ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)
IJDSIR : Dental Publication Service
Available Online at: www.ijdsir.com
Volume – 4, Issue – 2, April - 2021, Page No. : 106 - 111

Efficacy and post treatment comfort of cyanoacrylate as an adjunct to non-surgical periodontal therapy: a case report

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Citation of this Article: Dr Pooja Agrawal, Dr Rajesh Kumar, Dr. Kanteshwari IK, Dr Gagan Jaiswal, Dr Heena Agrawal, Dr Soumya Sanghmitra Arya, "Efficacy and post treatment comfort of cyanoacrylate as an adjunct to non-surgical periodontal therapy: a case report", IJDSIR- April - 2021, Vol. – 4, Issue - 2, P. No. 106 – 111.

Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Non-surgical periodontal therapy (NSPT) can be related with various post operative impediments such as tenderness of gingival tissues and sensitivity of teeth which can have a negative impact on oral self care, thus markedly affecting the periodontal wound healing. Also the inability of removal of biofilm can further worsen the sensitivity of gingival tissues and the teeth leading to patient's reluctance towards regular self oral care and specialized therapy. In this case report, supra gingival application of cyanoacrylate adhesive as an aide to scaling and root planing (SRP) in minimizing post treatment discomfort of dental hard and soft tissues and its efficacy in periodontal wound healing was assessed. Considerable reduction in dentinal hypersensitivity and bleeding on probing (BOP) was achieved. Improved healing was also observed after the application of cyanoacrylate with less pain and no discomfort. Substantial reduction in BOP

specifies that the application of cyanoacrylate with its antimicrobial properties and its treatment acceptance can be served as a useful adjunct to NSPT in reducing gingival inflammation.

Keywords: Non-surgical periodontal therapy, cyanoacrylate tissue adhesive, bleeding on probing, hypersensitivity

Introduction

Periodontitis is defined as "an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with increasing probing depth formation, recession, or both[(1)]. The final aim of the periodontal therapy is stoppage and reversal of the lost periodontal attachment due to periodontitis and regeneration of the lost tissues and promotion of early wound healing[(2)]. Various treatment options for reducing the probing pocket depth (PPD), or for eliminating the pocket are non-surgical periodontal therapy such as scaling and root planning (SRP), or surgical therapy such as open flap debridement (OFD), resective osseous surgery and regenerative/ reconstructive periodontal surgery. SRP is fundamental professional instrumentation procedure utilized during periodontal debridement, which removes hard and soft deposits above and below the gingival margin. However, patients perceived post treatment discomfort and pain following the mechanical therapy thereby leading to hypersensitivity[(3)]. Various options such as administration of over the counter analgesics, topical anesthetic gels and desensitizing toothpastes have been utilized to minimize post-treatment discomfort following SRP. However due to their lack of predictability, prolonged duration to obtain an adequate response, compromised quality of life due to side effects such as gastric irritation, numbness, altered taste sensations, and need for repeated use need for an alternative for adjuvant therapy that may provide a more predictable protective barrier during the immediate and critical healing period following SRP still exists[(4)]. A novel adjunctive cyanoacrylate adhesive placed after SRP may assist with post-treatment complications has been hypothesized[(4)]. Cyanoacrylates developed in the 1950's, and are FDA approved as antimicrobial tissue adhesives with decades of successful applications in both medicine and dentistry. Medical soft tissue applications of cyanoacrylates adhesives are standard and include repairs of traumatic lacerations, myocardial tears and inguinal hernia. Cyanoacrylates have been used in field of periodontics for closure of periodontal flaps, for intraoral wound closure, for fixation of autologous bone grafts, in preserving the alveolar ridge, can be used as a periodontal dressing in gingivectomy procedures, in guided tissue regeneration for fixing the membrane and can be used in mucogingival graft fixation[(5,6)]. In the present case report, cyanoacrylate has been used as an aide to non-surgical periodontal therapy as its adjunctive placement may assist with post-treatment tissue healing during the immediate and critical period following SRP, the ability to complete comprehensive periodontal treatment and most importantly, patient's compliance with daily oral self-care procedures to obtain oral and overall systemic health.

Case Report

A 35 year old male patient reported with chief complaint of deposits and bleeding gums in upper left region of the jaw since 6 months. His medical and family history was non-contributory. On intraoral examination, there was probing pocket depth of 5 mm in teeth number 21,22,23,24 and 25 along with bleeding on probing. Patient was explained about NSPT and was planned for treatment with cyanoacrylate tissue adhesive. Patient was informed about the source of material and written informed consent was taken from the patient.

