Available online at www.sciencerepository.org

Science Repository

Case Report

Pericoronitis-related retrograde peri-implantitis in the right mandibular first molar region: a rare case report

Yanan Cheng[1], Pu Xu[2*] and Xinchun Jian[3]

[1]Resident, Department of Oral Implantation, Affiliated Haikou Hospital, Xiangya Medical school, Central South University, Hainan Provincial Stomatology Center, Haikou, China
[2]Professor and Chairman, Department of Oral Implantation, Affiliated Haikou Hospital, Xiangya Medical school, Central South University, Hainan Provincial Stomatology Center, Haikou, China
[3]Professor and Chairman, Department of Oral and Maxillofacial Surgery, Affiliated Haikou Hospital, Xiangya Medical school, Central South University, Hainan Provincial Stomatology Center, Haikou, China

ARTICLE INFO

Article history:
Received 28 February, 2018
Accepted 8 March, 2018
Published 15 March, 2018

Keywords:
pericoronitis
dental implant
retrograde peri-implantitis

ABSTRACT

The following report presents a very unusual case of a 50-year-old man with retrograde peri-implantitis secondary to pericoronitis of a horizontal, incompletely impacted mandibular right third molar. A cone-beam computed tomography scan revealed the presence of a radiolucency at the apex of the mobile implant at the right first molar site, which was detected one month after implant placement. The case management involved removal of the mobile implant and arrangement of a second implant surgery as well as extraction of the impacted third molar. The lesion gradually resolved over a 1-year period. The implant remained stable with no evidence of recurrence over a 4-year follow-up period.

Introduction

Retrograde peri-implantitis (RPI) is sometimes referred to in the literature as “apical peri-implantitis” or “implant periapical lesions” [1-4]. This type of case was first described by McAllister et al. [5]. RPI is defined as a clinically symptomatic periapical lesion that can be diagnosed as a radiolucency that develops within the first few months after an implant insertion, in which the coronal portion of the implant achieves normal osseointegration [6]. It is often accompanied by symptoms of pain, swelling, redness, tenderness and/or the presence of a fistulous tract [7].

The incidence of RPI is typically very low. Only 10 infected RPIs were found in 3800 implants by Reiser and Nevins and the prevalence of this RPI was only 0.26% in this sampling [7]. Although RPI is rare, its potential risk cannot be overlooked. If not treated early, it is a rapid infective process and it can potentially cause devitalization of adjacent teeth, and can greatly reduce the existing bone for future implants [8,9]. Therefore, recognition of possible etiologies and early clinical symptoms, frequent radiographic assessment, and early surgical management can minimize the extent of damage from RPI.

* *Corresponding author Pu Xu, Department of Oral Implantation, Affiliated Haikou Hospital, Xiangya Medical school, Central South University, Hainan Provincial Stomatology Center, Haikou, China, No. 43, Renmin Road, Haidian Island, Meilan District, Haikou, Hainan, China, 570208*
Fax.: +01186 089866189688 E-mail address: xupuhn@163.com

http://dx.doi.org/10.31487/j.DOCR.2018.10.002

Extensive studies indicated that the etiology of RPI is multifactorial and has been reported to include residual bacteria in the implant site, overheating during a surgical procedure, surface contamination of implants, bone compression, poor bone quality, premature loading, development of osteomyelitis, bone loss caused by a mucoperiosteal flap surgical procedure, adjacent endodontic lesions, residual root particles or foreign bodies, and HIV infection [6, 7, 10-17]. However, little attention has been paid to the role of impacted third molars combined with pericoronitis in the etiology of RPI. An impacted tooth that is completely or partially unerupted and is positioned against another tooth, bone or soft tissue so that its further eruption is unlikely, is described according to its anatomic position [18]. Tooth impaction is a pathological situation that may be a source of recurrent odontogenic pain, infection, and inflammation [19].

The case reported here involved a dental implant located in the right mandibular first molar region with a large periapical lesion, which was most likely caused by the horizontal, incompletely impacted right mandibular third molar combined with pericoronitis and was discovered one month after implant insertion. The patient exhibited discernible clinical improvement after removal of the source of infection over a 49-month follow-up period.

