International Journal of General Medicine and Pharmacy (IJGMP)
ISSN(P): 2319-3999; ISSN(E): 2319-4006
Vol. 3, Issue 4, July 2014, 7-10

International Academy of Science, Engineering and Technology
Connecting Researchers; Nurturing Innovations

BONE BANK BIOTECNOLOGY AND CLINICAL PROSPECTIVE

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ABSTRACT

Orthpaedic Bone Bank is a part of Tissue bank. It collects, store and prepare the collected Bone (Autologous) for future use in bone defect arising out of resection of diseased bone, destruction due to injury etc. Allogenic bone graft is often preferred for better tissue acceptability, insignificant immunological reaction. This technology adds quality of life by minimizing the disability of subject.

KEYWORDS: Orthopaedic Bone Bank, Allogenic None7

INTRODUCTION

Over a period of time several innovation have been developed by various organization/ agencies which have direct implication for solving day to day problems of common man (Juggad). It will be worthwhile to mentioned, “Orthopaedic Bone Bank” that have future significance. It is part of tissue Bank. Its clinical implication is some how elusive and needs further explosion and clarity. Even today, there are countable Bone Bank in India, these are at Tata Memorial Hospital, Mumbai, Madras Medical College, Chennai, AIIMS, New Delhi and Ganga Hospital, Coimbatore. It is not so popularized compare to the counter part- Blood Bank, Cornea Bank, Umbellical Blood Bank for stem cell, but In real life one is ten times more likely to have bone transplant then any other tissue.(1)

The Bone Bank like any other Tissue Bank by the Transplantation Human Organs Tissues Act 1994 (2). It has vast legal and clinical implication, but in this article we reviewed and projected the clinical implication of orthopaedic Bone Bank exclusively.

Aim and Objective

Bone Bank mainly harvest, preserves and provides Allografts as structural Bone and granular Bone to replace segment of lost bone and bone cavity filling respectively or inform of bone graft to facilitate union of bone gape between two segments (Figure 1, 2, 3).

Figure 1: Structural Bone **Granular Bone**

Figure 2: Structural Allograft Implantation **Allograft Fixed in Position**

Figure 3: Cavitary Defect Due to Tumor **Cavity Filled with Graft**

It is a technology innovation replacing costly prosthetic by biologically active allograft minimizing health care cost considerably, and making quality Health Care affordable and accessible at door step to the common people. This special design quality health care are quite cheaper then costly prosthetic implantation with minimal revision surgical intervention [(3)]. This technology or process also brings about no or insignificant disability adding value to the life of the subject [(4)]. In quite a few cases valuable limbs can be salvaged as well [(5).]

Protocol for Harvesting and Storage

Bone are harvested from segmental resection of malignant bone disease, amputation, infection And rarely from the donor hip and knee replacement. In all these cases written consent of the subject or patient is mandatory. Serological test to exclude all possible transmission of infection including HIV and Hepatitis. Blood grouping and Rh typing is essential in case of pregnant recipient. Histopathological study to exclude occult pathological conditions[(6).]

Standard operative procedure for collection, transportation, processing, storage and release for clinical practice are clearly out lined and mentioned in the following illustration.

ILLUSTRATION-I

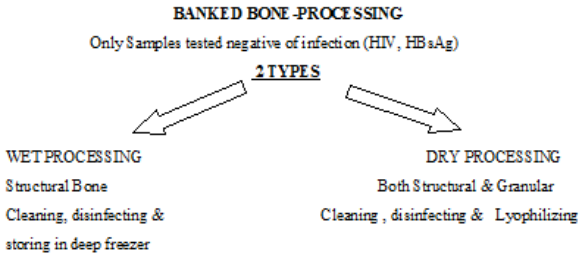

ILLUSTRATION-II

Final Sterilization

- Double packed in a sterile environment
- Final sterilization by exposing them to gamma radiation at dedicated centres (BARC, Mumbai) or its authorised branches (Kolkata)

ILLUSTRATION-III

ILLUSTRATION-IV

Storage: Bone so harvested and process is wrapped in a sterile material, labeled and store in the deep freeze within 30minute at - 80^0 C with a continuous temperature device. In this condition bone can be preserved for maximum 5years [(7).]

Clinical Application: Macewin first described the use of allogenic human bone tissue in 1881[(8)]. From that year onward, the use of allogenic transplantation has been increasingly applied in clinical practice and now a standard orthopaedic procedure.

Deep frozen allogenic bonegraft (Allografts) implantation is safe and effective. It offers a potential replacement therapy for significant loss of bone either due to disease or injury. In practice segmental resection of malignant bone disease in femoral diaphysis and amputation due to injury and infection is a major undertaking[(9)]. For reconstruction of

bone defect, allografts from orthopaedic bone Bank is invariable used. Apart from these, bone graft are often used in bridging the gap due to fracture. Joint arthroplasty and filling of the cavity created by enucleating of benign lesion / cyst or Infection. Autologous bone is preferred because of its osteoconductive and osteoinducive activities, but standard practice allograft from bone Bank is used. Its offer osteoconductive activities and frame against which newly form bone gets deposited[(10)]. It also allows immediate weight bearing with good long term and better functional outcome and acceptability. Standard biocompatibility test for allograft are also not essential as these bones being extracorporeal irradiated and deep freeze, offer no or a little immunological reaction[(11)].

CONCLUSIONS

Orthopaedic bone bank is a source of structural and granular bone and a biological substitute to address to the challenge arising out of long bone resection or gape or cavity in bone. Its significantly reduces the disabilities and bring about change for adding value to mankind. This is an existing proven technology, but need replication and scaling of.

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