Mandibular Fracture Caused by Peri-Implant Bone Loss: Report of a Case

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Background: *A major complication related to excessive bone loss around implants is fracture of the mandible. This complication is most likely to occur in a very atrophic mandible. A 57-year-old woman presented with progressive pain and swelling that had been present for 5 days in the right frontal region of the mandible. An intraoral radiograph revealed a radiolucency around one of the implants in the interforaminal region.*

Methods: *Ten years earlier, 4 hollow-screw implants of 10 mm length had been inserted in the interforaminal region of the edentulous mandible. Throughout the 10-year postoperative period, no adverse clinical events were seen; however, during the last 7 years, no radiographic follow-up was performed. Mobility was tested after removal of the bar, on which one of the implants appeared to be mobile. The mobile implant was removed together with the fibrous tissue.*

Results: *At a recall visit 2 weeks later, a radiograph revealed a fracture of the mandible at the explantation site. Characteristic features of the hollow-screw implant are the hollow body and the transverse openings in the side walls of the implant. It has been reported that these characteristic features can enhance infection and rapid bone loss, but a case of mandibular fracture has never been described.*

Conclusion: *Radiographs should be taken on a regular and perhaps more frequent basis to diagnose excessive bone loss, so that measures can be taken to prevent the risk of mandibular fracture.* J Periodontol 2003;74:1067-1070.

KEY WORDS

Dental implants; jaw fractures/therapy; mandibular fractures/therapy.

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It has been demonstrated that the mandibular overdenture retained by 2 or 4 endosseous implants is a successful treatment modality.[1,2] However, literature describing prospective studies for implant overdenture treatment with a follow-up period of 5 years or more is limited.[3-7] Marginal bone loss of up to 1 mm during the first year of implant function and an annual bone loss of 0.2 mm after this period have been recognized as acceptable.[8,9] Ongoing bone loss at this rate results in a very long lifetime of the implants. Progressive bone loss can be caused by infection, and total loss of integration can be caused by prolonged infection and by overloading.[10] This resorption can be enhanced by the specific implant design and surface characteristics of an implant system.[11] A major complication related to excessive bone loss around implants is fracture of the edentulous mandible. This complication is most likely to occur in a very atrophic mandible.[12,13] Although it has been reported that characteristic implant surface features can enhance infection and rapid bone loss, a case of mandibular fracture has never been described. The following report describes a case of a mandibular fracture caused by excessive peri-implant bone loss.

CASE DESCRIPTION AND RESULTS

A 57-year-old woman was referred by a general practitioner to the Department of Oral-Maxillofacial Surgery and Maxillofacial Prosthetics at the University Hospital Groningen with progressive pain and swelling for 5 days in the right frontal region of the mandible. An intraoral radiograph revealed a radiolucency around one of the implants in the interforaminal region. The general practitioner prescribed antibiotics and referred the patient to the department where the implants had been placed.

Ten years ago, this patient was referred because of persistent problems with her lower conventional denture. Four hollow-screw implants of 10 mm length‡ were inserted in the interforaminal region of the edentulous mandible. After an osseointegration period of 3 months, a bar superstructure and overdenture were

‡ Bonefit, Straumann AE, Waldenburg, Switzerland.

Figure 1.
Panoramic radiograph of the implant system at the beginning of the functional period.

made (Fig. 1). The patient underwent an annual recall program. Rotational panoramic radiographs were made at the time of overdenture construction and 1 and 3 years thereafter. The radiographs showed no progressive peri-implant bone loss (Fig. 2). Throughout the 10-year postoperative period, no adverse events were seen; the peri-implant soft tissues were healthy, and the patient practiced good oral hygiene.

Ten years later, clinical examination at the Department of Oral & Maxillofacial Surgery and Maxillofacial Prosthetics in the University Hospital showed a slightly swollen chin with redness. The right peri-implant sulcus had a probing depth of 10 mm, with some pus after removal of the probe. The other 3 implants exhibited no clinical adverse symptoms. Mobility was tested after removal of the bar: the right implant was mobile; the others were not. A panoramic radiograph confirmed the clinical findings: a severe radiolucency around the right implant (Fig. 3). The mobile implant was removed, together with the fibrous tissue. The bar was adjusted and refastened to the remaining 3 implants. The patient was instructed not to wear the overdenture during the first week, and a soft diet was advised. At a recall visit 2 weeks after removal of the implant, the patient had almost no pain, but there was still some redness and swelling of the skin under her chin. Palpation showed a hard swelling, without fluctuation, at the inferior border of the mandible in the region of the former implant site. The radiograph revealed a fracture of the mandible

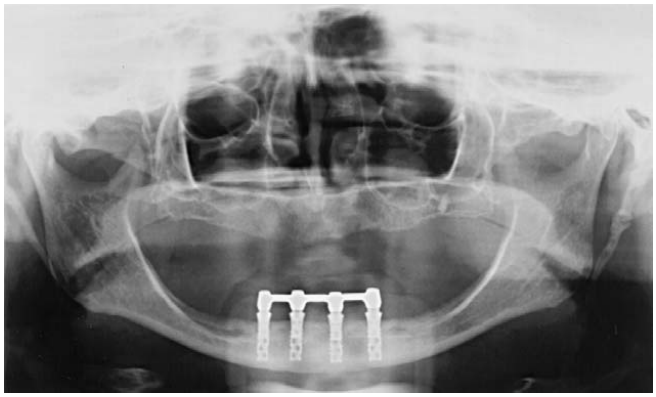

Figure 2.
Panoramic radiograph of the implant system after 3 years of functioning, with no signs of progressive peri-implant bone loss.

