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Case Report

Removal of infected nonresorbable hydroxyapatite graft material in recurrent periodontitis: a report of two cases

Shuichi Sato[1,2], Naoto Yoshinuma[1,2], Osamu Kishida[1], Yoshiaki Fujisaki[1] and Koichi Ito[1,2]

[1]Department of Periodontology, Nihon University School of Dentistry, Tokyo, Japan
[2]Division of Advanced Dental Treatment, Dental Research Center, Nihon University School of Dentistry, Tokyo, Japan

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Abstract: Long-term studies have indicated that alloplastic bone grafts composed of nonresorbable hydroxyapatite (NHA) are clinically stable and safe. However, our previous report suggested that NHA grafts may be an etiological factor for recurrent periodontitis in the absence of supportive periodontal treatment (SPT). We removed infected NHA from the root surface by flap surgery in two cases of recurrent periodontitis. After removal of the infected NHA, the inflammation subsided in these cases and they were clinically stable for several years. (J Oral Sci 51, 659-663, 2009)

Keywords: bone graft; alloplastic material; nonresorbable hydroxyapatite; contributing factor; flap surgery.

Introduction

Various materials have been implanted into periodontal defects to restore the lost periodontium. For many years, bone grafts have been used to treat infrabony defects associated with periodontal disease. Meta-analysis showed that the clinical attachment level improved significantly after hydroxyapatite (HA) treatment (1), and long-term studies have indicated that such grafts are clinically stable and safe (2). This approach is usually successful when used as part of a comprehensive care program that includes supportive periodontal treatment (SPT) and effective daily plaque control by the patient (3).

Ibbott et al. (4) and Ito and Murai (5) reported the occurrence of root resorption following the use of HA. Previously, we reported ankylosis of nonresorbable HA (NHA) (6). It was suggested that NHA grafts may be an etiological factor for recurrent periodontitis. Here, we report the effects of removing the NHA graft material from the root surface on recurrent periodontitis.

Correspondence to Dr. Shuichi Sato, Department of Periodontology, Nihon University School of Dentistry, 1-8-13 Kanda-Surugadai, Chiyoda-ku, Tokyo 101-8310, Japan
Tel: +81-3-3219-8107
Fax: +81-3-3219-8349
E-mail: sato-su@dent.nihon-u.ac.jp

Case Reports

Case 1

A 76-year-old Japanese woman re-visited the Department of Periodontology, Nihon University Dental Hospital, complaining of swollen gums (Fig. 1a). Her medical history was unremarkable, and her family history was non-contributory. The patient was in good general health with the exception of back pain. Periodontal surgery with NHA alloplastic graft material had been performed 15 years earlier. She received SPT for 14 years after the periodontal surgery, but had stopped one year prior to presentation because of medical problems. A comprehensive periodontal examination with full-mouth radiographs revealed severe periodontitis. Tooth #41 had a probing depth of 10 mm and showed class II mobility. Radiographic examination revealed radiolucency extending from the alveolar crest to the periapical area and calculus-like opacity (Fig. 1b). On periodontal surgery, the NHA graft material was found to be ankylosed with tooth #41 and encapsulated by granulation tissue (Fig. 2a). All of the granulation tissue

