Use of Self-Tapping Metal Screws for Temporary Fixation of a Resorbable Plate System in Maxillofacial Surgery

Toshinori Iwai, DDS, Susumu Omura, DDS, PhD, Noriaki Aoki, DDS, PhD, and Iwai Tohnai, DDS, PhD

Abstract: Resorbable plate systems have been used in maxillofacial surgery to obviate the need for plate removal. However, resorbable plates and screws are very costly, and refixation with additional screws may be necessary when reduction or repositioning of the bone segment is inaccurate. Here we report the use of self-tapping metal screws for temporary fixation of a resorbable plating system in maxillofacial surgery to avoid the use of additional screws following inaccurate fixation or the reuse of resorbable screws, which may result in loosening.

Key Words: Resorbable plate system, maxillofacial surgery, self-tapping metal screw, temporary fixation

Resorbable plate systems have been used in maxillofacial surgery to obviate the need for plate removal. In particular, the use of resorbable plate systems for the fixation of pediatric facial fractures allows for realignment and stable positioning of rapidly healing fracture segments while also avoiding any future issues secondary to long-term metal retention. However, resorbable plates and screws are very costly, and refixation with additional screws may be necessary when reduction or repositioning of the bone segment is inaccurate. Here we report the use of self-tapping metal screws for temporary fixation of a resorbable plating system in maxillofacial surgery to avoid the use of additional screws following inaccurate fixation or the reuse of resorbable screws, which may result in loosening.

We commonly use a resorbable plate system fabricated from a copolymer of poly-l-lactic and polyglycolic acid in an 82:18 ratio (LactoSorb; Biomet Microfixation, Jacksonville, FL) in maxillofacial surgery, such as orthognathic surgery and maxillofacial fracture repair. Tapping is typically necessary for resorbable screw insertion after accurate plate bending and bone drilling. Because inaccurate reduction or repositioning of the bone segment requires reuse of resorbable screws or the use of new screws for refixation, we use stainless-steel self-tapping screws (1.5 or 2.0 mm in diameter), with the same thread form as that of resorbable screws and which are reusable so they carry no additional cost, for temporary fixation of a resorbable plate (Fig. 1). In Le Fort I osteotomy, temporary self-tapping metal screws are inserted into the plate hole after accurately bending L-shaped miniplates for fixation of the nasomaxillary buttress and drilling of the bone (Figs. 2 and 3). Finally, temporary fixation of the bilateral nasomaxillary and zygomaticomaxillary buttresses is performed by inserting the self-tapping metal screws into the plate holes. When maxillary repositioning is judged to be accurate after removing the intermaxillary fixation, the self-tapping metal screws are removed and resorbable screws are inserted for complete plate fixation. If maxillary repositioning is judged to be inaccurate, repositioning and temporary fixation can be performed again without the use of the resorbable screws.

Compared with the titanium plate system, the resorbable plate system involves complicated procedures, including the tapping
stage, which can increase the surgical time and result in incomplete reduction or fixation in maxillofacial surgery. To address this, a simple and accurate procedure for bone reduction and resorbable plate fixation using a tap has been performed. In this method, a fracture fragment can be reduced to the correct place by handling the inserted tap, which acts as a temporary fixation screw after the handle is split. Although this method is useful for reducing the floating bone segment and for resorbable plate fixation, a long tap interferes with the surgical procedure at several plating sites. When inadequate reduction and fixation occur because of the resorbable screws being inserted into all plate holes, reuse of the screws or the use of new screws is required. Because refixation of the maxilla is sometimes performed in Le Fort I osteotomy, temporary maxillary fixation with our self-tapping metal screws is very useful to avoid the reuse of resorbable screws, which may result in loosening and the need for refixation with additional resorbable screws following insufficient repositioning or reduction of the bone segment. Similarly, the use of temporary self-tapping metal screws offers reliability and short surgical times to surgeons during reduction and fixation of zygomatic and/or maxillary fractures as well as in orthognathic surgery. We recommend the use of self-tapping metal screws for reliable fixation of resorbable plates in maxillofacial surgery, as they enable the tapping of screw holes, temporary plate fixation, and assessment of the accuracy of bone positioning to be performed simultaneously.

REFERENCES