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Case Report

Chairside Fabrication of Customized Healing Abutment by Socket Impression in Immediate Implantation. Case Report

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Abstract

Background: Customized healing abutments may support the peri-implant mucosa after immediate implant placement, but many available workflows require direct intraoral resin application, computer-aided design and manufacturing, or laboratory support.

Case description: A 28-year-old systemically healthy man presented with a non-restorable mandibular left first molar (FDI tooth 36). After atraumatic extraction and guided Type 1 implant placement, an addition-silicone socket impression was made around a temporary abutment. The impression was trimmed extraorally and used as a scaffold for a flowable and paste composite shell. The finished and polished component was a non-loaded customized healing abutment. At the 1-week review, clinical inspection showed stable soft-tissue adaptation and minimal inflammation. Following the planned healing period, a definitive zirconia crown was delivered. At 6 months after implant placement, the peri-implant mucosa remained clinically stable without visible recession. At 12 months panoramic radiographic section showed preserved peri-implant crestal bone without evident marginal bone loss. These follow-up findings were qualitative. Standardized soft-tissue measurements and calibrated baseline periapical radiographs were not presented.

Conclusion: This report describes an direct-indirect, laboratory free chairside method that transfers the socket contour to a composite healing abutment while allowing resin application, finishing, and polishing outside the oral cavity. Stable clinical and radiographic conditions were observed at 6 and 12 months in this patient. However, the single-case design and absence of quantitative measurements preclude conclusions regarding comparative effectiveness or general predictability.

Keywords

dental implants; immediate implant placement; customized healing abutment; emergence profile; case report

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Introduction

Successful implant therapy requires both osseointegration and maintenance of healthy peri-implant tissues (1). Immediate implant placement can reduce the number of surgical interventions and may facilitate preservation of the pre-extraction tissue architecture; however, it does not eliminate the dimensional remodeling that follows tooth extraction (2,3). Management of the transmucosal contour during healing is therefore relevant to the subsequent emergence profile and prosthetic workflow.

Prefabricated healing abutments are available in standardized circular or mildly anatomical shapes and may not reproduce the cervical anatomy of the extracted tooth, particularly at molar sites. Customized healing abutments have been manufactured from resin composite, polymethyl methacrylate (PMMA), polyetheretherketone (PEEK), zirconia, and titanium using direct chairside, conventional indirect, and digital computer-aided design/computer-aided manufacturing (CAD/CAM) workflows (4). Recent systematic reviews report a trend toward favorable soft-tissue, hard-tissue, and esthetic outcomes with customized components, but the number of comparative studies remains small, the protocols are heterogeneous, and follow-up is often limited (5-7). A randomized clinical trial also found short-term benefits for selected soft-tissue and esthetic variables, without demonstrating superiority for every peri-implant outcome (8).

Several clinical techniques have already been described. These include directly adding resin to a temporary cylinder, transferring the cervical form from the extracted tooth or a diagnostic model, and fabricating sealing socket abutments through digital design and milling or printing (9-14). Digital methods can provide reproducible design and facilitate the use of industrially processed materials, but they require scanning, software, manufacturing equipment, or laboratory support. Direct resin techniques are accessible and inexpensive, but intraoral contouring and finishing may be more difficult and may expose the socket to uncured material.

The novelty of the present report is not the general concept of a customized healing abutment. Its specific contribution is a direct-indirect chairside transfer method in which addition silicone records the post-extraction soft-tissue contour around a temporary abutment, is adjusted extraorally, and then serves as a removable form for the composite shell. The aim of this case report is to describe the clinical workflow, its practical advantages and limitations, and the 6-month clinical observation.

2. Case Presentation

2.1. Patient information and diagnostic reasoning

A 28-year-old man presented with a non-restorable mandibular left first molar (FDI tooth 36) affected by extensive secondary caries, a visible buccal crack, and localized chronic periodontal involvement (Figure 1). The patient reported no relevant systemic disease and was classified as American Society of Anesthesiologists (ASA) physical status I. Clinical and radiographic assessment indicated that predictable restoration of the tooth was not possible. Extraction followed by Type 1 immediate implant placement was selected (15) to reduce the number of surgical procedures and to permit prosthetically guided implant positioning, provided that adequate primary stability could be obtained.

Figure 1. Preoperative intraoral view of FDI tooth 36. The buccal crack is visible.

The treatment alternatives, expected benefits, limitations, and potential complications were discussed with the patient. Written informed consent was obtained for the treatment and for publication of anonymized clinical information and photographs.

