ORIGINAL RESEARCH PAPER

Dentistry

REGAIN WITH RESOLUTION - AN ANTICONVULSANT AS A SOFT TISSUE REGENERATOR.

KEY WORDS: Gingival tissue loss, phenytoin, tissue engineering

Dr.C.S. Prabhahar* MDS, Best Dental Science College, Madurai, Tamil Nadu. *Corresponding Author

Dr. M.Umayal MDS, Best Dental Science College, Madurai, Tamil Nadu.

Dr. M. Tamilarasan MDS, Best Dental Science College, Madurai, Tamil Nadu.

Dr. M. V. Noblin Shyma Best Dental Science College, Madurai, Tamil Nadu.

ABSTRACT

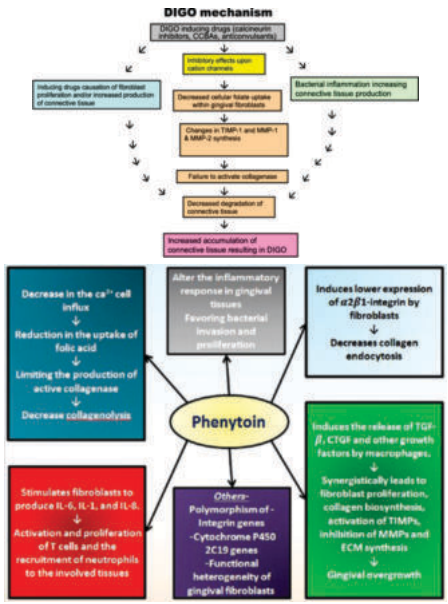
INTRODUCTION: Gingival tissue loss(recession) is one of the frequent mucogingival condition encountered by most of the population. It may be a major concern of the dentally aware patient with a high standard of oral hygiene. In recent epidemiologic investigations, it has been shown that gingival tissue loss may actually be a condition in industrialized populations. However, whereas prevalence seems to be large even in young people and may essentially be confined to buccal surfaces, extent and severity may be rather small even in older age groups. Treatment wise, apart from elimination of the etiology the goal has to be focussed on soft tissue regaining. Surgical modalities such as grafts based on different techniques are performed by periodontists universally. A Search for non-invasive and patient friendly methods for the correction of the tissue loss is inevitable. Anticonvulsants such as phenytoin have the potential of inducing growth in the gingival tissue. Our aim of this review is to understand and incorporate the mechanism of phenytoin induced tissue growth creativity.

GINGIVAL GROWTH BY TISSUE ENGINEERING:

The field of tissue engineering/ regenerative medicine (TE/ RM) has arose to manage these clinical scenarios, with the intent of replacing and recovering Lost tissues to restore normal function and structure(1). Having the design of the vasculature within gingival tissue isn't necessary for the topical application of phenytoin as the new tissues develops with the same colour and consistency as like the being one (2).

The current treatment for gingival recession is generally autologous soft tissue grafts. Also, material backups are available on the demand, which have some reports on their efficacity (3). Phenytoin is a potential agent for utmost connective tissue- derived cells, including bone cells and gingival tissue. Phenytoin can be used locally in the gingival tissues to enhance root coverage(4).

MECHANISM OF ACTION OF DRUG INDUCED GINGIVAL GROWTH:



LIMITATIONS OF SURGICAL TECHNIQUES:

1.Post operative discomfort,infection and irritation in the donor site.
2.Lack of sufficient bulk of tissue.
3.Time cohered with the tissue harvesting.
4.Less predictability of colour match between donor and recipient site.

GINGIVAL RECESSION MANAGEMENT BY PHENYTOIN INDUCED GINGIVAL GROWTH:

The frequency and extent of gingival tissue loss increase with age. The pathogenesis of tissue loss is multifactorial, and may be caused by inflammatory destruction, improper tooth brushing, incorrect occlusal relationships, improper flossing, plaque accumulation and traumatic injury. It may result in tooth hypersensitivity, root caries, gingival bleeding, plaque accumulation and poor esthetics (5). Thin gingival tissues, being more luminous and fragile, are more vulnerable to recede. Histologically, thin gingival tissues are less fibrous and less keratinized than thick gingival tissues. Alveolar bone loss is often related with receding gums. Receded gingival tissues hardly ever regain their original heights without concurrent regeneration of the underlying alveolar bone.

The capacity of these drugs in causing gingival growth is modified by the presence of bacterial plaque, gingival inflammation and genetic predisposition(6). Despite differences in pharmaceutics and primary tissue targets, these drugs induce similar fibrous gingival growth by enriching collagen production and inhibiting collagen destruction (7).

