

미만성 경화성 골수염을 동반한 하악에서 임플란트의 골유착

Osseointegration of dental implant in the mandible with diffuse sclerosing osteomyelitis: Report of a rare case

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There are very few reports of the restoration of tooth loss using dental implants in patients with diffuse sclerosing osteomyelitis (DSO). Because the patients with DSO have unfavorable bone quality for osseointegration of dental implants, additional considerations such as surgical trauma, infection control, and an extended healing period are essential when placing dental implants. The purpose of this study is to report on the success of osseointegration of a dental implant in the patient with DSO. (J Korean Acad Prosthodont 2021;59:314-8)

Keywords

Dental implant; Diffuse sclerosing osteomyelitis; Healing period; Osseointegration

Introduction

Diffuse sclerosing osteomyelitis (DSO) is a rare chronic bone disease. DSO often occurs in the mandibular region of adults, regardless of their sex. In addition, there is an increased level of radiopacity at regions near chronic inflammation, including periodontitis, pericoronitis, and periapical lesions.^{1,2} The etiology and treatment of diffuse sclerosing osteomyelitis are not yet clearly understood. Although still controversial, the cause of diffuse sclerosing osteomyelitis is thought to be the response against low-grade bacterial infection or chronic periostitis. Due to its low prevalence, DSO is often perceived as parotitis or local dental infection - despite accompanying symptoms of pain, edema, or trismus in the early stages - due to unclear known symptoms. Therefore, it is difficult to be correctly diagnosed at an early stage.³ Sclerosing bone apposition is mainly found around

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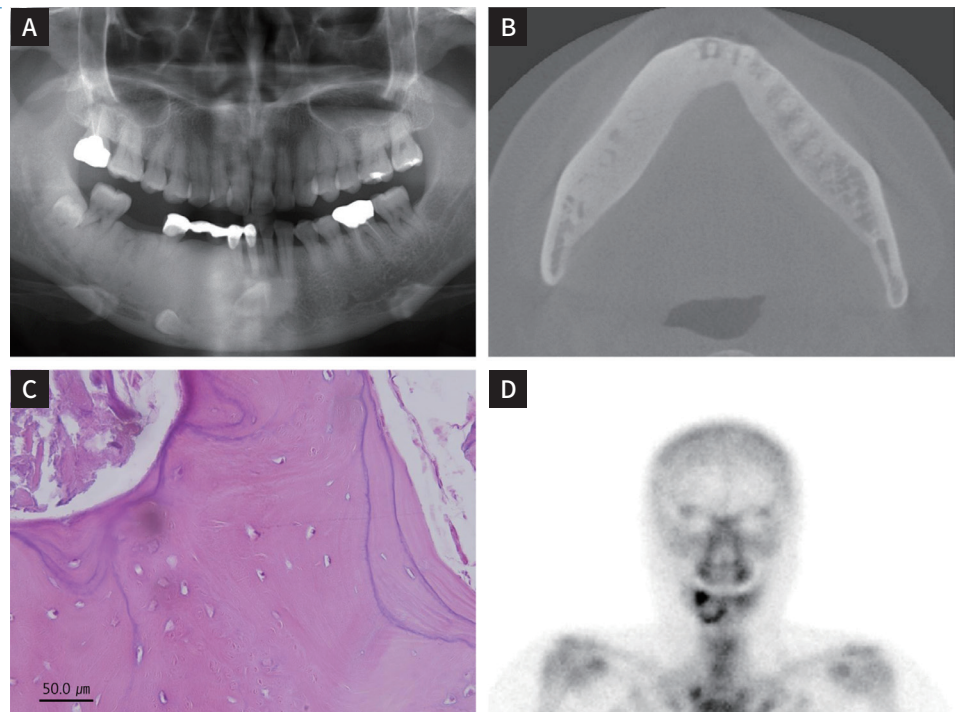
the alveolar bone around the teeth, however, the area of attachment to muscles such as masseter and mylohyoid does not originate. Nevertheless, there are some case reports that drugs administration such as bisphosphonates^{3,4} and denosumab⁵ improves osteomyelitis by preventing osteolysis. The possibility of failed dental implant placement due to loss of osseointegration in DSO patients cannot be neglected. In addition, insufficient blood supply, worsening of osteomyelitis due to surgery, and inflammation in adjacent teeth are all potential risk factors.⁶ Therefore, there are very few reports of the restoration of tooth loss in DSO patients using dental implants. The purpose of this study is to report on the failure and success of osseointegration of a dental implant in the patient with DSO.