2.2. Clinical procedure

Step 1. Tooth extraction and implant placement

Tooth 36 was removed atraumatically with the intention of preserving the socket walls (16). A tooth-supported surgical guide, designed in ExoCad, Elfesina 3.2. software for the Neodent GM guided-surgery system, was used (Figure 2). The osteotomy was prepared in the mesial root compartment of the extraction socket. A Neodent Grand Morse implant (4.0 mm diameter × 10 mm length; Neodent, Curitiba, Brazil) was inserted with an insertion torque of 35 Ncm.

Figure 2. Tooth-supported surgical guide designed in exocad software for the Neodent guided-surgery system.

The distal socket compartment was grafted with a xenogeneic bone substitute (cerabone; botiss biomaterials GmbH, Berlin, Germany) as part of an alveolar ridge-preservation approach (17).

Step 2. Socket impression

A Grand Morse Exact Temporary Abutment (Neodent) was connected to the implant. Addition-silicone putty (Elite HD+ Putty; Zhermack SpA, Badia Polesine, Italy) was adapted intraorally around the temporary abutment and into the coronal part of the extraction socket to record the visible soft-tissue contour (Figure 3). After polymerization, the temporary abutment and attached silicone impression were removed as one assembly and rinsed thoroughly.

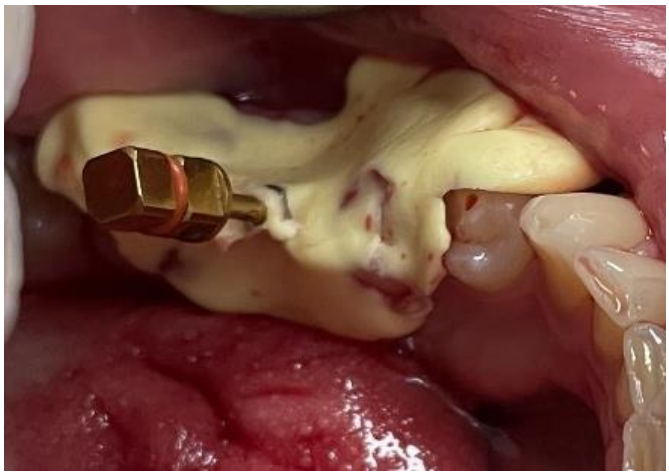

Figure 3. Intraoral socket impression. Addition-silicone putty was adapted around the temporary abutment and into the coronal part of the post-extraction socket.

Step 3. Extraoral modification of the silicone form

The apical excess of silicone that had extended into the socket was removed with a blade and fine rotary instruments. The material was reduced occlusally to approximately the gingival level and shaped to reproduce the cervical outline of the extracted molar without extending deeply into the socket (Figures 4 and 5). All modification was performed extraorally.

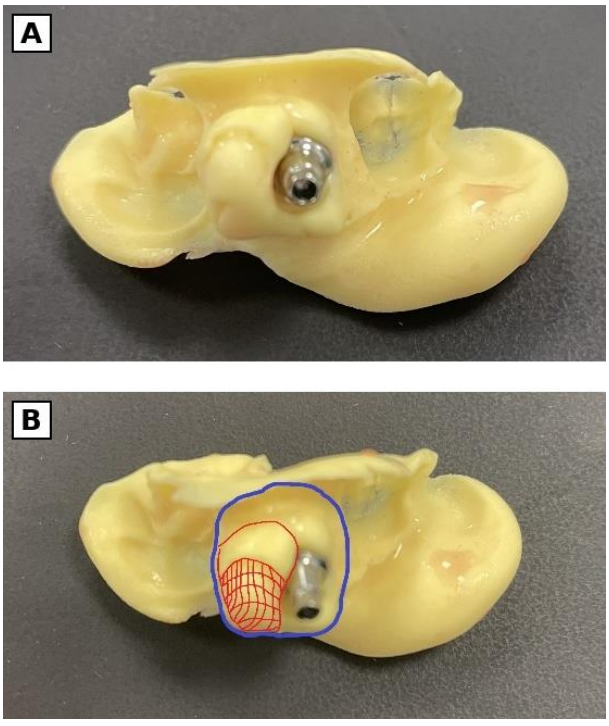

Figure 4. Extraoral silicone impression attached to the temporary abutment. (A) Appearance immediately after impression removal. (B) Marked trimming boundaries: the blue outline indicates the intended external contour; the red markings identify silicone extending into the socket that was removed.

