

Use of Calcium Phosphate Bone Cement for Additional Fixation in Orthognathic Surgery

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Abstract

This article is to demonstrate a conceptual use of calcium phosphate cement in orthognathic surgery, promoting better stability and fixation of the segments. In orthopaedic surgeries this cement is widely used and in dentistry its use has been demonstrate interesting results. The calcium phosphate cement has been used in orthognathic surgery to improve the fixation and stabilization of the bone segments and to promote a better postoperative period to the patient using the same concepts employed in orthopedic surgeries. With the use of this material the postoperative results showed a better stability, a seal of the wall of the maxillary sinus and a reduction of the edema, showing why the surgical cement of the calcium phosphate should be further studied.

Keywords: Orthognathic Surgery; Biomaterial; Calcium Phosphate Cement; Bone Substitutes; Maxillary Osteotomy; Bone Fixation

Fixation and stabilization of bone segments in orthognathic surgery is essential for appropriate bone consolidation and repair. The use of biomaterials can improve postoperative stability because it favours the process of new bone formation [1,2]. One of these biomaterials is calcium phosphate bone cement, which was initially used in the medical field to improve fixation of plates and screws in orthopaedic surgeries [3,4]. Based on the positive results obtained in orthopaedics, the possibility has been raised of applying this biomaterial in the field of oral and maxillofacial trauma, more specifically for additional fixation of bone segments in orthognathic surgeries.

A 34-year-old female patient with dental arch discrepancy resulting from posterior displacement of the maxilla (Figure 1) underwent surgery for maxillary advancement of 6 mm. The gap between bone segments caused by maxillary advancement (Figure 2), even with the use of rigid internal fixation, may not be enough to ensure bone segment stability for appropriate bone repair. Therefore, in order to accelerate new bone formation in the gap, it was filled with calcium phosphate bone cement (Osteovation IMPACT®, Ostemed, Osteomed Medical Company, Addison City, Texas, USA) (Figure 3). After hardening, cement was found to help promote initial stability of bone segments and sealing of buccal bone wall of maxillary sinus (Figure 4), which prevents the occurrence of facial soft tissue emphysema, reducing oedema in the immediate postoperative period. Calcium phosphate bone cementum is a

biocompatible material that has the same ionic constitution of human bone tissue and thus does not lead to inflammatory reaction due to foreign body exposure [5]. After 60 days, computerized tomography (CT) was performed to assess maxillary bone repair. CT scans revealed that lateral maxillary wall did not have a solution of continuity and bone gap was closed after new bone formation, showing the efficacy of the technique used.



Figure 1: Clinical image revealing posterior displacement of the maxilla, published with the patient's (or parent's or guardian's) consent.



Figure 2: Transoperative image showing maxillary advancement, bone, fixation with plates and screws, and bone gap between maxillary segments.



Figure 3: Transoperative image showing the use of calcium phosphate bone cement over plates and screws to rebuild anterior and lateral walls of the maxillary sinus, leading to sealing of the maxillary sinus.

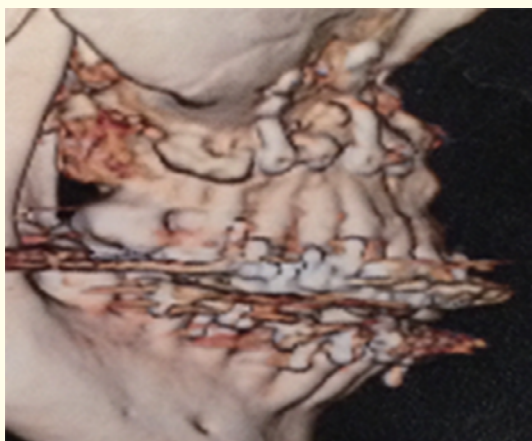


Figure 4: Three-dimensional computed tomography scan showing no bone gap and appropriate sealing of buccal bone wall of maxillary sinus.

The use of calcium phosphate bone cement provides greater bone segment stability in orthognathic surgeries, promotes sealing of maxillary sinus wall, reduces postoperative oedema caused by tissue emphysema, and accelerates bone segment repair.

Conflict of Interest

We have no conflicts of interest.

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