Case Report

A 50-year-old Chinese man without any relevant medical history visited our department in August 2012 for treatment of missing teeth 16 and 46. The patient lost his teeth 16 and 46 in October 2010 due to root fractures, which required their extraction. Clinical and radiographic examinations revealed that retained root fragments were present in the soft tissue of edentulous areas of teeth 16 and 46 (Fig 1a). Teeth 38 and 48 were horizontal and incompletely impacted. A cone-beam computed tomography (CBCT) scan examination revealed irregular radiolucency above the inferior alveolar nerve in the areas of teeth 46 and 47. In addition, a large radiolucency was observed at the peri coronal and periapical areas of the tooth 48 (Fig 1b). The proposed dental treatment plan included implantation of teeth 16 and 46 and extraction of 38, 48. Because of the patient's busy work schedule, he was unable to coordinate his time with ours to receive all of the planned treatments. The patient requested to have the dental implantation first and postponed the other recommendations.

On August 31, 2012, root fragments of 16 and 46 were extracted without apical debridement or flap reflection. The patient was then referred for implant placement (tooth 16: Nobel Replace RP 5×10mm; tooth 46: Nobel Replace RP 4.3×15mm) with a 35-Ncm insertion torque and immediate previsualization (nonfunctional loading). A CBCT scan showed the apical portion of the mandibular implant was very close to irregular radiolucency (Fig 2a). The patient received amoxicillin 250 mg tid, which was prescribed for 7 days, 0.12% chlorhexidine oral rinse, and acetaminophen was given as an analgesic when needed for pain control postoperatively.

Four weeks after the implant placement, the patient returned to our department, and complained of a pain that had developed in the mandibular implant site that could no longer be controlled with analgesics. At this time the site appeared healthy, but the implant was mobile. A CBCT scan showed a radiolucency at the apical and middle portions of the dental implant at the right first molar site, which was linked to low-density zones around tooth 48 as a single entity through the inferior alveolar canal (Fig 2b). A diagnosis of RPI was then established. Under local anesthesia, the implant was removed and the socket was then repeatedly rinsed and irrigated by using a sterile saline solution. The patient was advised that an extraction of tooth 48 was immediately required. Imminent overseas travel by the patient dictated that the extraction of tooth 48 be accomplished at this current visit.

Seven months after the implant extraction, the patient visited our department again and exhibited at the treated site recurring swelling and pain that persisted during that period. A CBCT scan showed that the radiolucency at the right first molar region had decreased in size and increased in density (Fig 2c). At that time, a second implant surgery was arranged for the patient. Routine preparation of the surgical field and administration of local anesthesia were performed. A crestal incision was made on the edentulous alveolar of tooth 46 and the mucoperiosteal flap was elevated. Implant (Bicon 5.0×8.0 mm) was placed. After the insertion of the implant, the flap was repositioned and sutured using a 3-0 silk. At the same time, extraction of tooth 48 was affected (Fig 3a). The patient was prescribed antibiotics (amoxicillin 250 mg, 3 times daily) and 0.2% chlorhexidine oral rinse and instructed to rinse twice daily for 7 days. Seven days after the surgical procedure, there were no symptoms of pain and inflammation, and the sutures were removed.

After submerged healing over a period of five months, the CBCT scan showed that there was new bone formation at the apical region of the implant, and that bone density slightly increased at the region of tooth 48 (Fig 3b). Second-step operation of implant on the edentulous ridge of tooth 46 was performed. Prosthetic rehabilitation was conducted one month later, and loading of the implant began (Fig 3c). During a 49-month follow-up, the mandibular implant was observed to be fully functional in the patient's mouth, with continuous stable bone levels around the implant. The CBCT scan revealed complete bone fill in the previous lesion area of tooth 48 (Fig 3d).

