CLINICAL DATA

1. INTRODUCTION

First implantation happened 1986. The product was first distributed under the trade name of Triosite™, property of the Zimmer company. Later one, Biomatlante has manufactured the same product under its own trade name MBCP™. A large bibliography is available; studies were performed either with Triosite™ or with MBCP™.

2. USE OF HYDROXYAPATITE.

A variety of methods and materials have been used for alveolar ridge augmentation. Proussaefs[1] published a clinical report describing an histological evaluation of a hydroxyapatite onlay bone graft retrieved after 9 years. He performed a review of human histology reports in literature. On the basis of this review together with this 9 years after implantation retrieved specimen, he could evidence that HA was biocompatible but the residual hydroxyapatite particles showed no sign of resorption, and tight contact with the surrounding bone was observed.

3. CONCEPT OF BCP.

In the opposite, Daculsi [2] has described the concept of BCP:
- Specially prepared biphasic calcium phosphate (BCP) macroporous ceramics consisting in various ratios HA/b-TCP supported that one of the means to control resorbability (in vivo dissolution) was the variation of this ratio [3]
- The processus of dissolution-reprecipitation of carbonated apatite-like crystals similar to natural bone could be evidenced [4]
- With a retrospective study of 300 implants in animal and 6 human biopsies, Daculsi [5] described the resorption /substitution process. He could show that after one year 50% of the ceramic is replaced by cortical lamellar bone with abone growth of 2.5mm from every side.

4. PRELIMINARY STUDY IN DOGS

In 1975, Nery has studied [6] the use of a porous bioceramic material he described as TriCalcium Phosphate (TCP) as a potential alternative to autogenous bone. The bioceramic was implanted in surgically produced infrabony defects in dogs. The defects were evaluated histologically at 1, 2, 4, 8, 16 and 24 weeks.
The results show that the ceramic is well tolerated by the tissue and yields no toxic reactions. Bone ingrowth into the pores and repair of periodontium are clearly demonstrated. No significant haematological changes were observed. Nery’s material he previously described as TCP was later demonstrated using X-Ray Diffraction to consist of a mixture of Hydroxyapatite (HA) and b-TCP. Consequently this material was later referred to as Biphasic Calcium Phosphate (BCP), the “ancestor” of MBCP™.

Legeros, Daculsi, Lynch and Nery first studied BCP with varying HA/b-TCP ratio and demonstrated that the bioactivity may be controlled by manipulating these ratios.

The tissue response to BCP of different ratios of HA/TCP was reported by Nery et al. [7]. The purpose of the study was to determine the optimal ratio of calcium hydroxyapatite (HA) to beta tricalcium phosphate (beta TCP) in a biphasic porous calcium phosphate (BCP) ceramic for effective repair of periodontal osseous defects. Defects were surgically produced in beagle dogs and made chronic for 4 months to simulate periodontal disease. Mucoperiosteal periodontal flaps were reflected, followed by osseous defect debridement and root planning. Specially prepared ceramic with different HA/β TCP ratios were implanted into the prepared defects. The sites were allowed to heal for 6 months, animals were euthanized, and site-blocks were removed for histological study. During the follow-up phase, scaling and polishing were done once a month, and standardized probing attachment levels were recorded pre- and 6-months postoperatively.

The Duncan's multiple range test showed that all the treatments produced statistically significant higher gain in probing attachment levels than the control group (0HA/0 β TCP) (P < 0.05).

Among the 7 "active" treatment groups, 2 (65/35 and 85/15) had significantly higher gain in probing attachment levels than those in 3 groups (50/50, 100/0, and 0/100) (P < 0.05). Histologically, higher HA ratio (but not 100% HA) showed accelerated new bone formation and new attachment levels.

The BCP bioceramic now commercialized under the trade name, MBCP™, is available in various HA/b-TCP ratios (e.g. 60:40) and is recommended for bone regeneration in the treatment of periodontal osseous defects.
5. USE OF BCP IN CONNECTION WITH IMPLANT PLACEMENT

Piatelli [8] has studied the clinical and histologic aspects of biphasic calcium phosphate ceramic (BCP) used in connection with implant placement. The (BCP) he used was composed of 50% hydroxyapatite and 50% beta-tricalcium phosphate which is comparable to MBCP™. The defects were covered with e-PTFE membranes. Some particles were undergoing resorption processes and were being gradually substituted by newly formed bone. No inflammatory infiltrate was present. His results point, in conclusion, to a good biocompatibility and osteoconductivity of this material.

6. USE OF BCP FOR MAXILLO-FACIAL/E.N.T. APPLICATIONS

Daculsi [9] has demonstrated effectiveness of MBCP™ bone graft substitutes for mastoid cavity obliteration. Clinical evaluation and histological study demonstrate the bioactivity and osteoconduction with partial transformation of MBCP™ granules into lamellar bone after several months.

Bagot d'Arc [10] has performed a retrospective review of 15 years experience of the use of micro macroporous biphasic ceramics and fibrin sealant as a moldable material for bone reconstruction in chronic otitis media surgery. He evidenced good clinical results with a complete regression of pathology in 82% of case (72 ears).

7. CONCLUSION OF LITERATURE REVIEW

Biphasic Calcium Phosphate ceramics have been demonstrating safety and effectiveness since 1975. First studies in dogs were focused on periodontics. Now the optimized product marketed under the name MBCP™ has been extensively studied and has evidenced safety and efficiency in many indications -- orthopaedics: extremities, pelvis and spine for surgical applications and reconstruction after trauma – but also E.N.T. and dental applications.

We have selected some relevant clinical cases in the dental field such as:

- Periodontal/Infrabony defects
- Ridge augmentation
- Extraction sites (implant preparation/placement)
- Sinus lifts
- Cystic cavities
CLINICAL DATA

References:


