

ABSTRACT

Regeneration of Calvaria bone defect of rat's cranium with chitosan – carbonate apatite / hidroxy apatite scaffold – human amniotic mesenchymal stem cell

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Background: Experimental study of bone tissue engineering, an alternative to autogenous bone graft showed promising result, however, its healing mechanisms and effectiveness has not been fully understood until today.

Purpose: The aim of this study is to describe the difference in bone healing mechanism and effectiveness between chitosan – carbonate apatite / hidroxy apatite loaded with hAMSC in the regeneration of calvaria bone defect .

Methods: Fifty whistar rat were divided into 10 groups based on the time of observation i.e. first and eight week, each group subdivided into 5 experimental groups, consisting of 5 rats per group. Twenty-five rats from each experimental week were sacrificed for histology and immunohistochemistry staining.

Result: Expression of VEGF, BMP2, Runx2 and angiogenesis commenced earlier in tissue engineering group compared with control group. Eight-weeks analysis showed that expression of Runx2, ALP, osteocalcin and collagen type-I fibres were higher in tissue engineering groups than control group. These results indicated that in late phase of healing, the osteogenic activities were higher in tissue engineering group than control group.

Conclusion: This study concluded that both the early and late stage of healing activities were higher in tissue engineering group than control group , also the bone forming capacity of tissue engineering group was comparable to control group. This experiment should be continued with more various time of observation to complete the information.

Keywords: human amniotic mesenchymal stem cell, chitosan, carbonate-apatite, hidroxy-apatite, calvaria bone defect