Clinical and histological evaluation of post-extraction platelet-rich fibrin socket filling: a prospective randomized controlled study.

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Introduction

Different surgical procedures using platelet-rich fibrin (PRF) as healing or grafting material have been described, but with contradictory results. We investigated whether the use of PRF membranes for socket filling could improve the microarchitecture and the intrinsic bone tissue quality of the alveolar bone after premolar extraction and assessed the influence of the surgical procedure prior to implant placement.

Materials and Methods

Twenty-three patients who required extraction of a nonrestorable premolar followed by implant placement were randomized to 3 groups: PRF group with simple extraction and socket filling with PRF; PRF-flap group with extraction with a mucosal flap and socket filling with PRF; and a control group with simple extraction without socket filling. Implant placement was performed at week 8 and a bone biopsy was obtained from the centre of the socket for histomorphometric analysis.

Loss of the alveolar crest width was clinically measured and superimposable radiographs were performed to measure the vertical alveolar bone loss prior to extraction and implant placement. µCT analysis was performed to investigate volume and microarchitecture of the new formed bone.

Results

<table>
<thead>
<tr>
<th>µCT</th>
<th>Control</th>
<th>PRF</th>
<th>PRF-Flap</th>
</tr>
</thead>
<tbody>
<tr>
<td>BV/TV (1)</td>
<td>0.249 ± 0.037</td>
<td>0.281 ± 0.037</td>
<td>0.197 ± 0.027</td>
</tr>
<tr>
<td>Tb.N (1/mm)</td>
<td>4.34 ± 0.34</td>
<td>5.56 ± 0.37*</td>
<td>4.55 ± 0.32</td>
</tr>
<tr>
<td>Tb.Sp (mm)</td>
<td>0.234 ± 0.019</td>
<td>0.173 ± 0.016*</td>
<td>0.219 ± 0.012</td>
</tr>
</tbody>
</table>

Results are bone volume to total volume (BV/TV), trabecular number (Tb.N) and trabecular separation (Tb.Sp). Values are mean ± SEM. *p<0.05, compared to control.

A significant effect was also observed on intrinsic bone tissue quality: elastic modulus (+17.42%, p<0.05), hardness (+10.01%) and working energy (+11.05%, p<0.05) were increased in the PRF group compared to PRF-flap group.

Socket filling with PRF without mucosal flap showed better bone healing with improvement of the bone microarchitecture and intrinsic bone tissue quality, and a better preservation of the alveolar crest width. The influence of the surgical procedure on bone healing seemed as important as the grafting material. The flap represented an invasive procedure for the soft tissue with a negative impact on bone healing inside the socket that could neutralize the advantages of the PRF.

Conclusions

These results support the use of a minimally traumatic procedure for tooth extraction and socket filling with PRF to achieve an improved alveolar bone healing and a better preservation of the alveolar crest width.

All authors declare no conflicts of interest.