Clinical procedure: A detailed examination included reviewing medical/dental history, intraoral photographs and comprehensive oral and periodontal examination. The periodontal parameter assessed was bleeding on probing (BOP). Also tooth sensitivity, pain and gingival tissue discomfort was assessed by VAS (visual analog scale). Then the site underwent SRP. Following completion of NSPT, the adjunctive application of cyanoacrylate adhesive at the gingival margins extending 1-2 mm above and below on both labial and lingual/palatal aspects was applied to the site. Intraoral photographs were taken following completion of its application. Then the patient was given post-operative instructions that included avoiding any unnecessary use of analgesics or antibiotics, avoid the use of any over-the-counter mouth rinses and also to refrain from brushing and flossing of only the experimental sites for the 1-week post-operative period. At 1-week following the completion of NSPT the patient was assessed for any adverse events and for any pain or discomfort in teeth or gingival tissues as well as his acceptability of having the material in their mouth. Changes in teeth sensitivity was assessed using VAS scoring at experimental site. Removal of any remnants of cyanoacrylate adhesive was done and patient was instructed to resume his oral self-care regimes. The final scheduled visit was at 6-8 weeks following completion of NSPT. This visit included the evaluation of BOP as well as sensitivity assessment of each tooth using VAS scoring. The patient's perception of discomfort in the soft tissues (gingiva), hard tissues (teeth), and his acceptability to the adjunctive adhesive dressing was determined using VAS scoring. No contrary events were testified during this period. The patient maintained his oral self-care hygiene during the entire follow up period and he did not report any pain/discomfort at the follow up visit. At the follow up visits, there was marked reduction in bleeding on probing and hypersensitivity following application of cyanoacrylate.

Fig. 1: N-butylcyanoacrylate with disposable syringe and ampule containing 0.25ml cyanoacrylate

Fig. 2: Preoperative photograph of experimental site

Fig. 3: Placement of n butylcyanoacrylate being done on the experimental site

Fig. 4: N-butylcyanoacrylate placed at the experimental site

Fig 5: Clinical photograph at 1 week after placement of n-butylcyanoacrylate

Fig 6: Clinical photograph at 6 weeks after placement of n-butylcyanoacrylate

Discussion

Various studies support the additive use of cyanoacrylate following NSPT. The findings of the present case report indicate that the adjunctive application of the cyanoacrylate adhesive did significantly reduce periodontal inflammation, which, can potentially translate to improvement in healing and minimizing the disease risk of the periodontium. BOP is not only an indicator of periodontal inflammation but also an important risk predictor of development of periodontal disease. It is an objective clinical sign that is more sensitive and reliable than visual signs of inflammation[7]. The diseased periodontal tissues have been shown histo-pathologically to have increased vasculitis, thinning and degeneration of the sulcular epithelium as well as perivascular collagen loss that predisposes the tissues to bleed on provocation when probed[8]. Several studies have shown a significant and strong correlation of BOP as compared to PD or CAL to C-reactive protein (CRP) levels in blood[9,10]. CRP is an essential inflammatory mediator that has been causally related to various systemic diseases. The experimental sites demonstrating a substantial reduction in BOP may be attributed to the antibacterial properties of the cyanoacrylate; heat and the trace amounts of lethal by-products are potentially bactericidal. This antibacterial response has been demonstrated for a period of up to 10 days following its application[11]. Teeth sensitivity was also assessed in this case report using VAS scoring. There was reduction in hypersensitivity of teeth at all time points. **Tammaro et al.**[12] showed an upsurge in the dentin sensitivity following SRP only in teeth that have high baseline sensitivity and have also shown a reduction in sensitivity within 2-3 weeks following meticulous plaque control which is similar to finding of the present study. Pain perception was noted using VAS. Initially there was increase in pain at day 1 but trends, however,

indicated a reduction of discomfort/pain for both teeth and adjacent soft tissues over the 1-week post-NSPT period. These results concur with a similar study conducted by **Pihlstorm et al**[13] to assess patient perception of pain following NSPT and they reported pain to be of maximum intensity in all subjects in the first 2-8 hours and found the pain returning to baseline levels by the next morning of the procedure. The study was clinically relevant for the adhesive application protocol used. There were no reported adverse reactions, allergic reactions, medical emergencies or localized abscess formations following the application of the adjunctive adhesive.

Conclusion

It can be concluded that cyanoacrylate tissue adhesive with its antimicrobial characteristics and high recognition rate may help as a safe and valuable adjunct to NSPT in decreasing gingival inflammation as evident by reduction in BOP. Further comparative studies with a control group and with larger sample size are required to authenticate the findings of the present study.

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