The Clinical Effects of Topical Metronidazole as Adjunct Therapy to Subgingival Debridement in Adult Periodontitis

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Abstract

Aim: The purpose of this investigation was to evaluate effect of local antibiotic therapy with metronidazole adjunctively to Scaling and Root Planning (SRP) mechanical or antibacterial treatment alone.

Method: This randomised double blind study was carried out in split-mouth design. Ten patients with moderate to severe adult periodontitis were selected. Each patient had to have at least 3 multi-root and 3 single-root nonadjacent teeth with a probing depth ≥5mm. Randomly selected teeth were treated with application of 25% gel metronidazole (SRP+Elyzol). A total of 141 site (≥5mm) were included. The clinical effects of treatment modalities were monitored over a period of 90 days.

Results: All three methods of treatment were effective and significantly reduced probing pocket depth and bleeding on probing and increasing clinical attachment level. No statistically significant differences were found between SRP and Elyzol alone. The t-test showed that the SRP+Elyzol group was significantly better than SRP or Elyzol alone. No statistically significant differences were found between multi-root and single-root teeth. There was also a significant improvement for SRP+Elyzol group over SRP and Elyzol alone at deep pockets (≥7mm) in comparison to moderate pockets.

Conclusion: In teeth with advanced periodontitis area comparing to moderately involved sites, local metronidazole in combination with scaling and root planning seems to be more effective than SRP or local metronidazole alone.

Key words: Periodontitis, drug therapy, metronidazole, local antibiotic therapy

Introduction

Periodontal diseases are caused by subgingival bacterial plaque. Microbiological investigations have indicated that these diseases are related with specific pathogens. Treatment of periodontitis is based on soft and hard bacterial deposits removal (plaque and calculus) by mechanical root debridement to eliminate subgingival plaque as a pocket treatment procedure.

In recent years mechanical therapy is used with antimicrobial agents systemically or locally delivered to increased success rate of periodontal therapy. There are several studies that have shown favourable results of adjunctive antibiotic therapy on adult periodontitis. Metronidazole has been extensively studied as an antimicrobial agent for treatment of periodontitis and its ability to improve periodontal status has been evaluated in several clinical trials.

However, the use of metronidazole as an adjunctive therapy in adult periodontitis is still controversial. The aim of this study was to determine the
benefits of utilizing local metronidazole gel (Elyzol) as a monotherapy and in conjunction with scaling and root planning (S.R.P) and S.R.P alone in improving periodontal health.

**Patients and Methods**

Ten patients, six men and 4 women (27-65 years old, mean age 46±6 years) were randomly selected for this study. Inclusive criteria were adult periodontitis with at least 14 natural teeth which have three single and three multiroot non adjacent teeth, with initial pocket probing depth (PPD) of 5 mm or more and bleeding on probing (BOP) and haven’t done subgingival scaling 6 months before the study. Exclusive criteria were smoking, any systemic diseases, history of drug consumption, antibiotic therapy and any periodontal therapy apart from subgingival scaling in the six month period before the study. All patients were told that the aim of this study is to investigate the effect of metronidazole gel (M gel) for treatment of periodontal diseases. All patients signed an informed consent before participating in study.

This study was carried out as a sequential randomized double blind clinical trial with a split-mouth design being selected for comparison of three treatment modalities (S.R.P, Mgel, Mgel plus S.R.P). Topical metronidazole was Elysol dental gel (Dumen Alpharma, Copenhagen, Denmark), applied with a project applicator. Three treatment methods were performed on each patient, the quadrants being randomly selected prior to the start of study. Supragingival tooth cleaning performed as required or the detailed oral hygiene instructions given on days 0, 7, 30, 60 and 90.

The treatment consisted of two subgingival gel applications carried out at days 0 and 7 on randomly selected quadrants in two test groups. Clinical parameters, like PPD was measured at six surfaces around each tooth (Disto buccal, Meso buccal, Distolingual, Meso lingual, mid buccal and mid lingual). BOP was recorded at days × (max 14 days before day 0) 60 and 90. Level of attachment loss is measured from CEJ to PPD. All measurements have been done at days 0, 60 and 90.