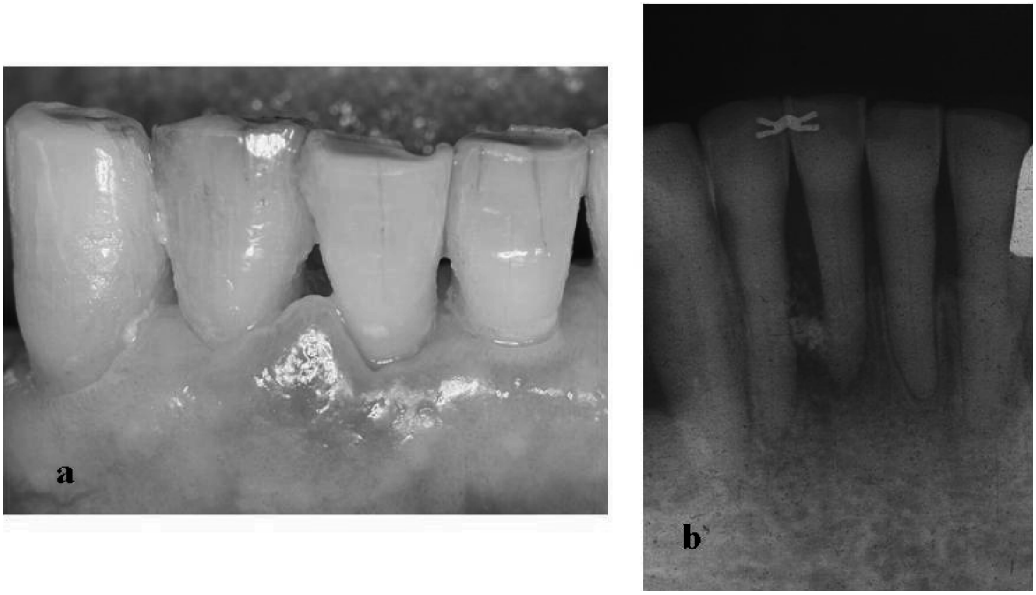

Fig. 1 Preoperative view (a) and radiograph (b).

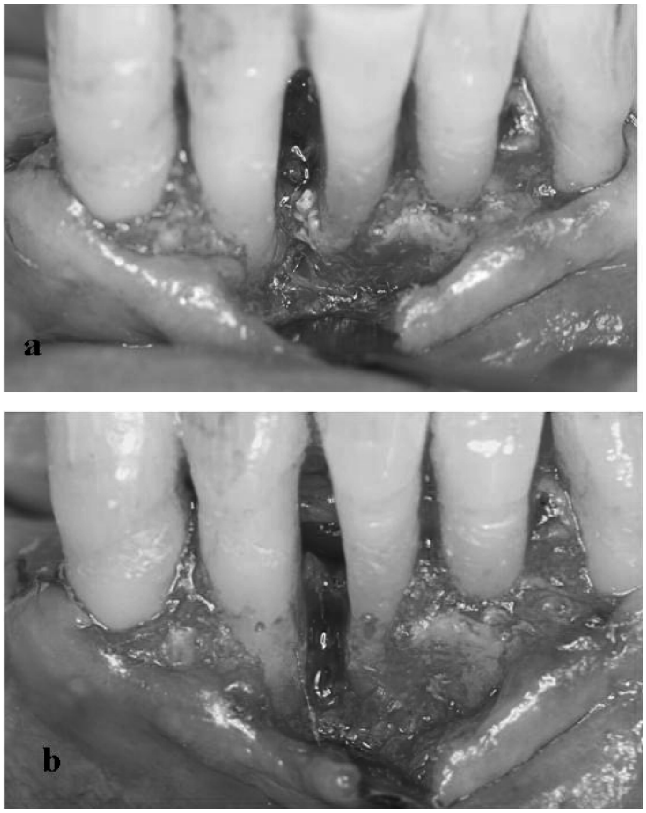

Fig. 2 a: The NHA particles ankylosed to tooth #41 were encapsulated with granulation tissue.
b: The NHA particles on tooth #41 were removed.

was removed, together with the ankylosed NHA graft material (Fig. 2b). After two years, the clinical findings and radiographs showed improvement of the periodontal status (Fig. 3a, b). SEM analysis showed rod-shaped and filament-shaped bacteria on the surface of the removed graft material (Fig. 4a, b)

Case 2

A 37-year-old Japanese man visited the Department of Periodontology, Nihon University Dental Hospital, complaining of pain on biting. Other than prostatitis, his medical history was unremarkable, and his family history was non-contributory. The patient was in good general health. Periodontal surgery with alloplastic material had been performed 17 years previously; he did not recall receiving any supportive periodontal therapy (SPT) after the periodontal surgery. A comprehensive periodontal examination with full-mouth radiographs revealed moderate periodontitis with severe localized (tooth #44) periodontitis (Fig. 5a). Tooth #44 had a probing depth of 6 mm and showed class I mobility. Radiographic examination revealed a vertical bone defect and root resorption at a distal site (Fig. 5b). On periodontal surgery, the NHA graft material was found within granulation tissue attached to the alveolar bone (Fig. 6a). All of the granulation tissue was removed, together with the NHA graft material (Fig. 6b). After four years, clinical findings and radiographs showed improvement of the periodontal status (Fig. 7a, b). This study was approved by the Medical Ethics Committee of Nihon University School of Dentistry.

