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Hyaluronic Acid Application for Treating Black Triangle – A Case Report

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Abstract

Aesthetics plays a major role in day-to-day life for everyone. The key of appearance for many people is their smile. The contour of the gingiva also contributes to aesthetics. Interdental papilla loss might occur due to several reasons as a consequence of periodontal surgery or trauma. Interdental papilla construction, especially in the esthetic area, is one of the most challenging tasks. The purpose of this study is to report the reconstruction of lost interdental papilla using hyaluronic acid. Hyaluronic acid is a glycosaminoglycan molecule with anti inflammatory, antiedematous, good tissue healing property on periodontal tissues invaded by submicrobial flora. It enhances wound healing and accelerates periodontal repair and regeneration. In addition to the field of dentistry, it has been used in other fields such as Orthopedics, Ophthalmology, and Dermatology. It shows growth factor interaction, regulates osmotic pressure, and enhances tissue lubrication, which helps in maintaining the structural and homeostatic integrity of tissues, hence resulting in beneficial effect on lost interdental papilla. This article reports a case aimed to reconstruct the lost interdental papilla by noninvasive approach which reduces patient's post-operative discomfort with marked variations in the volume of interdental papilla before and after the procedure.

Keywords: Hyaluronic acid, treatment, reconstruction of interdental papilla

Introduction

The ultimate goal of periodontal therapy is to arrest the progress of periodontal disease and regenerate the lost periodontal support (1). Hyaluronic acid (HA) is a high molecular weight component, anionic, nonsulphated glycosaminoglycan component which is produced during various phases of cell's life cycle. HA forms a major and critical component of connective tissue. It contributes in tissue hydrodynamics, cell migration, proliferation, and improves healing properties of the tissue (2). It acts as barrier to various gram negative bacteria (3). Physiological, structural, and biochemical properties prove that it provides elasticity and stability to tissues and is critically beneficial in tissue regeneration (4). Its nonimmunogenic nature increases its use in clinical applications. It is a highly biocompatible polysaccharide molecule with anti-oedematous and bacteriostatic properties. HA acts as an antioxidant by scavenging reactive oxygen species, which helps in the regulation of immune response implying its anti-inflammatory properties (5). It has also been reported that HA shows osteoinductive properties, which is useful for treatment of periodontal disease (6). Other beneficial effects are seen for the treatment of recurrent aphthous ulcer(7), for treating gingival lesions(9), and promote healing in extraction socket(8).HA has also been reported as a diagnostic biomarker of inflammation in gingival crevicular fluid and repair of tissues. Recently, HA has been added as a local chemotherapeutic agent to tissues. It is available in various forms (9). Low molecular weight HA shows angiogenesis whereas high molecular weight is opposite to it (10).Recent investigations have indicated that HA induces mineralization of dental pulp cells through CD44 cell surface glycoprotein and is considered to be a principle ligand for receptor CD44(11). Hyaluronic acid was found to have extensive actions in various periodontal therapies such as topical application in subgingival regions that reduces microbial activity, bone regeneration in deep

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periodontal bony defects, guided bone regeneration, nonsurgical treatment of periimplantitis pockets, periimplant maintenance of immediately placed implants, and gingival augmentation in mucogingival surgery. HA may act as a scaffold for other molecules such as Bone morphogenic protien-2 and platelet derived growth factor-BB, used in guided bone regeneration techniques and tissue engineering research (12). HA when applied to

Case report:

A 25-year-old female reported to the Department of Periodontics with her esthetic concern and complaint of black triangle, in the anterior maxillary region (Figure 1).The clinical examination revealed, class I type of interproximal tissue loss without any bone loss and no extraoral deformities were detected. Patient's oral hygiene was found to be good. A written informed consent was taken from the patient before the procedure.

