

Intraoral application of hyperdry amniotic membrane to surgically exposed bone surface

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Hyperdry amniotic membrane, a novel preservable material derived from the human amnion, has been introduced clinically in ophthalmology and other fields. This membrane is available as a wound dressing material for surgical wounds of the tongue and buccal mucosa but has not been used on wounds of the alveolar mucosa. This paper reports 2 cases in which intraoral alveolar wounds with bone exposure were successfully treated with the use of hyperdry amniotic membrane: a 74-year-old woman with gingival leukoplakia of the edentulous mandible, and a 43-year-old man who underwent vestibuloplasty of the reconstructed mandible. The results indicate that the hyperdry amniotic membrane is a useful dressing material, not only for soft tissue wounds, but also for exposed bone in the oral cavity. (Oral Surg Oral Med Oral Pathol Oral Radiol 2014;117:e83-e87)

Surgical procedures in the oral cavity occasionally result in exposure of bone. These procedures include vestibuloplasty for preprosthetic treatments and resection of broad mucosal lesions in the gingival and alveolar areas. Raw bone surfaces in the oral cavity are prone not only to infection but also to scar formation during secondary healing, and proper covering of the exposed periosteum or bone surface is often needed to prevent these complications.^{1,2} Mucosal and skin autografts have been used for this purpose and seem biologically ideal. However, these grafts require a separate surgical procedure and have other disadvantages, such as limited size of the donor mucosal graft and patient discomfort resulting from mismatching between the mucosa and the skin graft.³⁻⁶ For these reasons, other biologic materials, such as bovine-derived collagen, chitin membranes, and human skin allografts, have been used to cover surgical defects, and the biocompatibility and availability of these materials have been investigated.⁷⁻¹⁰

The human amniotic membrane (AM), the innermost layer of the placenta, is a suitable tissue for allografts because of its low immunogenicity.^{11,12} It also possesses antiinflammatory, wound-protecting, and scar-reducing properties.¹³ Preserved AMs have been used for decades in various clinical fields, including various types of wound care, such as burn lesion treatment, surgical wound covering to avoid collusion, and ophthalmology.¹⁴⁻¹⁸ Some reports have also suggested its

usefulness in defective areas of the oral mucosa.¹⁹⁻²¹ However, there have been problems with the storage and sterilization of the material.

Hyperdry AM, which we have introduced, is preservable and can be produced with the use of far-infrared irradiation and microwaves and then sterilized by γ -ray irradiation.¹³ This material has been clinically applied in ophthalmology, otology, and neurosurgery.²²⁻²⁴ In the oral cavity, we have reported the usefulness of hyperdry AM as a wound dressing material for secondary soft tissue defects of the tongue and buccal mucosa.²⁵ We present here 2 cases in which hyperdry AM was used to cover the surgically exposed bone surface in the oral region.

MATERIALS AND METHODS

Hyperdry AM was prepared as described previously.¹³ Briefly, fresh human amnions were obtained with the consent of donors who were scheduled to undergo cesarean section at Toyama University Hospital. The collected amnions were dried under consecutive far-infrared and microwave irradiation in a drying device (Sakura, Nagano, Japan), cut into adequate sizes and vacuum-packaged, then sterilized by γ -irradiation (25 kGy). During surgery, hyperdry AM was cut into a suitable shape (Figure 1), placed directly onto the wound, which consisted of exposed bone surface and periosteal soft tissues, and stabilized with the use of a surgical splint.

This study was performed with the approval of the Ethics Committee of Toyama University and followed the guidelines of the Helsinki Declaration. All patients were informed of the risks and alternative treatments, and grafting of hyperdry AM was performed at Toyama University Hospital.

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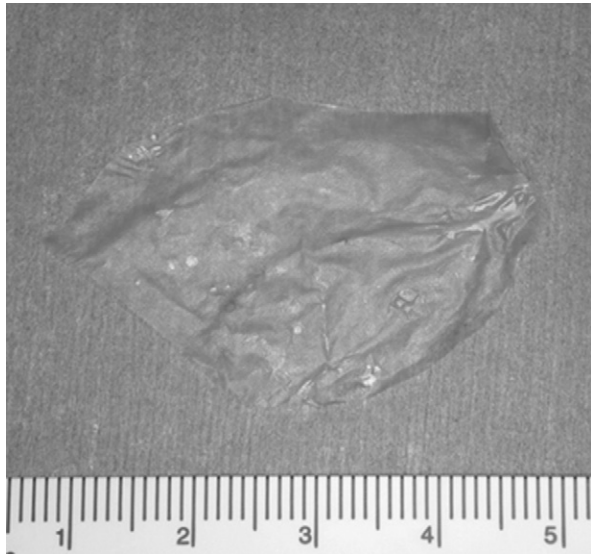


Fig. 1. Hyperdry amniotic membrane shaped with scissors.