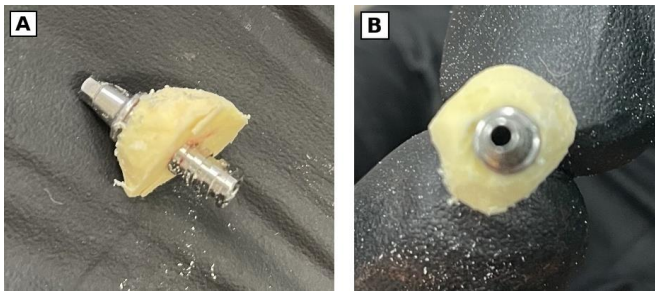

Figure 5. Final form of the trimmed silicone impression. (A) Lingual view. (B) Apical view.

Step 4. Composite-shell fabrication

A thin layer of flowable resin composite (CharmFil Flow; DentKist Inc., Gunpo, Republic of Korea) was applied to the external surface of the silicone form and light-polymerized to create a shell reproducing the recorded cervical contour (Figure 6). After removal of the silicone, the shell was reinforced internally with resin composite (GC Gradia Direct Posterior; GC Corporation, Tokyo, Japan) (Figure 7). The component was finished and polished to provide a smooth transmucosal surface.

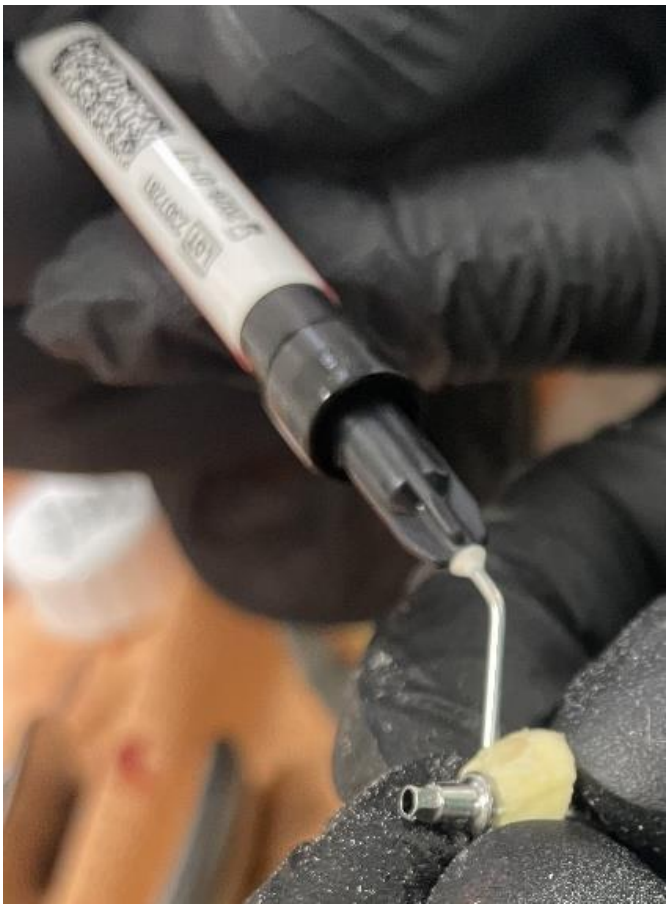

Figure 6. Application of a thin layer of flowable resin composite to the external surface of the silicone form to reproduce the cervical contour.

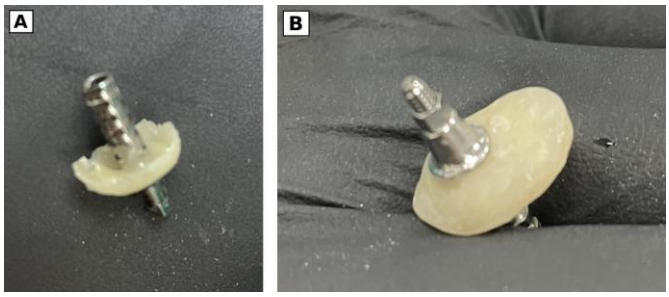

Figure 7. Composite-shell fabrication. (A) The shell after removal of the silicone form. (B) The internal aspect after reinforcement with flowable and paste resin composites.

Step 5. Connection and occlusal management

The customized healing abutment was connected to the implant and tightened according to the manufacturer's recommendation. The screw-access channel was protected with polytetrafluoroethylene tape and sealed with flowable resin composite. The occlusal portion was adjusted to remain approximately 1-2 mm coronal to the gingival margin and free of static and dynamic occlusal contact. The component functioned only as a non-loaded healing abutment (Figure 8).

Figure 8. Intraoral views of the customized healing abutment after connection to the implant.

