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Acellular Dermal Matrix in Mucogingival Surgery

Dr. Manpreet Kaur[1], Dr. Krishan Kumar[2]

[1,2]Department of Periodontics, Post Graduate Institute of Dental Sciences, Rohtak

ABSTRACT

Autogenous donor tissue is frequently used for recession coverage and gingival augmentation. However, due to non availability of donor tissue and associated morbidity, acellular dermal matrix (ADM) is used as a substitute. In this review, studies revealed that ADM offers results comparable to autogenous grafts in mucogingival procedures. Further well controlled randomized trials with similar study designs are required to compare results achieved from ADM with other techniques.

Key words: Acellular dermal matrix, recession coverage; gingival augmentation

INTRODUCTION

One of the objectives of mucogingival surgery is coverage of root recession. This coverage is achieved through lateral[1] or coronal repositioning[2] of pedicle graft. Coronally advanced flap combined with free connective tissue graft is also used for recession coverage[3]. Pedicle graft provides the most esthetic results. In case of non availability of donor site for pedicle graft, donor tissue is harvested from other sites such as palate, edentulous ridge. Gingival augmentation to increase width of attached gingiva also requires donor tissue that can be harvested from adjacent or distant sites. Obtaining donor tissue from distant site has disadvantage of being source of discomfort and pain[4]. Moreover, palate may not provide amount of tissue required. Due to these reasons, non autogenous substitutes have been tried for root coverage and gingival augmentation.

Acellular dermal matrix:

Acellular dermal matrix (ADM) is acellular, non-immunogenic cadaveric human dermis[5]. ADM is processed from human donor skin obtained from approved tissue banks. Epithelium is removed from graft[6]. The remaining dermal layer is washed in detergent solutions to inactivate viruses and reduce rejection. The remaining acellular collagen matrix is then cryoprotected and rapidly freeze-dried in a proprietary process to preserve biochemical and structural integrity. It has polarity by which one side of the material has basal lamina to facilitate epithelial migration when overlying flap did not cover ADM. The other side, an underlying porous dermal matrix contains structurally intact extracellular matrix, which allows ingrowth of fibroblasts and angiogenic cells[7].

ADM is used as a substitute for autogenous connective tissue in burns[8], for lip augmentation[9], facial augmentation[10], and dural replacement[11].

Shulman[12] was first to document the use of ADM in dentistry. Intraorally, ADM has since been utilized for soft tissue augmentation[13], augmentation of keratinized gingiva[14], as a barrier membrane[15], as a soft tissue grafting material to cover amalgam tattoos, and for root coverage procedures.

Histological differences between ADM and gingiva:

ADM contains abundance of elastin whereas gingiva lacks elastin. The primary method of determining the fate of ADM following oral implantation has been by staining biopsy samples to identify elastin contained within tissues with stains such as Verhoeff's solution[16]. Microscopically, the presence of elastin allows for easy determination of graft presence or absence, as well as incorporation within the surrounding tissues[16].

Results of studies using ADM as substitute in recession coverage:

In study by Harris RJ et al, root coverage with coronally positioned pedicle graft combined with connective tissue graft is compared with coronally positioned pedicle graft combined with ADM[17]. Comparable results are reported with no significant difference in mean root coverage and esthetics[16,17.] Predictable results are reported with use of ADM in recession coverage of multiple sites[18] as well as isolated recession sites[20]. Better esthetic results are reported with ADM[19,20]. One study revealed that root coverage is possible with ADM, however better results are achieved with use of connective tissue graft along with coronally advanced flaps[21].

Results of studies using ADM as substitute in gingival augmentation

ADM is easily handled material for use in keratinized tissue augmentation[22]. In humans, ADM is substituted and completely re-epitheliialized in 10 weeks[22.]. Other study reported unpredictable results for ADM due to significant shrinkage and inconsistent quality of attached gingiva gained, however esthetic results are better as compared to free gingival grafts[23].

Advantages of ADM:

The use of ADM eliminates the need for secondary surgical site and provides an unlimited amount of donor tissue. Better esthetic results are reported with ADM than with autogenous free gingival grafts[23] Use of ADM has decreased complications and increased clinical efficiency. Dead cells are antigenic and have potential for transmission of cell associated virus. Elimination of dead cells in ADM results in non-immunogenic material with no potential for transmission of viruses. Presence of intact collagen and elastin makes ADM biocompatible[21].

CONCLUSION

ADM is used for mucogingival procedures such as root coverage and gingival augmentation. Studies reported similar to better results with use of ADM than autogenous grafts. Using similar study designs, further studies are required to further evaluate efficacy of ADM.

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