling and occasional bleeding from the surgical site, consistent with the expected healing process following surgery (Figure 2).

By five months post-surgery, the patient had completed a full course of radiotherapy. Clinical examination at this point revealed a notable improvement in wound healing, indicating readiness for maxillofacial prosthetic rehabilitation (Figure 3).

Maxillofacial prosthetic rehabilitation procedures commenced three months prior to this report. This phase began with a detailed evaluation of the surgical site, followed by color matching to ensure the prosthesis would blend naturally with the surrounding skin. For the impression procedure, a light-body addition silicone elastomer (Virtual® Light Body, Ivoclar Vivadent, Liechtenstein) was used due to its high precision and patient comfort. The impression was then poured using Type IV dental stone (Fujirock® EP, GC Corporation, Japan) to create a master cast. A wax pattern of the nasal prosthesis was sculpted using modeling wax (Pro-Mod® Modeling Wax, Yeti Dental, Germany), which was carefully contoured and refined to harmonize with the patient's facial anatomy and skin tone (Figure 4).

The finalized custom-made nasal prosthesis was fabricated and inserted two months prior to this report, using room temperature vulcanizing (RTV) silicone (MDX4-4210, Dow Corning, USA). The prosthesis was successfully inserted, with retention facilitated by eyeglasses, providing both support and discreet integration (Figure 5).

At a follow-up visit one month after prosthesis placement, the patient demonstrated excellent outcomes in terms of prosthetic retention, functional



Figure 1. A 50-year-old man with a mass of a high-grade non-intestinal type sinonasal adenocarcinoma



Figure 2. Nasal defect after total partial rhinectomy high-grade non-intestinal type sinonasal adenocarcinoma



Figure 3. Significant improvement of nasal defect after radiotherapy

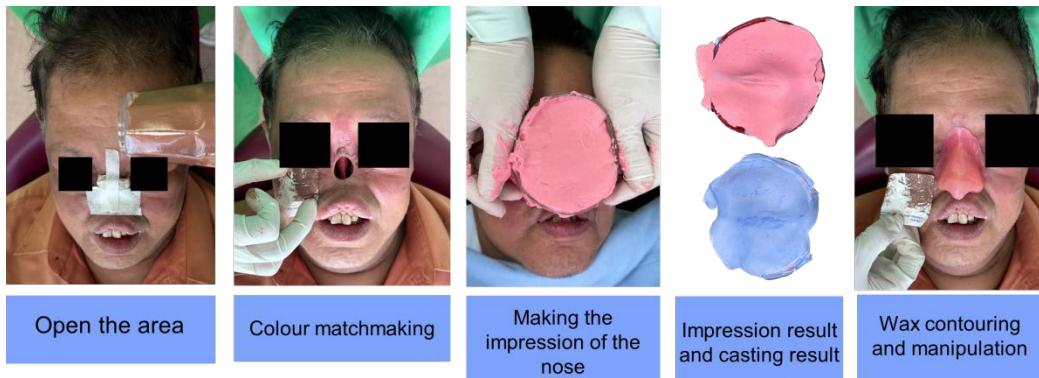


Figure 4. A custom nasal prosthesis was fabricated through impression making, color matching, and wax contouring following total rhinectomy

