

Single-Visit Digital Obturator Rehabilitation Following Hemimaxillectomy: A Clinical Case Report

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Abstract

Maxillary defects following hemimaxillectomy for oral cancer cause major functional and psychosocial disability because speech, swallowing, mastication, facial support, and oral competence may all be compromised. Obturator prostheses remain a valuable rehabilitation option, especially when rapid restoration, reversibility, reduced surgical burden, and postoperative surveillance of the defect are important. Digital workflows have expanded the possibilities for obturator fabrication by allowing dataset merging, CAD design, additive or subtractive manufacturing, and staged verification of fit and occlusion. However, fully verified same-day workflows are still described less often than partially digital protocols.

This case report describes the single-visit prosthetic rehabilitation of a 78-year-old man after right hemimaxillectomy for oral squamous cell carcinoma. The defect corresponded clinically to Brown class 2a and Aramany class I. A same-day digital workflow was used in which a primary intraoral scan and a conventional impression were merged in CAD software, a pink CAD-CAM polymer base was designed and manufactured, base fit was verified intraorally, wax trial teeth were milled and adjusted for esthetics and occlusion, and the verified setup was rescanned to mill definitive acrylic teeth that were bonded to the base. A soft tissue liner was selectively applied on the defect-bearing surface to protect irradiated and scarred tissues.

The prosthesis was delivered on the same day, with immediate improvement in oral-nasal separation, swallowing, speech intelligibility, and comfort. At 1 week and 6 months, retention remained acceptable, hygiene was manageable, and no significant mucosal ulceration was observed. This report highlights that a single-visit digital obturator workflow can combine the clinical advantages of removable prosthetic rehabilitation with staged intraoral verification and contemporary CAD-CAM manufacturing.

Keywords: Hemimaxillectomy, Obturator, Oral Cancer, Digital Prosthodontics, Cad-Cam, Maxillofacial Prosthesis, 3d Printing

INTRODUCTION

Acquired maxillary defects most commonly follow oncologic resection and can result in oral-nasal or oral-antral communication, hypernasal speech, nasal regurgitation, impaired mastication, reduced facial support, and deterioration in quality of life [8,9,11,22]. Obturator prostheses continue to play a central role in rehabilitation after maxillectomy, particularly when the surgeon and prosthodontist wish to restore function rapidly, preserve access for inspection of the surgical site, avoid additional donor-site morbidity, or offer a reversible treatment option [11,12,22]. Current systematic reviews indicate that obturators remain a valid alternative to flap

reconstruction in selected patients, and that no single reconstructive pathway is uniformly superior for every defect pattern or every patient-centered outcome [11,12].

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The classical prosthodontic principles governing obturator rehabilitation remain highly relevant despite the emergence of digital methods. Aramany's classification and design principles remain foundational for partially edentulous maxillectomy patients, while Brown and Okay classifications help communicate the extent of the defect and guide rehabilitation planning [1-4]. Functional success depends on the size and configuration of the defect, the quantity and distribution of remaining dentition, and the ability to achieve retention, stability, and patient comfort [1-4,7,8]. Immediate or early obturation has also been advocated because it restores partitioning between the oral and nasal cavities, supports healing tissues, and may facilitate swallowing, speech, and psychological recovery [5,6,10].

Digital maxillofacial prosthodontics has introduced intraoral scanning, three-dimensional image processing, dataset merging, CAD design, rapid prototyping, and CAD-CAM manufacturing into obturator fabrication [13-16,19-21]. Even so, recent reviews suggest that in many published reports digitalization is limited to one or two stages of the workflow, whereas fully integrated end-to-end or near-chairside workflows remain less common [19,20]. For elderly oncology patients, especially those who are post-radiotherapy, medically fatigued, geographically distant,

or unable to attend multiple appointments, a single-visit but carefully verified protocol may therefore be clinically valuable. The present report describes such a workflow for same-day rehabilitation after hemimaxillectomy.

CASE PRESENTATION

A 78-year-old man presented for prosthetic rehabilitation after right hemimaxillectomy performed for oral squamous cell carcinoma involving the maxillary alveolus, palate, and maxillary sinus with oral extension. He had completed surgery and postoperative radiotherapy before presentation. His principal complaints were hypernasal speech, leakage of liquids into the nasal cavity, impaired mastication, discomfort during function, and dissatisfaction with facial appearance.

Clinical examination revealed a right hemimaxillary defect with oro-nasal communication corresponding to Brown class 2a and Aramany class I [1,3]. The remaining dentition included teeth #21 to #27 and #31 to #37, which were judged adequate for support and retention planning. The tissues bordering the defect were scarred, irradiated, and tender. Because the patient strongly preferred rapid rehabilitation with the fewest possible visits, a same-day digitally assisted obturator was planned.