Case Report

A 42-year old female patient visited our center with loss of first molar on the right side of the mandible. Analysis of radiological images taken showed the presence of a

large radiopaque lesion with unclear boundaries. Orange-peel like bony appearance was observed and the mandibular canal was displaced downwards (Fig. 1A, Fig. 1B). A dental implant (Implantium, Dentium Co., Seoul, Korea) was placed in the mandibular first molar region, and initial stability was confirmed with excellent implant stability quotient (ISQ = 85). Bony specimen was gathered during drilling procedure for biopsy. Based on histopathological test outcomes, the patient was diagnosed with diffuse sclerosing osteomyelitis. Bony trabeculae exhibited severe sclerosis, and the patient showed signs similar to chronic osteomyelitis with minimal osteoblastic activity or inflammatory cells (Fig. 1C). From the nuclear medical examination (^{99m}Tc scintigraphy) performed prior to place a dental implant again, we observed that sclerosis was localized to the right mandibular region (Fig. 1D). A periapical radiograph taken right after implant installation showed relationship with adjacent structures (Fig. 2). After a month recall, patient felt dull pain around the implant site and then radiating radiolucency around implant site was observed, and thus

Fig. 1. Findings and diagnosis of diffuse sclerosing osteomyelitis. (A) Broad radiopaque lesion of right mandible in panoramic radiograph, (B) Highly dense, radiopaque lesion of right mandible in cone-beam computerized tomography, (C) Osteopetrosis-like sclerosed bone with few osteoblastic activity in a biopsy specimen (hematoxylin and eosin stain), (D) Irregular increased uptake of right mandible in ^{99m}Tc scintigraphy.



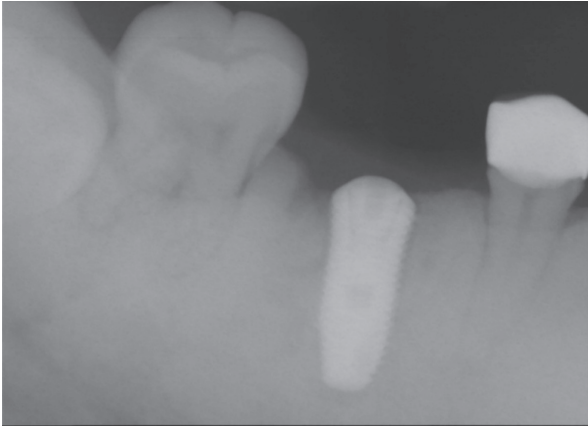


Fig. 2. A periapical radiograph taken right after an implant installation at the right first molar area of mandible.

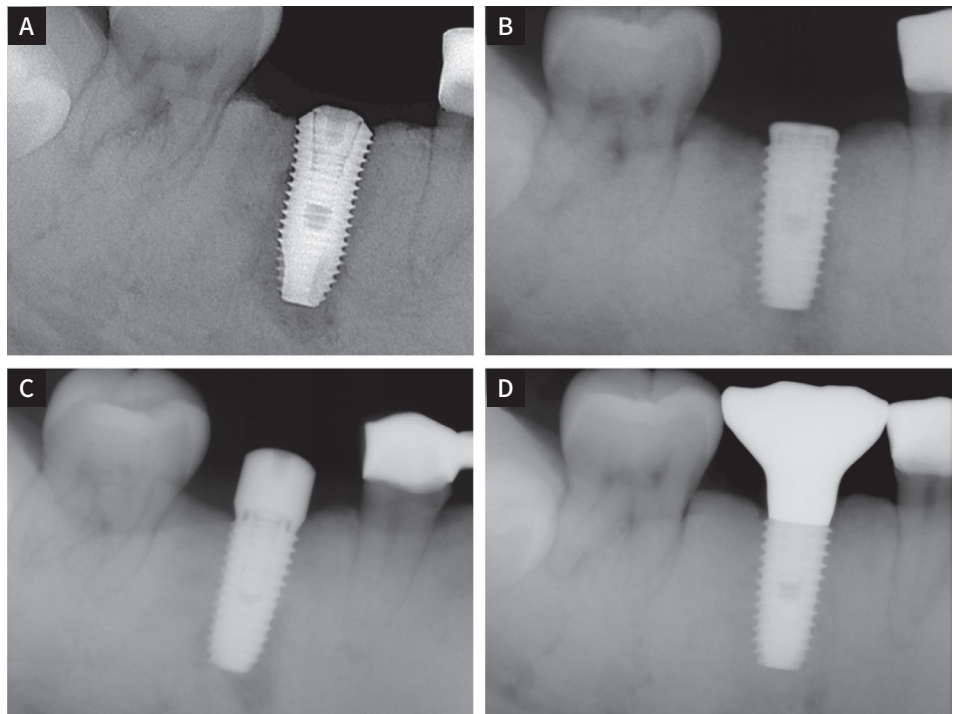
the dental implant was removed (Fig. 3A). A month after the removal of the implant, another dental implant (Sola, Shinhung Co., Seoul, Korea) was placed (Fig. 3B) and the ISQ value of immediately after the surgery was 87. During implant site preparation, minimal usage of rotary drilling machine with only low speed and profound irrigation was carefully performed to avoid the possibility

