

USE OF DECELLULARISED HUMAN AMNIOTIC MEMBRANE AS A CARRIER FOR PLATELET RICH PLASMA AND MESENCHYMAL STROMAL CELLS TO PROMOTE HEALING OF ACUTE LARGE WOUNDS

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PURPOSE:

Acute large wounds (ALW) instigated by trauma and surgical debridement heals by secondary intention. Delayed wound closure makes ALW vulnerable for infection, adding to patients' morbidity. The ideal choice of dressing is yet to be established.

Human amniotic membrane (HAM) was found to be an alternative for ALW management due to its excellent role in wound healing. Incorporation of mesenchymal stromal cells (MSC) and platelet-rich plasma (PRP) provides sustainable supply of cells and growth factors. This study investigates the safety and efficacy of HAM incorporated with MSC and PRP in rat ALW model.

MATERIALS AND METHODS:

Four full-thickness large wounds of diameter 2 cm each were created over the dorsal aspect of thirty-six (36) male rats. Two wounds were treated with either MSC and/or PRP while the remainder served as controls. The groups were control, G1: HAM+MSC, G2: HAM+PRP and G3: HAM+MSC+PRP (Figure 1). All wounds were secured with splints to prevent wound contraction and protective external bandages.

Wounds were assessed and photographed at day 0, 3, 7, 10 and 14. The rats were sacrificed at day 7 or 14 and the tissues were harvested for histopathology and biomechanical analysis.

RESULTS AND DISCUSSION:

Wound assessment showed progressive granulation tissue formation in all groups until day 14. H&E staining also demonstrated

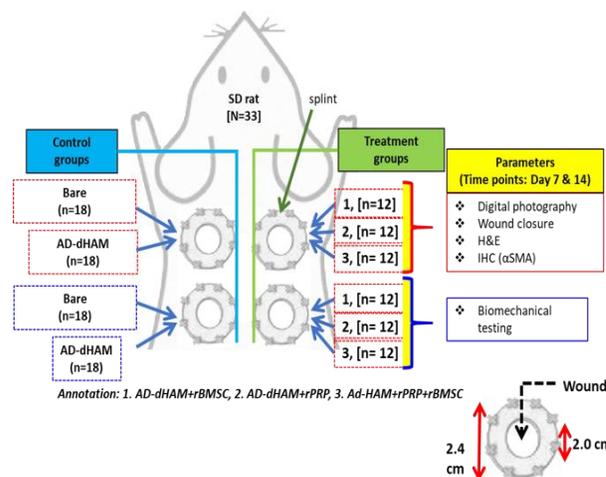


Figure 1: In-vivo study design and grouping

comparable granulation tissue formation and re-epithelisation across both control and treatment group. The α -SMA staining showed 5-fold increase ($p < 0.01$) in G1-3 indicating presence of dense repair precursors.

Biomechanical analysis indicated an increasing trend in ultimate tensile strength in all groups, with G3 showing the highest by 1.8-fold increase ($p = 0.02$).

CONCLUSION:

HAM incorporated with MSC and PRP exhibited enhanced wound healing without visible adverse effect and an increase in α -SMA expression and ultimate tensile strength suggesting its excellent safety and efficacy for ALW treatment.

REFERENCES:

1. Yang et al. Effect of Amniotic Fluid Stem Cells on the Wound Healing Process in a White Rat Model. Arch Plast Surg. 2013;40(5):496-504.