Figure 1. Pre-rehabilitation extraoral and intraoral views.

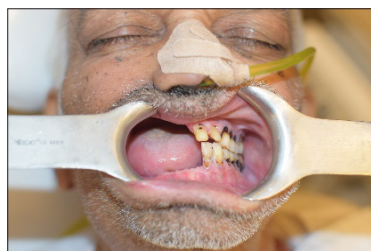


Figure 2. Remaining dentition and maxillary defect.

TECHNIQUE

A primary intraoral scan was obtained for the maxillary arch, residual dentition, opposing arch, and interarch relationship. Because optical scanning alone may not reliably capture deep undercuts, irregular tissue contours, or moist reflective surfaces within a maxillectomy defect, a conventional impression was also made. The scan data and the impression-derived model data were then merged

in CAD software to combine the advantages of digital surface capture with the tissue detail achievable through a conventional impression [13,15,16,19,20].

A definitive obturator base was designed on the merged dataset. The design aimed to maximize extension over the residual palate and into the defect without traumatizing vulnerable tissue. The base was then manufactured from a pink CAD-CAM polymer using the same-day

digital workflow. Intraorally, the base was tried first and evaluated for insertion path, extension, tissue adaptation, pressure areas, and primary retention. This separate base-verification stage was considered critical because an unstable base can make subsequent occlusal adjustment unreliable.

Once base fit was confirmed, the prosthetic teeth were milled in wax and tried separately on the verified base. Esthetics, lip support, midfacial fullness, phonetics, vertical dimension, centric contacts, and excursive interferences were assessed clinically. The wax stage permitted rapid modification of tooth position and occlusion while preserving reversibility. After clinical approval of the trial arrangement, the verified setup was rescanned, and the definitive teeth were milled in acrylic. These definitive teeth were then bonded to the previously verified base.

Mechanical retention was obtained through clasping of the remaining dentition in accordance with established maxillectomy prosthesis design principles [1,2,4]. A final insertion appointment was completed on the same day, and occlusion was refined clinically. Because the defect-contacting tissues were irradiated, scarred, and sensitive, a soft tissue liner was selectively applied to the intaglio surface contacting the defect. This was done to cushion delicate tissues, compensate for minor discrepancies, reduce localized pressure concentration, and improve immediate comfort [18].

The total clinical-laboratory workflow required approximately 6 to 8 hours. At delivery, the patient showed immediate improvement in separation of the oral and nasal cavities, swallowing of liquids, speech intelligibility, and overall comfort. Facial support and esthetics were acceptable to both the patient and the treating team.

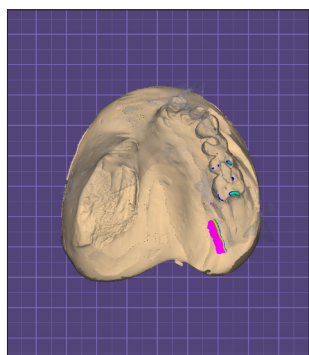


Figure 3. Merged digital dataset used for design.

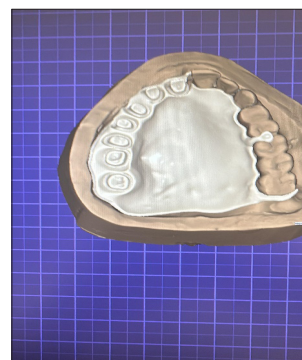


Figure 4. CAD design of the obturator base.

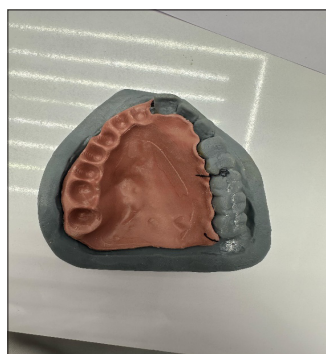


Figure 5. Manufactured obturator base.



Figure 6. Trial dentition and definitive obturator after assembly.



Figure 7. Definitive obturator in situ.

OUTCOME AND FOLLOW-UP

The patient was reviewed after 1 week, when minor adjustment of pressure spots and selective occlusal refinement were performed. He reported improvement in speech clarity, reduction in nasal leakage during drinking, and better confidence during social interaction. At 6 months, speech and swallowing remained improved, mucosal tolerance was acceptable, no significant ulceration was present, retention remained clinically serviceable, hygiene was manageable, and esthetics were maintained.

