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# Salvage to Success: Overcoming Reconstructive Challenges in Dental Rehabilitation After Segmental Mandibulectomy

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## ABSTRACT

Ameloblastoma is the most common clinically significant odontogenic tumor. Although benign, it can be locally aggressive. A patient was referred to our academic institution for treatment of a diagnosed left mandibular follicular ameloblastoma. The patient was counseled on the risks and benefits of resection and reconstruction with either an anterior iliac crest bone graft (AICBG) or a free fibula flap (FFF) and elected to proceed with AICBG reconstruction. Following an initial phase of dental extractions and soft tissue healing, the patient underwent segmental resection and left mandibular reconstruction with a left AICBG. The patient initially did well but later developed an intraoral communication that resulted in infection and partial loss of the graft. After surgical debridement and a period of healing, the mandible was reconstructed using a right AICBG. The patient ultimately healed well and was rehabilitated with four conventional endosteal implants placed into the grafted mandible.

## INTRODUCTION

Ameloblastoma is the most common clinically significant odontogenic tumor. Although benign, these tumors are locally aggressive and arise from remnants of the dental lamina. They are broadly categorized into four groups: conventional, unicystic, peripheral, and metastasizing. The conventional subtype accounts for approximately 75-86% of cases and is the most aggressive. Unicystic ameloblastomas are further classified into luminal, intraluminal, and mural subtypes. Luminal and intraluminal variants are less invasive and often amenable to conservative treatment with enucleation and curettage, whereas mural unicystic ameloblastomas are treated similarly to conventional lesions due to their invasive behavior [1].

Conventional ameloblastomas have been reported to have recurrence rates as high as 64.9% when treated conservatively. Therefore, they should be treated with surgical resection with 1-cm bony margins and removal of at least one uninvolved anatomic layer. This approach reduces recurrence rates to approximately 12% [2].

In cases where resection results in mandibular discontinuity defects, reconstruction options include vascularized and non-vascularized bone grafts, often in combination with load-bearing reconstruction plates. The most common vascularized option is the free fibula flap (FFF), while the most common non-vascularized option is the anterior iliac crest bone graft (AICBG). Prior to the widespread use of free tissue transfer, AICBG was considered the gold standard for mandibular reconstruction. AICBG allows harvesting approximately 50 cc of autogenous corticocancellous bone and is suitable for reconstructing mandibular defects up to 5 cm in length. It is less invasive, has shorter operative and recovery times, and is associated with lower morbidity than FFF. However, AICBG is contraindicated in cases with inadequate soft tissue coverage, defects larger than 5 cm, or in patients with compromised healing potential, such as those with a history of or planned head and neck radiation therapy [3].

## CASE PRESENTATION

### Surgical Intervention

A 46-year-old male was referred to our academic institution for management of a previously diagnosed conventional ameloblastoma of the left mandible (Figure 1). The patient reported a 12-month history of lower jaw swelling with a dull ache, prompting evaluation by his general dentist. He was subsequently referred to a private oral and maxillofacial surgeon, where an incisional biopsy confirmed the diagnosis of conventional ameloblastoma.

At presentation to our department, radiographic evaluation demonstrated a multilocular lesion of the left mandible measuring approximately 2x4 cm and involving teeth #19-24, consistent with the histopathologic diagnosis. Reconstruction options, including FFF and AICBG, were discussed, and the patient elected for reconstruction with AICBG. Preoperatively, teeth #18-26 were extracted to allow complete mucosal healing and the establishment of a healthy soft-tissue bed, and to permit a sterile extraoral surgical approach. After approximately six weeks of healing, virtual surgical planning was performed, and patient-specific titanium cutting guides and a custom reconstruction plate were fabricated.

**Figure 1:** Initial presentation of the radiolucent lesion in the mandible (left).

The patient was taken to the operating room for segmental resection with 1-cm bony margins, followed by reconstruction using a left AICBG and a custom reconstruction plate with a mesh crib (Figure 2). He was admitted overnight for observation and discharged on postoperative day one without complications. Initial postoperative evaluation demonstrated appropriate healing. However, at the two-week follow-up visit, a small area of graft exposure was noted on the lingual aspect of the mandible. The patient was prescribed chlorhexidine mouth rinse (Peridex) and an additional course of antibiotics. Although the area initially appeared to improve, a recurrent infection developed approximately 2 months postoperatively, necessitating a return to the operating room for surgical debridement resulting in significant graft loss (Figure 3).