of complication such as heat damage. Low speed drilling procedure consisted of final size and tapping drill which were allowed to be appropriate to defect. According to final-size drill used, an implant with different configuration was selected. For six months, the degree and area of radiolucency surrounding dental implant site were assessed. Radiopacity increased near the implant site (Fig. 3C), and the ISQ when the healing abutment was connected was 81. Conventional prosthetic procedure was performed after soft tissue healing period. Single implant gold crown with screw retention was secured and occlusal relationship was harmonized with no deflective contact. After periodic recall, the process of prosthetic restoration was completed and bony status around implant was stably maintained (Fig. 3D).

Discussion

Despite few clinical reports of prosthetic restorations using dental implants in patients with DSO, the plan of this case was unavoidable as a treatment plan. Restor-

Fig. 3. Sequential periapical radiographs showing prolonged healing. (A) Loss of osseointegration of an implant with surrounding radiolucent lesion, (B) Placement of another implant at 1 month after removal, (C) Healing abutment connection after 6 months submerging period, (D) Stable bony status around implant at 12 months follow-up.



ative method for tooth loss area was to use the implant as long as the existing fixed dental partial denture was present because the second premolar tooth was functioning as an abutment.

It is possible to estimate excessive heat generation during implant site preparation as a cause associated with osseointegration failure during the first implant installation. Even if bone removals were performed with sufficient water irrigation, the resistance to preparation of installed area with increased bone density would have increased drilling pressure, which might have led to bone necrosis.⁷ The patient complained of blunt pain in the area of implantation during a month's recall, and radiograph examination showed radiating radiolucency around the implant. The rapid destruction of installed site showing high bone density in a rather short period of time (one month recall) might be thought to be a strong evidence of bone necrosis. In addition, there would be thought of a complex possibility of bacterial infection, although no significant suppurative inflammation was found in the removal of failed implants. Despite of rapid bone destruction, bone healing capacity of the patient was considered to be favorable with the evaluation of radiographs in two months recall after the re-installation process.

Timing determination of re-installation and new selection of the second implant were resulted from the purpose of minimal bone removal after confirmation of the healing progress of the defect site and to match the defect shape as possible. Because of bone necrosis, the first implant was easily removed, and radiograph examination conducted after one-month healing period clearly identified a problem in cancellous bone area, so it was determined that there would be no problem in the subsequent bone healing process. In addition, the final-size drill and tapping drill were used in low-speed rotary state and sufficient water irrigation to minimize the effects on additional bone removals. The final-size drill had a diameter of 3.8 mm, which resulted in the selection of 4.0 mm diameter implant with different configuration. By

placing the dental implant before the bony healing of the failed implant site was complete, we minimized the drilling required for placing dental implant placement again.

There are previous studies suggesting that the prevention of bone resorption using bisphosphonate can improve osteomyelitis⁸ and muscle relaxation at the affected site is an effective treatment.⁶ Currently, subcutaneous injection of a human monoclonal antibody (denosumab) showed a possibility of alternative treatment for patients suffering from DSO.⁵

Since DSO patients have dense bones, the unclear boundary of the region exhibiting sclerosis and insufficient blood supply, treatment accompanying dental implant placement is contraindicated if the patient requires surgical reconstruction or removal of the affected site. Nonetheless, if the inflammation does not worsen, dental implant placement might be possible.⁹ The patient in this case report also exhibited no signs of progression based on the radiological image taken 2 years prior to the re-visit. However, because of the probability of failure in osseointegration, the presence of an inadequate blood supply and the possibility of exacerbating the disease, implant therapy should be used with caution in the majority of DSO patients.⁹

Conclusion

Since DSO is a disease that is difficult to be diagnosed in the early stages and treated properly, restoration using dental implant might be challengeable and needs to be performed with prolonged observation of nearby bony tissue after the placement of dental implants.

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미만성 경화성 골수염(diffuse sclerosing osteomyelitis, DSO) 환자에서 임플란트를 사용하여 손실된 치아의 회복에 대한 보고는 거의 없다. DSO 환자는 임플란트의 골유착에 불리한 골질을 지니고 있기 때문에 임플란트를 식립할 때, 외과적 외상, 감염 관리 및 연장된 치유 기간과 같은 추가적인 고려사항이 필수적이다. 본 증례는 DSO 환자에서 임플란트 골유착의 실패와 성공에 관한 보고이다. (대한치과보철학회지 2021;59:314-8)

주요단어

임플란트; 미만성 경화성 골수염; 치유기간; 골유착

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