2.3. Postoperative care and follow-up

The patient received postoperative oral-hygiene and medication instructions according to the clinical protocol. At the 1-week review, the customized healing abutment remained in place and clinical inspection showed stable soft-tissue adaptation with minimal inflammation. Following the planned healing period of approximately 3 months, the customized healing abutment was replaced by a definitive zirconia crown. At the 6-month review, the crown remained in function and the peri-implant mucosal contour appeared stable, without clinically visible recession or signs of inflammation (Figure 9A). A cropped section from the panoramic radiograph obtained 12 months after implant placement showed preserved crestal bone around the implant, without radiographically evident marginal bone loss (Figure 9B). Because no standardized linear soft-tissue measurements, digital volumetric

analysis, or calibrated baseline periapical radiograph was available, recession and marginal bone-level change were not quantified.

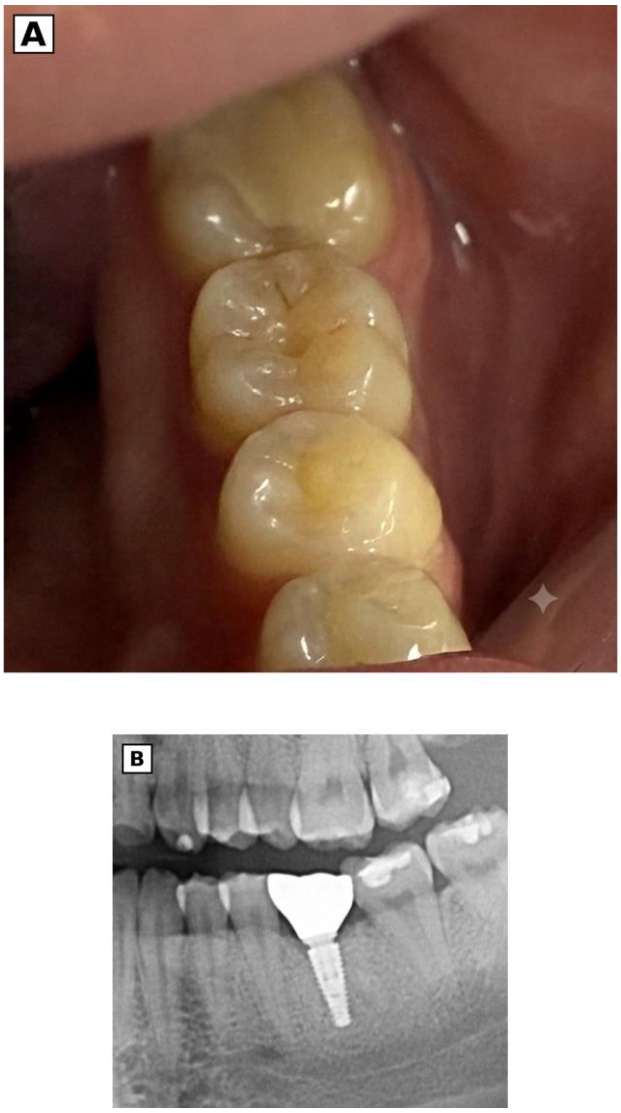

Figure 9. Six-month follow-up after implant placement. (A) Intraoral view of the definitive zirconia crown. The peri-implant mucosal contour was clinically stable without visible recession or inflammation. (B) Cropped panoramic radiographic section showing the implant and preserved peri-implant crestal bone levels without radiographically evident marginal bone loss. The panoramic image was not calibrated for quantitative marginal bone-level measurement.

2.4. Timeline

Time point	Clinical event	Available outcome
Day 0	Clinical and radiographic assessment; atraumatic extraction; guided immediate implant placement; grafting of the distal socket compartment; chairside fabrication and connection of the customized healing abutment.	Insertion torque 35 Ncm; non-loaded healing abutment on place.
1 week	Clinical review.	Healing abutment stable; clinically acceptable soft-tissue adaptation and minimal inflammation.
Approximately 3 months	Definitive prosthetic rehabilitation.	Customized healing abutment replaced by a definitive zirconia crown.
6 - 12 months after implant placement	Clinical and panoramic radiographic review.	Crown in function; stable peri-implant mucosal contour without visible recession; preserved crestal bone without radiographically evident marginal bone loss..

2.5. Patient perspective

A formal patient-reported outcome measure and a written patient perspective were not collected. This absence is acknowledged as a reporting limitation.

Discussion

This case demonstrates a practical way to create a customized healing abutment without a laboratory or a complete digital manufacturing workflow. The method differs from direct composite techniques because the socket contour is first transferred to an addition-silicone

form and the resin is subsequently applied, polymerized, finished, and polished extraorally. It also differs from CAD/CAM protocols because no intraoral scan, virtual design, milling, or printing is required (10-14). The contribution should therefore be understood as a modification of established chairside customization concepts rather than as the first use of a customized healing abutment.