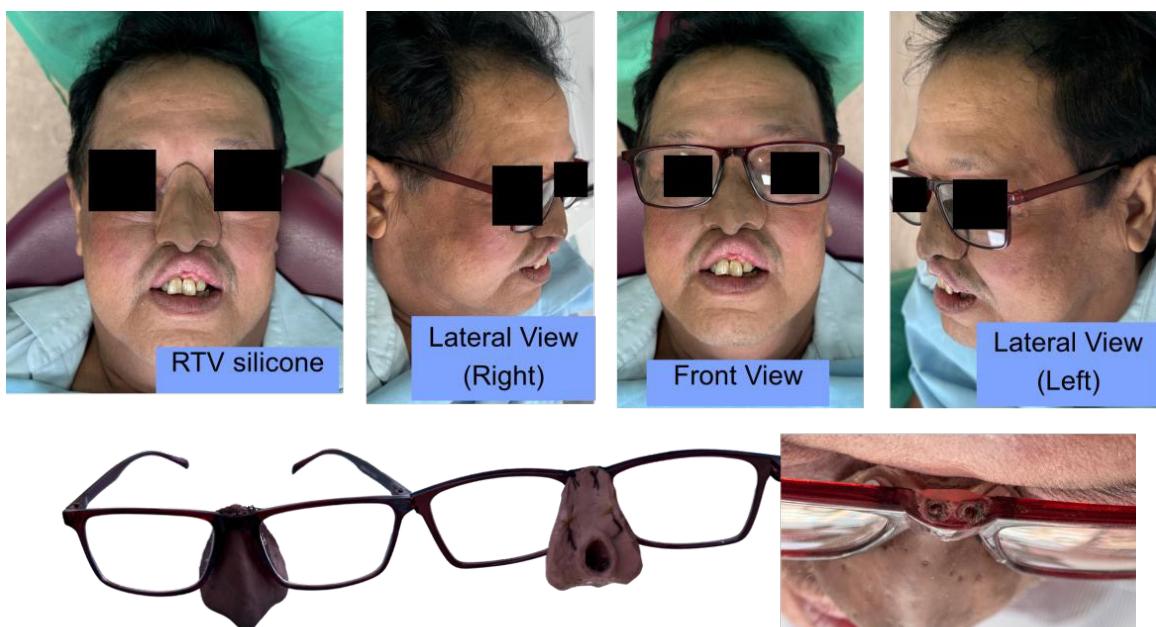


Figure 5. The nasal prosthesis made from RTV silicone was inserted and retained mechanically using eyeglasses

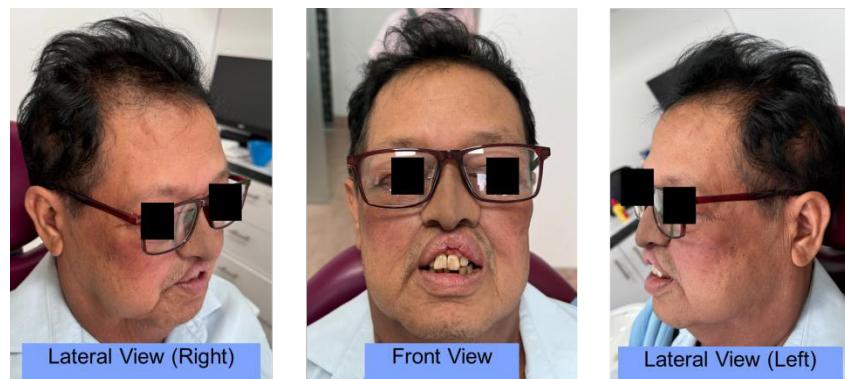


Figure 6. One month post-insertion, the nasal prosthesis showed good function, aesthetics, and stable retention

performance, and cosmetic appearance. No complications were noted, and the patient expressed satisfaction with the rehabilitation results (Figure 6).

DISCUSSION

Rehabilitation after total rhinectomy is essential to restore both functional and psychosocial well-being, as the procedure significantly impacts facial aesthetics and respiratory function. Custom-made maxillofacial prostheses have shown substantial benefits in improving quality of life, including better social interaction, body image, and mood.⁷ Full nasal epitheses have also demonstrated high patient satisfaction and minimal long-term complications, making prosthetic rehabilitation a reliable alternative to surgical reconstruction.⁸

This case report presents the comprehensive rehabilitation of a 50-year-old man post-total rhinectomy due to advanced sinonasal carcinoma, using a custom RTV silicone nasal prosthesis to restore form and function. A comparable case by Vincent et al involved a 64-year-old woman with a partial rhinectomy due to basal cell carcinoma, rehabilitated with a polymethyl methacrylate (PMMA) prosthesis retained via eyewear. The prosthesis was tailored to match the skin tone and facial contour, improving both aesthetics and comfort. Integration with glasses provided retention and improved psychosocial outcomes by restoring facial symmetry and confidence, reinforcing the value of customized prostheses, an outcome mirrored in our case.⁹

Prosthetic rehabilitation was preferred over surgical reconstruction due to its predictable aesthetics, fewer complications, and faster recovery. Unlike surgery, which often involves multiple stages, donor site morbidity, and prolonged hospitalization, prostheses offer immediate cosmetic restoration without surgical risks. Faris et al reported a 2:1 patient preference for prosthetic rehabilitation, citing superior function and easier maintenance.⁵ Moreover, prostheses can be customized and reversed, an advantage for patients undergoing radiotherapy or with conditions contraindicating surgery.² In oncologic contexts, prostheses allow facial restoration while preserving surveillance access, which flap-based reconstructions cannot easily provide.⁴

