

Successful Medical Treatment of An Implant Periapical Lesion: A Case Report

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An implant periapical lesion (IPL) is an infectious-inflammatory alteration surrounding an implant apex. In the English literature, the treatments for IPL have all been surgical methods. We present a case of successful treatment of an IPL with medical methods. A 36-year-old man underwent placement of two implants in the molar region of the right mandible. About one month later, the patient had pain at the surgical site and radiolucencies at the apical portion of the two implants on radiographs. Systemic antibiotic treatment with amoxicillin and acetaminophen was instituted, but the symptoms did not improve. The medications were changed to prednisolone, augmentin and mefenamic acid and the patient's symptoms completely subsided. This case was successfully treated using medical methods. The IPL disappeared on radiography and there were no symptoms or signs of recurrence at the 2-year follow up. We report a successful case of an IPL using medical methods. However, additional data are certainly necessary for a more comprehensive understanding of the etiopathologic and clinical problems related to an IPL. (*Chang Gung Med J 2011;34:109-14*)

Key words: implant periapical lesion, antibiotic, therapy

The etiology and mechanism of implant failure are multifactorial.⁽¹⁾ An implant periapical lesion (IPL) was first described in 1992.⁽²⁾ It is infectious-inflammatory alterations surrounding an implant apex,⁽³⁾ and is one possible cause of implant failure.⁽⁴⁾ In the literature, an IPL⁽⁹⁾ is also called periapical implant pathology,⁽¹⁰⁾ endodontic-implant pathology,⁽¹¹⁾ a periapical implant lesion,⁽¹⁾ retrograde peri-implant infection,⁽⁶⁾ apical peri-implantitis,⁽⁵⁾ and retrograde peri-implantitis.⁽⁷⁾ The condition usually develops within the first month after insertion and is caused by bacterial contamination during insertion, premature loading, or preexisting inflammation.⁽⁷⁾

The incidence of an IPL in dental implant procedures varies from 0.26% to 9.9%.^(9,12,13) The site of most occurrences is the maxillary premolar.⁽⁶⁾ The

low incidence of pathosis may be due to the selective placement of implants into edentulous arches in the early years of implant history. As implants have become the standard for dentate arches, more of these lesions may be expected.⁽¹⁴⁾

IPLs can be classified into active and inactive lesions according to the activity of the infection.⁽⁹⁾ Lesions also are classified according to their evolutive stage as either acute or chronic.⁽³⁾ The endodontic-implant pathology can be divided into two case types according to the main infection pathways, implant to tooth (due to bone overheating, indirect or direct trauma to the tooth root), and tooth to implant (due to periapical pathology leading to contamination of the implant). In both types, the resulting periapical pathology contaminates the fixture and

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inhibits osseointegration of the implant during stage I healing.⁽¹⁰⁾

The diagnosis is based on clinical manifestations and radiological findings, where radiotransparency can be seen at the periapical level.⁽³⁾ Distinguishing an infected from an inactive form of periapical lesion cannot be readily diagnosed unless clinical symptoms develop.⁽¹⁵⁾ The active or infective lesion tends to enlarge, is symptomatic, and results in fistula formation.⁽¹⁵⁾

Treatment of an IPL varies according to the type of lesion. Inactive lesions, which should be observed and monitored, do not need further treatment unless their size increases.^(7,9) Monotherapy via systemic antibiotics usually cannot achieve complete resolution of an IPL.⁽⁶⁾ Antibiotic administration alone is unlikely to be successful because of difficulties in the eradication of bacterial colonies from the IPL.⁽¹⁴⁾ The infected lesion typically requires surgical intervention, elimination of the infection, and an implant apical resection, or implant removal, depending on the extent of infection and the stability of the implant.⁽⁹⁾

In the English literature, most IPL treatments have been surgical methods. We present a case of successful medical treatment of an IPL. After the IPL disappeared on radiography, there were no symptoms or signs of recurrence at the 2-year follow up.

CASE REPORT

A 36-year-old man with a history of gout underwent placement of two implants in the molar region of the right mandible in 2006. (3i Osseotite®, 3i Implant Innovations, Inc., Palm Beach Gardens, FL). The implant specifications were 4 x 13 mm at the first molar site (No. 30), and 5 x 11.5 mm at the second molar site (No. 31). The teeth had been extracted at a local dental clinic several years before the patient presented to the dental department of Chang Gung Memorial Hospital, Chiayi branch. A panoramic radiograph revealed no evident bone pathology (Fig. 1). The implant placement procedure was uneventful, and the patient had no particular complaints after surgery.

