Early implant placement with simultaneous GBR following single tooth extraction in the esthetic zone. 12 month results of a prospective study with 20 consecutive patients

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Introduction
Early implant placement following extraction of a single tooth is a procedure used by many clinicians in the maxillary anterior zone, but there is a lack of documentation on esthetic outcomes. When esthetic results have been reported, mucosal recessions have been observed. The aim of this study, therefore, was to prospectively investigate esthetic outcomes of early implant placement in single-tooth extraction sockets in the esthetic zone with Straumann® Bone Level Implants.

Materials and Methods
A total of 20 patients requiring single tooth replacement in the anterior maxilla were entered into the study. After tooth extraction the socket was allowed to heal for 4 – 8 weeks. Bone level implants were subsequently placed, sealed with healing caps, with simultaneous contour augmentation using GBR with anorganic bovine bone mineral and a collagen membrane (Figure 1). Reopening was performed 8 – 12 weeks later (Day 0). Within 7 days, provisional crowns were placed, which were gradually enlarged if necessary to optimize soft tissue contours. Final all-ceramic restorations were placed after 6 months.

The parameters measured were: modified plaque index (mPLI), modified sulcus bleeding index (mSBI), probing depth (PD), width of keratinized mucosa (KM), distance from mucosal margin to implant shoulder (DIM), distance from implant shoulder to first bone-to-implant contact (DIB), mid-facial height of implant crown and contralateral tooth, pink esthetic score and white esthetic score.

Results
All implants were successfully integrated at 12 months, with healthy peri-implant soft tissues. The implants fulfilled strict success criteria, and the results were in line with those from other prospective studies with the same parameters. Mean mPLI, mSBI and PD values at 12 months were 0.36, 0.21 and 4.43 mm, respectively (Table 1). A wide KM band was seen at 3 months, which remained stable at 6 and 12 months (Table 1).

Mean DIB values at 3, 6 and 12 months were 0.09, 0.14 and 0.18, respectively (Table 1). The radiographic analysis indicated that 15 of 20 implants showed minimal bone resorption (Figure 2), and only one implant showed bone loss > 0.5 mm, with minor mucosal recession of 0.5 – 1.0 mm. Mean DIM values at 12 months were -6.68, -6.00, -3.53 and -3.84 for mesial, distal, facial and oral, respectively.

Predictable contour augmentation with an anorganic bovine bone mineral therefore showed a reduced risk of mucosal recession, compared to other studies which have shown mucosal recession of 30–40 %.

Figure 1: Occlusal view following implant placement, with a 2-wall peri-implant defect, favorable for predictable GBR.
Table 1: Clinical and radiographic parameters at 3, 6 and 12 months

<table>
<thead>
<tr>
<th>Parameter</th>
<th>3 mos</th>
<th>6 mos</th>
<th>12 mos</th>
</tr>
</thead>
<tbody>
<tr>
<td>mPLI</td>
<td>0.08 ± 0.24</td>
<td>0.08 ± 0.20</td>
<td>0.36 ± 0.33</td>
</tr>
<tr>
<td>mSBI</td>
<td>0.26 ± 0.29</td>
<td>0.16 ± 0.23</td>
<td>0.21 ± 0.17</td>
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<tr>
<td>PD</td>
<td>3.69 ± 0.62</td>
<td>3.75 ± 0.46</td>
<td>4.43 ± 0.57</td>
</tr>
<tr>
<td>KM</td>
<td>4.06 ± 1.43</td>
<td>4.10 ± 1.41</td>
<td>4.50 ± 1.54</td>
</tr>
<tr>
<td>DIB</td>
<td>0.09 ± 0.16</td>
<td>0.14 ± 0.25</td>
<td>0.18 ± 0.20</td>
</tr>
</tbody>
</table>

Mean pink and white esthetic scores were 8.10 and 8.65, respectively, (total score = 16.75) indicating good esthetic outcomes. The maximum for both pink and white esthetic scores is 10, and the threshold for clinical acceptability is 6/10 for each index.

Figure 2: The majority of patients (80 %) showed < 0.3 mm bone loss

Conclusions

- Good esthetic and clinical results were seen over 12 months
- The risk of mucosal recession was low
- Strict success criteria were fulfilled, resulting in 100 % success and survival rates at 12 months
- Minimal crestal bone resorption was demonstrated
- Majority of patients showed less than 0.3 mm bone loss