Illustrations

Figure 1

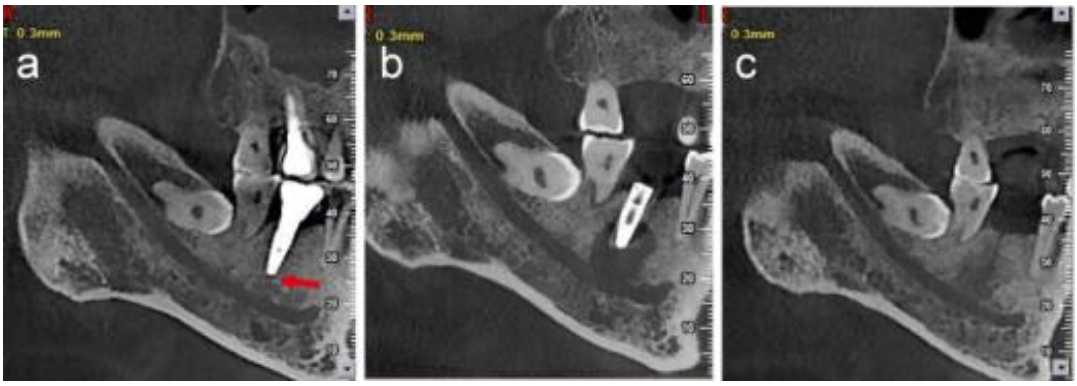

Figure 2

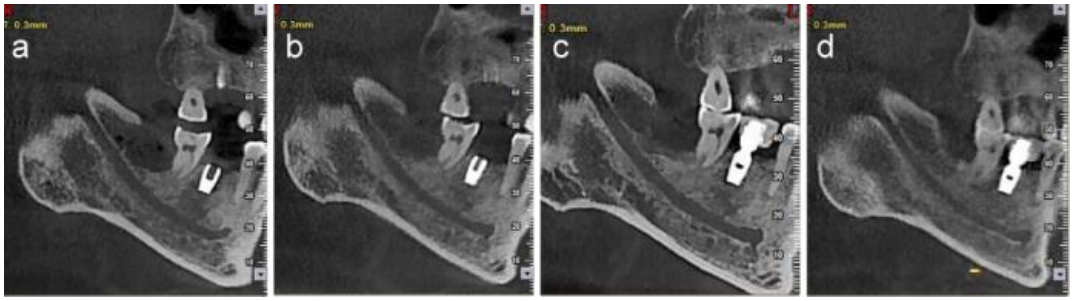

Figure 3

Figure legends

Fig. 1 Radiographic examination at first visit: (a) Panoramic radiograph shows root fragments retained in the soft tissue of edentulous areas of teeth 16 and 46(arrows). (b) CBCT sagittal sections demonstrates radiolucency was observed above the inferior alveolar canal and the distal and apical regions of the tooth 48(arrows).

Fig. 2 CBCT examination at the first implant treatment: (a)The apical part of the implant was close to irregular radiolucency (arrow).(b)The large radiolucency was located in the apical and middle regions of the dental implant four weeks after the implant first placement. (c)The radiolucent lesion was still observed, which was linked to low-density zones around tooth 48 as a single entity through the inferior alveolar canal seven months after the implant movement.

Fig. 3 CBCT examination at the second implant treatment: (a) Implant was inserted and tooth 48 was extracted. (b) New bone formation at the apical region of the implant and bone density slightly increased at the region of tooth 48 five months after the second implant insertion. (c) Prosthetic rehabilitation one month after a second-step operation of implant. (d)The bone around implant was stable at a 49-month follow up.

Discussion

RPI is infectious-inflammatory alterations surrounding an implant apex, and can be caused by a number of situations [20]. Sussman proposed two pathways that might lead to RPI: type 1 (implant to tooth) and type 2 (tooth to implant). Type 1 RPI occurs when the osteotomy preparation results in devitalization of the tooth pulp and periapical pathology. Subsequently, the peri apically infected tooth inhibited osseointegration of the implant. Type 2 RPI occurs when an adjacent tooth with periapical pathology contaminates the fixture and interferes with osseointegration of the implant [9]. The case reported here belongs to type 2, but the source of infection was from the impacted teeth. In this reported case, a large radiolucency surrounded the peri coronal and periapical areas of a horizontal impacted right, and the third molar implied that a chronic infection existed. If the source of infection was not alleviated immediately, the infection could have spread easily along the inferior alveolar canal to the apical area of the mandibular teeth. The irregular radiolucency above the inferior alveolar nerve existed in the areas of teeth 46 and 47 which was advantageous evidence to support this transmission route (Fig 2a).

The process of implant placement could cause activation of a latent response either due to overheating of the site or contamination or a combination of the two [21]. In this reported case, the apical of the mandibular implant was very close to irregular radiolucency, so the placement of the implant may have triggered periapical pathology at the apical portion of the tooth 46. This activation could have resulted in the rapid bone loss over a short period of time. The extraction of tooth 48 implied the removal of the source of infection, so the patient healed uneventfully and no recurrence of RPI was noted during a 49-month postoperative follow-up period. In addition, the patient's CBCT scan revealed that the radiolucency entirely resolved and there was new bone formation at the previous lesion area of the region of teeth 46 and 48, which implied that the horizontal incompletely, impacted right mandibular third molar combined with pericoronitis was the main cause of this patient's complaint.