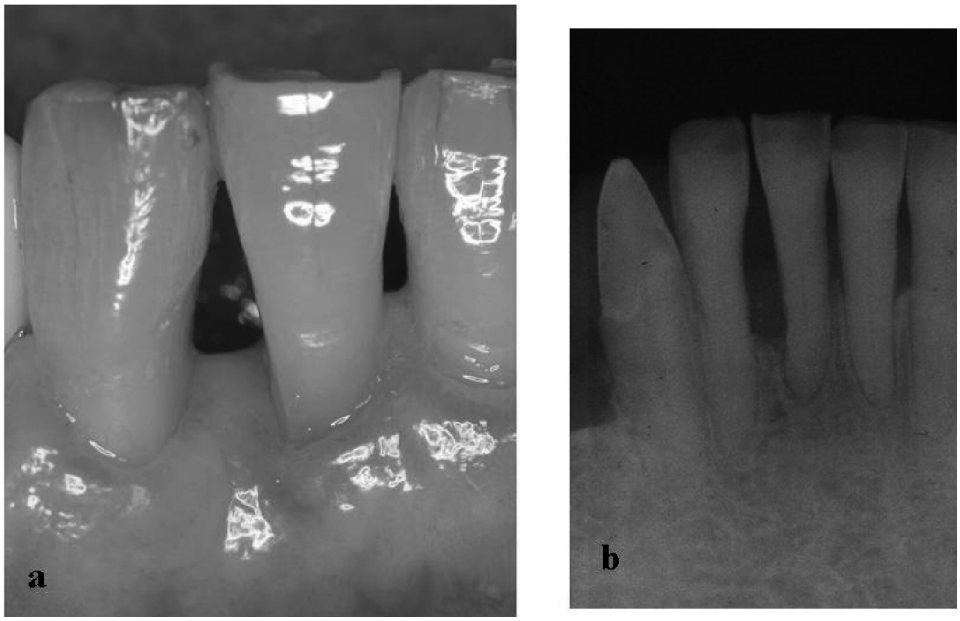

Fig. 3 Clinical (a) and radiographic (b) views two years after surgery.

Discussion

Hydroxyapatite particles, typically with NHA particles, were the primary alloplastic grafting material used in Japan in the 1980s. Healing occurs generally by the formation of a long junctional epithelium, and hydroxyapatite particles are generally found encapsulated within fibrous connective tissue. The 1996 World Workshop in Periodontics concluded that synthetic graft materials function primarily as defect fillers, and that other materials should be used if regeneration is the desired treatment outcome (7).

The cases reported here had maintained their clinical status for over 10 years. However, severe periodontitis occurred after cessation of SPT. In case 1, NHA ankylosed to the root surface. Calculus or enamel pearls may be contributing factors in periodontal disease as they may promote plaque retention. Goldstein (8) reported that once breakdown occurs in these regions, more rapid progression of the disease is likely, as the anatomy of the pearl allows retention of plaque. SEM observation showed rod-shaped bacteria on the particle surfaces. In these cases, the patients had never undergone or had stopped SPT. Numerous studies have shown successful maintenance of attachment levels after various modes of periodontal therapy in the presence of optimal plaque control (3). The alloplastic material in our cases may have caused recurrent periodontitis resulting from retention of plaque.

In case 2, root resorption and granulation tissue with HA were observed on flap surgery. Root resorption is not a

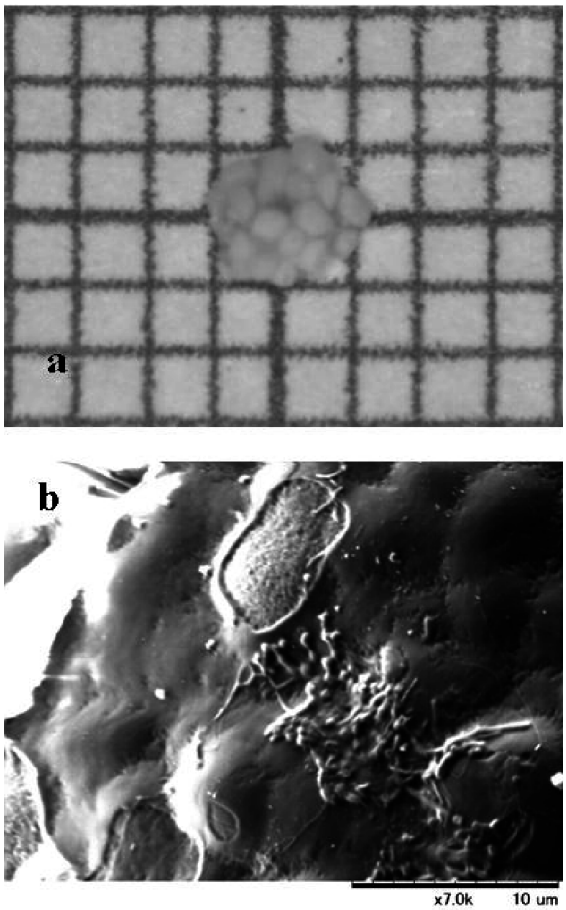

Fig. 4 The removed NHA was irregularly shaped (a), and rod-shaped and filament-shaped bacteria were observed on the surface (b).

