Long-Term Follow-up of Iatrogenic Implant Endodontitis: A Case Report

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An undesirable injury of adjacent teeth is one of many accidents that may occur during implant placement. Limited surgical access in a noncooperative patient can induce apical root transection. When endodontic pathosis is identified, root canal treatment is often initiated to prevent implant microbial contamination. This case report demonstrates the successful resolution of implant endodontitis by endodontic intervention without any surgical treatment in a patient presenting a moderate mental disorder. Int J Periodontics Restorative Dent 2019;39:239–243. doi: 10.11607/prd.3517

Osseointegrated dental implants are nowadays considered the standard of care for the rehabilitation of edentulism. Although high, long-term success rates are to be expected, some anatomical and patient-related factors must be considered to achieve functional and esthetic results. Potential causes of implant failure include inadequate surgical technique (eg, surgical trauma, overheating of bone during placement, infection secondary to inadequate aseptic technique), residual infection at the implant site, excessive loading, and peri-implantitis. Another factor that may contribute to implant failure is implant endodontitis, which has been defined as endodontic failure caused by implant placement. It is noteworthy to differentiate between implant endodontitis and retrograde peri-implantitis (RPI), which has been reported as a sequela of dental implant surgery. Probable etiologies of RPI include endodontic infection of the adjacent tooth, residual bacteria remaining at the site of implant placement, excessive heating or bone compression, and overextended preparation of implant osteotomy.

There is almost a general agreement on the iatrogenic nature of most complications. Preoperative case preparation and adequate surgical management reduce the risk.
of their occurrence. However, there are situations where implants are less than ideally placed subsequent to local and patient-related factors. When implants are placed among natural teeth, the proximity to adjacent roots is of concern, and apical transection during implant surgery may result in implant failure.

Few reports have been published in the literature concerning the management of irreversible pulpal damage of teeth adjacent to osseointegrated implants.

The aim of this case report is to show that adequate management of endodontic complications associated with implant placement can lead to radiographic osseous healing.

Case Report

A 28-year-old man was referred in September 2007 to the Department of Periodontics, School of Dental Medicine, Saint-Joseph University, for evaluation and further treatment of his Class III edentulism. Medical history revealed that the patient had undergone a bilateral extraction of his mandibular second premolars and first molars 4 years prior to consultation and had received regular (appointments every 2 months) supportive periodontal treatment since 2002. The patient’s guardian complained of the patient’s reduced chewing potential, and although a removable partial denture was proposed as an alternative to implant surgery, such treatment was not attempted because of the patient’s inability to withstand dentures.

A sedative was administered prior to implant placement (Lexotanil 1.5 mg, Roche), and surgery was performed under local anesthesia (Articaine 4%, Ubistesine 3M ESPE). Two regular-platform, 10-mm-long MK III Brånemark implants were placed to restore the patient’s missing mandibular right second premolar and first molar. Drilling was performed in type II bone in a relatively narrow ridge. Although sufficient bone height was present above the mandibular nerve (Fig 1a), only 10-mm-long implants could be placed due to limited oral opening and compromised access to the posterior regions of the mandible. As a result, excessive distal angulation of the drilling burs at the second premolar implant site led to apical nerve transection of the adjacent first premolar (Fig 1b). Postoperative instructions were given along with the following prescriptions: 2 g systemic amoxicillin every day for 10 days, 600 mg ibuprofen every 8 hours for 4 days, 1 g acetaminophen every 6 to 8 hours as needed for pain, and chlorhexidine digluconate 0.12% mouthwash applied twice daily for 2 weeks.

After 1 week, the first premolar responded negatively to cold testing, indicating pulpal necrosis. The patient was referred for endodontic treatment that was undertaken 2 weeks later, at which time a radiolucency in the periapical area was detected. However, at 2 months postoperative, the implant placed at the first molar site showed mobility and pus exudate. It was removed due to this early failure, and the site was manually debrided and cleaned with antiseptic solution (chlorhexidine digluconate 0.12% mouthwash). Second-stage surgery was also performed on the implant at the second premolar site (Fig 2a).