About one month later, the patient had pain on the lingual side of the surgical site and in the right submandibular area. The radiographs showed radiolucencies at the apical portion of the two implants

(Fig. 2). The patient had pain upon palpation, tenderness, and swelling, but no sinus tract or pus formation was found.

At first, systemic antibiotic treatment with amoxicillin 250 mg and acetaminophen 500 mg (every 8 hours for 3 days) was instituted. Four days later, because the symptoms did not improve, the medications were changed to prednisolone (5 mg tablets three times daily for 3 days), and augmentin 375 mg and mefenamic acid 250 mg (three times daily for 7 days). After this treatment, the patient's symptoms completely subsided.

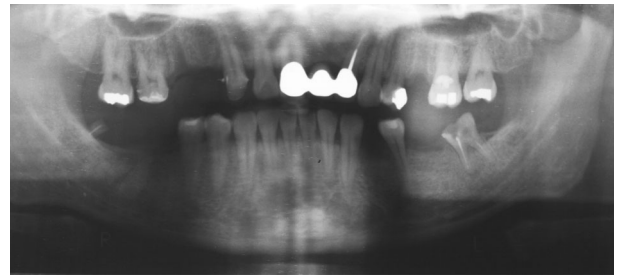


Fig. 1 A panoramic radiograph reveals no preexisting bone pathology before dental implant placement.

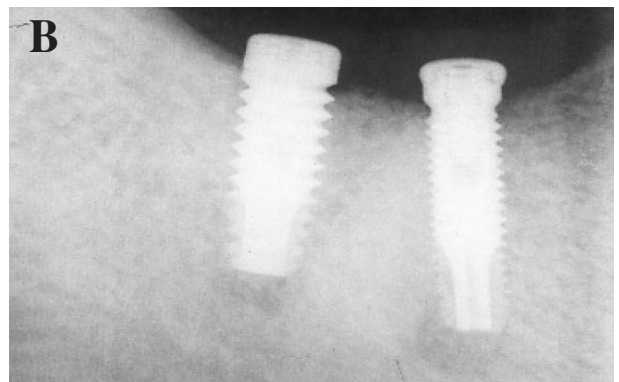
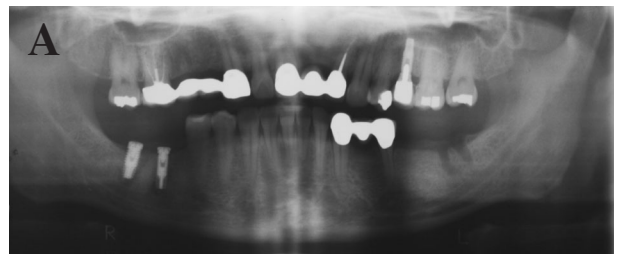


Fig. 2 Radiographs show radiolucencies at the apical portion of the two implants. (A) Panoramic radiograph and (B) Periapical radiograph.

Five months after medical treatment, the IPL had disappeared on radiography (Fig. 3). Implant stage II surgery was performed three months later. Five months later, the implants were restored with permanent crowns (Fig. 4). At 2 years, 17 months after functional loading, no symptoms or signs of an IPL had recurred at follow-up (Fig. 5).

DISCUSSION

Radiographic periapical radiolucency is sometimes asymptomatic when an IPL is present.⁽⁴⁾ Clinically, the patient may complain of swelling and a facial fistula that is sometimes associated with tenderness.^(1,4,9) Severe pain is an uncommon finding, and pocketing is rare.⁽⁶⁾ Formation of a sinus tract is the most common clinical manifestation,⁽⁶⁾ but our patient did not present with this clinical sign.

