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الطبيب محمد خلف عبد الله محمد

للحصول على درجة الدكتوراه في جراحة العظام

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باللغة الإنجليزية :

Demineralized Bone Matrix for Tratment of iong bones non union

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Demineralized Bone Matrix for Treatment of long bones non union

A thesis
Submitted for

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بسم الله الرحمن الرحيم
وعلمك ما لم تكن تعلم
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ABSTRACT

The treatment of posttraumatic skeletal conditions such as delayed union, nonunion, malunion, and other problems of bone loss are challenging. In most cases, restoration of alignment and stable fixation of the bone is all that is necessary to achieve a successful reconstruction. However, in many cases, adjunctive measures such as bone-grafting or bone transport is required to stimulate bone-healing and fill bone defects.

The use of iliac crest autologous bone graft is widely considered as gold standard for a number of reasons, including osteogenic, osteoconductive, and osteoinductive properties and the lack of disease transmission or of immunogenicity. But the use of autograft may be at risk of major drawbacks, such as limited availability and variable quality of the graft, hematoma, infection, increased operative time and bleeding, chronic donor site pain.

In this study we proved that using demineralized bone matrix in treatment long bone nonunion can be good alternative for iliac bone graft especially in selected cases.

Still there's alot of limitation for using DBM here in Egypt due to lack of availability and increased its cost.

Keywords: Non-united fracture, Nonunion, DBM, demineralized bone matrix, Iliac bone graft

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
AP	Antero-Posterior view
BMPs	Bone Morphogenetic Proteins
CT	Computed Tomography
DBM	Demineralized Bone Matrix
DFDBA	Demineralized Freeze-Dried Bone Allograft
ETO	Ethylene Oxide
HIV	Human Immunodeficiency Virus
IL	Interleukin
MRI	Magnetic Resonance Imaging
MSC	Mesenchymal Stem Cells
OI	OsteoInduction
RANKL	Receptor Activator of Nuclear factor Kappa B Ligand
RUST	Radiographic Union Scale for Tibial Fractures
SARS	Severe Acute Respiratory Syndrome
TENS	Titanium Elastic Nail System
TNF-α	Tumor Necrosis Factor-alpha
TNFR	Tumour Necrosis Factor Receptor
USG	Ultrasonography
VEGF	Vascular Endothelial Growth Factor
WNV	West Nile Virus

Introduction

Introduction

Fracture healing is a complex and dynamic process that is not fully understood. General treatment principles involve stabilizing the fracture and restoring the mechanical alignment while preserving and promoting the biological healing response. Even with optimal treatment, some fractures will not successfully heal. There are many different treatment options for nonunions; these vary in respect to cost, risk, and benefit. [(1)]

The definition of nonunion typically hinges on three important variables: the duration of time since the injury, characteristics of the fracture noted on serial radiographs, and clinical parameters that the treating surgeon can identify with a careful history and thorough physical examination. Currently, the US Food and Drug Administration (FDA) defines nonunion as a fractured bone that has not completely healed within 9 months of injury and that has not shown progression toward healing over 3 consecutive months on serial radiographs. [(2)]

According to literature, nonunion will occur in approximately 10% of fractures after conservative or operative treatment. The use of iliac crest autologous bone graft (ICABG) is widely considered as gold standard for a number of reasons, including osteogenic, osteoconductive, and osteoinductive properties and the lack of disease transmission or of immunogenicity.

However, the use of autograft may be at risk of major drawbacks, such as limited availability and variable quality of the graft, hematoma, infection, increased operative time and bleeding, chronic donor site pain, and additional cost.

Subsequently, research has focused on the development of novel bone graft substitutes for the last decades.

Demineralized bone matrix (DBM), first described by Urist et al. In 1965, who described an osteoinductive substance while preparing soluble extracts from Demineralized bone. It is obtained after mineral content extraction of bone through acid treatment. However, a wide range of types and modes of preparation of bone and carriers associated to the DBM for delivery are commercially available**.** [(3)]

The treatment of posttraumatic skeletal conditions such as delayed union, nonunion, malunion, and other problems of bone loss are challenging. In most cases, restoration of alignment and stable fixation of the bone is all that is necessary to achieve a successful reconstruction. However, in many cases, adjunctive measures such as bone-grafting or bone transport is required to stimulate bone-healing and fill bone defects.[(4)]

Review of Literature