

## Advanced bone regeneration: Beyond the limits of current surgical techniques

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Osseointegrated dental implants have been successfully used for many years for the rehabilitation of edentulous (toothless) patients. To expect a predictable long-term prognosis for osseointegrated implants, a sufficient volume of healthy bone should be available. A common procedure for obtaining this volume is the transplantation of bone tissue, which replaces the missing part of the skeleton and/or guides its reconstruction. As early as 1920, attention was directed to calcium phosphate derivatives, particularly tricalcium phosphate and hydroxyapatite. Hydroxyapatite (HA) is the main mineral component of bone and teeth, whose property of promoting bone formation has been demonstrated many times. HA granules are used for filling bone defects but they are difficult to handle and to maintain in the surgical site. Pro Osteon 200R, 'bone void fillers', are osteoconductive, clinically proven bone substitute materials derived from marine coral which can be used in treating oral and maxillofacial reconstruction.

Fibrin glue is composed of two separate solutions of fibrinogen and thrombin. When mixed together, these agents mimic the last stages of the clotting cascade to form a fibrin clot that has been used for many years in different branches such as thoracic surgery and neurosurgery. Hydroxyapatite is a biomaterial used in orthopedics because of its peculiar characteristics that make it an ideal bone substitute. Will be discussed and detailed the various methods of GBR possible through the use of hydroxyapatite and fibrin glue. It will be presented a large series for proper clinical application of this technique in different situations in different anatomical and clinical conditions that may occur to achieve the best possible prosthetic rehabilitation. The piezoelectric surgery is a simple and precise technique that allows the surgeon to optimize the various oral surgical procedures reducing the trauma. Absolute and unique advantage of piezoelectric bone surgery is to allow a selective and a precise micrometric cutting of mineralized tissue, precisely due to the physical characteristics of the ultrasonic vibrations that are used. The minimization of the risk of iatrogenic injury to soft tissue and respect of the soft tissues permits to work more safely in proximity to noble anatomical structures such as the maxillary sinus or the inferior alveolar neurovascular bundle nerve. The lecture is designed to allow the acquisition and proper use of piezoelectric bone surgery and manage the correct regenerative techniques in oral and maxillofacial surgery. The "Implant Site Preparation" by means of Piezosurgery®, by removing the differential bone within the pilot hole, is a simple and precise technique that allows the oral surgeon to optimize implant placement and avoid the various problems resulting from incorrect positioning of the implant. We will also present the histologic findings obtained *in vivo* on patients with this regenerative technique with long term follow-ups.

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