DISCUSSION

Rehabilitation after hemimaxillectomy is inherently multidisciplinary because speech, swallowing, mastication, esthetics, oral competence, and psychological adaptation are all affected by the defect and by the method of reconstruction. Obturators remain clinically relevant because they restore oral-nasal separation, permit direct surveillance of the surgical site, avoid the morbidity of additional reconstructive surgery, and can often be fabricated comparatively quickly [8,11,12,22]. This is particularly important in elderly patients, medically compromised patients, and those who prioritize functional recovery with minimal additional intervention.

At the same time, conventional obturator fabrication may require multiple appointments for impressions, jaw relation records, framework try-in, tooth try-in, insertion, and subsequent adjustments. These steps can be difficult in patients with trismus, scarred tissues, post-radiotherapy mucosal sensitivity, transportation limitations, or treatment fatigue. Digital workflows aim to address some of these burdens by separating data acquisition, design, and manufacturing into a more controlled and reproducible sequence [13-16,19-21]. The recent systematic reviews by Paul et al and Srivastava et al suggest that digital obturator fabrication is expanding, but that the literature still contains relatively few reports of fully integrated workflows with comprehensive chairside verification [19,20].

The principal strength of the present technique lies in staged verification within a compressed treatment timeline. The workflow did not simply accelerate fabrication; rather, it preserved prosthodontic checkpoints while reducing the number of patient visits. Base verification was performed independently before tooth verification. This matters because stable obturator function is strongly linked to retention and support, and because occlusal refinement becomes unreliable if the base itself is unstable [1,2,7,8]. By confirming tissue adaptation first, then verifying the wax tooth arrangement, and only then manufacturing

the definitive acrylic dentition, the workflow preserved the logic of conventional prosthodontic validation while taking advantage of digital reproducibility.

A second advantage is the flexibility of digital manufacturing. Published reports have described 3D-printed definitive obturators, digitally designed hollow surgical obturators, and fully digital workflows for maxillectomy defects [13-16]. Newer work has also explored PEEK and PEKK in obturator rehabilitation, particularly when rigidity, polishability, weight reduction, or esthetics are important [17,21]. In practical terms, a digital workflow allows the clinician to archive the design, reproduce the prosthesis, or modify the arrangement later without starting from the beginning. This can be valuable when follow-up adjustments, relining, repair, or remake are anticipated.

The selective use of a soft liner was another important element in this case. Post-maxillectomy tissues are frequently irregular, compressible, tender, or irradiated, and a completely rigid intaglio surface may transmit uneven loads to fragile tissue. Yanamoto et al reported improved masticatory performance and oral health-related quality of life when a silicone soft reliner was used in obturator patients after maxillectomy [18]. In the present patient, the soft liner was not intended to compensate for poor base design; rather, it functioned as a protective interface between a verified digital base and biologically compromised tissues.

This report should be interpreted within the limitations of a single case. It does not establish superiority over conventional obturators, hollow-bulb designs, flap reconstruction, or implant-retained rehabilitation. The follow-up period is limited, and outcomes were assessed clinically rather than with formal speech analysis, validated obturator functioning scales, or standardized quality-of-life instruments. Nevertheless, the case demonstrates that a same-day digital protocol can be executed without abandoning stepwise verification. In carefully selected patients, such a protocol may serve either as a longer-term obturator or as a high-quality interim prosthesis pending later modification.

CONCLUSION

A single-visit digitally assisted obturator can be fabricated and delivered after hemimaxillectomy for oral cancer by combining a primary intraoral scan with a conventional impression, CAD-based base design, staged verification of base fit and trial dentition, definitive milling of acrylic teeth, and selective soft-liner application. The principal value of the technique lies not only in speed, but in the ability to compress treatment into one day without

sacrificing prosthodontic checkpoints. In selected post-hemimaxillectomy patients, this approach may improve convenience, expedite restoration of speech and swallowing, and provide a practical removable rehabilitation option.

Patient Consent Statement

Written informed consent for publication of de-identified clinical details and images is obtained from the patient before submission.

Conflict of Interest

The authors declare no conflict of interest.

Funding

No external funding was received for this work.