TOPICAL APPLICATION OF PHENYTOIN:

Compared with systemic administration, topical application of the aforementioned drug has been shown to confer pharmaceutical benefits without systemic toxicity (8).There is ample evidence showing that phenytoin induces bone and periodontal ligament cells turn over(9).Topical phenytoin has a better therapeutic outcome in wound healing and promotes collagen deposition and neovascularization with increased expression of vascular endothelial growth factor and basic fibroblast growth factor in the wound tissue (10).

Topical application of phenytoin will lead to an increase in

production of fibroblasts, myofibroblasts, extracellular matrix, its proteins, and activity of growth factors. Results from various studies suggest that topical application of phenytoin may regulate soft tissue regeneration.

DISCUSSION & CONCLUSION:

Many advancements have occurred over the last 10 to 20 years in the field of Tissue engineering. Periodontal tissue engineering involves a multidisciplinary approach towards the regeneration of periodontal ligament, cementum and alveolar bone surrounding teeth. Current regenerative approaches utilized in everyday clinical practice are mainly bone or tissue regeneration based. Hard tissue regeneration may be achieved by synthetic grafts or grafts of animal origin. But soft tissue regeneration can be achieved only by autografts which is performed by surgical procedures. A Novel approach in the regeneration of lost gingival marginal tissue by non-surgical method is achieved by the topical application of Phenytoin. Phenytoin was 1st introduced as an anticonvulsant medication in 1973. Gingival enlargement is a common complication of long term oral phenytoin treatment. Various studies provided new evidence that localized controlled release of phenytoin confers therapeutic benefits towards gingival recession. This finding generated interest in using phenytoin to promote root coverage. Topical phenytoin have been used to accelerate healing in chronic wounds, burns, diabetic foot wounds and skin graft donor sites. Topical phenytoin increases fibroblast proliferation, extracellular matrix production, collagen synthesis and causes granulation tissue to form significantly earlier. Keeping the hypothesis that, "Root coverage with non-surgical treatment may be accelerated with topical medication such as phenytoin" in mind and based on studies performed by the topical application of phenytoin, we could find the anticipated effect.

The present review provided new evidence that localized controlled release of phenytoin confers therapeutic benefits towards gingival tissue regain.

REFERENCES:

1. Brouwer KM, Lundvig DM, Middelkoop E, Wagener FA, Von den Hoff JW. Mechanical cues in orofacial tissue engineering and regenerative medicine. Wound Repair Regen 2015; 23:302-11.
2. Mikecs, B.; Vág, J.; Gerber, G.; Molnár, B.; Feigl, G.; Shahbazi, A. Revisiting the vascularity of the keratinized gingiva in the maxillary esthetic zone. BMC Oral Health 2021, 21, 160
3. Patel, M.; Nixon, P.J.; Chan, M.F.W. Gingival recession: Part 3. Surgical management using free grafts and guided tissue regeneration. Nat. Publ. Gr. 2011, 211, 353–358.
4. Kanda, J Izumo N, Kobayashi Y, Onodera K, Shimakura T Yamamoto , N ... Wakabayashi H (2017). Effects of the antiepileptic drugs phenytoin, gabapentin and levetiracetam on bone strength, bone mass and bone turnover in rats. Biological and pharmaceutical Bulletin , 40(11), 1934-1940
5. Chan, H. L., Chun, Y. H., MacEachern, M., & Oates, T. W. (2015). Does gingival recession require surgical treatment? Dental Clinics of North America, 59(4), 981–996. https://doi.org/10.1016/j.cden.2015.06.010.
6. Mishra, M. B., Khan, Z. Y., & Mishra, S. (2011). Gingival overgrowth and drug association: A review. Indian Journal of Medical Sciences, 65(2), 73–82.
7. Xiao-Heng Zhaoa, Franklin R. Tay. Topical application of phenytoin or nifedipine-loaded PLGA microspheres promotes periodontal regeneration in vivo. Archives of Oral Biology 97 (2019) 42–51
8. Chan, F. C., Kennedy, C., Hanson, R. P., O'Sullivan, B., Kelly, J., & Bouchier-Hayes, D. (2007). Topical diphenylhydantoin sodium can improve healing in a diabetic incisional animal wound model. Journal of Wound Care, 16(8), 359–363.
9. Kanda, J., Izumo, N., Kobayashi, Y., Onodera, K., Shimakura, T., Yamamoto, N., ...Wakabayashi, H. (2017). Effects of the antiepileptic drugs phenytoin, gabapentin, and levetiracetam on bone strength, bone mass, and bone turnover in rats. Biological & Pharmaceutical Bulletin, 40(11), 1934–1940.
10. Chen, F. M., Shelton, R. M., Jin, Y., & Chapple, I. L. (2009). Localized delivery of growth factors for periodontal tissue regeneration: Role, strategies, and perspectives. Medicinal Research Review, 29(3), 472–513.