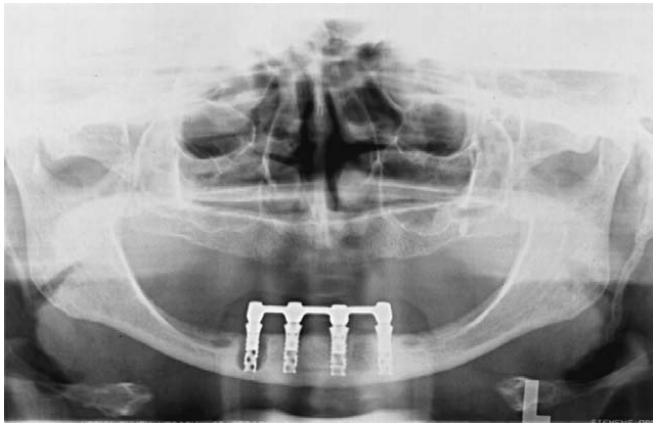

Figure 3.
Panoramic radiograph of the implant system 10 years after implant placement, showing a severe radiolucency around the right implant.

Figure 4.
Panoramic radiograph 2 weeks after removal of the right implant, with a mandibular fracture at the former implant site.

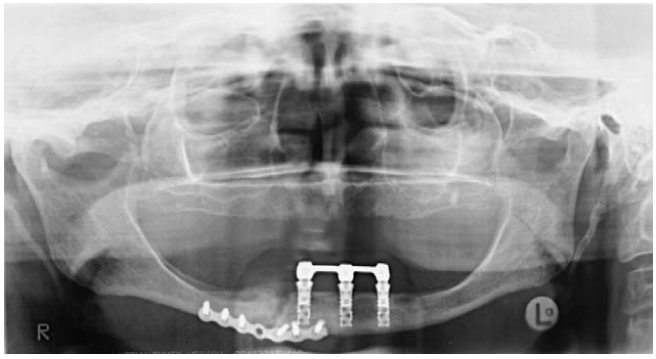

Figure 5.
Panoramic radiograph 10 months after repositioning of the mandible, with normal fracture healing.

(Fig. 4). Reexamination showed no mobility of the mandible at the fracture sites, and a wound dehiscence could not be detected. There was an undisturbed sensibility in the lower lip. The patient did not recollect any time when this fracture could have happened. It was decided to continue antibiotics for 2 weeks and to follow a conservative treatment protocol. However, in the following weeks, there was an increasing mobility with progressive pain. Five weeks after detection of the fracture, the patient underwent surgery to reposition the mandible. Fibrous tissue at the fracture site was excised. Corticocancellous bone grafts were taken from the anterior iliac crest to bridge the non-union areas. The mandible was fixed with titanium osteosynthesis plates. Postoperative wound healing was uneventful, with a normal sensibility of the lower lip. Construction of a new overdenture on the remaining 3 implants began after 2 months. At the 1-year follow-up (after repositioning), the patient had no pain and functioned satisfactorily with the new prosthetic construction. The radiograph showed a normal aspect (Fig. 5).

DISCUSSION

A percentage of 0.2 has been reported in the literature as the rate of occurrence of fractures of edentulous mandibles related to implants,[13] but always as a complication from the insertion of implants. Although this percentage is very low, great effort must be undertaken to prevent this because of the serious consequences. In this patient, the bone loss was asymptomatic. The healthy peri-implant soft tissues, the good oral hygiene, and the supposed stable marginal bone level after 3 years led to the decision to postpone further radiographic follow-up. It is not known if bone loss in this patient was gradual in the 10 years, but the speed could have been enhanced by the specific design of the implant system. Characteristic features of the hollow-screw implant are the hollow body and the transverse openings in the side walls of the implant. Reporting long-term retrospective studies, Versteegh et al.[14] and Mericske-Stern et al.[15] identified the possible influence of the hollow body and transverse openings on infection and rapid bone loss. Further research is recommended to determine whether the specific design of this implant leads to infection and rapid bone loss once the reduction of the marginal peri-implant bone level reaches the transverse openings. Therefore, it is recommended that radiographs be taken on a regular and frequent basis to diagnose excessive bone loss, so that measures can be taken to prevent the risk of mandibular fracture.

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