Short communication

Making bone II: maxillary sinus augmentation with mononuclear cells—case report with a new clinical method

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Abstract

We report a simplified method of using bone marrow aspirate concentrate (BMAC™) to regenerate hard tissue. The results suggest that BMAC™ combined with a suitable biomaterial can form sufficient bone within 3 months for further implants to be inserted, and at the same time minimise morbidity at the donor site.

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Introduction

Raising the sinus floor is standard treatment for an atrophic maxilla. Autologous bone is still the gold standard, but morbidity must be taken into account.

Osteoconductive biomaterials have been tested as an alternative but, to gain osteoinductivity, growth factors or cells are needed. In earlier in vitro studies, grown bone chips used to raise the sinus floor yielded varying results.

Transplantation of progenitor cells from bone marrow aspirate has been tested before. Two tested methods, the FICOLL concentration and BMAC™ (bone marrow aspirate concentrate), showed comparable formation of new bone. Here we describe a new method using BMAC™.

Material and methods

Both maxillary sinuses of a 46-year-old partially edentulous man were augmented (Fig. 1). BMAC was obtained from the superior posterior iliac spine. The aspiration needle and 2 × 60 ml syringes were flushed with heparin 10 000 U/ml. Citric acid 8 ml was inserted and BMA 52 ml collected in each syringe. It was injected into two dual chamber disposables (BMAC™, Harvest Technologies Corporation, Plymouth, MA, USA), and placed into the SmartPReP2-centrifuge. Enucleated cells were separated and concentrated by centrifugation (Fig. 2). Most of the plasma was removed and the cells were resuspended. Before augmentation BMAC was mixed with autologous thrombin and BBM in a non-metal dish.

Under general anaesthesia a mucoperiosteal flap was raised, an osteotomy made, and the sinus membrane detached. It was then augmented with BBM enriched with BMAC and autologous thrombin. Augmented areas were biopsied after 3 months.

Biopsy specimens of bone were taken, 100 μm slides prepared, and histomorphometric analysis made under light microscopy.

Results

Histological analysis showed no signs of inflammation. The particles of BBM occupied 29.1% of the specimen and newly formed bone 26.9%. The newly formed bone connected the particles of biomaterial, and stabilised the grafted complex. It was integrated into the local bone with blood vessels running through it (Fig. 3).

Discussion

The combination of BBM and BMAC seems to result in quicker formation of bone, as previously reported sinus augmentation with BBM and venous blood showed bony formation of 14.7% after a healing time of 6–8 months.9

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