



SHORT COMMUNICATION

FREEZE-DRIED UMBILICAL CORD ALLOGRAFT- THE NEW BIOMATERIAL

“CORD TO THE RESCUE..!”

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ABSTRACT

The world of dentistry has always been evolved at its best. In the recent years, enormous treatment modalities with novel biomaterials have been discovered in regenerative dentistry. Despite all the advancements, however there are few limitations with certain biomaterials. The most recent potential alternative biomaterial and the first to be used in India is the freeze dried umbilical cord allograft (FUDUCA). FUDUCA is prepared from the placenta along with the umbilical cord from a potential donor after parturition. FUDUCA is 10 times thicker than the amnion and chorion membrane and is found to contain enormous amount of growth factors and immunomodulatory factors owing to a great potential in regenerative dentistry. The superior properties of this novel biomaterial in regenerative dentistry brings in an evolution of biomaterials and a boon to dentistry.

KEYWORDS: Regenerative dentistry; Tooth loss; Aesthetics; Freeze-dried Umbilical Cord Allograft

INTRODUCTION

Dentistry has evolved through the years with enormous treatment modalities and various biomaterials to treat hard and soft tissue defects in the oral cavity. Yet, gingival recession, tooth loss and aesthetics remains a major problem for many patients. This is due to high level of patient discomfort as these result in tooth hypersensitivity, pain, cervical abrasion and increased risk of root caries.¹

There are several treatment modalities to manage the above problems addressed by the patients. Few of them include pedicle grafts, autogenous free gingival grafts, subepithelial connective tissue grafts with or without the use of biomaterials, after endodontic management of painful, carious and abraded teeth. However, there are limitations with soft tissue grafts such as patient morbidity, two surgical sites and limited blood supply.² Hence to every dentist, an evolution becomes utmost necessary in order to explore, solve and overcome the above limitations.

One of the potential recent alternative novel biomaterial is the Freeze-dried Umbilical Cord Allograft. It is known to contain essential growth and immunomodulatory factors that promote an anti-inflammatory environment. This new allograft can be used as a treatment modality for various defects in the oral cavity and is the first to be procured and used in India.

Different regenerative materials have been used in dentistry from the advent of Millipore to GTR and various other collagen membranes. Non-resorbable membranes were replaced with resorbable membranes to avoid second surgical procedure. Recent advances include the amnion and the chorion membrane which were derived from the placenta. The most recent regenerative material and the first to be used in India is the freeze-dried umbilical cord allograft which is derived from the umbilical cord of the foetus. It is known to contain immunomodulatory factors thus promoting an anti-inflammatory environment resulting in periodontal regeneration.

MATERIALS AND METHODS

Freeze-dried umbilical cord allograft is prepared at the TISSUE BANK, TATA MEMORIAL HOSPITAL - MUMBAI using standard protocol. Placenta with umbilical cord is received from potential donor (which is expelled out after the delivery of baby) and a written informed consent is taken from them. Before processing the umbilical cord tissue, donor is screened for medical and social history and other blood investigations included tests for HIV, HBV, HCV and syphilis antigens. After screening, if donor is suitable for processing, the umbilical cord tissue is processed, freeze-dried, cut into appropriate sizes, packed and gamma sterilized. (Fig 1)



Fig 1: Freeze-dried umbilical cord allograft

RESULTS

Increased gingival thickness, no patient morbidity or post-operative complications along with almost complete root coverage is seen when used in root coverage procedures, since this allograft contains essential growth factors and immune-modulatory properties. Another added advantage of freeze-dried umbilical cord allograft is that, it is about 10 times thicker than amniotic membrane, easier to handle and is comprised of higher concentrations of biologic components.³

More specifically, it is shown to induce apoptosis of activated neutrophils and macrophages, decrease fibroblast proliferation, downregulate TGF- β (transforming growth factor beta) signalling, increase the expression of anti-inflammatory cytokines, thereby reducing the expression of proinflammatory cytokines.⁴ One such complex active biologic component in freeze dried umbilical cord allograft is HC-HA/PTX3 (heavy chain- hyaluronin/pentraxin 3) is responsible for promoting regenerative healing by exerting anti-inflammatory and ant scarring actions.⁵

DISCUSSION

This new novel biomaterial can be used in guided tissue regenerative procedures, socket preservation procedures, to treat intrabony defects, in various oral and maxillofacial procedures, implant-related procedures (treatment of periimplantitis), as a bandage after procurement of palatal grafts or from various other donor sites and root coverage procedures. Freeze-dried umbilical cord allograft is known to achieve almost complete root coverage in the treatment of gingival recession. Hence the aesthetic concern of the patient is also satisfied. Thus this new allograft is of use in various fields of dentistry and especially in the field of Periodontology.

CONCLUSION

Collectively, the above properties of freeze-dried umbilical cord allograft help to promote the healing and regeneration of various tissues in the oral cavity. Thus all these applications bring in an evolution of biomaterials in the field of dentistry. This novel biomaterial is a recent boon in the field of regenerative dentistry with more applicability, ease with superior properties replacing other regenerative materials in times to come.

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There are no conflicts of interest.

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