Possible etiologies that induce a periapical implant lesion can be attributed to the following: (1) Implant factors: contamination of the implant surface during production or insertion,^(9,16) lack of biocompatibility,^(9,16) and different implant surface designs.⁽¹⁶⁾ (2) Patient factors: preexisting or adjacent bone pathology,^(1,15-18) residual root fragments and foreign bodies in the bone,^(6,9,15-17) implant placement in an infected maxillary sinus,^(9,15-17) implant placement in poor quality bone,⁽¹⁵⁻¹⁷⁾ and smoking.⁽⁵⁾ (3) Dentist factors: overheating of bone (traumatic factor),⁽¹⁵⁻¹⁷⁾ excessive tightening of the implant with compression of the bone chips,⁽¹⁵⁻¹⁷⁾ overloading of the implant,⁽¹⁵⁻¹⁷⁾ and accidental implantation of gingival epithelial cells.⁽¹⁵⁾ Because the patient had a successful, functional Osseotite® implant on the left maxillary premolar site before the IPL occurred, the lack of biocompatibility of the implant was excluded. The patient was not a smoker, and had never taken bisphosphonates. The bone density was type 3 to type 2. There was no evident preexisting or adjacent bone pathology, and no residual root fragments and foreign bodies in the bone. Consequently, the suspected etiologies according to the clinical and radiographic findings, were overheating of the bone (heat-induced aseptic bone necrosis), excessive tightening of the implant with compression of the bone chips, or contamination of the implant surface.

Treatment of an infection at the apex of an implant can be very difficult.⁽¹¹⁾ There is no clinical protocol for the management of an IPL.⁽⁹⁾ However,

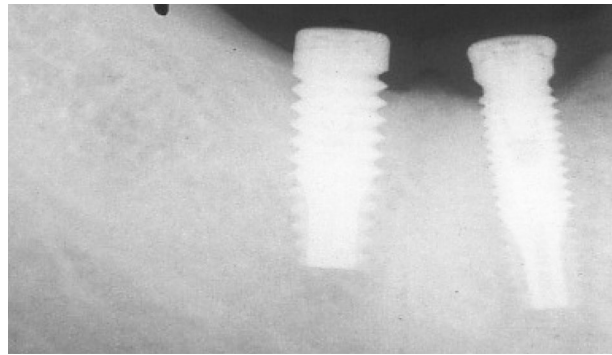


Fig. 3 The implant periapical lesion has disappeared on radiography, 5 months after medical treatment.

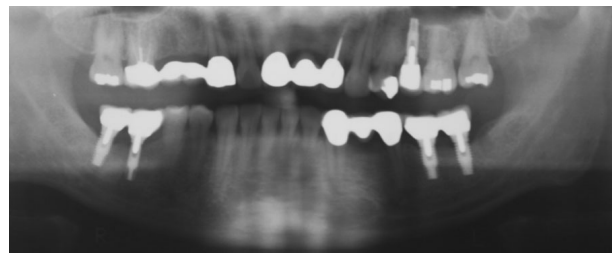


Fig. 4 The implants are restored with permanent crowns.

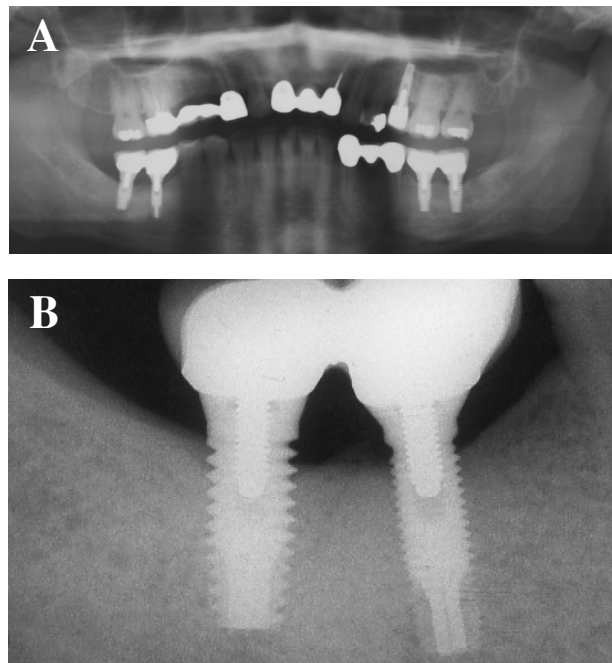


Fig. 5 The IPL has disappeared on radiography and there is no recurrence of symptoms or signs at the 2-year follow-up. (A) Panoramic radiograph and (B) Periapical radiograph.