A CBCT scan is a major innovation in the field of dentistry and has gained popularity, because of its lower radiation dose, easier image acquisition, limited area exposure and high resolution when compared to medical CTs [22]. It has also been previously observed that the CBCT image quality of fine dental and bony structures is superior [23]. In this reported case, panoramic radiographs do not provide accurate information regarding available bone quality and quantity, because they are confined to a two-dimensional view of a three-dimensional object [24]. As a result, this may lead the practitioner to overlook a portion of the preexisting inflammation and not properly treat the patient. Therefore, the clinician should improve the ability of reading radiographic examinations, and be aware that these sites may be at greater risk for implant placement, which underscores the value of a close evaluation of the suspected sites with more sensitive investigative procedures such as a CBCT scan. Economic considerations may preclude the routine use of such procedures, but the suspected sites have to be evaluated with a CBCT scan to avoid retrograde implant failures [25].

The treatment goals of RPI include elimination of the infection, resolution of the lesion and ultimately, implant survival [17]. In summary, various therapeutic alternatives have been demonstrated, such as systemic antibiotics, debridement only or the combination of debridement with grafting material with or without the use of membrane, detoxification of infected implant surfaces, or an apicoectomy, and implant removal [2, 12, 26-29]. In all cases, it must be ensured that the stability of the implant has not been damaged. If the implant is mobile, the implant should be considered to have failed and removal of the implant is the only management option [7, 13]. In this case report, the mobile implant was removed and the socket required only thorough debridement without grafting material placement, because of the lesion was close to inferior alveolar nerve. Although it was a long procedure, its outcome helped in prevent paresthesia in the inferior alveolar nerve and achieved the required function and aesthetics, which were of concern to the patient.

In summary, this case report revealed a new etiologic cause of RPI from combined pericoronitis of a horizontal, incompletely impacted mandibular right third molar making this case report a useful reference for implant surgery. The clinician must be aware of the potential risk of developing RPI as a result of an impacted tooth that can be associated with pericoronitis. This case report suggests that the greater incidence of implant failure at sites requires a more detailed analysis of the radiographs prior to implant installation.

Acknowledgments

This study is supported by the Key Research and Development Projects of Hainan Province (ZDYF2016018).

Conflict of interest

The authors declare no conflicts of interest.

REFERENCES

1.Kutlu HB, Genc T, Tozum TF (2016) Treatment of Refractory Apical Peri-Implantitis: A Case Report. *J Oral Implantol* 42: 104-109. [Crossref]

2.Quaranta A, Andreana S, Pompa G, Procaccini M (2014) Active implant peri-apical lesion:a case report treated via guided bone regeneration with a 5-year clinical and radiographic follow-up. *J Oral Implantol* 40: 313-319. [Crossref]

3.Peñarrocha-DiagoM, Maestre-Ferrín L, Cervera-Ballester J, Peñarrocha-Oltra D (2012) Implant periapical lesion: diagnosis and treatment. *Med Oral Patol Oral Cir Bucal* 17: 1023-1027. [Crossref]

4. Silva GC, Oliveira DR, Vieira TC, Magalhães CS, Moreira AN (2010) Unusual presentation of active implant periapical lesions: a report of two cases. *J Oral Sci* 52: 491-494. [Crossref]

5. McAllister BS, Masters D, Meffert RM. (1992) Treatment of implants demonstrating periapical radiolucencies. Pract Periodontics Aesthet Dent 4: 37-41.

6.Quirynen M, Gijbels F, Jacobs R (2003) An infected jaw bone site which compromising successful osseointegration. *Periodontol 2000* 33: 129-144. [Crossref]

7. Reiser GM, Nevins M (1995) The implant periapical lesion: etiology, prevention,and treatment. *Compend Contin Educ Dent*.16: 768, 770, 772 passim. [Crossref]

8.Sussman HI (1997) Implant pathology associated with loss of periapical seal of adjacent tooth:clinical report. *Implant Dent* 6: 33-37. [Crossref]

9.Sussman HI (1998) Periapical implant pathology. *J Oral Implantol* 24: 133-138. [Crossref]