Interdental papilla classification;

Nordland and Tarnow (12) proposed a classification using three reference points, i.e., contact point, facial and apical extent of cementoenamel junction (CEJ), and interproximal extent of CEJ (iCEJ), and was classified into the following four classes:

Normal: Interdental papilla occupies embrasure space to the apical part of the interdental contact point.

Class I: Tip of interdental papilla occupies space between the interdental contact point and the most coronal part of CEJ.

Class II: Tip of interdental papilla lies at/or the apical to the CEJ but coronal to the apical most part of the CEJ on facial aspect.

Class III: Tip of interdental papilla lies at level with or apical to the facial CEJ.

The loss of interdental papillae can be due to many reasons such as gingivitis, oral hygiene procedures with trauma, tooth shape with abnormal anatomy, or improper contours of the restoration.

Hyaluronic acid injection technique

After introducing a local anesthetic agent, less than 0.2 ml of the HA gel was injected at the sites 2–3 mm apical to the coronal tip of the papilla (Figure 2). The patient was instructed not to brush on the day of treatment but maintain oral hygiene, and after 24 hours, using a soft bristle toothbrush at the anterior teeth to start their routine oral hygiene measures

patients with chronic periodontitis showed reduction in bleeding on probing (BOP), probing pocket depth (PPD), and clinical attachment level, and hence, can be used as an adjunct to scaling and root planing (13).

HA is biocompatible and intrinsically safe to use, with no evidence of cytotoxicity. HA gel, injections, or oral (by mouth) should not be used in patients with allergies (6).
and avoid using dental floss at the site of treatment. The tolerance of the gel was unconditionally good and no intolerance was observed.

After 3 months, photographs were taken and comparison was done using these images. This technique resulted in significant gain in papillary volume and esthetic improvement was noted (Figure 3).

Figure 1 – Pre-operative view

Figure 3: Post-operative view

Discussion

Using hyaluronic acid for interdental papilla reconstruction is an efficient noninvasive method and most widely used method for reconstruction of interdental papilla reconstruction. The advantage of using hyaluronic acid is patient discomfort during the procedure is been reduced. And due to hyaluronic acid has a filler , good healing properties it gives post operatively a good result (16). Several studies have been proposed regarding the effects of HA on periodontium. Becker et al (17). concluded that HA gel is a synthetic material and can be used with no drug interference and is a safe material, which significantly decreases the interdental black triangle in the esthetic zone. It has also been approved by the Food and Drug Association. Vedamurthy (18) reported HA to be a dermal filler and applied it for soft tissue augmentation, observing significant improvements. Monheit et al (19), discussed the inherent properties of HA that make them ideal for cosmetic surgeries. Prato et al (20), Pendyala et al. found that antioxidant capacity of HA is inversely proportional to the severity of inflammation and can be used as a biomarker in periodontitis. It is acceptable that injecting HA to periodontal wound sites had shown significant effects in periodontal tissue regeneration. Engström et al. reported bone regenerative effects of HA in nonsurgical and surgical groups and showed no statistical difference when evaluated on radiographs in the nonsurgical group; however, there was remarkable decrease in the height of alveolar bone after oral prophylaxis in both the nonsurgical and surgical group. There was also decrease in PPD after surgical treatment and also with SRP. HA when involved with soft and hard tissues showed negligible effect on the immune system of the patient. Ballini et al. stated enhanced accelerating capacity of new bone formation in the infrabone defects when combined with autologous bone graft (16).

Conclusion

In recent years, Hyaluronic acid have made their way into dentistry for both dental esthetic and dental therapeutic uses in the oral and maxillofacial areas. They are here to stay and with more and more intra oral uses of these materials, they are fast becoming an integral part of everyday dental practice including restorative, aesthetic, Periodontal, Orthodontic and Prosthodontics implications. They provide patients with most significant, predictable, minimally invasive, aesthetic and therapeutic outcomes available for many everyday clinical situations. These treatments are more than a complement to Aesthetic Dentistry Hyaluronic acid are now an integral part of every esthetic dental treatment plan.

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