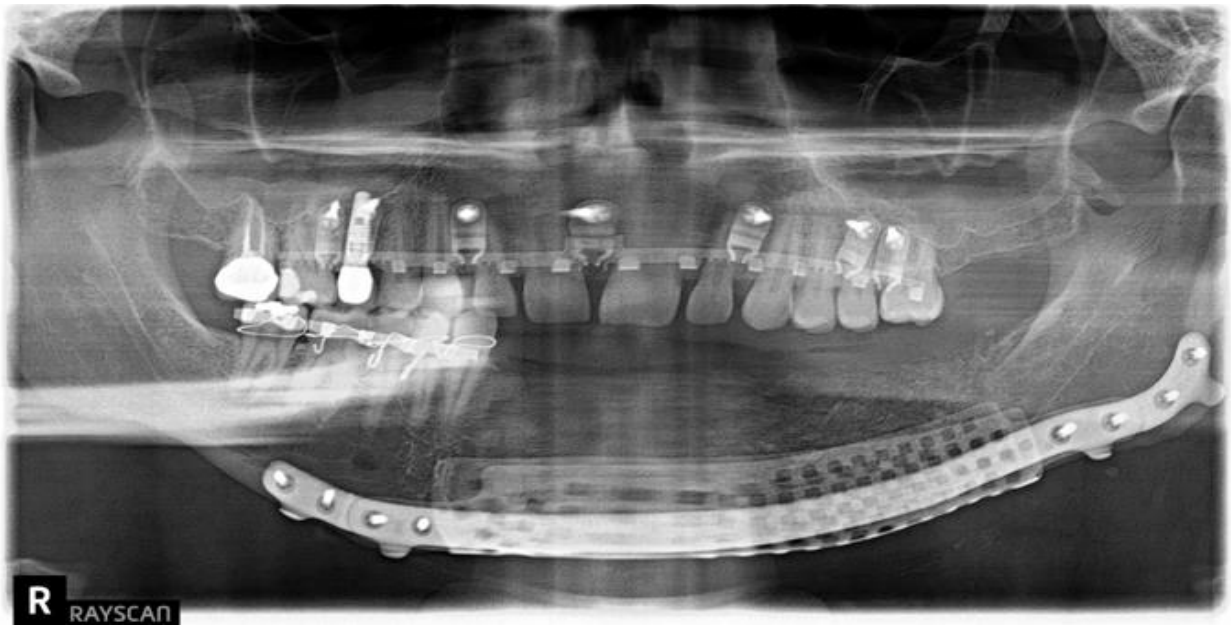


**Figure 2:** Post-operative panoramic radiograph following initial AICBG.

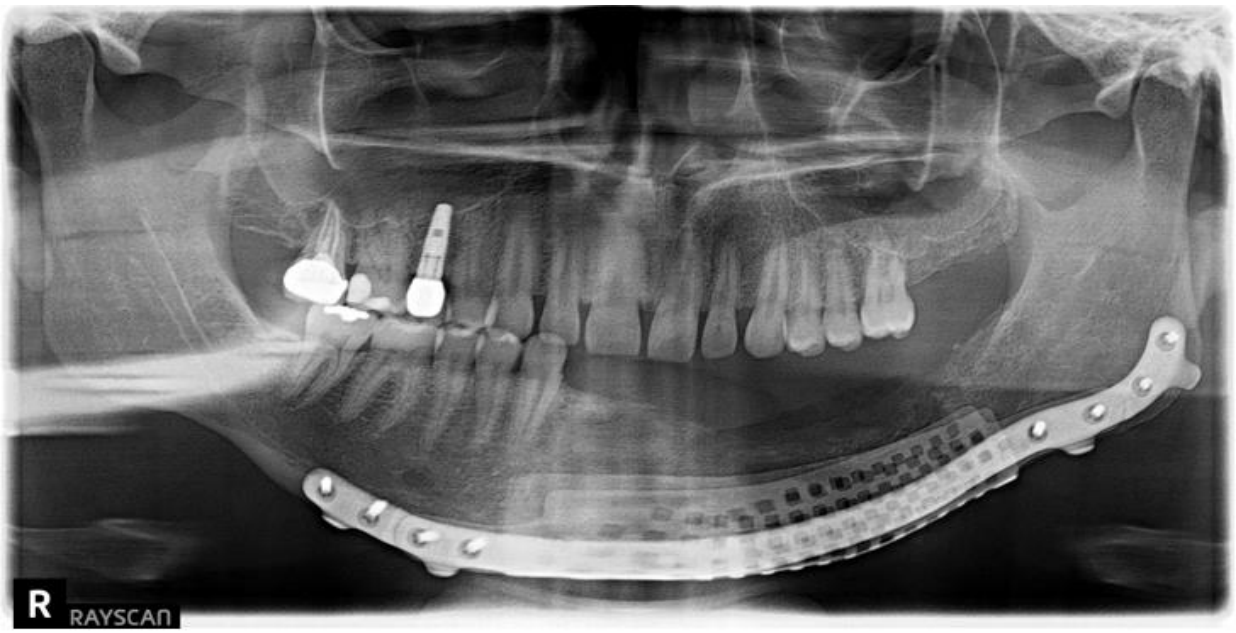


**Figure 3:** Post-operative panoramic radiograph following debridement of infected graft.

The patient was monitored for 4 months following debridement to ensure complete soft tissue healing and resolution of infection. Although an inferior mandibular continuity of approximately 1 cm in height remained, bone volume was insufficient for implant placement. After discussion, the patient was scheduled for salvage reconstruction using a right AICBG, which was performed without complication and followed by an uneventful postoperative course (Figures 4 and 5).

