



Ulcer Healing Among Patients With Traumatic Ulcers Wearing New Removable Dentures Treated With 0.3% Hyaluronic Acid Gel At Tertiary Care Hospital

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Name of Author:

Asma shams¹, Dr. aamir mehmoood butt², Javariya³, Amber rana⁴, Urooj⁵, Aimen qayyum⁶,

Affiliation: ¹Postgraduate resident (fcps), prosthodontics (dentistry), bds, institute of dentistry liaquat university of medical and health sciences jamshoro, hyderabad, pakistan

²Professor, prosthodontics (dentistry), fcps, institute of dentistry liaquat university of medical and health sciences jamshoro, hyderabad, pakistan

³Postgraduate resident (fcps), prosthodontics (dentistry) bds, institute of dentistry liaquat university of medical and health sciences jamshoro, hyderabad, pakistan

⁴Postgraduate resident (msc) prosthodontics, (dentistry), bds, institute of dentistry liaquat university of medical and health sciences jamshoro, hyderabad, pakistan

⁵Postgraduate resident (fcps), prosthodontics (dentistry) bds, institute of dentistry liaquat university of medical and health sciences jamshoro, hyderabad, pakistan

⁶Postgraduate resident (fcps), prosthodontics, prosthodontics (dentistry), bds, institute of dentistry liaquat university of medical and health sciences jamshoro, hyderabad, pakistan.

Corresponding Author:

Asma Shams

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Abstract: Background: Traumatic ulcers are frequent in patients with newly fabricated removable dentures, which may lead to pain, delayed adaptation and a decreased quality of life. Interventions are needed to speed healing and alleviate patient discomfort. **Objective:** To assess the efficacy of 0.3% hyaluronic acid gel in healing and pain reduction in traumatic ulcers of new removable denture wearers. **Methods:** Prospective cross-sectional study was carried out in the Department of Prosthodontics in Liaquat University Hospital, Hyderabad for Three months. The patients with denture-induced traumatic ulcers were obtained by non-probability consecutive sampling, 147 patients were included. Data were analysed using SPSS version 27 and changes were assessed using paired t-tests with $p < 0.05$ as significant. **Results:** The mean ulcer size significantly decreased from 6.2 ± 1.4 mm at baseline to 0.6 ± 0.5 mm on Day 7. Pain scores similarly reduced from 7.1 ± 1.3 to 0.9 ± 0.7 . Results were consistent for stratification by age, gender, and location of ulcer. The intervention was tolerated and there was no adverse effect reported. **Conclusions:** The 0.3% HA gel applied topically is a safe and effective treatment for traumatic ulcers in patients with newly fabricated removable dentures.

Keywords: Traumatic ulcer, Hyaluronic acid gel, Denture stomatitis, Oral mucosal healing, Prosthodontics.

INTRODUCTION

Traumatic ulcers are particularly widespread among patients wearing recently manufactured removable dentures, primarily in the first phase of adaptation, when the mucosal tissues are exposed to a great amount of mechanical stress and friction. The primary factors that play a role in the pathogenesis of traumatic ulcers and compromise the integrity of the oral mucosa are localized pressure, prosthesis instability and incorrect occlusal adjustments (1). These ulcers demand clinical treatment which not only takes care of the cause of the ulcer but also promotes rapid and effective mucosal healing. Traumatic ulcers is a problem that occurs when new dentures are first worn, and there are many factors that can affect the patient such as age, general health, oral health, salivary flow and the accuracy of the denture fit. It has been found that elderly patients and patients with impaired systemic conditions have been known to have a slower healing process because of their diminished regenerative ability and immune function (2). Moreover, recurrent trauma of ill-fitting dentures may extend the inflammatory process and slow down the healing of the epithelia, and thus timely treatment is a key factor in avoiding the chronicity of lesions.

Various treatment options have been discussed for traumatic ulcers such as mechanical modification of dentures and pharmacological measures of pain relief and healing (3). Clinical evidence suggests that topical use of HA gel has a significant effect on pain reduction, re-epithelialization and overall healing in oral ulcerative diseases (4). It is also non-immunogenic and biocompatible, making it an ideal choice for use in the sensitive oral tissues. The effectiveness of hyaluronic acid in the management of ulcers is also evidenced by the fact that hyaluronic acid has been shown to stimulate cellular growth, angiogenesis and collagen production. The use of HA alone or in combination with other therapeutic agents has been shown to be more effective in decreasing ulcer size and healing time than the traditional methods (5). These properties have been seen to be particularly useful in denture induced ulcers, where the most critical factor for patient comfort and denture usage is integrity of the mucosa.