After a 3-month healing period, a regular-platform, 10-mm-long MK III Brånemark implant was placed adjacent to the curedt site (first-molar site) to replace the failed implant (Fig 2b). Definitive splinted restorations were delivered to the patient 3 months later. A follow-up radiograph at 18 months (Fig 3) showed complete radiographic

Fig 1 (a) Initial radiograph taken before implant surgery. Note the presence of debris in the extraction sites of the mandibular right second premolar and first molar, and the level of the mandibular nerve. (b) Radiograph taken after implant placement, indicating apical nerve transection of the first premolar.
healing of the bone at the apex of the first premolar. At 2 years postoperative, the patient was still under the bimonthly maintenance program, and no discomfort was reported following prosthesis delivery. At 4 years postoperative, a cone beam computed tomography scan was performed to make sure the healing had been maintained and to exclude any pathologic condition (Fig 4). After 9 years, the results remained stable, no radiographic signs of pathosis were present, and no clinical discomfort was reported (Fig 5).

Discussion

The case report presented here shows the successful management through endodontic therapy of a case of implant endodontitis, preserving both the implant and the tooth.
Pathway 1 is when the implant insertion results in devitalization of the neighboring tooth (eg, because of insufficient distance, cutting off the blood supply to the pulp, or bone overheating during drilling), causing an endodontic pathology that consequently may influence the osseointegrated implant. Pathway 2 is when a periapical lesion from a neighboring devitalized tooth contaminates the implant. Pathways 1 and 2 are also known today as implant endodontitis (I-E) and endodontic implantitis (E-I), respectively.3 The case presented in this report corresponds to Sussman’s12 pathway 1, the I-E.

Few reports present similar accidents.6–8,13,14 In 1993, Sussman and Moss13 presented a case of an implant placed in a mandibular incisor extraction socket that caused a periapical pathosis on an adjacent lateral incisor after 2 weeks. Despite endodontic treatment, the infection reached the implant, resulting in its failure. Three similar cases were presented by Margelos and Verdelis6 2 years later. In 1997, Rubenstein and Taylor7 reported a 10-year follow-up of an apical nerve transection of a first mandibular left premolar. Endodontic therapy of the concerned tooth saved the implant and resulted in a long-term survival of the restoration. In 2016, Chung et al14 presented two cases, one of E-I and one of I-E. The authors stated that implant endodontitis was caused by an insufficient tooth-implant distance, creating a direct (eg, mechanical or thermal stimuli) or indirect (eg, cutting the blood supply to the pulp canal) trauma to the root during implant placement.

One may speculate that if the endodontic treatment of the adjacent tooth was delayed, a diffusion of the latent endodontic infection onto the implant may have resulted in E-I. Thus, the success of the implant would have been compromised. Indeed, some authors presented cases in which implant placement was thought to have caused pulpal necrosis, which in turn led to implant failure.12,13

Interestingly, the patient had given no signs of discomfort either immediately after implant placement, during the healing period, or at second-stage surgery; only little pain at palpation was reported before endodontic treatment. This is in agreement with previous reports where the nerve transection did not result in acute symptoms after implant placement, and the manifestations were only mild, transient, and reversible.7 It appears that after an implant insertion resulting in I-E, the patient may complain of pain or increased sensitivity immediately after the surgery, but I-E is usually asymptomatic.15

The other interesting observation in this report was the early failure of the implant placed at the first molar site (probably due to overheating during implant site preparation) that was successfully replaced 3 months later in an adjacent site, as well as the success of the “transecting” second premolar implant.

Some authors16 have stated that when the apex of the implant touches an adjacent root, retrograde peri-implantitis may often build up. It is difficult to determine if the present case developed retrograde peri-implantitis, since the endodontic treatment was conducted within a short period of time, resulting in a rapid elimination of any infectious source.

Placing dental implants aims to restore function and esthetics. Although high survival rates have been reported in the literature, esthetic and functional complications are a common finding in long-term studies. Several criteria have been proposed to radiographically analyze oral implants.17,18 Most of these studies suggest (1) the absence of a peri-implant radiolucency as a radiologic success criterion, and (2) limited marginal bone remodeling.
(≤ 2 mm after the first year of loading). From a clinical point of view, a functional implant with an acceptable esthetic appearance and the absence of signs of pain and an unhealthy pocket probing depth is considered a success. In the present case, the authors reported the patient’s 9-year history of what most would consider an abject failure that turned out to be a functional restoration over time. This long-term survival of the restoration could not have been achieved without the early endodontic treatment of the transected root, which resulted in a complete healing of the radiographic osseous lesion after 18 months.

**Conclusions**

Damage to adjacent teeth caused by inadequate implant placement may have adverse effects on concerned teeth and may increase the risk of implant failure. But with early endodontic management and a strict follow-up routine, radiographic osseous healing and stable long-term results can be established. The removal of the implant or the extraction of concerned teeth at an early stage is not mandatory, and a successful rehabilitation can be obtained if the case is adequately managed.

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**References**