Differences between three treatment methods and various examination intervals were evaluated by means of the t-student test and pre and post treatment difference was measured by paired t-test. Evaluation of BOP was assessed by chi-square test.

**Results**

In this study a total of 141 periodontal pockets ≥5 mm around single and multi root teeth were evaluated. Before treatment, teeth with PPD ≥5 showed bleeding on probing and there was no significant difference between clinical indicators at the baseline in three randomly selected treatment groups (S.R.P, Mgel, S.R.P plus Mgel).

At the end of follow up period (day 90) the mean reduction of PPD in S.R.P, Mgel and combined therapy group were 1.2 mm, 1.4 mm, 2 mm respectively (table 1).

All three treatment methods were effective in reduction of PPD, BOP and gaining of attachment level.

As it is shown in table 1, in combined therapy group the reduction of PPD was more than S.R.P and Mgel group (P<0.002) as well as the rate of attachment gain level took over 3 month on observation period.

Table 2 shows changes of clinical indicators in single and multi root teeth in three treatment procedure during investigation interval. Although reduction of clinical indicators around single root teeth was better than multiple root but this difference was not significant from statistical point of view.

Table 3 demonstrates achievement gain of attachment in three treatment methods with PPD

<table>
<thead>
<tr>
<th>Table 1: clinical Results of PPD and CAL with Interval of 60 and 90 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PPD</strong></td>
</tr>
<tr>
<td>Treatment</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>SRP</td>
</tr>
<tr>
<td>Elyzol</td>
</tr>
<tr>
<td>SRP+Elyzol</td>
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</tbody>
</table>
Table 2: Clinical Results of PPD and CAL in Single and Multiroot Teeth

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Teeth Root</th>
<th>PPD</th>
<th>CAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline mm</td>
<td>90 day mm (%)</td>
</tr>
<tr>
<td>SRP</td>
<td>Single</td>
<td>6.0</td>
<td>1.5 (25)</td>
</tr>
<tr>
<td></td>
<td>Multi</td>
<td>5.9</td>
<td>0.9 (15)</td>
</tr>
<tr>
<td>Elyzol</td>
<td>Single</td>
<td>5.5</td>
<td>1.65 (30)</td>
</tr>
<tr>
<td></td>
<td>Multi</td>
<td>5.8</td>
<td>1.1 (19)</td>
</tr>
<tr>
<td>SRP+Elyzol</td>
<td>Single</td>
<td>5.7</td>
<td>2.18 (38)</td>
</tr>
<tr>
<td></td>
<td>Multi</td>
<td>5.9</td>
<td>1.7 (29)</td>
</tr>
</tbody>
</table>

Table 3: Clinical Results of PPD and CAL in PPD ≥5 and PPD ≥7

<table>
<thead>
<tr>
<th>Treatment</th>
<th>PPD</th>
<th>Day 90 mm (%)</th>
<th>Baseline mm</th>
<th>90 day mm (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRP</td>
<td>≥5</td>
<td>5.3</td>
<td>1.1 (21)</td>
<td>6.3</td>
</tr>
<tr>
<td></td>
<td>≥7</td>
<td>7.3</td>
<td>1.4 (19)</td>
<td>7.7</td>
</tr>
<tr>
<td>Elyzol</td>
<td>≥5</td>
<td>5.3</td>
<td>1.3 (25)</td>
<td>6.3</td>
</tr>
<tr>
<td></td>
<td>≥7</td>
<td>7.2</td>
<td>1.7 (23)</td>
<td>8.2</td>
</tr>
<tr>
<td>SRP+Elyzol</td>
<td>≥5</td>
<td>5.25</td>
<td>1.75 (33)</td>
<td>6.3</td>
</tr>
<tr>
<td></td>
<td>≥7</td>
<td>7.3</td>
<td>2.80 (38)</td>
<td>7.9</td>
</tr>
</tbody>
</table>

PPD ≥5 \( (6.6^{mm}, 0.6^{mm}, 0.9^{mm} \) respectively) and PPD ≥7 \( (0.9^{mm}, 0.9^{mm}, 1.7^{mm} \) respectively).