The pattern and course of traumatic ulcers in the stages of denture adjustments is critical in understanding the best methods of treatment. Clinical studies have shown that most ulcers occur in the areas of maximum pressure such as the alveolar ridges and the vestibular regions and that most of these ulcers can heal with proper adjustments and supportive treatment (6). Monitoring the healing process allows healthcare providers to assess the success of their interventions and make necessary adjustments to

optimize the results. HA's special physicochemical and biological characteristics are thought to be responsible for its role in oral wound healing. HA is a naturally occurring glycosaminoglycan present in the oral mucosa connective tissue, which has been shown to be involved in wound healing processes as a factor that maintains the moist wound environment, regulates local inflammation and controls cell activities like migration and proliferation (7). In the oral cavity, HA contributes to the maintenance of the mucosal homeostasis, and serves as a template for tissue regeneration following traumatic injury. These properties have led to a wide range of studies of HA as a therapeutic agent for a variety of oral mucosal diseases such as periodontitis, aphthous lesions and denture-induced lesions (8).

The oral mucosa is known to have different wound healing properties from the skin, with a more rapid re-epithelialization, less scar formation and more controlled inflammatory response. These differences could be attributed to the special oral microenvironment, which is constantly exposed to saliva and its growth factors, antimicrobial peptides and modulators of wound healing (9). In the case of denture wearers, chronic mechanical irritation from ill-fitting dentures can change this homeostatic state and increase the susceptibility of the mucosal tissues to poor healing and chronic ulceration. Another factor in this patient group that affects the healing of the oral mucosa is aging. Oral mucosa undergoes changes as age increases, including thinning of the epithelium, reduced vascularity and reduced cellular renewal, all of which impact the healing response of denture-induced traumatic ulcers (10).

There are many factors involved in denture induced ulceration, such as the fit of the denture, occlusal balance, adaptability of the supporting tissues, denture hygiene and denture material. The studies have confirmed that the most significant etiological factors of denture stomatitis and oral mucosal lesions are denture pressure and trauma, and this needs to be addressed clinically in a timely manner (11). Systematic denture adjustment and pharmacological therapy continue to be the mainstay of the treatment of acute traumatic ulcers, treating both the mechanical cause of the ulcer and aiding tissue healing. Oral wound healing is mediated by various growth factors, cytokines and extracellular matrix components in a complex manner. Hyaluronic acid has been shown to synergize with some of the key mediators in the wound healing process, such as epidermal growth factor (EGF) and transforming growth factor beta (TGF- β), which increases bioavailability and extends the duration of the mediators' activity at the wound site, which in turn accelerates healing in oral ulcerative conditions (12).

In the management of traumatic ulcers and prevention of their recurrences, patient compliance and proper denture hygiene are very significant factors. Mucosal irritation from poorly fitting dentures or from leaving dentures in the mouth at night will also diminish the effectiveness of the pharmacological treatment, and will also increase the risk of chronic ulceration (13). Although hyaluronic acid has been shown to have a role in oral wound healing, there is limited clinical information on the use of hyaluronic acid in traumatic ulcers secondary to newly fitted removable dentures in tertiary care centers. Topical HA gel was previously proven to be effective in clinical trials of aphthous ulcers and periodontal disease, but not in controlled

clinical trials for denture-induced traumatic ulcers (14). The aim of this study is to contribute to the growing evidence of the clinical effectiveness of the use of 0.3% hyaluronic acid gel for treating acute oral traumatic lesions in the context of new removable dentures.

Objective: To evaluate the effectiveness of 0.3% hyaluronic acid gel in accelerating healing, reducing pain, and improving mucosal recovery among patients with traumatic ulcers caused by newly fitted removable dentures.

participate and give informed consent were only selected.

MATERIALS AND METHODS

Study Design

A prospective cross-sectional study.

Study Setting

The Study Was Conducted At The Department Of Prosthodontics, Liaquat University Of Medical And Health Sciences Jamshoro, Hyderabad, A Tertiary Care Hospital.

Duration of Study

2nd July 2025 – 3rd October 2025

Ethical Approval

The study was approved by the Institutional Research Ethics Committee (No.LUMHS/REC/-400 date 28-08-2024).

Sample Size

A total of 147 patients were included using non-probability consecutive sampling.

Inclusion Criteria

Patients aged 25–70 years with newly made removable dentures with traumatic oral ulcers were included. Patients who had developed atleast one traumatic ulcer in the course of one week after the first visit of denture insertion and were willing to

Exclusion Criteria

Patients with systemic conditions which influence wound healing like diabetes mellitus, immunocompromised conditions, or malignancies were excluded. Patients with frequent aphthous ulcers, hyaluronic acid allergy, or corticosteroids and other ulcer medications were also not included in the study.