although the direct etiology of an IPL is still unknown, successful treatment is available.⁽²⁾ Treatment varies according to the type of lesion.^(7,9) If an infected IPL is discovered, it should be treated aggressively.⁽⁹⁾

The therapies for an IPL, which are similar to those for peri-implantitis, include the following: (1) non-surgical treatment via systemic antibiotics, (2) resective treatments including debridement along with detoxification of the implant surface using a chemical agent (chlorhexidine gel, stannous fluoride, tetracycline hydrochloride, hydrogen peroxide, citric acid, polymyxin B, or chloramine T), and intraoral apicoectomy of the implant apex, (3) regenerative treatments including debridement, detoxification of the implant surface, intraoral apicoectomy of implant apex, and guided bone regeneration, and (4) removal of the infected implant.^(2,4-8,9-11,13-19)

The clinician should remember that monotherapy via systemic antibiotics cannot achieve complete resolution of the IPL.⁽⁶⁾ The criteria for the selection of antibiotics includes the etiology, presence or absence of pain and abscess, time of onset, and whether the lesion is open or closed.⁽⁶⁾ Bacteria associated with failing implants have been found to be sensitive to penicillin G, amoxicillin, a combination of amoxicillin and metronidazole, and amoxicillin-clavulanate.⁽¹⁹⁾ Amoxicillin-clavulanic acid is the first choice for the treatment of implantology infections.⁽²⁰⁾ Antibiotic administration alone is unlikely to be successful because of the difficulties in eradicating bacterial colonies from an IPL,⁽¹⁴⁾ obtaining a culture from IPL sites,⁽⁵⁾ and patient compliance with antibiotic regimens.⁽⁵⁾ Therefore, it is generally recommended that systemic antibiotics not be used as the sole therapeutic method in treating an IPL, and definitive surgical intervention is advised within one month of IPL onset.⁽⁶⁾ However, our patient was treated successfully only by medication with amoxicillin and augmentin. The radiographic radiolucency completed disappeared after 7 months. To date, the patient's implants still function well.

Surgical intervention is comprised of removal of infected tissue via mechanical debridement, decontamination of the implant surface, and thorough rinsing of the infected bony housing to remove detached microorganisms and prevent further colony formation via a nucleation effect.⁽⁶⁾ Salvage of the implant should be attempted via implant apicoectomy if suf-

ficient osseointegration remains, infection is compartmentalized to the apex, the defect and implant surface are completely accessible, and sufficient length remains to allow for removal of the apical portion.^(9,13) If the implant has lost its stability, removal of the implant is suggested.

Periapical implant lesion is a preventable disease. Implant therapy should be directed to minimize the occurrence or consequences of an IPL by careful diagnosis, systematic treatment planning, and appropriate treatment.⁽⁸⁾ The combination of careful evaluation of planned implant sites for potential contaminants, careful surgical technique, and meticulous sterilization techniques may limit the incidence of infected IPLs.⁽⁹⁾

Conclusions

Although IPLs are reported infrequently, they remain a valid concern in the success and longevity of osseointegrated implant treatment. There is no systemic scientific validation of the treatment of an IPL, and therapy is based mainly on empirical experience and inference from the clinical findings. In addition to the various surgical methods, medical methods may be successful in the treatment of this condition, as in our patient. However, additional data are certainly necessary for a more comprehensive understanding of the etiopathologic and clinical problems related to the periapical implant lesion.

REFERENCES

1. Tözüm TF, Sençimen M, Ortakoğlu K, Ozdemir A, Aydın OC, Keleş M. 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* 2006;101:e132-8.
2. McAllister BS, Masters D, Meffert RM. Treatment of implants demonstrating periapical radiolucencies. *Pract Periodontics Aesthet Dent* 1992;4:37-41.
3. Peñarrocha Diago M, Boronat López A, Lamas Pelayo J. Update in dental implant periapical surgery. *Med Oral Patol Oral Cir Bucal* 2006;11:E429-32.
4. Jalbout ZN, Tarnow DP. The implant periapical lesion: four case reports and review of the literature. *Pract Proced Aesthet Dent* 2001;13:107-12; quiz 114.
5. Flanagan D. Apical (retrograde) peri-implantitis: a case report of an active lesion. *J Oral Implantol* 2002;28:92-6.
6. Park SH, Sorensen WP, Wang HL. Management and prevention of retrograde peri-implant infection from retained root tips: two case reports. *Int J Periodontics Restorative*

