ORIGINAL RESEARCH

Mesotherapy Using Vitamin C and Platelet Rich Plasma as an Anti-inflammatory Agent in Persistent Gingival Inflammation: A Pilot Study

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Abstract

In mesotherapy, the recipient receives minor dosages of biologically active substances in an area of pathology, which are delivered to the skin via local intradermal therapy (LIT). In addition to their anti-inflammatory properties, vitamin C and platelet-rich plasma (PRP) can improve tissue repair and reduce inflammation.

Aim: This study examined whether local injections of vitamin C and PRP could be used to treat persistent gingival inflammation.

Materials and methods: Following phase-I therapy, 15 patients with chronic persistent gingival inflammation underwent PRP and vitamin C injections respectively into the gingiva. Each patient underwent a weekly evaluation to see if the inflammation had subsided.

Results: During recall visits, the inflammation of the injected sites showed a significant improvement in post clinical pictures.

Conclusions: Local intradermal therapy (LIT) with vitamin C and PRP has a synergistic interaction along with scaling and root planing in the treatment of persistent gingival inflammation.

Keywords: Anti-inflammatory agents, Inflammation, Mesotherapy, Periodontal therapy, Platelet-rich plasma, Vitamin C.

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Introduction

This study looked at the possibility of treating chronic gingival inflammation with local injections of vitamin C and platelet-rich plasma (PRP). Depending on their location, severity, and response to treatment, gingival inflammations can exhibit a range of clinical signs and symptoms, from localized lesions that are simple to treat to chronic lesions that have redness, bleeding, and varying degrees of swelling.[1] The anti-inflammatory properties of vitamin C can lessen inflammatory processes and aid in tissue repair. Vitamin C's constituents function as reducing agents, free radical scavengers, antioxidants, and cofactors for enzymes. Inflammatory cytokines are released, and phagocytosis is initiated. This nutrient has components that work as antioxidants, reducing agents, free radical scavengers, and cofactors for enzymes.[2–5] Additionally, inflammation alters the growth rates of fibroblasts and lowers the production of type I collagen. By preventing fibrosis and collagen cross-linking, it also lessens scarring. It is also necessary for angiogenesis. The enzyme is responsible for the production of hydroxyproline, which is transformed into collagen and enhances the health and functionality of endothelial cells.[6] Growth factors are deposited in the extracellular matrix and released during matrix breakdown. Their subsequent interaction with surface receptors on target cells activates intracellular signaling pathways, which in turn trigger the transcription of Messenger RNA (mRNA) and proteins necessary for regenerative processes.[7,8] Platelet-rich plasma, a rich source of growth factors, is used in tissue engineering to increase growth factor levels by releasing them from intracellular stores.[9] Platelet-derived growth factor (PDGF) and transforming growth factor (TGF) are two growth factors found in PRP that are both involved in the control of bone regeneration.[10] Additionally to growth factors released during periodontal wound healing, as a result.

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Materials and Methods

The following inclusion criteria were used to select study participants from patients who visited the department of periodontology: (1) Age between 20 and 50 years; (2) Systemic health; and (3) Plaque-induced gingivitis. Patients with systemic conditions, expectant or nursing mothers, those who had received antibiotic treatment within the previous 6 months, and those with additional factors were all disqualified from the study (smoking, mouth breathing, and local trauma). Around thirty patients between the ages of 35 and 60 were split into two groups using a randomized controlled procedure based on the following inclusion and exclusion criteria. Before receiving full-mouth scaling and root planing (SRP) using hand and ultrasonic instruments, each patient received oral hygiene instructions. Two times, using mouthwash containing 0.2% chlorhexidine was advised. The only cases that were included after a 4 week maintenance period were those with chronic persistent gingival inflammation (Figs 1 and 2). There were

Fig. 1: Preoperative photo of case 1

Fig. 2: Case 1 Follow-up after the 2nd dose

two groups of 15 patients each made up of 30 patients with chronic gingival inflammation. Platelet-rich plasma (PRP) was injected into group II, while vitamin C was injected into group I. Each injection procedure was carried out by the same examiner. The affected area was put to sleep using a 1:200,000 lidocaine-adrenaline solution. As part of the mesotherapy approach, 1 mL (150 mg concentration) of vitamin C and 1 mL of PRP were injected using insulin syringes into the keratinized gingival tissues in the localized inflamed area (Figs 3A and B, Figs 4A and B).[11] Centrifugation protocols for PRP processing were used from a study done by Kutlu et al.[12] using double centrifugation, with the first at (2400 rpm) for 10 minutes and the second at (3600 rpm) for 15 minutes. The analgesic (ibuprofen 200 mg) is given to each group after two sessions, and it should only be used as needed. Following a week, patients underwent a reassessment while continuing to take the same dosage. Following the second injection, patients were reevaluated one week later. Plaque Index (Silness and Loe)[13] and Sulcus Bleeding Index (SBI) (Muhlemann and Son)[14] measurements were taken before the injection procedure, at 1 week and at 2 weeks.