CASE REPORTS

Case 1

A 74-year-old woman was referred to the Department of Oral and Maxillofacial Surgery at Toyama University Hospital in 2009 for the treatment of widespread oral leukoplakia of the edentulous mandible. Intraoral examination revealed a white lesion extending from the right to the left molar area of the lower alveolar mucosa. There was also a verrucous lesion in the left incisor area. Regional lymph nodes were not palpable. The patient underwent resection of the bilateral lesion and marginal resection of the left mandible. The secondary defect of the mucosa was covered with a bovine-derived collagen sheet. The histologic diagnosis was oral epithelial dysplasia and verrucous carcinoma of the mandible. Eight months later, a white lesion recurred in the right lower alveolar mucosa from the incisor to molar area, and the lesion was resected. The wound surface consisted of exposed bone and denuded periosteal tissues (Figure 2, A). Hyperdry AM was applied to the defect (Figure 2, B) and retained with a surgical splint, which was fixed with the use of miniscrews. Because of the hyperdry AM's transparency and good adherence to the irrigated wound surface, the wound tissues could be seen clearly through the membrane (Figure 2, B).

Oral feeding was commenced the day after surgery. No hemostatic issue was observed, although the patient was treated with an anticoagulant agent. Postoperative pain was assessed as a maximum of 3 cm on a visual analog scale (VAS, 0-10 cm) without analgesics. When the surgical splint was removed 1 week after surgery, the wound surface appeared smooth and glossy. Although it was difficult to observe the membrane at this time, slight hyperalgesia was observed. Epithelialization of the entire wound was seen at approximately 6 weeks after surgery, with no rejection or excessive inflammatory reaction. The patient was free from recurrence 18 months after the last surgery (Figure 3).

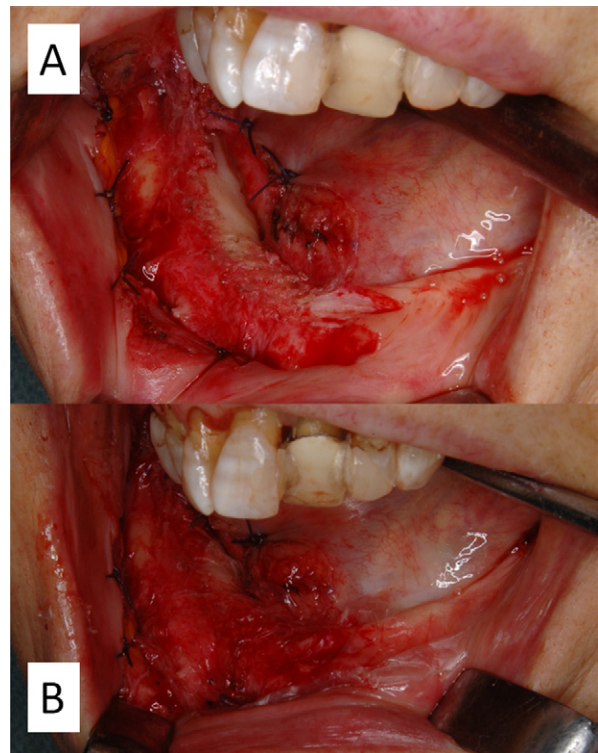


Fig. 2. Intraoperative findings in case 1 (A) before and (B) after covering of the bone surface with hyperdry amniotic membrane.



Fig. 3. Intraoral findings 8 months after surgery in case 1.

Case 2

A 43-year-old man with gingival swelling and radiolucency of the left mandible was referred to the Department of Oral and Maxillofacial Surgery at Toyama University Hospital (Figure 4). Histologic diagnosis of ameloblastoma was determined following incisional biopsy. The first surgery comprised marginal resection of the left mandible and primary reconstruction with a titanium reconstruction plate. In the second surgery, free iliac bone block was transplanted to the bone defect area 12 months after the first surgery. After a healing period of 7 months for the transplanted bone, 4

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