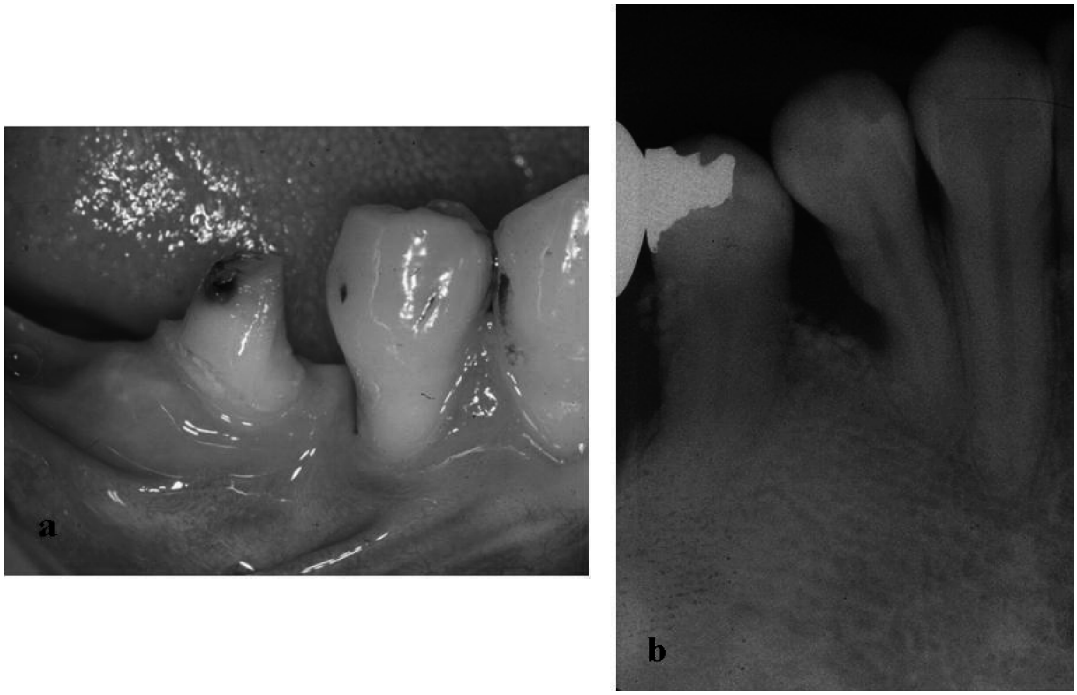

Fig. 5 Preoperative view (a) and radiograph (b).

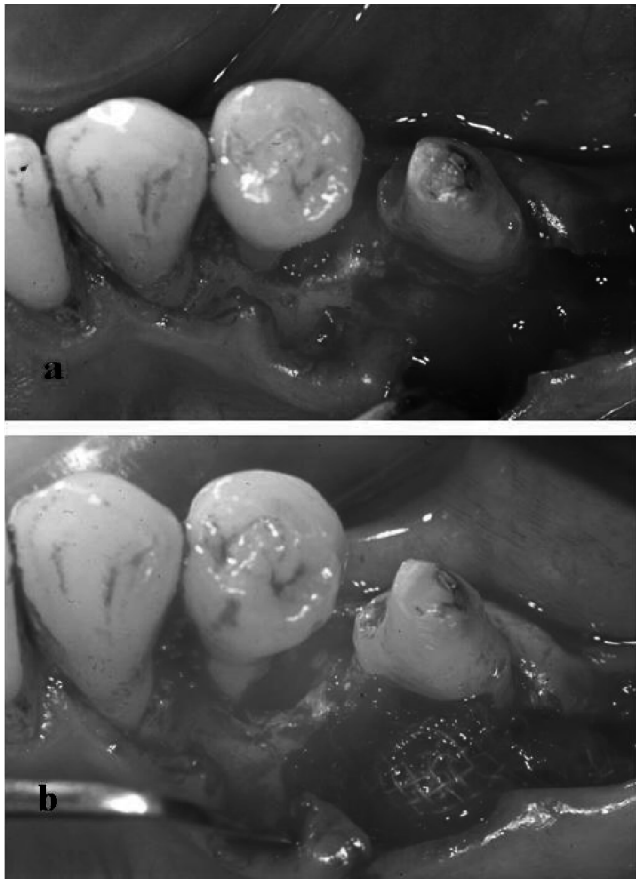

Fig. 6 a: The NHA particles were encapsulated with granulation tissue.
b: The NHA particles with granulation tissue were removed.

