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A foreign body granuloma is induced by a polymer membrane following guided bone regeneration surgery



KEYWORDS

Foreign body granuloma;
Alveolar ridge augmentation;
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Poly(lactic acid) (PLA)-based materials have been widely used in many medical fields, such as surgery, orthopedics, and aesthetic medicine. Due to their good mechanical strength, biocompatibility, and biodegradability, PLA membranes are also utilized in guided bone regeneration (GBR) as barriers.¹ Reports from varying medical fields have revealed that PLA-based materials can induce granulomatous inflammation and foreign body reaction.^{2–4} To the best of our knowledge, no PLA membrane-induced foreign body granuloma in GBR has been reported. We hereby reported a case of PLA membrane-induced foreign body granuloma presenting as a bulky soft tissue mass at the alveolar ridge augmentation site of a 63-year-old female patient.

A 63-year-old healthy woman had teeth 45 and 46 loss for more than 4 months, and she went to a dental clinic for rehabilitation. Ridge deficiency was severe at tooth 45 area (Fig. 1A). Surgery was performed with the patient's consent. Full mucoperiosteal flaps were reflected under local anesthesia. A dental implant (OsseoSpeed™ EV; Dentsply Sirona, Charlotte, NC, USA) was placed at tooth 46 location, and granulation tissue of tooth 45 area was removed. Allogeneic and xenogeneic bone grafts were used to augment the buccal bone of tooth 45 site using sandwich technique, and a PLA membrane (ReDura™; Medprin Biotech, La Mirada, CA, USA) was used to cover the site without implant placement. Six months after surgery, protuberant soft tissue at the

surgical area was still noted (Fig. 1B) and the second stage implant surgery was performed. After flap reflection, the healing of hard tissue was satisfactory and another implant (OsseoSpeed™ EV) was placed at tooth 45 location. After evaluation of the voluminous soft tissue (Fig. 1C), the dentist decided to undermine the tissue and send the specimen for histopathological examination. The healing after second stage surgery was uneventful (Fig. 1D). Histopathological inspection revealed the aggregation of lymphocytes and multinucleated giant cells (Fig. 1E). Intracytoplasmic asteroid bodies and engulfed PLA fragments were noted in some of the multinucleated giant cells (Fig. 1F–H). A histopathological diagnosis of foreign body granuloma was confirmed.

GBR using various bone grafts and barrier materials has predictable outcomes in oral surgeries. Resorbable membranes including synthetic and natural polymers have several advantages over non-resorbable membranes. PLA is one of the resorbable synthetic polymers and can be further classified into poly (L-Lactide) (PLLA), poly (D-Lactide) (PDLA), and poly (meso-lactide) subgroups. PLLA has the disadvantage of prolonged resorption time. Copolymers of lactide, glycolide, and ε-caprolactone, etc. have been developed to enhance the resorption efficiency.¹ The membrane used in this case is made of PLLA homopolymer. Foreign body granulomas have been reported to be associated with PLLA-