10. Quirynen M, Vogels R, Alsaadi G, Naert I, Jacobs R, et al. (2005) Predisposing conditions for retrograde peri-implantitis, and treatment suggestions. Clin Oral Implants Res 16: 599-608. [Crossref]

11. Sussman HI, Moss SS (1993) Localized osteomyelitis secondary to endodontic-implant pathosis. A case report. J Periodontol 64:306-310. [Crossref]

12. Ayangco L, Sheridan PJ (2001) Development and treatment of retrograde peri-implantitis involving a site with a history of failed endodontic andapicoectomy procedures: a series of reports. Int J Oral Maxillofac Implants 16: 412-417. [Crossref]

13.Piattelli A, Scarano A, Balleri P, Favero GA (1998) Clinical and histologic evaluation of an active "implant periapical lesion": a case report. *Int J Oral Maxillofac Implants*13: 713-716. [Crossref]

14.Shaffer MD, Juruaz DA, Haggerty PC (1998) The effect of periradicular endodontic pathosis on the apical region of adjacent implants. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 86: 578-581. [Crossref]

15. Brisman DL, Brisman AS, Moses MS (2001) Implant failures associated with asymptomatic endodontically treated teeth. J Am Dent Assoc 132: 191-195. [Crossref]

16.Scarano A, Di Domizio P, Petrone G, Iezzi G, Piattelli A (2000) Implant periapical lesion: a clinical and histologic case report. *J Oral Implantol* 26: 109-113. [Crossref]

17.Chan HL, Wang HL, Bashutski JD, Edwards PC, Fu JH, et al. (2011) Retrograde peri-implantitis: a case report introducing an approach to its management. *J Periodontol* 82: 1080-1088.

18.Janakiraman EN, Alexander M, Sanjay P (2010) Prospective analysis of frequency and contributing factors of nerve injuries following third-molar surgery. *J Craniofac Surg* 21: 784-786. [Crossref]

19. Scheinfeld MH, Shifteh K, Avery LL, Dym H, Dym RJ (2012) Teeth: what radiologists should know. *Radiographics* 32: 1927-1944.

20.Peñarrocha Diago M, Boronat López A, Lamas Pelayo J (2006) Update in dental implant periapical surgery. *Med Oral Patol Oral Cir Bucal* 11: 429-432. [Crossref]

21.Mohamed JB, Shivakumar B, Sudarsan S, Arun KV, Kumar TS (2010) Retrograde peri-implantitis. *J Indian Soc Periodontol* 14: 57-65. [Crossref]

22. Okano T, Harata Y, Sugihara Y, Sakaino R, Tsuchida R, et al. (2009) Absorbed and effective doses from cone beam volumetric imaging for implant planning. *Dentomaxillofac Radiol* 38: 79-85. [Crossref]
23. Hofmann E, Medelnik J, Fink M, Lell M, Hirschfelder U (2013) Three-dimensional volume tomographic study of the imaging accuracy of impacted teeth: MSCT and CBCT comparison-an in vitro study. Eur J Orthod 35: 286-294. [Crossref]
24. Vujanovic-Eskenazi A, Valero-James JM, Sánchez-Garcés MA, Gay-Escoda C (2015) A retrospective radiographic and cone beam computerized tomography. *Med Oral Patol Oral Cir Bucal* 20: 239-245. [Crossref]
25. Mohamed JB, Alam MN, Singh G, Chandrasekaran SC (2012) The management of retrograde peri-implantitis: a case report. *J Clin Diagn Res* 6: 1600-1602.
26. Waasdorp J, Reynolds M (2010) Nonsurgical treatment of retrograde peri-implantitis: a case report. Int J Oral Maxillofac Implants 25: 831-833. [Crossref]
27. Tözüm TF, Sençimen M, Ortakoğlu K, Ozdemir A, Aydin OC, et al. (2006) Diagnosis and treatment of a large periapical implant lesion associated with adjacent natural tooth: a case report. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 101: 132-138. [Crossref]
28. Penarrocha-Diago M, Maestre-Ferrín L, Penarrocha-Oltra D, Canullo L, Piattelli A, et al. (2013) Inflammatory implant periapical lesion prior to osseointegration: a case series study. Int J Oral Maxillofac Implants 28: 158-162. [Crossref]
29. RokadiyaS, MaldenNJ(2008) An implant periapical lesion leading to acute osteomyelitis with isolation of Staphylococcus aureus. Br Dent J 205: 489-491. [Crossref]