- Dent 2004;24:422-33.
7. Quirynen M, Vogels R, Alsaadi G, Naert I, Jacobs R, van Steenberghe D. Predisposing conditions for retrograde peri-implantitis, and treatment suggestions. *Clin Oral Implants Res* 2005;16:599-608.
 8. Oh TJ, Yoon J, Wang HL. Management of the implant periapical lesion: a case report. *Implant Dent* 2003;12:41-6.
 9. Reiser GM, Nevins M. The implant periapical lesion: etiology, prevention, and treatment. *Compend Contin Educ Dent* 1995;16:768,770,772.
 10. Sussman HI. Periapical implant pathology. *J Oral Implantol* 1998;24:133-8.
 11. Sussman HI, Moss SS. Localized osteomyelitis secondary to endodontic implant pathosis: a case report. *J Periodontol* 1993; 64:306-10.
 12. Esposito M, Hirsch J, Lekholm U, Thomsen P. Differential diagnosis and treatment strategies for biologic complications and failing oral implants: a review of the literature. *Int J Oral Maxillofac Implants* 1999;14:473-90.
 13. Balshi SF, Wolfinger GJ, Balshi TJ. A retrospective evaluation of a treatment protocol for dental implant periapical lesions: long-term results of 39 implant apicoectomies. *Int J Oral Maxillofac Implants* 2007;22:267-72.
 14. Shaffer M, Juruaz D, Haggerty P. The effect of periradicular endodontic pathosis on the apical region of adjacent implants. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1998;86:578-81.
 15. Scarano A, Di Domizio P, Petrone G, Iezzi G, Piattelli A. Implant periapical lesion: a clinical and histologic case report. *J Oral Implantol* 2000;26:109-13.
 16. Piattelli A, Scarano A, Piattelli M, Podda G. Implant periapical lesions: clinical, histologic, and histochemical aspects. A case report. *Int J Periodontics Restorative Dent* 1998;18:181-7.
 17. Piattelli A, Scarano A, Balleri P, Favero GA. Clinical and histologic evaluation of an active "implant periapical lesion": a case report. *Int J Oral Maxillofac Implants* 1998;13:713-6.
 18. Sussman HI. Endodontic pathology leading to implant failure--a case report. *J Oral Implantol* 1997;23:112-5; discussion 115-6.
 19. Ayangco L, Sheridan PJ. Development and treatment of retrograde peri-implantitis involving a site with a history of failed endodontic and apicoectomy procedures: a series of reports. *Int J Oral Maxillofac Implants* 2001;16:412-7.
 20. Bowen-Antolin A, Pascua-García MT, Nasimi A. Infections in implantology: from prophylaxis to treatment. *Med Oral Patol Oral Cir Bucal* 2007;12:E323-30.

利用非手術性方式成功治療人工牙根根尖病灶

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人工牙根根尖病灶 (Implant Periapical Lesion, IPL) 是指環繞在人工牙根根尖的發炎病變。至今所有發表過的有關 IPL 的治療方法，都是利用不同的手術方式來治療此根尖病灶。而我們以下將提出“利用非手術方式成功治療人工牙根根尖病灶”的病例報告。一名 36 歲男性患者在右側下顎骨的大臼齒區植入二根人工牙根，大約術後一個月，患者的手術區有疼痛的感覺，經 x 光照射檢查發現二根人工牙根根尖有放射線透過性病灶 (radiolucencies) 的存在。因此先給與藥物治療 (amoxicillin and acetaminophen)，但症狀沒有改善；之後改用 prednisolone、augmentin 和 mefenamic acid。在這種治療以後，患者的症狀完全地消退了。並且在使用 2 年後 (functional loading)，依然沒有任何症狀再出現。除了各種的外科方法以外，我們發表成功運用非手術方式來治療 IPL；然而為了減少 IPL 的發生，更加全面的理解 IPL 的病因一定是必要的。(長庚醫誌 2011;34:109-14)

關鍵詞：牙科植體根尖病灶，抗生素，治療

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