Retrograde Peri-implantitis: Report of a Case Successfully Treated by Resection of the Implant Apex

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Retrograde peri-implantitis (RPI) is a periapical lesion that develops after implant insertion in which the coronal portion of the implant achieves a normal bone-to-implant interface. The most common etiology of RPI is the presence of an adjacent endodontic lesion. In most of the case reports available in the literature, the diagnosis of RPI occurred between 1 week and 4 years after implant placement. This case report illustrates the treatment of RPI that occurred more than 15 years after implant loading, caused by endodontic infection of the adjacent tooth. Int J Periodontics Restorative Dent 2021;41:443–448. doi: 10.11607/prd.4837

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clinical findings are the presence of lesions around the implant apex and sinus tract, often accompanied by symptoms of pain, tenderness, and swelling.

Treatment options were suggested in some reviews of case reports. The protocol usually included elevation of a full-thickness flap, complete removal of granulation tissue, and curettage of the bony cavity walls. Some studies reported the use of grafting materials alone or in association with a membrane. While others did not use any grafting material or membrane. Some authors reported the use of detoxification agents, and very few cases included apicoectomy of the implant.

Case Report

A 45-year-old systemically healthy woman with an American Society of Anesthesiologists classification of I was referred for consultation in April 2014 regarding her maxillary right canine. The patient complained of swelling and pain to percussion. The canine had a composite restoration, and fixed crowns on implants restored the maxillary right first and second premolars. The radiographic examination showed radiolucency apical to the canine (Fig 1a). The electric and thermal pulp test confirmed necrosis of the tooth. Endodontic therapy was performed with ProTaper Universal (Dentsply Maillefer) to an ISO size of #40.

The root canal was filled using gutta-percha (Mynol, Block Drug) and the warm vertical condensation technique. At the 6-month and 1-year clinical and radiographic follow-ups, there was incomplete resolution of periapical lesion, and the patient did not report any signs or symptoms. At 17 months postoperatively, the patient presented with swelling at her maxillary right buccal site. Radiographic examination revealed a radiolucent lesion on the apical and distal sites of the right canine, and no pathologic periodontal probing depth (PPD) was recorded. In agreement with the patient, an endodontic surgery was planned. The surgery was performed under magnification using diamond drills associated with constant sterile water irrigation. A complete debridement of the pathologic tissue was performed after root resection, approximately 3 mm from the apex with no bevel angle, in order to have a complete visualization of bone cavity that extended close to the apical part of the implant. A retrograde cavity was prepared with ultrasonic tips, the cavity obtained (3- to 4-mm depth) was dried with microtips applied to air and sealed with mineral trioxide aggregate (ProRoot MTA, Dentsply Sirona; Fig 1b).

Nine months later, a large abscess developed on the buccal aspect of the canine, with an associated 12-mm PPD on the central buccal site. The radiographic examination showed radiolucency around the most apical part of the implant distal to the canine (Fig 1c), but the implant was clinically stable with no signs of pathologic probing. It was decided to extract the tooth (Fig 1d), where a vertical fracture had recently been confirmed. The alveolar socket was cleaned with sterile saline solution, and a systemic antibiotic therapy was prescribed for 6 days (875 mg amoxicillin and 125 mg clavulanic acid every 12 hours).

Wound healing was uneventful 1 month after tooth extraction, but a fistula was still present on the buccal side (Fig 2a), and the patient still had soreness and swelling. A 3D sectional CBCT was done to exclude sinus communication (Figs 2b and 2c). The CBCT confirmed an area of radiolucency around the most apical part of the implant, and the sinus floor was intact. Therefore, it was decided to surgically access the area to allow for debridement of the bone cavity and decontamination of the implant surface (Fig 2d).

