Treatment of peri-implantitis with deproteinised bovine bone and tetracycline: a case report

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Objective: The objective of this study is to evaluate the use of tetracycline in a patient with peri-implantitis.

Background: Tetracycline is widely used in regeneration procedures owing to its positive effect with bone graft material, regeneration of extraction socket bone and its traditional antibacterial effect. However, there have been limited reports on bone graft procedures combined with tetracycline application in peri-implantitis.

Materials and methods: The detoxification procedure was performed with chlorhexidine and tetracycline, and the defect area was grafted with a 4:1 volume ratio combination of deproteinised bovine bone mixed with tetracycline.

Results: Soft tissue healing was uneventful, and the treatment yielded improved clinical results with a reduced probing depth.

Conclusions: Tetracycline was used in the treatment of peri-implantitis by burnishing the implant surface and applying tetracycline in conjunction with an osseous graft to the defect area. The treatment of peri-implantitis with tetracycline seemed to show improved clinical results up to the follow-up period.

Keywords: peri-implantitis, tetracycline, bovine bone.

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Introduction

Surgical treatment procedures of peri-implantitis around titanium implants have previously been evaluated in humans and animals, and protocols such as air-powder abrasives, citric acid and antimicrobial agents have been suggested for the detoxification procedures.

Tetracyclines are primarily bacteriostatic antimicrobials, which exert their antibacterial activity by inhibiting microbial protein synthesis. Tetracycline is used widely in the regeneration procedure because of its positive effect with bone graft material, its regeneration of extraction socket bone, its traditional antibacterial effect and its anticollagenase activity. However, there have been limited reports on bone graft procedures combined with tetracycline application in peri-implantitis.

The objective of this case report of a patient with peri-implantitis is to evaluate the use of tetracycline. We do so by burnishing the implant surface and applying tetracycline in conjunction with an osseous graft in the defect area.

Case

A 48-year-old man presented to the Dental Clinic at the Armed Forces Capital Hospital seeking treatment for his lower left molar area. The patient had a non-contributory medical history.

Clinical examination revealed that his two lower left molars were missing. There was a ridge defect of the buccal area on the most mesial aspect and the keratinised tissue on the buccal side measured 1 mm wide. Treatment with a dental implant was planned after consultation with the patient about his condition, treatment period and complications.

Three implants (Neoplast, Neobiotech; Seoul, Korea) were placed in the lower left sextant with an insertion torque of 40 Ncm (Fig. 1). The defect of 5 mm (mesio-distal) × 5 mm (apico-coronal) on the most mesial implant was grafted with...
deproteinised bovine bone (Bio-Oss®; Geistlich Pharm AG, Wolhusen, Switzerland) (Fig. 2). A healing cap with 2.0 mm label bevel height was connected, and a portion of the healing cap was left exposed to avoid tension on the incision line. The patient was placed on amoxicillin 500 mg, three times a day for 5 days, mefenamic acid 500 mg initially, then mefenamic acid 250 mg four times a day for 5 days, and chlorhexidine digluconate 0.12% three times a day for 4 weeks. The patient was asked not to chew and brush the surgical area for the first 4 weeks post-operatively.

The abutments were connected, and final implant-supported crowns for the lower first and second molars were inserted 4 months after implant installation (Fig. 3). Soft tissue healing was uneventful on the most mesial implant with keratinised tissue on the buccal side measuring 2–3 mm.

The patient came to the clinic complaining of pus discharge and swelling 2 months after prosthesis connection. Clinical examination revealed an 8-mm pocket defect with exudates coming through the gingiva (Fig. 4). A periapical radiograph demonstrated an intrabony defect involving up to three threads of the most mesial implant (Fig. 5).
Granulation tissue was removed with plastic curettes to minimise damage to the fixture surface. Wound dehiscence extended apically, with a total of three exposed threads (Fig. 6). All remaining tissue tags were carefully removed, and once the implant surface was visibly free of any debris and tissue tags, the surface was washed copiously with saline and chlorhexidine. The surface was then burnished with tetracycline solution on a cotton pledget for 2 min. The 6.5 mm (mesio-distal) × 7.0 mm (apico-coronal) defect was then packed with deproteinised bovine bone (Bio-Oss®; Geistlich Pharm AG, Wolhusen, Switzerland) and a 4:1 volume ratio of tetracycline (Evans et al.) (Fig. 7). Sutures were placed, and the patient was prescribed amoxicillin 500 mg three times a day for 7 days, mefenamic acid 500 mg initially, then mefenamic acid 250 mg four times a day for 7 days, and chlorhexidine digluconate 0.12% three times a day for 4 weeks. No removal of the prosthesis was intended.

Soft tissue healing was uneventful and probing depth at the final examination was 5 mm, demonstrating that the treatment produced improved granulation tissue was removed with plastic curettes to minimise damage to the fixture surface. Wound dehiscence extended apically, with a total

**Figure 5** Radiograph demonstrating a defect area around the implant.

**Figure 6** The granulation tissue is removed, revealing a 6.5 mm (mesio-distal) × 7.0 mm (apico-coronal) defect on the most mesial implant.

**Figure 7** The defect area is filled with tetracycline and deproteinised bovine bone after irrigation with chlorhexidine and application of tetracycline.

**Figure 8** Clinical view 4.5 months after treatment of peri-implantitis. The soft tissue shows uneventful healing.

**Figure 9** Radiograph taken 4.5 months after treatment of peri-implantitis. The defect area shows stable results up to the follow-up period.
clinical results (Fig. 8). A periapical radiograph taken 4.5 months after the treatment of peri-implantitis demonstrated increased radiopacity (Fig. 9), and the patient was scheduled for a follow-up visit every 6 months.

Discussion
This case report shows the successful management of peri-implantitis with tetracycline. Surface debridement of the fixture is an important step and needs to be carried out with extreme care to prevent damage to the fixture surface. Plastic curettes were used in this report for mechanical cleaning to remove granulation tissue because they provide less implant surface alteration. However, there are other reports of treatments that utilise titanium or graphite curettes.

Detoxification of the implant surface was performed using irrigation with chlorhexidine and burnishing of tetracycline. The concentration of burnishing was 50 mg/ml tetracycline, as used in the treatment of intrabony periodontal defects, and the tetracycline solution was applied to the implant surface using cotton pledges for 2 min as used in the treatment of a furcation defect. However, there are other reports suggesting that cotton pellets and saline may be adequate for the treatment of rough implant surfaces.

After the debridement and detoxification procedure, the remaining defect area was filled with deproteinised bovine bone and a 4:1 volume ratio of tetracycline used in the treatment of furcation defect and localised juvenile periodontitis. Graft material was used because bone graft to supplement surgical curettage in peri-implant infection has been reported to show adjunctive effects. Park et al. reported successful management of a rapidly developing periapical implant lesions caused by an undetected retained root tip. The apical area was filled with demineralised freeze-dried bone allograft mixed with 250-mg tetracycline; however, the ratio was not described. There is another report showing the potential of tetracycline fibres and subsequently reported mean improvements in clinical parameters.

Conclusions
Tetracycline was used in the treatment of peri-implantitis by burnishing the implant surface and applying tetracycline in conjunction with an osseous graft to the defect area. The treatment of peri-implantitis with tetracycline seemed to show improved clinical results in the follow-up period.

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References

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