common complication of periodontal surgery, despite the damage to the periodontal ligament and root surface that often occurs during reattachment procedures. Ito and Murai (5) reported that the cause of root resorption may depend more on the status of inflammation than on the type of material grafted into the defect. In this case, once the inflammation occurred, the graft material encapsulated within fibrous connective tissue may have accelerated inflammatory infiltration.

Clinical bone filling with graft material encapsulated within fibrous connective tissue produces clinically acceptable results. However, it has been speculated that the long junctional adhesion is less a barrier to invading toxic elements than is connective tissue attachment. A long junctional epithelium can not be probed in the noninflamed state, and the epithelium may facilitate the passage of bacterial products into the underlying connective tissue (9). The inflammatory infiltrate may result from such a process, particularly if plaque control is inadequate, and may lead to the sudden occurrence of probable defects at sites that initially appear to have responded well to therapy aimed to create a new attachment (10).

Along with the pathogenic bacteria present in subgingival plaque, considerable evidence suggests that local factors may result in accelerated attachment loss or alveolar bone loss. Therefore, it is imperative for clinicians to recognize and remove these local factors or irritants. Therefore, we completely removed the contributing factors during flap

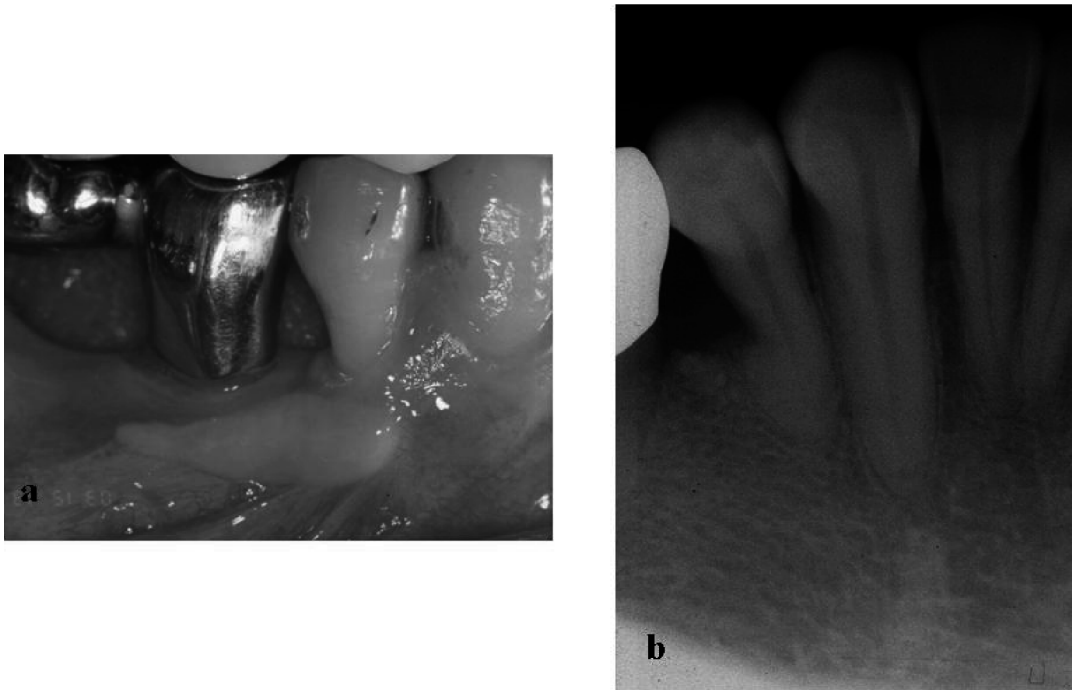

Fig. 7 Clinical (a) and radiographic (b) views four years after surgery.

surgery. After removal of the infected NHA, no clinical inflammation was detected in these cases and they were clinically stable for several years.

We postulated that the alloplastic materials in the absence of SPT resulted in recurrent periodontitis. It should be emphasized that good plaque control is important for long-term success of HA bone graft surgery.

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