First, a mucoperiostal flap was elevated to access the lesion, which was a small cave under the cortical bone, 5 mm in diameter, containing pus and granulation tissue. The granulation tissue was removed, and curettage of the bony cavity walls was performed. The apical implant surface was irrigated with sterile saline solution, and the implant surface was decontaminated by means of the gentle and controlled use of Air-Flow Perio powder (EMA Dental).
Fig 1 (a) Initial radiograph. A radiolucency was seen apical to maxillary right canine. (b) Radiographic view after endodontic surgery and root resection. (c) Nine months after root resection, a big radiolucency was seen apical to the canine, and (d) the tooth was extracted.

Fig 2 (a) A fistula was still present after tooth extraction. (b and c) CBCT sections of the right maxilla, confirming an intact sinus floor and an area of radiolucency around the most apical part of the implant. (d) First access surgery. The bone cavity was debrided, and the implant surface was decontaminated.
At the 6-week follow-up, a small fistula was present under the mucosa, and the infection was still active (Fig 3a). It was thus decided to perform a second surgical procedure to treat the RPI lesion. A full-thickness paramarginal flap was elevated to remove the apical portion of the implant by means of a multiblade bur. The exposed implant surface was cut up to the bone margin (Figs 3b to 3d).

At the 1-month follow-up clinical examination, the patient showed a good wound healing without pain or swelling. The patient was enrolled in a stringent oral hygiene protocol and adhered to follow-ups for 2 years postoperatively. Further bone healing progress was observed (Fig 4).

Discussion

Peri-implantitis is becoming a very important issue in implant therapy. Peri-implantitis is defined as a pathological condition occurring in tissues around dental implants, characterized by inflammation in the peri-implant connective tissue and progressive loss of supporting
bone. In the present case report, a multisurgical therapy involving a tooth extraction, two surgical accesses for implant surface debride-
ment, and implant apicoectomy was required for the treatment of an RPI lesion (ie, reestablishment of peri-
implant tissue health).

Most RPI cases are caused by infections of peri-implant soft tis-
ues that develop from the gingival margin through the sulcus; in some cases, the contamination of the im-
plant surface can occur through an endodontic lesion of adjacent teeth. Prevalence of peri-implantitis on an implant adjacent to an endodontically treated tooth is reported as 7.8%, which was higher than the overall reported incidence. The most common etiology of RPI described in the literature was the presence of an adjacent endodontic lesion. Other etiologies include residu-
al bacteria in the implant site, overheating, implant surface contamination, fenestration of vestibular bone, and development of osteomyeli-
tis. For most of the case reports available in the dental literature, the diagnosis of RPI occurred between 1 week and 4 years after implant placement. The RPI diagnosed in the present case report occurred 15 years after implant loading, confirm-
ing the importance of the endodontic conditions of teeth adjacent to implants over time. Moreover, the present case report confirmed the possible contamination of the implant surface by means of an endodontic infection, even after many years of implant loading. In the pres-
ent case, there was no loss of supporting bone and the peri-implant soft tissues were stable, except for the presence of a buccal fistula and the radiographic evidence of radio-
lucentuency around the implant apex.

Many surgical approaches have been described to treat RPI. These should provide an adequate access to the defect, but at the same time be as conservative as possible. Most studies include debride-
ment of the defect and detoxification of the implant surface using different agents. None of the studies published described a specific protocol to treat the exposed implant surface, which is a crucial component to achieve resolution of the infection.

In the present case report, two considerations might be drawn. With regard to accessing the defect to provide complete detoxification of the implant surface, the debride-
ment of the bone defect performed in the first surgery was not enough to solve the infection. Consequently, subsequent resection of the implant apex was necessary to allow complete resolution of the infection and new bone formation at the 2-year follow-up. Although guided bone regeneration (GBR) procedures have been proposed in the literature, no GBR procedure was performed in the present case after resection of the implant apex, as the implant sur-
face was under a thick cortical bone and the residual bone defect had the configuration of a four-wall defect.

Conclusions

Within the limits of this case report, the proper diagnosis and treatment of teeth with endodontic lesions adjacent to implants may prevent the development of RPI, even after many years of implant loading. Once an RPI lesion is established, the implant surface debridement should be effective in order to rees-
ablish peri-implant tissue health.

Acknowledgments

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