Methods

All patients received denture adjustment after initial clinical examination in order to remove traumatic factors. The size, location, and the level of pain (using Visual Analogue Scale) of the baseline ulcer were measured. The patients were advised to use hyaluronic acid gel 0.3% topically on the ulcer site twice a day over a period of 7 days. Evaluations were done at day 7 to determine the reduction in ulcer size, intensity of pain and healing process. Complete epithelialization of the lesion was considered as clinical healing. The SPSS software version 25 was used to record and analyze the data. Mean and standard deviation were used as descriptive statistics and paired t-test was used to determine the differences in healing results with time. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 147 patients participated in this study. Among them, 86 (58.5%) were male and 61 (41.5%) were female. The average age of the subjects was 52.4 ± 10.6 years. This age distribution is evenly spread between genders and agrees with the typical age range for removable denture users.

Table 1: Demographics of Patients (n=147)

Variable	Frequency	Percentage (%)
Age (Mean $\pm$ SD)	52.4 ± 10.6	–
Male	86	58.5
Female	61	41.5

The characteristics of the ulcers were assessed before the treatment (Day 0) and 7 days after the treatment (Day 7) with the hyaluronic acid gel. The mean size of the ulcer at baseline was 6.2 ± 1.4 mm, significantly decreasing to 0.6

± 0.5 mm by Day 7. At the follow-up visit, complete or near-complete epithelialization was seen in most patients. The reduction of the ulcer area over time indicates a positive healing tendency of the ulcer in the presence of topical application of hyaluronic acid gel.

Table 2: Ulcer Size Reduction Over Time

Time Point	Mean Ulcer Size (mm)	SD
Day 0	6.2	1.4
Day 7	0.6	0.5

There was also a significant decrease in pain intensity (Visual Analogue Scale [VAS]). The mean baseline pain score was 7.1 ± 1.3 , which decreased to 0.9 ± 0.7 on Day 7. The paired analysis showed significant decrease in ulcer size ($p < 0.001$) and pain ($p < 0.001$), demonstrating hyaluronic acid's effectiveness in accelerating healing and alleviating symptoms.

Table 3: Pain Scores Over Time (VAS)

Time Point	Mean VAS Score	SD
Day 0	7.1	1.3
Day 7	0.9	0.7

The healing pattern observed showed significant decrease from baseline to followed by a gradual improvement up to Day 7. Alveolar ridge (47%) and vestibular sulcus (33%) ulcers were most frequently observed, while buccal mucosa ulcers were observed in 20% of cases. In most patients, full healing was obtained regardless of the location of the ulcer, demonstrating the effectiveness of the hyaluronic acid gel in all anatomical areas. All of the patients tolerated the treatment well and no side effects were reported. Adjustment of dentures and topical gel application were both found to play a role in the recovery of the mucosa, decreased pain and increased patient comfort. The outcome of healing did not differ significantly by age or sex, indicating that the treatment is effective in the adult age range and in both sexes.

DISCUSSION

The current research assessed the efficacy of 0.3% hyaluronic acid gel in enhancing healing in patients with traumatic ulcers due to newly-made removable dentures. The results obtained are consistent with the previous clinical trials that have shown the beneficial effects of hyaluronic acid in the healing of oral ulcers due to its anti-inflammatory and tissue regeneration properties (1). Denture wearers' traumatic healing is a multifaceted process, which is influenced by local mechanical factors and systemic conditions. Healing can be delayed by factors such as poor denture adaptation, high pressure points and patient factors such as age and oral hygiene. In earlier research, it has been highlighted that denture adjustment and removal of traumatic factors at an early stage is necessary in promoting mucosal recovery (2). Denture adjustments were done in this study before the gel application, which probably led to the good healing results achieved. Various treatment modalities have been studied for the treatment of denture induced ulcers including topical anesthetics, antimicrobial agents and laser treatment.

Whereas traditional therapies are mainly aimed at symptomatic management, emerging therapies are targeted to speed up the healing of tissues. For instance, laser therapy has been shown to have beneficial healing effects, such as stimulating cell growth and reducing inflammation, but is not widely available and is expensive to use in clinical settings (3). In comparison, hyaluronic acid gel is more cost-

effective and easily applied and offers the same therapeutic benefits. Hyaluronic acid is well known to play a role in wound healing especially in oral mucosal lesions. It is said to function by maintaining moisture in tissues, improving cell mobility and regulating inflammation. In clinical trials of aphthous ulcers, topical HA has been proven to exert a profound effect on pain and healing time, and can be applied in various ulcerative diseases (4). The observations of the present study are in agreement with the observations of the above-mentioned studies which indicated that epithelialization and relief of symptoms was rapid within seven days of treatment. Furthermore, the biological effects of hyaluronic acid effectiveness are stimulation of fibroblast growth, formation of collagen and angiogenesis. These are essential in repairing and regeneration of tissues. The study of hyaluronic acid with other therapeutic agents has shown that the healing effects increase, suggesting that it can be used in combination therapy (5). Nevertheless, despite being an individual therapy, like in this research, hyaluronic acid proved to be highly effective clinically.

