Abstract

Introduction: Gingivitis and periodontitis are dental plaque-induced infections triggered by the accumulation and maturation of pathogenic film on the tooth surface and the oral cavity soft tissues. Supragingival and subgingival dental plaques are different from the qualitative and quantitative standpoints and hence require different removal techniques (1,4,5).

Patients may employ daily tooth washing, tooth rinsing and other adjuvant methods to remove supragingival plaque. Nevertheless, studies have shown that the observance of oral hygiene methods is low and that patients are not motivated or trained for a long-term preservation of a plaque-free denture (5,7).

Consequently, plaque self-control programs alone, deprived of the dentist’s intervention, fail to ensure a successful and long-lasting treatment of recurrent gingivitis.

Fig. 1- Chronic gingivitis located at the lateral group level in the IV quadrant (Discipline of Periodontology)

Repeated untreated occurrences of the active disease lead to the onset of an inflammatory lesion that will finally result into periodontium destruction. Periodontium involvement may be: superficial (gingivitis) or deep (periodontitis) (4,7).

A great amount of attention should be paid to microbiota control, at least to the extent that the
host may establish a balance equivalent with the state of health. Inflammatory process control requires that mechanical, manual or machine curettage be performed every 3 months, in order to prevent the reoccurrence of the pathogenic biofilm (fig.1) (2,6).

The patient is practically completely unable to perform an adequate subgingival plaque pathogen removal or suppression. Well-organized subgingival dental plaque is hardly reachable since it makes up the apical part of the periodontal pocket, in close connection with the alveolar bone and the connective tissues (7,8).

Fig. 2- Dental plaque revealed by plaque revealers (Discipline of Periodontology)

Plaque control is crucial. If these well-organized units of periodontopathic bacteria are out of control, periodontal disease will certainly affect more than 10% of the adults aged 30 and over, which means that a periodic subgingival film removal by professional cleaning is absolutely imperative (fig.2).

Scope

Subgingival plaque control is absolutely vital in periodontal disease treatment. In addition to subgingival scaling, the topical application of antimicrobial preparations was supported and used since beneficial effects were noticed when it was employed as adjuvant therapy to conventional treatment, both from the clinical and microbiological viewpoints.

The trial was designed to compare the effects of the topical application of antimicrobial agents (chlorhexidine and TM paste), combined with root scaling and surfacing, and to determine the possible treatment response differences between medium deep and very deep periodontal pockets.

Material and method

The trial was performed on a group of 216 patients of the Periodontology Clinic aged between 24 and 47 years, of whom 148 were suffering from generalized marginal chronic periodontitis and 68 from aggressive marginal periodontitis.

The patient inclusion criteria were: no antibiotic treatment on the 3 months preceding the trial and no periodontal treatment on the 6 months preceding the trial; we excluded patients suffering from uncomplicated or moderate periodontitis, and included only those with severe conditions.

They were divided depending on the type of periodontal disease and on the type of treatment undergone:

• only root scaling and surfacing;
• root scaling and surfacing accompanied by chlorhexidine rinsing;
• root scaling and surfacing accompanied by TM paste application.

Group 1
We performed:
- supragingival scaling – using both manual and ultrasound tools;
- subgingival scaling and curettage – using manual tools – Gracey curettes;
- after full tartar removal, we performed a professional tooth brushing in order to polish the surfaces, using a fine grain paste.

The patients were called for follow-up after 4 and 12 weeks.

Group 2
We performed:
- supragingival scaling – using both manual and ultrasound tools;
- subgingival scaling and curettage – using manual tools – Gracey curettes;
- after full tartar removal, we performed a professional tooth brushing in order to polish the surfaces, using a fine grain paste.

- after subgingival scaling completion, and further to full hemostasis achieved by light packing with sterile gauze, we applied chlorhexidine gel (Plack-Out preparation) with sterile cotton balls and we recommended...
the patients to perform two rinsing sessions per day, after tooth brushing, using a 0.2% chlorhexidine solution, for 2 weeks. The patients were called for follow-up after 4 and 12 weeks.

**Group 3**
We performed:
- supragingival scaling (using both manual and ultrasound tools);
- subgingival scaling and curettage (using manual tools – Gracey curettes);
- after full tartar removal, we performed a professional tooth brushing in order to polish the surfaces, using a fine grain paste.
- after subgingival scaling completion, and further to full hemostasis achieved by light packing with sterile gauze, we applied TM paste with a syringe (fig.3).

**TM paste:**
Rp/ Tetracycline 3g
Metronidazole 3g
Fat 100g

External D.S. for instillations in the gingival sulcus or periodontal pockets

**Results**
859 teeth were included in the trial, of which 451 underwent root scaling and surfacing, 253 - adjuvant chlorhexidine treatment, 155 - adjuvant TM paste treatment.

We analyzed the evolution of the periodontal pockets and compared the types of pockets (superficial - smaller than 4.4 mm and deep – larger than 4.5mm) and the depth evolution further to treatment.