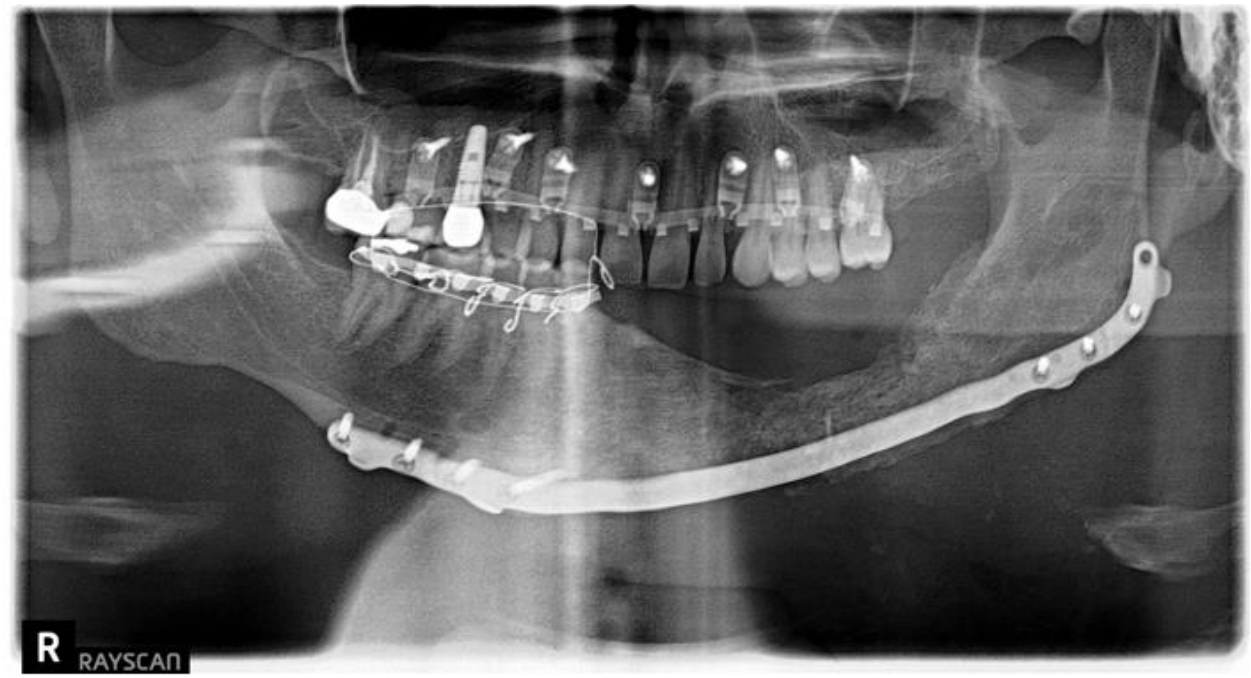


**Figure 4:** Post-operative panoramic radiograph following final AICBG.


**Figure 5:** Panoramic radiograph approximately 8 months following final AICBG.

**Prosthodontic Treatment**

The patient was referred to the Advanced Prosthodontics Clinic by Oral and Maxillofacial Surgery for definitive prosthetic planning following mandibular resection and reconstruction. Oral examination revealed healthy dentition with no evidence of periodontal disease or caries. The patient reported regular annual dental visits for prophylaxis and evaluation.

Irreversible hydrocolloid impressions and a facebow record were obtained, and the maxillary cast was mounted on a semi-adjustable articulator. A mandibular record base was fabricated, and interocclusal records were used to mount the mandibular cast. After verification of accurate mounting, a diagnostic wax-up was completed to replace teeth #19–26 and was tried in to evaluate tooth size, esthetics, and occlusal relationships. Following patient approval, the mandibular cast with the wax setup was scanned (Trios E3, 3Shape) and imported into implant planning software (coDiagnostiX, Dental Wings GmBh). In collaboration with Oral and Maxillofacial Surgery, implants were planned to support an implant-assisted or implant-supported prosthesis (Figure 6). The patient was offered the options of an implant-assisted removable partial denture or an implant-supported fixed segmental hybrid prosthesis. The patient and his wife elected the fixed segmental hybrid option.

