Application of Polyglycolic Acid Sheets and Fibrin Glue Spray to Bone Surfaces During Oral Surgery: A Case Series

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Purpose: Previous studies have described the use of a combination of polyglycolic acid (PGA) sheets (a resorbable biomaterial) and fibrin glue spray to treat open soft tissue wounds during oral surgery, which have produced good results. However, there have not been any detailed investigations of the use of these materials to treat exposed hard tissue wounds. This study investigated the combination of PGA sheets and fibrin glue spray to treat exposed bone surfaces during oral surgery.

Materials and Methods: PGA sheets and fibrin glue spray were applied to exposed bone surfaces after lesion resection in 8 patients (10 sites) who had been diagnosed with malignant tumors. The sheets were cut into pieces (width, 5 to 10 mm) and applied to the exposed bone surface.

Results: PGA adhesion was confirmed for the final time on postoperative days 28 to 56 (mean, 35.8 days), and there were no cases in which the PGA sheets fell off the wound prematurely. Epithelialization of the wound surface occurred gradually and was complete by postoperative weeks 4 to 5, regardless of the size of the wound.

Conclusion: This method was considered very effective at preventing postoperative bleeding, alleviating postoperative pain, and promoting epithelialization during the reconstruction of bone surfaces after tumor resection in the oral cavity.

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In oral surgery, palatal mucosal grafts, split-thickness skin grafts, and various artificial materials have been used to treat oral mucosal defects that are not extensive enough to warrant the use of free flaps and for which suturing is difficult.[1-4] However, secondary invasion at the site from which the mucosal or skin graft is harvested can be a problem in such cases, and many artificial materials exhibit low biocompatibility and act only as temporary wound coverings. Artificial skin in which a silicon membrane is used to cover collagenous tissue has been used widely in the clinical setting since the 1990s. Such materials can be sutured to the mucosa and are considered to display excellent wound-healing and pain-relieving effects. However, they have to be compressed to prevent uplift at the wound site because these materials do not adhere directly to the wound surface and, in most cases, are used in combination with a tie-over method. The use of such materials involves a complex procedure, and the wound is covered with a pseudomembrane, even after the removal of the tie-over, so utmost care is needed to ensure that the wound is not disturbed. In recent years, polyglycolic acid (PGA) sheets (Neoveil, Gunze Co, Ltd, Tokyo, Japan), which are resorbable biomaterials, and fibrin glue spray (Bolheal, Chemo-Sero-Therapeutic Research Institute, Kumamoto, Japan) have been used in combination to

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treat open soft tissue wounds during oral surgery, and good results have been reported.[1-3] However, there have not been any detailed investigations of the use of these materials to treat exposed hard tissue wounds. The present study investigated the combination of PGA sheets and fibrin glue spray to treat exposed bone surfaces and the utility of this technique. To the best of the authors' knowledge, this is the first clinical report to examine the use of these materials to treat exposed bone surfaces.

Materials and Methods

From March 2010 through July 2012, PGA sheets (Neoveil) and fibrin glue spray (Bolheal) were used to treat 26 patients at the Department of Oral and Maxillofacial Surgery, Nagasaki University Hospital (Nagasaki, Japan). In 18 patients, these materials were attached to soft tissue surfaces after the resection of malignant or premalignant lesions; in 8 patients, they were applied to bone surfaces after the partial resection of maxillary bone. The latter 8 patients were used as subjects for this study (10 sites). They included 4 men and 4 women with an age range of 64 to 85 years (mean, 75 years; Table 1). Fibrin glue is a blood-derived formulation, so informed consent was obtained after the patients had been given a full explanation of the necessity of using fibrin glue for their treatment and to combat the risk of infection.

PGA sheets are medical materials that were first approved in 1992 as tissue substitution cloths for use in reinforcing organ defects. They are composed of resorbable PGA and come in thicknesses of 0.15, 0.3, 0.4, and 0.5 mm; 0.15-mm sheets were used at all 10 sites in the present study. Any post-resection bleeding from the wound was controlled sufficiently, and then the sheets were cut into pieces (width, 5 to 10 mm) and applied to the wound so that they did not overlap too much (Figs 1A, B). Next, the surgeon rubbed a small amount of fibrin glue solution A (fibrinogen) into the wound with a finger. Solution A and solution B (thrombin) were poured into a special spray kit and sprayed from above the PGA sheets at low pressure (0.075 MPa). Usually, 1 mL each of solution A and solution B is applied per 10 cm^2. In the present study, 1 mL of each solution was sprayed over the wound site, which took several seconds. The excess fibrin glue was removed approximately 1 minute after it had hardened. In each case, the period of time that the PGA sheets remained in place, whether secondary hemorrhaging occurred, the pain-relieving effect of the treatment, which was assessed using the Wong-Baker face scale,[5] and the presence or absence of postoperative infections were examined. The utility of the treatment was

Table 1. BACKGROUND DATA FOR 8 PATIENTS WHO REQUIRED SURGERY THAT EXPOSED THE BONE SURFACE

Patient	Age (yr)	Gender	Disease
1	80	M	palatal mucosal and buccal cancer
2	75	M	palatal melanoma
3	64	F	maxillary gingival cancer
4	76	F	mandibular gingival cancer
5	85	F	mandibular gingival leukoplakia
6	71	F	maxillary gingival cancer
7	79	M	maxillary gingival cancer
8	70	M	maxillary gingival cancer

Abbreviations: F, female; M, male.

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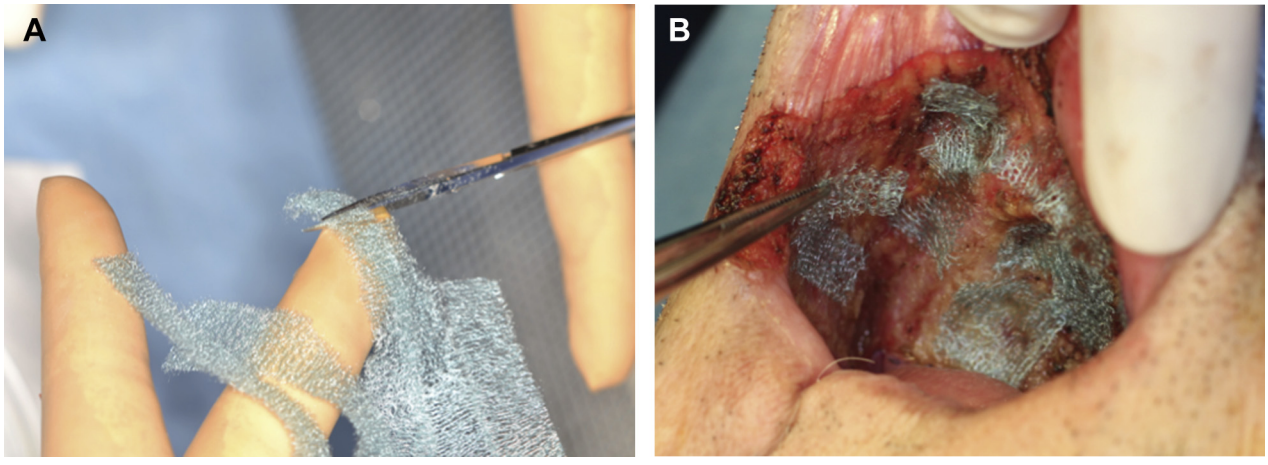

FIGURE 1. *A*, Neoveil sheets were cut into small pieces (approximately 5 to 10 mm wide). *B*, Approximately 3 to 10 pieces were used to cover each wound.

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