# Implant Reconstruction of a Large Mandibular Defect Following Removal of a Nonossifying Fibroma

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The fixed implant-supported restoration of this mandibular surgical defect deliberately violated the principles of mandibular flexure, crown-to-implant ratio, and off-axis loading. A custom-made implant-mounted jig revealed no mandibular flexure in this patient, but crown-to-root ratios of up to 39:12 were unavoidable. The restoration has needed no maintenance for 14 years. This apparent success calls into question the blind application of prevailing clinical principles. *Int J Prosthodont 2011;24:520–522*.

There are many principles that guide prosthodontic treatment planning to minimize the risk of adverse outcomes. Avoiding an excessive crown-to-root ratio is one such principle transferred from tooth restorations to implant superstructures.<sup>1-3</sup> Another is the risk thought to be posed by mandibular flexure to fixed restorations on teeth or implants.<sup>2-4</sup> A third is the avoidance of off-axis implant loading.<sup>3,5</sup> However, the large loss of tissue following tumor resection often forces the clinician to violate these principles, raising the perceived risk of clinical or technical failure in an already compromised situation.<sup>6-9</sup> This case report documents the deliberate violation of these principles with apparent success, calling into question the force of these principles.

## **Case Report**

## **Patient History**

A 68-year-old male physician had been treated with conventional fixed and removable prostheses over a 30-year period to restore a large surgically acquired mandibular defect. Mandibular continuity had been maintained. Crowns had been placed on the remaining mandibular posterior teeth to serve as abutments. Several removable partial dentures were constructed over the years, all of which were mostly toothsupported. Eventually, the mandibular left abutment teeth were lost, eliminating any tooth support. The prostheses thereafter became more unstable and problematic. Reconstruction with implants became a consideration.

#### **Clinical Findings**

The mandibular surgical defect extended from the mesial aspect of the left third molar root to the mesial aspect of the right canine. The overlying tissue extending from the left sublingual area to the buccal mucosa was very thick, soft, and extremely mobile (Fig 1). The original panoramic radiograph is shown in Fig 2. The maxillary arch had a full complement of teeth, suggesting the capacity to exert heavy forces on the mandibular prosthesis. The occlusal surfaces exhibited a reverse Monson curve resulting from long-standing heavy bruxism, further evidence of heavy occlusal forces. An Angle Class II relationship with a moderately deep anterior overbite was noted, raising concern about horizontal forces.

#### Treatment Plan

Respecting the principles listed previously, the treatment plan was expected to include several implants in the remaining mandibular defect area. The number and location would have regard for the need for support against the expected heavy loads and the need for hygiene maintenance. The crowns on the remaining mandibular teeth would be renewed, and the prosthesis then would be removable and supported and retained by the teeth and implants. The patient, however, wanted a fixed solution.

#### **Course of Treatment**

Selected prosthetic teeth were arranged on mounted casts and verified in the mouth for esthetics and occlusion. A surgical guide was not made because of concern about locating it on such mobile tissue and the likely limited freedom for implant location. Fifteen millimeters of bone was available vertically in the

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Fig 1 Preoperative intraoral view.



Fig 3 Tracing device used to measure mandibular flexing.



Fig 2 Original panoramic radiograph.



Fig 4 Sectioning of the definitive cast.

left defect area, and six implants were placed. The overlying soft tissue was 8 to 13 mm thick, so most of the healing abutments inserted at implant placement surgery remained below the mucosal surface. The crowns on the remaining mandibular teeth were replaced with new crowns, surveyed to receive a removable partial denture in case a fixed replacement was later judged not to be possible.

Abutment connection was accomplished using custom-made 13- and 16-mm abutments and standard abutments through the soft tissue. Consideration was given to reducing the soft tissue thickness but was rejected because of risk to the structures in the floor of the mouth.

The final impression for the master cast was made and poured, and the analog positions were checked in the mouth using a verification jig. To test for the risk of mandibular flexure with a fixed prosthesis, a tracing device was constructed (Fig 3). It was placed in the mouth on abutments as far apart as possible, and the patient was instructed to perform extreme movements and hard clenching. No markings could be found, suggesting mandibular flexure. The framework for the fixed restoration was cast using the original tooth arrangement. It was sectioned (Fig 4), indexed in the mouth, soldered, and verified (Fig 5). After processing of the teeth to the framework, the prosthesis was inserted and adjusted, and all screws were torqued and covered.

The patient was pleased with the final result (Figs 6 and 7). The prosthesis has been followed for 14 years and has required no maintenance intervention.

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Fig 5 Fit verification in the mouth.



Fig 6 Prosthesis in centric occlusion in the mouth.

 $\ensuremath{\textit{Fig7}}$  (Ieft) Panoramic radiograph with the finished prosthesis in place.



## Discussion

A cautious approach to the risk of mandibular flexure in this patient afforded some confidence in the construction of the fixed prosthesis. However, the crown-to-implant ratios were unavoidable, varying between 30 to 39 mm on 12- to 15-mm implants, and grossly eccentric to the long axis, violating the two other principles. The long period of apparent success calls into question the blind application of these principles.

# Conclusion

With respect to all the mitigating problems this case presented, the author would do it all again. Since all other treatment options were exhausted, there was no other choice than implants. If the fixed prosthesis as presented was unsuccessful, a removable prosthesis could have been constructed on the same implants using the opposite side of the arch for support. The fixed prosthesis was the only treatment option the patient would accept.

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