Sinus Floor Augmentation Using Platelet Rich Plasma and Bovine Derived Xenograft


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INTRODUCTION

Maxillary sinus augmentation procedure is a well accepted and predictable method of increasing the volume of bone to facilitate the placement of implants in areas of the posterior maxilla with insufficient bone quantity and/or quality (Wallace & Fraser 2003; Del Fabbro et al. 2004). Various grafting materials are available for sinus augmentation. Among these, bovine derived xenograft (BDX) has been shown to have osteoconductive properties and no inflammatory or adverse reactions as grafting materials used in sinus augmentation procedures (Mangano et al. 2007; Traini et al. 2007). Platelet rich plasma (PRP) has become an increasing popular clinical tool as an alternative source of growth factors for regenerative procedures (Kassolis et al. 2005; Fischelov et al. 2008; Steigmann et al. 2005). The incorporation of PRP into sinus graft has been proposed as a method to shorten healing time, enhance wound healing, and improve bone quality (Boyapati et al. 2006). The purpose of this study is to compare the bone formation after bilateral sinus augmentation with PRP plus BDX versus BDX plus collagen membrane (CM) using radiological and histological findings.

MATERIALS and METHODS

• Bilateral Sinus Augmentation (PRP+BDX) versus (BDX+CM): Two stage implant placement

- PRP (SmartPrep) Preparation:
  20 ml Blood Drawn from the Antecubital Vein
  Mixing the Blood with 2 ml Citrate Anticoagulant Solution
  Centrifuge for 14 minutes
  3 ml PRP obtained

- Autologous Thrombin Preparation:
  10 ml Blood Drawn from the Antecubital Vein
  Mixing the Blood with 1 ml Anticoagulant Solution
  1 ml Autologous Thrombin obtained

- Postsurgical Care
  Amoxicillin, Metronidazole (2x1, 1g) for 5 days
  Chlorhexidine (0.2%) for 2 weeks post-surgically

- Radiological Analysis
  Computerized tomography (CT)
  Panoramic radiography
  Bone density (Hounsfield Unit [HU])
  SinPeri2 Software

- Histological Analysis
  Bone biopsy specimen
  Formalin fixation
  Dehydration
  Embedding in paraffin
  Hematoxylin + Eosin staining

RESULTS

Table 1. Mean (± SD) values of alveolar bone height at baseline and 8 months after surgery (n=10)

<table>
<thead>
<tr>
<th></th>
<th>Baseline (mm)</th>
<th>8th month (mm)</th>
<th>Change (mm)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP + BDX</td>
<td>575.65 ± 157.58</td>
<td>692.74 ± 155.72</td>
<td>117.09 ± 144.96</td>
<td>0.037</td>
</tr>
<tr>
<td>BDX + CM</td>
<td>530.57 ± 125.58</td>
<td>752.23 ± 194.22</td>
<td>221.66 ± 126.98</td>
<td>0.005</td>
</tr>
</tbody>
</table>

Table 2. Mean (± SD) values of alveolar bone densities at baseline and 8 months after surgery (n=10)

<table>
<thead>
<tr>
<th></th>
<th>Baseline (HU)</th>
<th>8th month (HU)</th>
<th>Change (HU)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP + BDX</td>
<td>0.131 ± 0.999</td>
<td>0.999</td>
<td>0.86 ± 0.84</td>
<td></td>
</tr>
<tr>
<td>BDX + CM</td>
<td>0.131 ± 0.999</td>
<td>0.999</td>
<td>0.86 ± 0.84</td>
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REFERENCES


CONCLUSIONS

• The results of this study do not point out statistical clinical difference between both sites regarding alveolar bone heights and densitometric values.
• The difference noted was that, the side treated with PRP was presumed to have more newly formed mature bone whereas the contralateral side continued to show histological evidence of residual graft materials.
• Both combinations seem to be suitable for sinus augmentation procedures and accommodate osteointegrated implants.

CONCLUSIONS

• The purpose of this study is to compare the bone formation after bilateral sinus augmentation with PRP plus BDX versus BDX plus collagen membrane (CM) using radiological and histological findings.