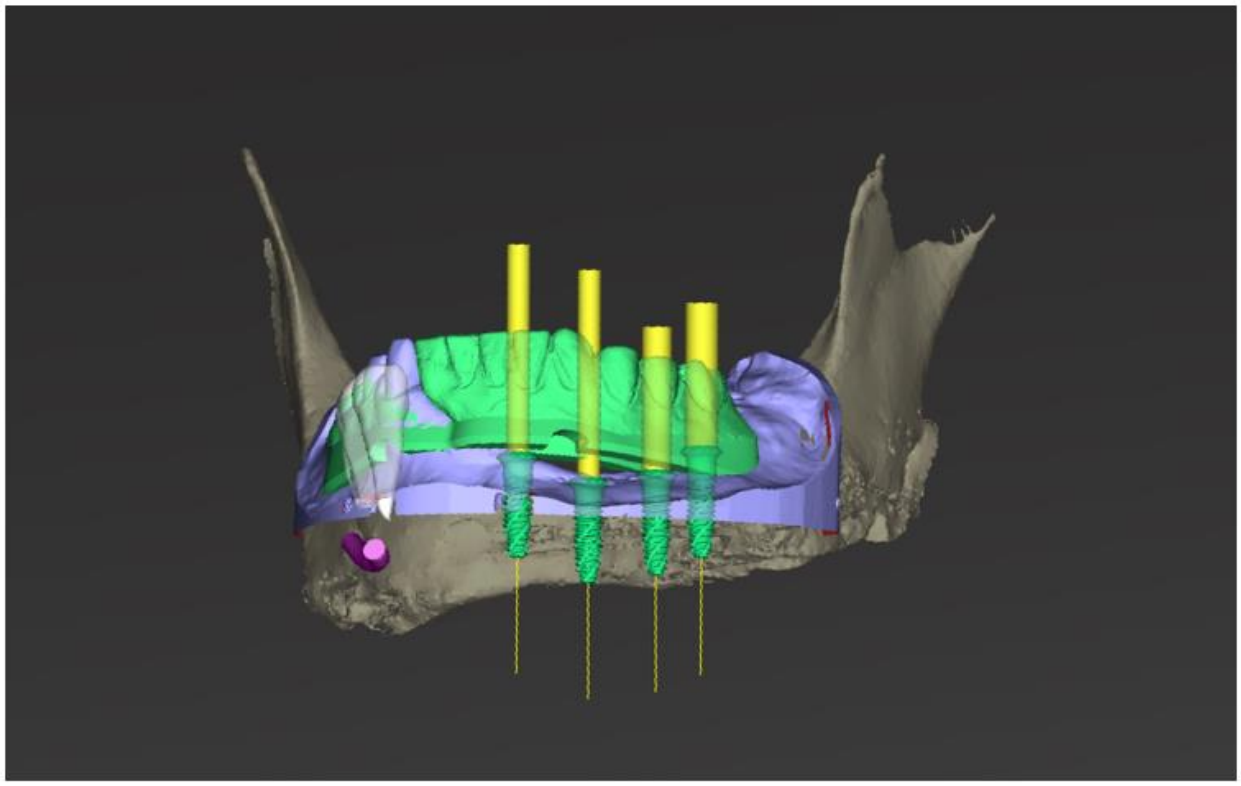

**Figure 6:** Co-DiagnostiX implant planning based on prosthetic tooth position.

Implants were planned in sites #19, 20, 22, and 23, and a surgical guide was fabricated. Implant placement was performed by the Oral and Maxillofacial Surgery team. After four months of osseointegration, second-stage surgery and placement of healing abutments were completed, and the healing abutments were left in place for six weeks (Figure 7).

**Figure 7:** Healing after second-stage surgery.

A primary impression was made using closed-tray impression copings, and the resulting cast was used to fabricate an impression jig and custom tray (Figures 8 and 9). The jig was sectioned, reconnected intraorally with pattern resin, and a master impression was made using vinyl polysiloxane (Figure 10). A verification jig was fabricated on the master cast and tried in using the one screw test to confirm passivity and accuracy of fit (Figure 11). The master cast was mounted using an implant-supported record base, and a new tooth setup was completed on temporary abutments. The setup was tested and adjusted for phonetics, occlusal fit, and cleanability. A milled PMMA provisional hybrid prosthesis was fabricated and delivered (Figure 12).

The patient wore the provisional prosthesis for two months without complications, and clinical evaluation demonstrated good hygiene and function. As no modifications were required, the laboratory used the previous digital data to fabricate the definitive restoration consisting of a titanium substructure and zirconia superstructure, which were luted together. The final prosthesis was inserted, and a one-screw test was used to verify passivity. A panoramic radiograph was also made to verify the fit of the prosthesis (Figure 13). Once the fit was verified, the remaining screws were inserted and torqued to 32 Ncm. The occlusion was evaluated, adjusted, and polished as needed. Access holes were dried, filled with Teflon tape, and sealed with composite (Figure 14). Hygiene instructions and maintenance schedule were discussed with the patient before dismissal.

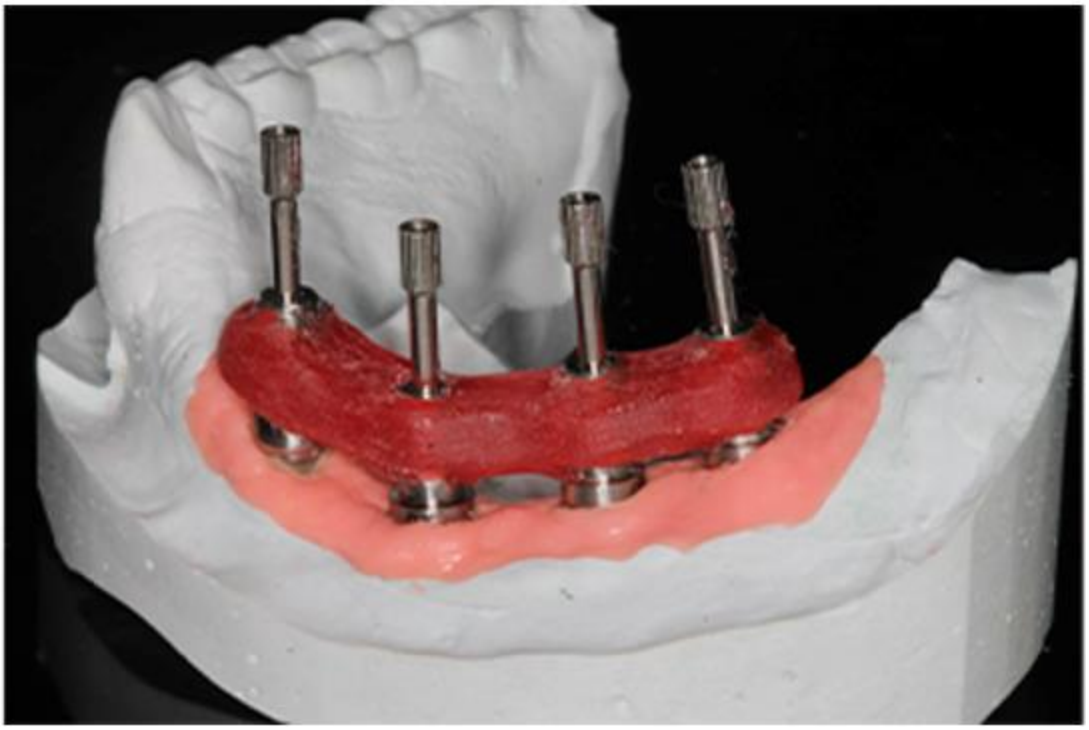

**Figure 8:** Impression jig fabrication using open tray impression copings.

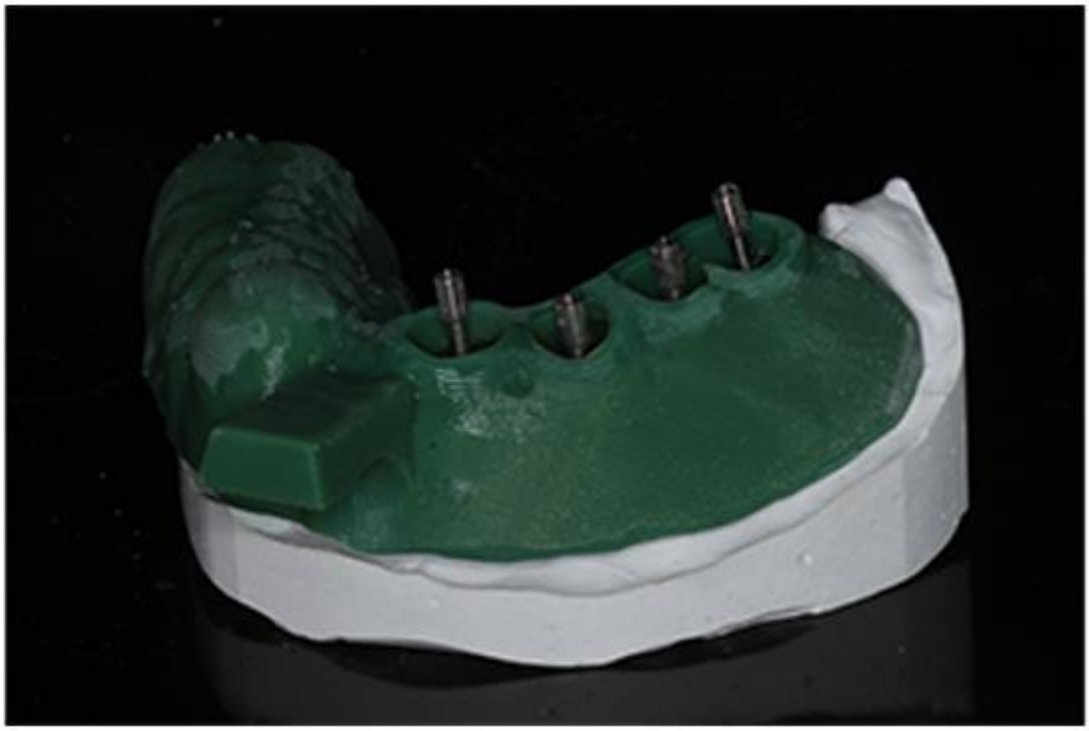

**Figure 9:** Printed custom tray.

**Figure 10:** Impression jig luted together intraorally.

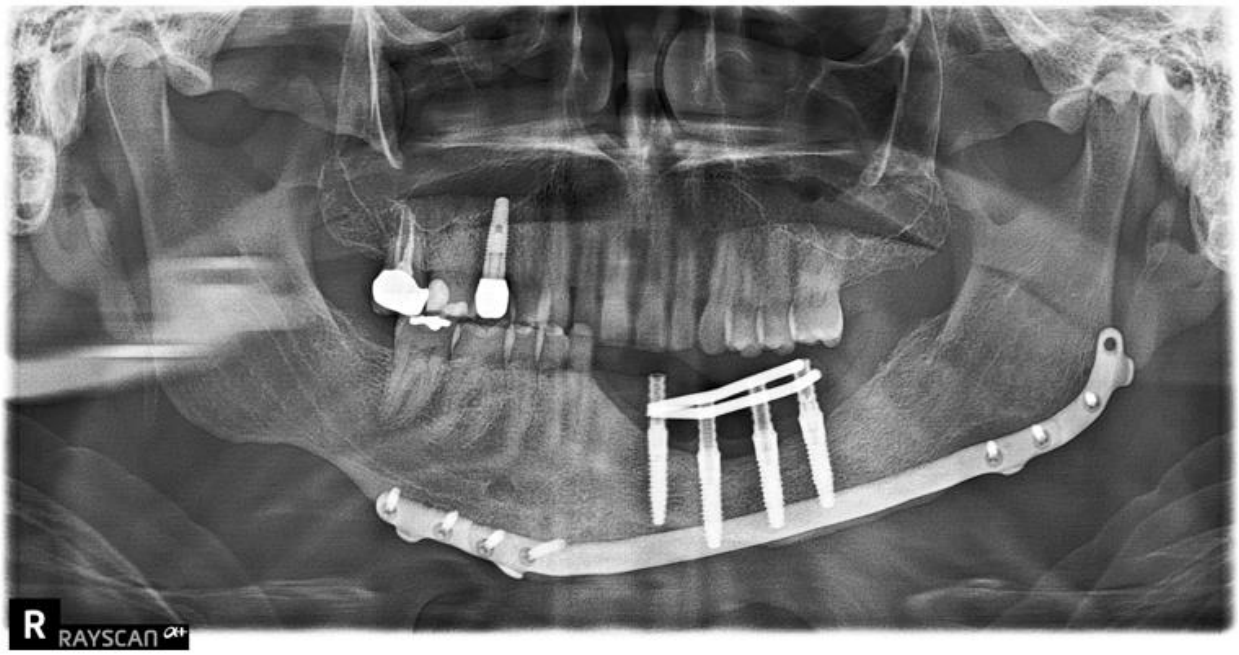


**Figure 11:** Radiographic confirmation of verification jig passive fit using a one-screw test.

**Figure 12:** Full contoured PMMA provisional restoration.


**Figure 13:** Panoramic radiograph of final prosthesis.

**Figure 14:** Full-contoured metal zirconia final restoration.

## DISCUSSION

Conventional ameloblastoma requires surgical resection with 1 cm margins and demonstrates excellent disease control with relatively low recurrence rates [1]. However, this approach often results in significant mandibular defects requiring reconstruction to restore facial contour and oral function. AICBG remains a reliable option for