Osteotome Sinus Floor Elevation and Simultaneous Implant Placement in Grafted Biomaterial Sockets: 3 Years of Follow-Up

Roberto Crespi,* Paolo Capparè,* and Enrico Gherlone*

**Background:** Immediate bone grafting procedures were proposed to preserve bone volume in residual damaged alveolar walls and to prevent the expansion of the sinus floor in the maxillary molar region. The use of an osteotome allows vertical bone augmentation and localized sinus elevation with minimal surgical trauma. The aim of this study is to evaluate the clinical outcome of implants placed in previously grafted alveoli that were expanded at a second-stage surgery by an osteotome technique.

**Methods:** Twenty patients requiring extraction of one or two upper molar teeth and/or a second premolar were selected. Thirty teeth were extracted, and their fresh sockets immediately received magnesium-enriched hydroxyapatite as a graft material. Three months after bone filling, osteotome sinus floor elevations were performed in grafted sites, and 30 titanium dental implants were placed. Three months after implant placement, temporary restorations were performed. Follow-up examinations and intraoral digital radiographs were taken at baseline and 6, 12, 24, and 36 months after implant placement to evaluate the alveolar bone gain for each implant. Comparisons among mean values of alveolar bone gain over time were performed by the Student two-tailed t-test.

**Results:** At the 36-month follow-up, a survival rate of 100% was reported for all implants. The alveolar bone gain after 6 months of healing was 2.41 ± 1.23 mm. Successively, after 12 months, the bone gain increased (3.85 ± 1.37 mm). At 24 and 36 months after implant placement, the levels were stable (3.86 ± 1.50 mm and 3.82 ± 1.57 mm, respectively). Statistical analyses showed a significant difference (P < 0.05) only between the 6- and 12-month values.

**Conclusion:** At the 36-month follow-up, the use of the osteotome technique for vertical expansion of the grafted tissue was considered a predictable procedure in the implant surgery. J Periodontol 2010;81:344-349.

**KEY WORDS**
Dental implants; maxillary sinus surgery; tooth socket.

* Department of Dentistry, Vita Salute University, San Raffaele Hospital, Milan, Italy.

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Posterior maxillary tooth extraction causes an inferior expansion of the maxillary sinus in relation to fixed anatomic structures, thus proving the pneumatization phenomenon after tooth loss. The expansion of the sinus is larger after the extraction of teeth enveloped by a superiorly curving sinus floor, extraction of several adjacent posterior teeth, and extraction of second molars compared to first molars. Furthermore, roots that protrude into the sinus have a thin cortical bone lining, and during the extraction procedure, this thin bone may break and dislocate, allowing the sinus to expand toward the empty socket.

Molar extraction induces greater pneumatization than premolar extraction, probably due to a larger defect left in the alveolar cavity that allows the sinus to pneumatize.

To prevent the expansion of the sinus floor and to preserve the bone volume of fresh sockets after tooth extraction, immediate dental implant placement and/or immediate bone grafting procedures are advocated. In an effort to increase the apical occlusal dimension of available bone for implant placement, the use of an osteotome allows for vertical bone augmentation and localized sinus elevation with minimal surgical trauma. The crestal bone is displaced toward the sinus floor, and the apical portion of the implant is placed in the