Discussion

Findings from different researches indicate the role of SRP in reduction of PPD, BOP and Clinical Attachment Level (CAL).\(^{25}\) Also improvement of clinical indicators is reported by usage of topical and systemic metronidazole as an adjunct therapy in patients with adult periodontitis\(^{16,17}\).

The aim of this study was to find out the effect of SRP and Mgel alone in comparison with Mgel following mechanical periodontal therapy in improving the clinical conditions of periodontitis.

As the results indicated in this study during the 60 and 90 day observation period, several significant changes observed in clinical parameters (BOP, PPD, CAL) in 3 treatment methods (SRP, Mgel, SRP plus Mgel).

Statistical analysis showed a significant difference between baseline (pre-treatment) and during the time intervals of 60 and 90 days after treatment.

No statistical significant difference in SRP and Mgel treatment group could be demonstrated which seems to be compatible with results of other investigators\(^{17,29}\).

In our study the reduction of PPD in metronidazole group was 1.4\(^{mm}\). In previous studies this rate was 1.3\(^{mm}\), 1.17\(^{mm}\), 1.41\(^{mm}\) and 1.6, 1.8\(^{mm}\)\(^{21,22}\).

In this study the reduction of PPD in single root teeth in comparison with multi root teeth was 1.65\(^{mm}\) and 1.5\(^{mm}\) and in the another study they were 2.7 and 1.7\(^{mm}\) respectively\(^{23}\).

The reason for reduction of PPD in Mgel treatment group without mechanical debridement may be related to the effect of metronidazol against anaerobic susceptible microorganisms.

The amount of reduction of PPD and BOP and CAL was increased, in the combined therapy procedure (Mgel plus SRP) in comparison to Mgel and SRP treatment alone.

This results are similar and comparable to the results obtained by other investigators\(^{6,24,29,34}\) while not compatible with some others\(^{9,12}\).

More reduction of indicators in combination therapy may depend on more reduction of subgingival plaque and removal of necrotic cementum from the root surface. Also we can relate
It to the role of metronidazole in reduction of sensitive microorganisms that is one of the main factors in periodontal diseases.

In this study during the follow-up period, no relevant differences could be determined between three treatment methods in single and multi root teeth, that is comparable to results found by other investigators. 21-35

Lindhe also demonstrated that there is no difference between SRP and Mgel 27 in single and multi root teeth. The relative reduction of clinical indicators (PPD, BOP, LAL) were reported by Pihlstrom and Norland that were similar to this study.

Kalliala in a two year period observed a pronounced influence on reduction in PPD, BOP and CAL with PPD ≥ 5 in single root teeth more than in multiroot teeth. 16,19 In previous study we did not observe any difference in comparison between single and multi root teeth with combined therapy.

In our study in two groups of teeth with PPD ≥ 5 mm, the results of three treatments had no differences in reducing indicators, that is compatible with Pihlstrom and Lindhe findings.

In our study usage of Mgel as adjunct therapy with SRP in clinical trials showed a significant statistical difference between two groups of teeth with PPD ≥ 7 mm. Evidence regarding this difference in more reduction of PPD, and gain of attachment level (CAL) in the teeth with PPD ≥ 7 mm comparing to PPD ≥ 5 mm in the combined therapy is an evidence for studies supporting the concept that presence and accumulation of subgingival bacteria is an important factor for progression of periodontal diseases.

This study discuss the effect of Mgel with the local delivery system resulting an effect on the subgingival plaque. Although, the pocket elimination remains as an important factor in the treatment of periodontal diseases.

Conclusion
In conclusion it may be stated that the local delivery of metronidazol gel as an adjunct therapy in the treatment of adult periodontitis is more effective than SRP and Mgel alone. The effect of combined therapy in the severe periodontitis (PPD ≥ 7 mm) is more than moderate periodontitis (PPD ≥ 5 mm).

References