reconstruction of mandibular defects up to 5 cm in length. Although AICBG has limitations, it offers several advantages over free flap reconstruction, including shorter operative time, reduced hospital stay, and faster recovery. Complications of AICBG harvest include sensory disturbances and seroma but are typically mild and transient. Reported rates of transient sensory disturbance are approximately 0.8%, while more serious complications such as seroma and fracture occur at rates of 0.27% and 0.54%, respectively [4].

Graft failure is most commonly associated with infection secondary to intraoral exposure of graft material [5]. Because non-vascularized grafts rely on creeping substitution for incorporation, the early healing phase is particularly vulnerable to infection. Once intraoral exposure occurs, oral microbiota and food debris can contaminate the graft, leading to infection that is difficult to control with antibiotics alone due to the non-vascularized nature of the graft. For this reason, meticulous soft tissue closure and protection of the graft are critical. When exposure does occur, some authors advocate nasogastric feeding, systemic antibiotics, and chlorhexidine mouth rinses until mucosal closure is achieved.

## CONCLUSION

In this case, surgical resection successfully eradicated the conventional ameloblastoma, despite initial graft failure. Salvage reconstruction with a second AICBG following debridement ultimately resulted in successful mandibular reconstruction and allowed for definitive rehabilitation with a fixed implant-supported prosthesis. This case demonstrates that reconstruction of mandibular discontinuity defects with AICBG remains a viable and successful option even after initial graft failure, provided appropriate management and staged reconstruction are performed.

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