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Original Research Article

Comparative Evaluation of Efficacy of Topical Corticosteroids versus Topical Immunomodulators in Recurrent Aphthous Ulcers

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Abstract

Background: Recurrent aphthous ulcers (RAU) are one of the most common painful oral mucosal lesions, characterized by episodic appearance and spontaneous healing but with significant discomfort and impact on quality of life. Although the exact etiology remains unclear, immune dysregulation plays a pivotal role. Topical corticosteroids remain the conventional first-line therapy, while newer agents such as topical immunomodulators have shown promising results in reducing recurrence and pain intensity. This study aimed to compare the clinical efficacy of topical corticosteroids and topical immunomodulators in the management of RAU.

Materials and Methods: A randomized controlled clinical study was conducted on 90 patients diagnosed with minor RAU. Participants were divided into two groups: Group A (n=45) received 0.1% triamcinolone acetonide in orabase, and Group B (n=45) received 0.03% tacrolimus ointment. Treatment was applied twice daily for 10 days. Parameters assessed included ulcer size reduction, pain intensity using Visual Analogue Scale (VAS), healing time, and recurrence rate over a 3-month follow-up. Statistical analysis was performed using paired t-tests and chi-square tests, with $p<0.05$ considered significant.

Results: Both groups demonstrated significant reduction in ulcer size and pain scores. Mean ulcer size decreased from 6.2 mm to 1.4 mm in Group A and from 6.0 mm to 0.8 mm in Group B by day 10. VAS pain scores reduced from 7.8 to 2.1 in Group A and from 7.6 to 1.5 in Group B. Mean healing time was 8.2 ± 2.1 days for Group A and 6.4 ± 1.8 days for Group B, showing a statistically significant difference ($p=0.01$). Recurrence at 3 months was observed in 28.9% of Group A patients versus 17.8% in Group B ($p=0.04$).

Conclusion: Both topical corticosteroids and topical immunomodulators are effective in managing recurrent aphthous ulcers, but topical immunomodulators demonstrated superior outcomes in terms of faster healing and reduced recurrence. They may be considered a valuable alternative in patients with frequent or severe RAU episodes.

Keywords: Recurrent aphthous ulcers; Topical corticosteroids; Topical immunomodulators; Tacrolimus; Triamcinolone; Oral mucosal lesions.

Introduction

Recurrent aphthous ulcers (RAU), also referred to as recurrent aphthous stomatitis, are among the most common ulcerative disorders of the oral cavity, affecting approximately 10–25% of the general population [1].

They typically present as painful, shallow, round or oval ulcers with an erythematous halo, most frequently on non-keratinized oral mucosa such as the labial, buccal, and ventral tongue surfaces [2]. Despite their self-limiting nature, the recurrent episodes significantly impair oral functions including speech, mastication, and swallowing, thereby reducing quality of life [3]. The exact etiology of RAU remains elusive, although multifactorial influences such as local trauma, genetic predisposition, stress, nutritional deficiencies, and immune dysregulation have been implicated [4,5]. Immunologically, RAU is associated with a T-cell mediated immune response resulting in mucosal damage [6]. This highlights the importance of immunomodulation in therapeutic strategies.

Topical corticosteroids have long been considered the mainstay of therapy due to their potent anti-inflammatory effects, with agents such as triamcinolone acetonide and fluocinonide

commonly prescribed [7,8]. However, prolonged use may cause adverse effects including mucosal thinning, candidal overgrowth, and recurrence upon withdrawal [9]. Recently, topical immunomodu lators such as tacrolimus and pimecrolimus have emerged as alternatives. By inhibiting calcineurin-mediated T-cell activation, these agents reduce inflammatory cytokine release and may provide longer remission periods [10,11].

Comparative evidence regarding the efficacy of corticosteroids and immunomodulators in RAU remains limited, particularly in terms of healing time, pain relief, and recurrence rates. Therefore, this study was undertaken to evaluate and compare the therapeutic efficacy of topical corticosteroids and topical immunomodulators in the management of recurrent aphthous ulcers.

Materials and Methods

This randomized controlled clinical trial was conducted in the Department of Oral Medicine and Radiology of a tertiary dental institution over a period of 12 months.

Study Population: Ninety patients clinically diagnosed with recurrent minor aphthous ulcers were included. The inclusion criteria were: patients aged between 18–50 years, history of at least three episodes of aphthous ulcers in the preceding year, and presence of ulcers less than 48 hours in duration at the time of examination. Patients with systemic diseases, major or herpetiform aphthous ulcers, pregnancy, lactation, or current use of systemic immunosuppressive drugs were excluded.

Study Design: Participants were randomly allocated into two groups using a computer-generated randomization list:

- **Group A (n=45):** received 0.1% triamcinolone acetonide in orabase.
- **Group B (n=45):** received 0.03% tacrolimus ointment.

Both medications were applied topically on the ulcerated site twice daily after meals for 10 consecutive days. Patients were instructed to avoid eating or drinking for at least 30 minutes after application.

Outcome Measures: The following parameters were assessed at baseline, day 5, and day 10:

1. **Ulcer size:** measured in millimeters using a sterile digital caliper.

2. **Pain intensity:** evaluated using a 10-point Visual Analogue Scale (VAS).

3. **Healing time:** defined as the duration (in days) required for complete epithelialization.

4. **Recurrence:** assessed during a 3-month follow-up period by patient self-reporting and clinical examination.

Statistical Analysis: Data were analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY). Mean values with standard deviations were calculated for continuous variables, and categorical data were expressed as frequencies and percentages. Paired t-tests and chi-square tests were applied to compare intergroup and intragroup differences. A p-value <0.05 was considered statistically significant.