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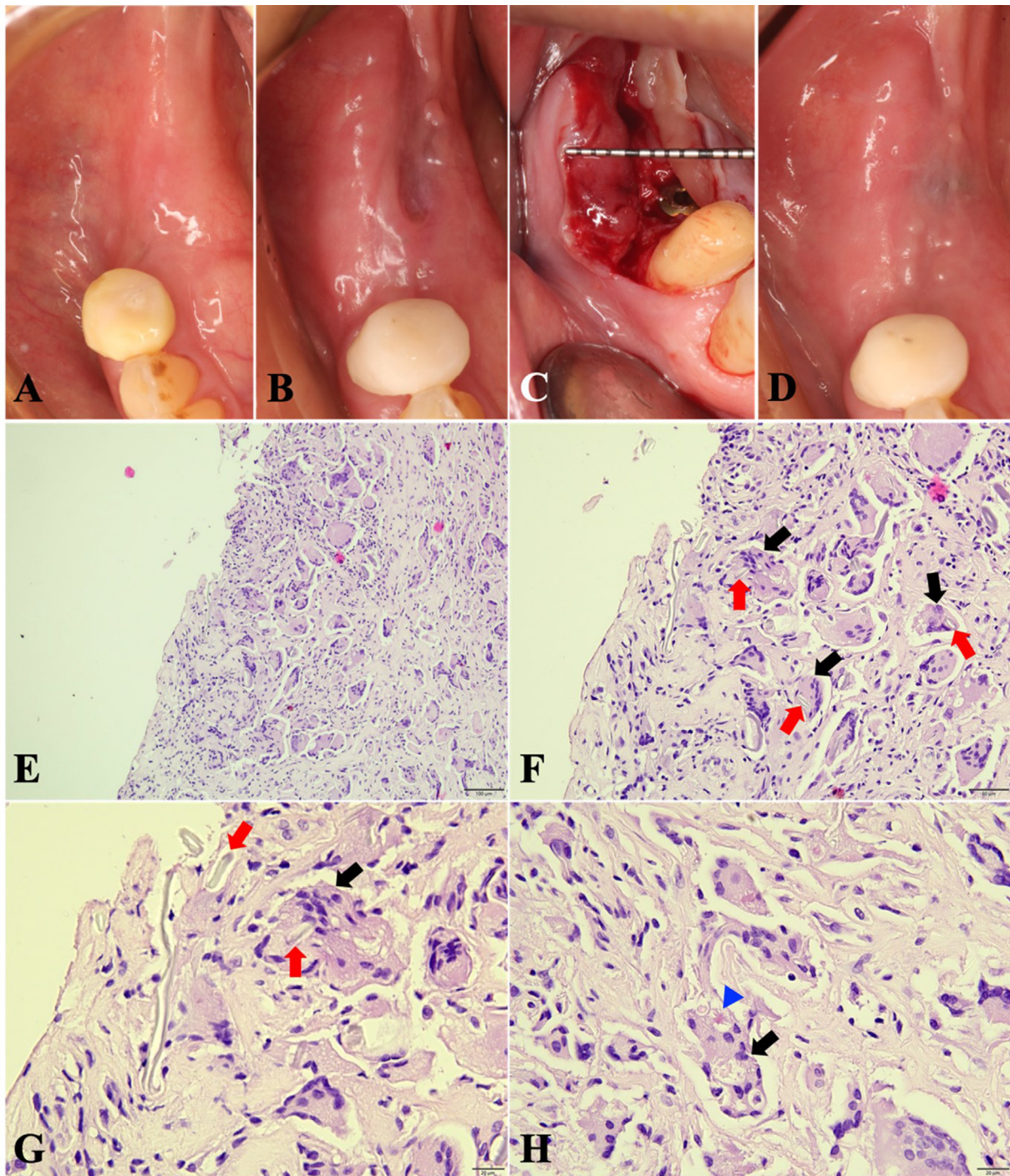


Figure 1 Clinical photographs of horizontal ridge augmentation and histopathological microphotographs of a PLA membrane-induced foreign body granuloma. (A) Teeth 45 and 46 have been lost for more than 4 months. (B) Four-week follow-up after implant placement and ridge augmentation with PLA membrane, and allogeneic and xenogeneic bone grafts. (C) Six-month follow-up after surgery. The second surgery was performed, and the volume of soft tissue mass showed unusual thickening and was removed. (D) Six-week follow-up after the second surgery. (E) Medium-power microphotographs showing granulomatous fibrous connective tissues containing lymphocytes and multinucleated giant cell (black arrows). (F and G) High-power microphotographs showing strip-shaped or spindle-shaped transparent foreign body materials (red arrows) engulfed by multinucleated giant cells (black arrows). (H) High-power microphotographs demonstrating asteroid bodies (blue arrow head) seen within the giant cells of a foreign body granulomas (black arrow) (Hematoxylin and eosin stain; original magnification; E, 10x; F, 20x; G and H, 40x).

based biomaterials, such as microspheres, sutures, screws, and plates.^{2–4} PLLA membranes for periodontal surgery also elicit transient foreign body reactions.⁵ The usage of ReDura™ membrane in this case is off-label, although the Taiwanese distributor claims it is viable in oral GBR. This product needs years to be completely resorbed. Prolonged existence of the residual product may cause longer and more intense foreign body reaction. It is advocated that dentists should not use biomaterials that are not validated for dental applications.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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