

Implant Placement with Simultaneous Bone Grafting Using a Novel Alloplastic Particulate Graft Material

Peter Fairbairn,¹ Minas Leventis,² Ashish Kakar,³ Monish Bholra,¹ Orestis Vasiliadis,² Charles Mangham⁴

¹ Department of Periodontology, School of Dentistry, University of Detroit Mercy, Detroit, MI, USA;

² Department of Oral and Maxillofacial Surgery, Dental School, University of Athens, Athens, Greece;

³ Department of Periodontics, Rutgers School of Medicine, NJ, USA; Private Practice; New Delhi, India;

⁴ Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry, UK

Topic: Basic research

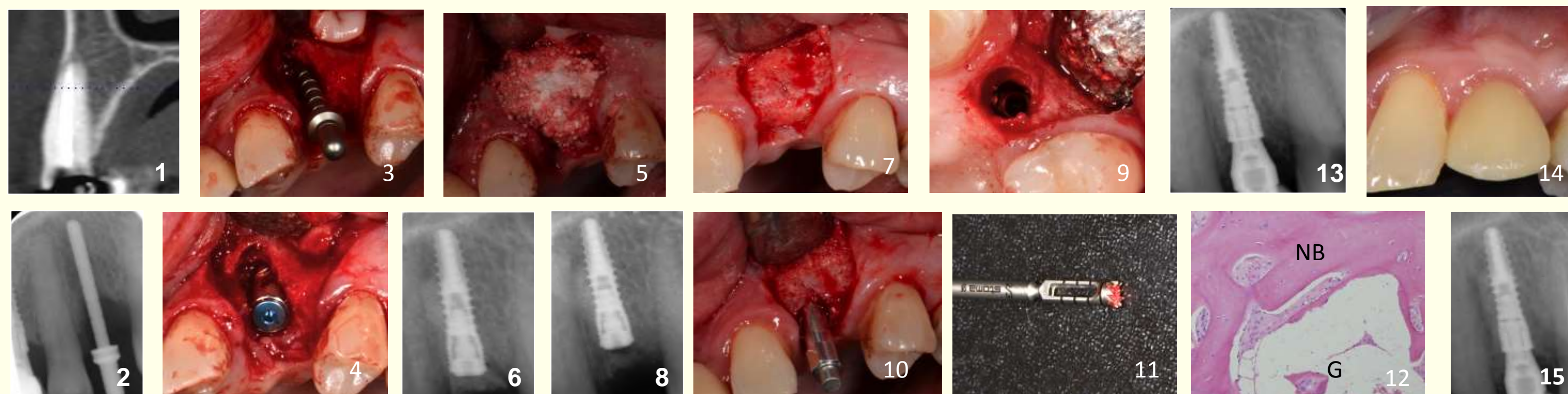
Background and Aim

Background: The loss of the upper canine often leads to an extensive bone defect with the loss of the buccal plate due to its anatomical position in the alveolar crest (very buccal with only a thin layer of host bone) as well as higher co-axial forces applied when in function. Preservation and restoration of the bone subsequently can be challenging to achieve an adequate outcome both functionally and aesthetically.

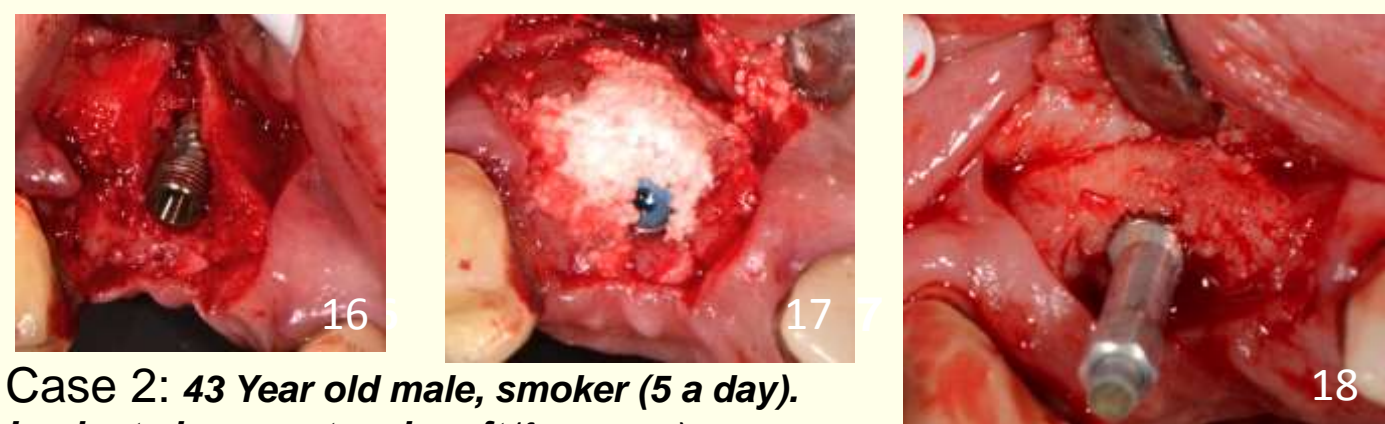
Aim: To Evaluate the efficacy of a novel biphasic synthetic particulate grafting material consisting of β -tricalcium phosphate (β -TCP, 65%) and calcium sulphate (35%) in bone regeneration with a set protocol that has been used by the primary author for over 12 years.