REFERENCES

1. Aramany MA. Basic principles of obturator design for partially edentulous patients. Part I: Classification. *J Prosthet Dent*. 1978;40(5):554-557.
2. Aramany MA. Basic principles of obturator design for partially edentulous patients. Part II: Design principles. *J Prosthet Dent*. 1978;40(6):656-662.
3. Brown JS, Rogers SN, McNally DN, Boyle M. A modified classification for the maxillectomy defect. *Head Neck*. 2000;22(1):17-26.
4. Okay DJ, Genden E, Buchbinder D, Urken ML. Prosthodontic guidelines for surgical reconstruction of the maxilla: A classification system of defects. *J Prosthet Dent*. 2001;86(4):352-363.
5. Marker P, Svane-Knudsen V, Jorgensen KE. Immediate obturation of the surgical defect after partial maxillectomy in the edentulous patient. *Acta Oncol*. 1997;36(1):41-44.
6. Shambharkar VI, Puri SB, Patil PG. A simple technique to fabricate a surgical obturator restoring the defect in original anatomical form. *J Adv Prosthodont*. 2011;3(2):106-109.
7. Koyama S, Sasaki K, Inai T, Watanabe M. Effects of defect configuration, size, and remaining teeth on masticatory function in postmaxillectomy patients. *J Oral Rehabil*. 2005;32(9):635-641.
8. Chen C, Ren W, Gao L, Cheng Z, Zhang L, Li S, et al. Function of obturator prosthesis after maxillectomy and prosthetic obturator rehabilitation. *Braz J Otorhinolaryngol*. 2016;82(2):177-183.
9. Ali MM, Khalifa N, Alhajj MN. Quality of life and problems associated with obturators of patients with maxillectomies. *Head Face Med*. 2018;14(1):2.
10. Dalkiz M, Dalkiz AS. The effect of immediate obturator reconstruction after radical maxillary resections on speech and other functions. *Dent J (Basel)*. 2018;6(3):22.
11. dos Santos DM, de Caxias FP, Bitencourt SB, Turcio KH, Pesqueira AA, Goiato MC. Oral rehabilitation of patients after maxillectomy. A systematic review. *Br J Oral Maxillofac Surg*. 2018;56(4):256-266.
12. Cao Y, Yu C, Liu W, Miao C, Han B, Yang J, et al. Obturators versus flaps after maxillary oncological ablation: A systematic review and best evidence synthesis. *Oral Oncol*. 2018;82:152-161.
13. Jiao T, Zhu C, Dong X, Gu X, Sun Y, Wang L, et al. Rehabilitation of maxillectomy defects with obturator prostheses fabricated using computer-aided design and rapid prototyping: A pilot study. *Int J Prosthodont*. 2014;27(5):480-486.
14. Tasopoulos T, Kouveliotis G, Polyzois G, Karathanasi V. Fabrication of a 3D printing definitive obturator prosthesis: A clinical report. *Acta Stomatol Croat*. 2017;51(1):53-58.
15. Kortes J, Dehnad H, Kotte ANT, Fennis WMM, Rosenberg AJWP. A novel digital workflow to manufacture personalized three-dimensional-printed hollow surgical obturators after maxillectomy. *Int J Oral Maxillofac Surg*. 2018;47(9):1214-1218.
16. Ye H, Wang Z, Sun Y, Zhou Y. Fully digital workflow for the design and manufacture of prostheses for maxillectomy defects. *J Prosthet Dent*. 2021;126(2):257-261.
17. Sharaf MY, Eskander AE. PEEK versus metallic attachment-retained obturators for patient satisfaction: A randomized controlled trial. *Eur J Dent*. 2022;16(1):80-95.
18. Yanamoto S, Soutome S, Murata M, Kawakita A, Yamaguchi E, Yoshida K, et al. Efficacy of silicone soft reliner on the obturator prosthesis after maxillectomy for oral malignant tumors: A single-arm prospective interventional study. *Clin Exp Dent Res*. 2020;6(6):612-617.
19. Paul A, Dhawan P, Jain N. Digital applications in the fabrication of obturators in maxillectomy defects: A systematic review. *Cureus*. 2024;16(9):e70479.
20. Srivastava G, Padhiary S, Mohanty N, Molinero-Mourelle P. Digital workflow feasibility for the fabrication of intraoral maxillofacial prosthetics after surgical resection: A systematic literature review. *Acta Odontol Scand*. 2024;83:392-403.

21. Ozcivelek T, Kilicarslan MA. Full digital workflow of a 2-piece obturator with polyetherketoneketone in a patient with maxillectomy and trismus: A clinical and laboratory report. *J Prosthet Dent.* 2024;131(2):346-351.
22. Zaid W, Amin D, Carlson ER. Obturating the maxillary defect: Surgical and prosthetic considerations. *Atlas Oral Maxillofac Surg Clin North Am.* 2024;32(2):81-90.

Cite this article: Dr. Chirag Chamria. *Single-Visit Digital Obturator Rehabilitation Following Hemimaxillectomy: A Clinical Case Report.* *Era Journal of Medical and Clinical Case Reports.* 2026; 4(1): 08-13.

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