The site and course of traumatic ulcers also contribute to the healing outcomes. Alveolar Ridges and Vestibular regions have previously been shown to be commonly involved in the denture adjustment period for high pressure areas (6). The present research provided the same results, which supports the need to evaluate and follow-up on the prosthetics in order to avoid the re-emergence of trauma and guarantee the appropriate recovery. Oral mucosal lesions caused by removable prostheses are ideal for treatment with HA,

due to its biological properties. HA is a natural component of oral connective tissue and is important in tissue hydration, cell signaling and ECM organization, all of which are important in the healing of denture induced ulcers (7). Their anti-inflammatory and pro-regenerative properties are complemented by mechanical correction that is offered by the adjustment of the denture to offer a comprehensive approach to mucosal recovery. Furthermore, the biocompatibility and non-immunogenic properties of HA make it a suitable topical agent in the general routine of prosthodontic work and also a suitable agent for the use in the delicate tissues of the oral mucosa. HA gel formulations have been shown to be effective across a variety of oral mucosal diseases, such as periodontal disease and aphthous ulcers, to speed up the repair of the mucous membranes and relieve patient discomfort (8).

The oral mucosal physiology changes with age is an important factor to take into consideration when managing denture-induced traumatic ulcers. Structural changes in the oral mucosa, such as decreased thickness of the epithelium and decreased vascularity, are common in the elderly patient and combine to decrease the ability of the mucosal tissues to regenerate (9). The changes are significant for the context of prosthetic rehabilitation where there is greater need for clinical surveillance and therapeutic intervention in a proactive manner to ensure satisfactory healing. The oral mucosal microenvironment also has unique properties that have a significant impact on the healing trajectory. The oral mucosal wound healing process occurs in a moist environment, where growth factors, antimicrobial proteins and tissue repair mediators are constantly provided by the saliva, while these factors are not readily available in the drier environment of the skin, which may account for the more rapid healing seen with adjunctive topical agents like hyaluronic acid (10). The present study confirmed the positive impact of this oral-specific healing milieu by the consistent improvement in all patients.

A correlation between denture stomatitis and prosthesis-related trauma has been well documented in the prosthodontic literature. Poorly-fitting dentures disrupt the mucosal barrier, permitting a chronic inflammatory process and delayed re-epithelialization (11). In the present study, the mechanical stability of the mucosal wound bed was obtained by systematically adjusting the dentures prior to application of the gel, thus removing the primary etiological stimulus, and allowing the therapeutic effects of HA to occur on a stabilized wound bed. At the molecular level, HA stimulates important mediators of wound healing, such as epidermal growth factor (EGF) and transforming growth factor beta, which will stimulate fibroblasts to migrate and

produce collagen to fully restore the tissue (12). This growth factor-potentiating effect may have contributed to the fast ulcer healing and epithelialization rates observed during the 7-day follow-up period.

Patient acceptance of denture hygiene routines and follow-up schedules is a part of the success of any therapeutic procedure in denture related oral lesions. Poor prosthesis hygiene can lead to a microbial colonization of the surface of the prosthesis and to the development of a reservoir for reinfection and mucous irritation that will upset the healing process (13). The present study gave patients detailed instructions for gel application and denture care, which may have resulted in the generally good results found in all patients. The results of the present study collectively support the clinical significance of the use of hyaluronic acid gel as a first-line topical treatment for denture induced traumatic ulcers. Given its polypharmacological properties, safety, and ease of use, HA could be considered a very useful and evidence-based therapeutic modality in the therapeutic armamentarium of a prosthodontist, as described in the literature for use in oral mucosal care (14). In this instance, hyaluronic acid gel has been found to be safe, effective and clinically viable treatment for the improvement of the healing of ulcers in removable denture patients.

CONCLUSION

This paper concludes that 0.3 percent hyaluronic acid gel is a safe and effective treatment to traumatic ulcers in patients with newly fabricated removable dentures. The gel application resulted in a significant reduction in the extent and intensity of pain, and a more rapid restoration of the epithelial tissue during a short time. Its anti-inflammatory, moisturizing and tissue-renewing properties render it highly applicable to the oral mucosal lesions, particularly in the scenario of the prosthodontic patients during denture adaptation. The intervention was well-tolerated by all patients and had no adverse effects, which also leads to its safety and clinical applicability. Moreover, hyaluronic acid gel may be combined with sufficient denture adjustment to enhance the overall treatment results and patient comfort. Therefore, it can be recommended as a topical therapeutic agent in the first line of treatment of denture-related traumatic ulcers in the daily clinical practice.

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