In Vivo Bone Tissue Engineering Using Dental Stem Cells on Novel Scaffold

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OBJECTIVE: This article reports a case of a chronic maxillary sKeywords: Dental Pulp Stem Cells, Scaffold, Mandible, Bone Morphogenic Protein, Bone Regeneration

BACKGROUNDS: This study has been implemented to evaluate osteogenic potential of dental pulp stem cells from children per se and in combination with growth factor applied in induced critical bony defects in the mandible of dogs

AIMS: Our aim is in vitro differentiation of dental stem cells taken from children into osteogenic potentials, to be implanted on a proper scaffold and to evaluate & compare histologically the effect of dental pulp stem cells when used per se & in combination with growth factor on healing of induced bone defect in dogs.

MATERIALS AND METHODS: This study was conducted on experimental 12 dogs divided into four groups (A, B, C, D) each contains three dogs and surgery for each experimental dog has been conducted where fabricate surgeries in the lower jaw and took the gap backward as a test while the front to be considered control and then the induced defect was filled with absorbable scaffold of proper material to be a control group, while the other defect was performed posteriorly where the defect of the same size and filled with specific material according to the type of group (test group) and experimental animals has been scarified after twelve weeks. After the extraction of the lower jaw of the animals were separated into two halves, right and left for examination radioactively then cut up and prepared to study bones in critical gaps microscopically.

RESULTS: The results showed that the highest percentage bone formation is the group that contains the stem cells within scaffold in the presence of growth factors (Group C), followed by the group that contains stem cells within the scaffold (Group D) and then the group that contains growth factors inside scaffold (group B) and finally the group that contains scaffold only (group A) control group.

CONCLUSIONS: The feasibility of using stem cell-mediated bone regeneration to treat bony defects. The bone cavities resulting from the surgical removal of the diseased tissue can be filled dynamically and safety with stem cells within the scaffold if it was surrounded by healthy bone & the scaffolds do not have any side-reactions or interactions poisoning or cellular damage or generate any effect on bones.