Results

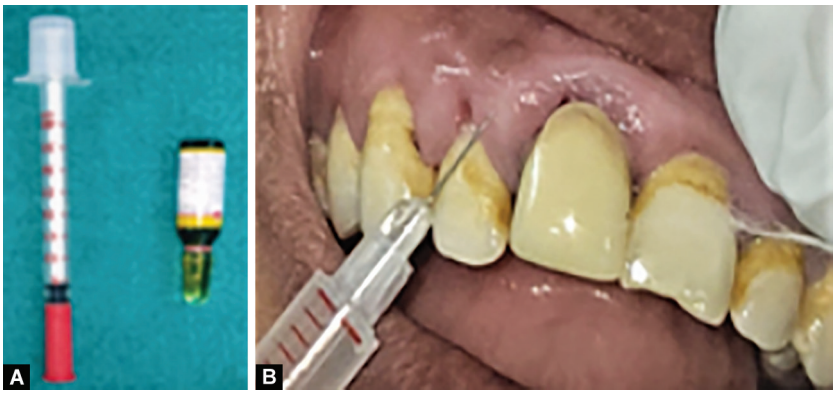
After two injections, the inflammation had reduced in every case (Figs 5 and 6). All of the patients were successfully treated, and they all expressed satisfaction with the outcomes. None of the patients reported any negative side effects or the requirement to take the rescue analgesic. Plaque index scores significantly decreased for all patients from the start of treatment to the end along with the sulcus bleeding index.

Discussion

Chronic or Resistant inflammation, which is characterized by persistent redness, bleeding upon probing, and various grades of tissue edema that can be diffuse or localized, persists even after the etiologic factors have been removed and oral hygiene has been improved. Antibiotics or corticosteroids were frequently used in such cases, followed, if required, by surgical procedures. These are no longer frequently used due to their detrimental effects. Therefore, before surgery is required, safer nonsurgical treatments should be used to treat such conditions or, at the very least, to hasten tissue healing and reduce inflammation symptoms.[15] Improvements in color, form, and SBI were observed clinically with a significant decrease in gingival inflammation from the average baseline value over the course of 2 weeks in the current study. Depending on the severity of the condition, 1 week may elapse between intraepidermal vitamin C and PRP injections that were given in various doses, depending on the severity of the condition. It is crucial to handle the inflamed tissues with care in order to prevent tearing and necrosis in tissues with thin gingival biotypes. These findings were in line with Yussif et al.[15] studies, which discovered that using antioxidants significantly enhanced gingival health. According to Mammucari et al.[16] the use of anti-inflammatory drugs in dermal mesotherapeutic techniques showed encouraging outcomes in the treatment of localized inflammation. As a result of the rapid decline in tissue antioxidant levels that occurs during inflammation, more free radicals are produced in the affected area.[17,18] Therefore, it is essential to take more antioxidants like vitamin C. Antioxidants that cooperate with free radicals to stabilize them. High systemic doses must be given, which may be harmful to patients, in order for an adequate dose to be delivered to the site of localized inflammation. Thus, local injections successfully administer the required doses.[19]

The local injection of vitamin C is preferable to topically apply vitamin C dentifrice or gel because it is water soluble and has a superficial penetrating effect, as demonstrated in earlier

Figs 3A and B: Injecting PRP using insulin suring



Figs 4A and B: Platelet-rich plasma was injected using insulin syringes into the keratinized gingival tissues in the localized inflamed area

Fig. 5: Case 1 – 1 week follow-up after the 1st dose

Fig. 6: The inflammation had reduced in every case

studies by Daniels and Jefferies[20] and Shimabukuro et al.[21] One disadvantage of topical vitamin C is that it takes longer to see results. Other disadvantages include localized erosions of enamel, decreased absorption, lack of substantiveness on oral soft tissues, instability when exposed to heat, light, or air, and reduced absorption.[22,23] Along with supporting earlier research on these growth factors; we demonstrated that PRP is a significant source of fibroblast growth factor-b, vascular endothelial growth factor, and epidermal growth factor. Fibroblast growth factor-b (FGF-b) is chemotactic and mitogenic for periodontal ligament fibroblasts, and epidermal growth factor (EGF) has been shown to be a major regulator of the growth of numerous cells derived from the ectoderm and mesoderm.[24] This prevents the synthesis of type-I collagen, one of the periodontium's most common extracellular matrices, and a prerequisite for the development of calcified nodules.[25] Vascular endothelial growth factor (VEGF) has been demonstrated to be crucial for the growth of new blood capillaries in the healing of wounds in addition to maintaining the integrity of the endothelial lining of the vasculature.[26] Because PRP provides significant amounts of growth factors collectively, which are essential for wound healing and regeneration, our findings corroborated earlier studies on its potential as a good. Also known as chemokine (C-C motif) ligand 5 (CCL5), this chemokine is normally expressed in T-cells, is activated-regulated, and may have two distinct functions in inflammation. It is also normally secreted. A strong chemo-attractant and activator for monocytes, regulated upon activation, normal T cell expressed and secreted (RANTES), a mediator of inflammation, facilitates monocytes adhesion to endothelial cells.[27,28] In addition, RANTES can stop the release of histamine from basophils, which is brought on by a number of cytokines. This inhibits inflammatory processes and changes the environment around the wound to one that is conducive to healing and repair. Aside from the many benefits of mesotherapy for persistent gingival inflammation, there are also fewer drawbacks like limited applicability, higher patient acceptance, and increased predictability. Additionally, mesotherapy is a quicker, less invasive procedure with no negative side effects afterward.

Conclusions

It follows that mesotherapy with PRP and vitamin C interacts synergistically with SRP to treat persistent gingival inflammation. To confirm these findings, more studies with longer follow-up intervals are advised.

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