Methods and Materials

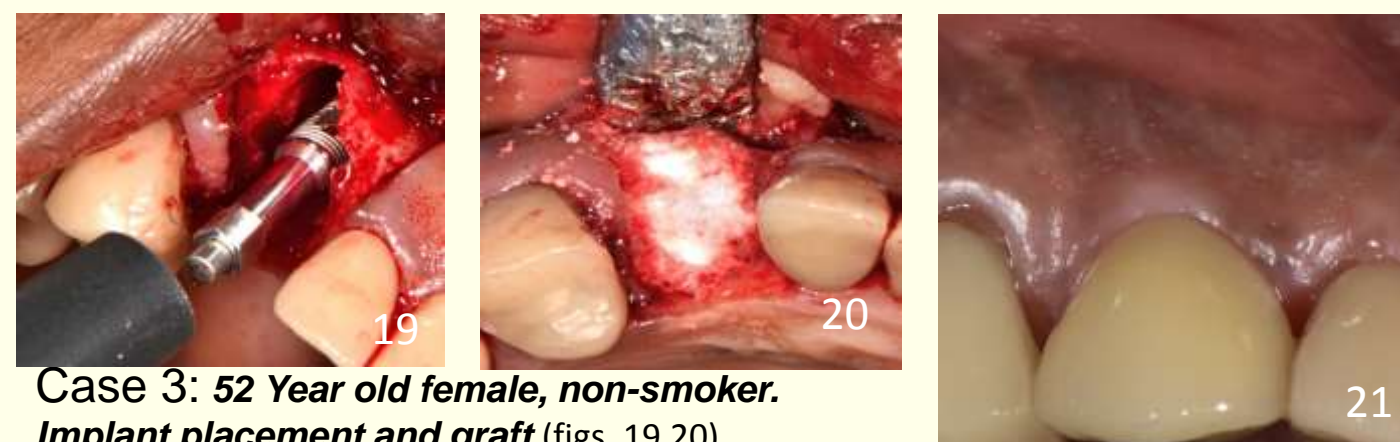
In a series of ten patients with upper canine loss and an associated extensive buccal bone loss (>5mm by 8 mm in dimensions) the exact same protocol was employed using the biphasic grafting material (EthOss[®], Regenamed Ltd, London, UK). This protocol involved 3 week soft tissue healing followed by implant placement at an altered angle, with site specific flaps and simultaneous bone grafting without the use of a membrane or autogenous material. All cases had placement and loading resonance frequency readings taken (Osstell ISQ[™], Göteborg, Sweden). A flap was raised at loading to verify the presence of regenerated bone 10 weeks post placement as well as to ensure to correct fitment of the Osstell SmartPeg due to bone overgrowth. Core samples were taken above the implant whilst gaining access for abutment fitment in 2 of the cases for histologic analysis.



Case 1: 62 year old female non-smoker, non-diabetic, root decay (fig. 1). After 3 week soft tissue healing period, site specific flap. Re-angle osteotomy (figs. 2,3). Dio (Dio Corp., Busan, Korea) SM 3.8 by 12 mm implant placed at 25 Ncm, 41 ISQ, with bone defect (fig. 4). Grafted with EthOss, set hard for improved stability (figs. 5,6). Flap raised showing new bone at 10 weeks, true bleeding bone (figs. 7,8). Access to the Implant using a core trephine, showing 3 mm new height (fig. 9). Osstell reading taken using a Type 49 Peg, again shows new bone (fig. 10). Histology: H and E staining, 50% newly-formed woven bone (figs.11, 12). Radiograph at 6 months loaded (fig. 13) Case at 1 year loaded showing retention of both hard and soft tissue profile (fig.14) and radiograph showing improved bone as material bio-absorbs (Fig. 15)



Case 2: 43 Year old male, smoker (5 a day). Implant placement and graft (figs. 16,17). ISQ reading being taken again showing the new buccal bone (fig. 18).



Case 3: 52 Year old female, non-smoker. Implant placement and graft (figs. 19,20). One year loaded showing hard and hence soft tissue retention (fig. 21).

Results - Conclusions

Results: All cases were successfully loaded and the average placement ISQ of 44 was raised to 76 after a 10 week healing period. Clinical observation showed full coverage of the defect with up to 4 mm of new bone over the implant buccally and up to 3 mm vertically over the implant. Histological analysis showed up to 50% new bone formation at 10 weeks even at the core sample site directly over the implant.

Conclusions: Preliminary results from this study appear to back up long term results seen using similar biphasic synthetic particulates, where β -TCP in a calcium sulphate matrix was used. These findings suggest the viability of these materials to provide a scaffold for bone regeneration whilst themselves eventually being fully bio-absorbed and show the excellent osteogenic potential of the novel bone grafting material, permitting implant loading at 10 weeks. Further analysis will be needed with comparative materials to complete the study.

Patient (site)	Place ISQ	Load ISQ	Visible New Bone	Histology
1. VB (23)	42	75	Yes	Yes
2. JK (13)	38	76	Yes	No
3. CC (13)	41	78	Yes	No
4. NN (23)	50	78	Yes	No
5. NC (13)	44	75	Yes	No
6. JI (23)	42	72	Yes	No
7. OP (13)	41	74	Yes	Yes
8. DS (13)	48	77	Yes	No
9. LS (13)	44	76	Yes	No
10. FG (13)	55	76	Yes	No
Mean ISQ	44	76		

References

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