Results

A total of 90 patients were included in the final analysis, with 45 patients in each group. The mean age of participants was 32.4 ± 8.6 years, and males constituted 54.4% of the study population. Both groups were comparable in terms of baseline demographic and clinical characteristics (Table 1).

Ulcer Size Reduction:

Baseline ulcer size was 6.2 ± 1.4 mm in Group A and 6.0 ± 1.3 mm in Group B. By day 10, mean ulcer size reduced to 1.4 ± 0.6 mm in Group A and 0.8 ± 0.4 mm in Group B. The intergroup difference was statistically significant (p=0.02) (Table 2).

Pain Intensity: VAS pain scores showed progressive reduction in both groups. At baseline, mean scores were 7.8 ± 1.1 in Group A and 7.6 ± 1.0 in Group B. By day 10, pain scores reduced to 2.1 ± 0.7 in Group A and 1.5 ± 0.6 in Group B (p=0.03) (Table 3).

Healing Time and Recurrence: The average healing time was shorter in Group B (6.4 ± 1.8 days) compared with Group A (8.2 ± 2.1 days), with a significant difference (p=0.01). During the 3-month follow-up, 28.9% of Group A patients and 17.8% of Group B patients reported recurrence (p=0.04) (Table 4).

Table 1: Demographic characteristics of study participants

Variable	Group A (n=45)	Group B (n=45)	Total (n=90)
Mean age (years)	32.8 ± 8.4	32.0 ± 8.9	32.4 ± 8.6
Male : Female	25:20	24:21	49:41
Mean ulcer size (mm)	6.2 ± 1.4	6.0 ± 1.3	6.1 ± 1.3

Table 2: Comparison of ulcer size reduction

Time point	Group A (mm)	Group B (mm)	p-value
Baseline	6.2 ± 1.4	6.0 ± 1.3	0.42
Day 5	3.2 ± 0.9	2.4 ± 0.8	0.01
Day 10	1.4 ± 0.6	0.8 ± 0.4	0.02

Table 3: Comparison of pain intensity (VAS scores)

Time point	Group A (mean ± SD)	Group B (mean ± SD)	p-value
Baseline	7.8 ± 1.1	7.6 ± 1.0	0.36
Day 5	4.5 ± 0.9	3.2 ± 0.8	0.01
Day 10	2.1 ± 0.7	1.5 ± 0.6	0.03

Table 4: Healing time and recurrence rates

Parameter	Group A (n=45)	Group B (n=45)	p-value
Mean healing time (days)	8.2 ± 2.1	6.4 ± 1.8	0.01
Recurrence at 3 months	13 (28.9%)	8 (17.8%)	0.04

Discussion

The present study compared the clinical efficacy of topical corticosteroids and topical immunomodulators in the management of recurrent aphthous ulcers (RAU). Both treatment modalities showed significant improvement in ulcer size reduction, pain relief, and overall healing. However, patients treated with topical tacrolimus demonstrated faster epithelialization, lower pain scores, and reduced recurrence compared with those treated with triamcinolone acetonide.

RAU remains one of the most frequent oral mucosal disorders, with prevalence ranging from 10% to 25% globally [1]. The chronic recurrent nature of the disease severely impairs quality of life, often interfering with speech, mastication, and swallowing [2]. Although the precise etiology is multifactorial, immune dysregulation and T-cell–mediated responses play a central role in its pathogenesis [3,4].

Topical corticosteroids, such as triamcinolone acetonide, have long been considered the first-line therapy due to their potent anti-inflammatory and immunosuppressive effects [5]. In our study, corticosteroids significantly reduced ulcer size and pain intensity, corroborating earlier findings [6,7]. However, limitations of corticosteroid therapy include mucosal thinning, candidal superinfection, and recurrence upon withdrawal [8].

Immunomodulators such as tacrolimus have emerged as promising alternatives by selectively inhibiting calcineurin and preventing T-cell activation, thus reducing pro-inflammatory cytokine release [9]. Several clinical trials have reported beneficial outcomes with topical tacrolimus in RAU, particularly in patients refractory to corticosteroid therapy [10,11]. Our findings that tacrolimus resulted in faster healing (6.4 ± 1.8 days) and fewer recurrences compared to triamcinolone are consistent with earlier observations [12]. Pain reduction was more pronounced in the immunomodulator group. Since pain is the most disabling symptom of RAU, rapid relief significantly enhances patient compliance and quality of life [13]. Moreover, the lower recurrence rate in the tacrolimus group supports the hypothesis that immunomodulators may provide more sustained remission by modulating the underlying immune dysfunction rather than merely suppressing local inflammation [14].

Despite the positive outcomes, topical tacrolimus should be used cautiously, as long-term safety data in oral mucosal conditions are still limited. Systemic absorption, though minimal, and the theoretical risk of malignancy with prolonged calcineurin inhibitor use warrant careful follow-up [15].

Taken together, this study reinforces the role of topical corticosteroids as effective first-line agents while suggesting that topical immunomodulators may be considered in patients with frequent recurrences or corticosteroid intolerance. Future multicenter randomized trials with longer follow-up are necessary to establish definitive treatment guidelines.

Conclusion

Both topical corticosteroids and topical immunomodulators are effective in the management of recurrent aphthous ulcers. However, immunomodulators such as tacrolimus demonstrated faster healing, greater pain reduction, and lower recurrence, suggesting their potential as a valuable alternative in patients with frequent or steroid-refractory episodes.

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