Compared with a stock healing abutment, an anatomical component can occupy the coronal socket entrance and support a non-circular transmucosal contour. Compared with direct intraoral addition of flowable composite, the silicone form may simplify visual control of the contour and keeps the main resin-building and polishing procedures outside the socket. Nevertheless, the method remains operator-dependent, and the accuracy with which the silicone form reproduces the original tissue contour was not measured in this case.

Digital CAD/CAM workflows can use PMMA, PEEK, zirconia, titanium, or other industrially processed materials and may provide standardized design, reproducibility, and the possibility of preoperative fabrication (4,10,11). Their disadvantages include dependence on scanning accuracy, software, manufacturing equipment, material availability, and additional cost or laboratory time. The present composite technique requires fewer technological resources and was completed chairside, but resin composite is a temporary material and its surface quality, polymerization, repairability, and biologic behavior depend on handling and finishing. Extraoral polymerization and polishing may be advantageous, but this case did not evaluate residual monomer release, surface roughness, microbial adhesion, or histologic tissue response.

The clinical evidence should be interpreted cautiously. The systematic review by Lenz et al. found generally favorable peri-implant responses but emphasized the limited number of controlled studies and long-term observations (5). Ruhstorfer et al. identified only five eligible studies and reported a trend toward better peri-implant and esthetic outcomes with customized healing abutments, while also highlighting small samples and relatively short follow-up (6). A 2025 systematic review similarly included five studies and found heterogeneous dimensional findings (7). In the randomized trial by Chokaree et al., selected soft-tissue and esthetic outcomes favored customized abutments, whereas marginal bone changes were not consistently different (8). A randomized trial of CAD/CAM PEEK socket-sealing abutments reported favorable short-term tissue and patient-related outcomes, but those results cannot be transferred directly to the present manually fabricated composite technique (11).

The chairside fabrication time recorded in this single procedure was approximately 2-3 minutes for the impression, 2-3 minutes for trimming the silicone, 1-2 minutes for creating the shell, 1-2 minutes for reinforcement, and 2-3 minutes for finishing and polishing. These times are descriptive only. No comparator, formal time-and-motion analysis, cost analysis, or assessment of the learning curve was performed.

The present report has substantial limitations: it describes one patient without a control; the socket and jumping gap were not measured; there were no standardized clinical indices, digital scans, volumetric analyses, or quantitative implant-stability measurements; no formal patient-reported outcome was collected; and the clinical follow-up was limited to 6 months. The 12 month radiographic assessment was based on a cropped panoramic image rather than standardized baseline and follow-up periapical radiographs, so marginal bone-level change could not be measured. Similarly, the absence of baseline linear or digital soft-tissue measurements means that the observed absence of visible recession remains a qualitative clinical finding. The technique's accuracy, biological effect, complication rate, durability, and generalizability therefore remain unknown. This case cannot establish reduced healing time, fewer complications, superiority over other workflows, or improved long-term implant success.

Within these limitations, the technique may be considered when a clinician requires a laboratory-free method for creating a non-loaded anatomical healing abutment at an immediate posterior implant site. The 6/12-month clinical and radiographic observations strengthen the description of this individual case but do not validate the technique. Future prospective studies should compare it with stock, direct-composite, and digital CAD/CAM approaches using standardized socket measurements, surface characterization, calibrated radiographic bone-level analysis, digital soft-tissue assessment, patient-reported outcomes, definitive-restoration assessments, and longer follow-up.

Conclusion

In this single case, an addition-silicone socket impression was used as an extraoral form for chairside fabrication of a composite customized healing abutment. The component was fabricated and connected without laboratory manufacturing. At 6 months after implant placement, the definitive zirconia crown was in function, the peri-implant mucosal contour appeared clinically stable without visible recession. At 12 months the panoramic radiographic section showed preserved crestal bone without evident marginal bone loss. Because these findings were qualitative and the report lacks a comparator and standardized measurements, no conclusion can be drawn regarding comparative effectiveness, predictability, or long-term implant success.

Additional information

Funding statement

No external funding was received.

Ethical compliance

The treatment was provided as part of routine clinical care. Written informed consent was obtained from the patient for treatment and for publication of anonymized clinical information and photographs.

Conflict of interest

The authors declare that they have no conflict of interest.

Author contributions

Conceptualization: AN. Data curation: YSS. Formal analysis: MD. Investigation: ID. Methodology: AN. Resources: IL, ID. Supervision: AT. Visualization: IL.

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