

## Role of Mesenchymal Stems Cells in Bone Grafting

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Bone grafting an interesting topic, the majority of craniofacial surgeons, maxillofacial surgeons, reconstructive plastic surgeon and orthopedic surgeons practicing this kind of surgery, it is a difficult task to be approached, required knowledge, skill and expertise and many cases were reported of failure cases because of infection, loss of rigid fixation and lack of experience [1].

Bone grafting either immediately applied or as elective surgical procedures carried out after tumor or cancer surgery or incases of posttraumatic missile injuries of facial skeleton or in limb surgery.

Bone grafting is a demand choice to the patient and surgeon, the patient seeks the best possible reconstruction with the most looking features from aesthetic and functional point, the surgeon try to solve the patient problem and demand and he have to make his decision whether to do and perform quick reconstruction by using metal prosthesis or to delay the bone grafting as elective procedure depending on general condition of the patient and the amount of soft tissue damage required priority of reconstruction. In the early practice of surgery, the result may be with humbling surgery.

Bone grafting has been used for reconstruction of congenital malformation and facial reconstruction and for reconstruction of the temporomandibular joint (TMJ) by chondro-osseous graft in TMJ disease for restoration of growth and function and for reconstruction of First Arch dysplasia syndrome.

Bone grafting is a surgical technique used to fix problem by transfer a piece of bone transplanted transferred from iliac crest to rebuild or reconstruct a defect in facial skeleton for restoration of esthetic and function of bone it is extremely a complex technique may carried a significant risk to the patient and its liability to fail.

In orthopedic surgery, bone grafting was used as a filler and scaffold to facilitate bone formation and can regenerate but requires a very small fracture space or scaffold to do so.

Bone grafting has an important role in restoring building and growth of craniofacial deformity surgery, required to be inserted in the osteotomy gap of Le Fort III of facial skeleton and reconstruction of the skull and anterior cranial fossa after advancing midface.

Alloplastic material and other form of bone material such as hydroxyapatite and Bovine type been used in reconstruction of craniofacial region, but they are not very optimistic due to resorption and relapse and might be rejected and became infected.

Other type of bone grafting been used as vascularized with muscle and bone, these type of bone grafting applied successfully in area radiated after radical cancer or the area is large enough free bone graft is not useful, other type non vascularized bone graft from iliac crest successfully been used by the author for reconstruction of the half of mandible after tumor surgery or reconstruction of a gap in the mandible after previous traumatic injuries as elective procedure or by using a cortical plate from iliac crest for reconstruction of orbital

floor defect for correction of enophthalmos or diplopia, but problem may arise due to resorption of bone after a while, second operation required to add another layer of rubber silicon material (Sialastic) this material is biologically inert, cranial bone graft give better result with less resorption because its membranous type of bone.

The advances of application of bovine type of bone graft obtained from cadavers in secondary hip replacement and in surgery of ankle and foot by orthopedic surgeons, also oral and dental surgeons using this kind of bone for building the alveolar bone for implant and for building the atrophied ridge for denture reconstruction and been used for building the alveolar bone in advance periodontal disease.

Kummoona Chondro-Osseous Graft advocated for reconstruction of the temporomandibular joint (TMJ), the was to restore growth, repair and remodeling, designed reconstruction of the TMJ ankylosis after excision of ankylosed joint and coronoid process and re attachment of surrounding muscles, it consist of cap of 1cm width of cartilage and osseous shaft of 4 - 5 cm harvested from iliac crest of children, the graft has the ability to growth due to presence of round mesenchymal stem cells in the second histological layer and to endogenous growth potential of the graft, the graft also been used for reconstruction of milled First Arch syndrome [2,3].

The author did experimental studies on Rabbits to study the cellular changes associated with successful bone grafting, this type of research no one do it before we were the pioneer of this type of research.

We did research on Rabbits by resecting a piece of bone of 1.5 cm from lower border of rabbit mandible and reconstructed immediately by piece of bone from the iliac crest of the rabbit of about 2 cm after decortication of both the segments of the mandible and bone graft, the graft was fixed to the mandible by soft stainless steel wire of 0.25 mm by rigid fixation. Twelve young Rabbits of 3 months of age divided into 2 groups, each five and 2 Rabbits used as control, by three months the experiment terminated, histological section obtained every 2 weeks, 4 weeks and 8 weeks [4].

The histology and cytological changes of bone grafting was quiet interesting and showed formation of clot and platelets aggregation with releasing growth factor(PGF) and healthy granulation tissue formed with releasing of mesenchymal stem cells from bone marrow, periosteum and covering muscles with formation of large amount of fibroblast and tiny small vessels and also osteoblast seen with chondrocyte [4].

This research proved to be of great value to human's and for better understanding of the cellular changes and mechanism of mesenchymal stem cells in bone grafting.

The managements of bony defect urgently required bone grafting after traumatic injuries, after missile war injuries and after radical cancer surgery.

### Bibliography

1. Kummoona Raja. "Bone Grafting, Recent Advances with Special Reference to Cranio-Maxillofacial Surgery". Book Editor, IntechOpen (2018).
2. Kummoona R. "Kummoona Chondro-Osseous Graft for Reconstruction of the Temporomandibular Joint in Children". *Archives of Clinical and Experimental Orthopaedics* 1 (2017): 1-3.
3. Kummoona R. "Temporomandibular Joint Ankylosis that Effect Children and Reconstruction by Kummoona Chondro-Osseous Graft". *EC Paediatrics* 7.11 (2018): 1035-1036.
4. Kummoona R., et al. "Reconstruction of lower jaw by iliac Bone Graft, Experimental Study on Rabbit and Role of Mesenchymal Stem Cells". *Journal of Stem Cell and Regenerative Biology* 4.1 (2018): 20-24.

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