Current recommendations suggest that prosthetic intervention should begin once surgical and radiotherapy-induced tissue healing has sufficiently stabilized, generally at least 6 weeks post-rhinectomy or radiotherapy.¹⁰ Early initiation, around the second month after surgery allows soft tissue edema to subside and mucosal integrity to recover, thereby improving accuracy and comfort during the impression phase. For example, Teichgraeber and Goepfert noted that radiotherapy typically commences within six weeks post-resection, making this a safe window for prosthetic work without compromising oncological care.¹¹

In this patient, the custom-made prosthesis was ideal given his post-surgical and post-

radiotherapy condition. Patients in such cases often have compromised tissue integrity, making them unsuitable for complex reconstruction. RTV silicone prostheses adapt well to facial contours and allow precise color matching, enhancing both appearance and psychological recovery. Shaxrizoda et al. (2025) emphasized prosthetic rehabilitation as a less invasive, reversible, and adaptable option when anatomical or medical factors preclude surgery.¹²

Material selection is another key consideration. RTV silicone, commonly used for its affordability and ease of handling, is ideal for both interim and long-term use despite lower mechanical strength compared to HTV silicone.¹³ HTV silicone provides better tensile strength and thermal stability but may reduce esthetic quality and flexibility during fabrication.¹⁴ A comparative analysis of VST50F RTV and Cosmesil M511 HTV found a 1.17-fold difference in durability, highlighting the trade-offs between ease of fabrication and long-term performance.¹⁵

Retention method significantly affects prosthetic success. Eyewear-based retention offers a simple, non-invasive, and cost-effective solution especially suitable for elderly or medically compromised patients, though stability may be affected during facial movement.¹⁶ In contrast, implant-retained prostheses provide superior stability and alignment, especially with magnetic attachments, but require surgery and are prone to corrosion.¹⁷ A 2024 clinical comparison found that while magnetic systems offered better function, spectacle-supported prostheses remained valuable, particularly in the interim stage.¹⁸

Overall, custom nasal prostheses significantly improve outcomes in breathing, speech, and psychosocial health. Although internal airflow is not fully restored, the prosthesis facilitates partial redirection of airflow and resonance for speech. A 2023 case series showed over 70% of patients reported improved vocal clarity and reduced social withdrawal post-rehabilitation. Psychologically, prosthetic use reduced depressive symptoms by 60% within three months.¹⁹ Additionally, 83% of patients reported high satisfaction with breathing

and communication functions after prosthesis placement.²⁰

The timeline in this case, starting impressions around 4–6 months post-radiotherapy and inserting the definitive prosthesis at six months is well aligned with recent studies. A 2021 series using 3D-printed interim prostheses reported initiating impression work approximately 4 months post-surgery, with strong patient satisfaction in aesthetics and function. Similarly, Morriston's implant-retained prosthetic protocol describes final prosthesis fabrication at 6 weeks post-radiotherapy, which broadly corresponds to a 2-to-6 month range when adjunct treatments are considered.²¹

This case highlights a comprehensive and well-coordinated rehabilitation process involving a multidisciplinary team comprising otolaryngology surgeons, oncologists, and rehabilitation specialists. The use of a custom-made nasal prosthesis fabricated from RTV silicone, tailored to match the patient's facial contour and skin tone, provided both aesthetic and functional restoration. The patient achieved satisfactory outcomes in terms of function, appearance, and psychosocial adjustment within a relatively short period.

Despite the favorable outcomes, several limitations were noted. The prosthesis retention relied on an external mechanism (eyeglasses) rather than an implant-retained system, potentially affecting long-term stability and patient convenience. Additionally, psychosocial and quality-of-life assessments were not conducted using standardized quantitative instruments such as Quality of Life (QOL) scales. The follow-up period was limited to one month, which does not adequately reflect the long-term effectiveness and durability of the rehabilitation approach.

CONCLUSION

This case demonstrates that rehabilitation using a custom-made nasal prosthesis fabricated from RTV silicone can serve as an effective solution for patients following total rhinectomy, particularly in terms of aesthetic and functional outcomes,

thereby contributing to an overall improvement in the patient's quality of life. Successful rehabilitation requires a multidisciplinary collaboration and an individualized approach.

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CONFLICT OF INTEREST

The authors declare no conflict of interest related to this case report.

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