

The use of bioceramic scaffolds in the treatment of non-unions, bone defects and avascular necrosis of the femoral head.

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Abstract

Impaired fracture healing response develops when a fracture is deprived from optimum mechanical and biological conditions to successfully heal. Clinical conditions associated with a failed fracture healing process include non-union, critical size bone defects and avascular necrosis of bone (AVN). The incidence of non-union has been estimated to range between 5%-10% particularly after long bone fractures. Bone defects, non-unions and AVN create a significant physiological and psychological impact to the patient and increased health care costs to the healthcare system. Usually, additional surgery is needed with often unpredictable outcomes.

The conceptual framework of the 'diamond concept' for a successful fracture healing response has identified certain factors that must be present including an osteoconductive matrix, mechanical stability, osteoinductive mediators, and the presence of osteogenic cells. Bioceramic materials represent the osteoconductive component of the diamond concept and are being used either in isolation or in combination with other graft materials to support the bone repair. Their use in the clinical setting requires selection of the appropriate material for the right patient and indication. They can be implanted loaded with progenitor cells, in

combination with growth factors or as graft extenders when a large volume of bone graft is required, particularly for the management of critical size bone defects.

Clinical cases will be presented to demonstrate their applications and their effectiveness in difficult situations. Different surgical techniques will also be presented to allow a better understanding of the issues and challenges that one must overcome to enable a successful clinical outcome.