**Tab. 1 - ≤ 4.4 mm pocket depth reduction after treatments**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Initial pocket depth (mm)</th>
<th>Pocket depth reduction - 4th week (mm)</th>
<th>Pocket depth reduction - 12th week (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling</td>
<td>3.15</td>
<td>0.35</td>
<td>0.42</td>
</tr>
<tr>
<td>Scaling + CHX</td>
<td>3.19</td>
<td>0.37</td>
<td>0.47</td>
</tr>
<tr>
<td>Scaling + TM paste</td>
<td>3.21</td>
<td>0.4</td>
<td>0.52</td>
</tr>
</tbody>
</table>

After 4 weeks, the pockets smaller than 4.4 mm decreased by 9% further to scaling, by 16.5% in chlorhexidine patients, and by 19.3% in TM paste patients.

**The parameters** that we monitored were the:
- probing depth;
- probing bleeding.

**Pocket depth** was measured using a Williams probe, and we tried to standardize the probing pressure as much as possible.

**Probing bleeding** was considered positive if bleeding occurred 10-30 sec. after a light probing operation.
Tab.2 - ≥ 4.5 mm pocket depth reduction after treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Initial pocket depth (mm)</th>
<th>Pocket depth reduction – 4th week (mm)</th>
<th>Pocket depth reduction – 12th week (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling</td>
<td>5.01</td>
<td>1.02</td>
<td>1.33</td>
</tr>
<tr>
<td>Scaling + CHX</td>
<td>5.04</td>
<td>1.09</td>
<td>1.52</td>
</tr>
<tr>
<td>Scaling + TM paste</td>
<td>5.06</td>
<td>1.12</td>
<td>1.58</td>
</tr>
</tbody>
</table>

Combined chlorhexidine treatment brought about a 24.7% reduction, TM paste treatment determined a 25.6% drop, and root scaling and surfacing caused a 19.5% reduction.

As one may easily notice, there was no statistically significant difference in the probing depth, after 4 weeks, between the group treated only by scaling and the two groups that underwent combined treatment; on the other hand, after 12 weeks of treatment, the differences between pocket depth reduction in scaled patients and in mixed treatment patients were significant.

No significant differences were found between the two groups subjected to adjuvant topical treatment.

Probing bleeding

The three treatment groups experienced a highly significant statistical reduction of probing bleeding during the first two weeks. After 12 weeks, the data show a better improvement of this ratio in the metronidazole and chlorhexidine gel patients than in the root scaling and surfacing patients.

There were no significant probing bleeding differences between the two groups that underwent combined treatment.

Tab.3 - Probing bleeding in various treatment groups – mean values

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Initial probing bleeding</th>
<th>Probing bleeding in the 4th week</th>
<th>Probing bleeding in the 12th week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling</td>
<td>0.79</td>
<td>0.25</td>
<td>0.18</td>
</tr>
<tr>
<td>Scaling + CHX</td>
<td>0.84</td>
<td>0.21</td>
<td>0.17</td>
</tr>
<tr>
<td>Scaling + TM paste</td>
<td>0.85</td>
<td>0.19</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Discussions

The trial was carried out on 216 patients diagnosed with moderate to severe and aggressive chronic marginal periodontitis. All the patients were given professional instructions concerning tooth brushing techniques able to ensure both efficient dental plaque removal and periodontal protection.

We preferred patients that were concerned about their periodontal condition and were aware of and motivated to improve their oral health state.

The trial compared a combination of two topically applied antibiotics – metronidazole + tetracycline, an antiseptic – chlorhexidine, with the effect of scaling alone, not supported by any other adjuvant treatment method.

Probing depth effect analysis of narrow pockets, after 12 weeks of treatment, reveals a reduction of the probing depth of 0.15-0.46 after the three treatments.

After 4 weeks, deeper pockets experienced a similar probing depth reduction within the three groups; after 12 weeks however the differences were obvious between the two combined treatment groups and the scaled group. This means that the combined treatment effect is due to scaling only immediately after the treatment, since, as time goes by, the effects of the
Antimicrobial agents become increasingly obvious (6,8). Nevertheless, topical antimicrobial agents release may require the same precautions as the systemic medicine use. To begin with, patients who are known to be allergic to the medicine will also experience this reaction after its topical application, since some of the topically delivered antibiotic will be absorbed by the human body, and may even reach significant serum levels.

More often, there may be a transitional subgingival selection of bacteria, which became resistant after topical application, which only lasts 3-6 months. There is no definite information so far on the possible adverse effects of subgingival topical antibiotic delivery devices on the gastro-intestinal tract microbiota. This lack of data led to a series of speculations regarding the possible spread of bacterial resistance after topical antibiotic delivery (2,3,7).

We may say that root scaling and surfacing is an extremely efficient method in treating moderate periodontitis. Although most of the sites respond positively to this treatment, when there are however sites that require a more aggressive treatment, topically released antimicrobial products are recommended.

Conclusions:

Topical antibiotic application has more advantages than their systemic delivery. Systemic antibiotic therapy may cause a series of adverse effects such as hypersensitivity, nausea, diarrhea, gastro-intestinal intolerance, candidosis, oral contraceptive interactions, pruritus, Antabuse® effect, or unpleasant taste. Topical antibiotic application therapy also prevents the patient’s uncertain consent.

Finally, we should emphasize that, just as after any type of periodontal therapy, optimum supragingival plaque control is vital for the achievement of clinical improvements, even after topical antibiotic application. Subgingival antibiotic application should generally not be performed before a thorough dental plaque examination.

References: