A 53-year old Caucasian male presented to the University of Iowa College of Dentistry Clinics for comprehensive care. His chief complaint was related to smile aesthetics.

Clinical and radiographic examination

Patient presents with several missing teeth (#1, 2, 3 and 4), pneumatization of the right maxillary sinus associated with a combined (horizontal and vertical) ridge deficiency, severe non-carious dental lesions in multiple teeth mainly due to parafunctional habits (tobacco chewing) and collapsed vertical dimension.

Patient's periodontal status was stable. He was enrolled in a regular maintenance program. Tissue biotype was average to thick, however there were gingival recession defects (Miller Class I) on the facial of #6, 11, 21 and 28. Tooth #5 was deemed as non-restorable.

Treatment plan included periodontal maintenance, endodontic treatment of #6, 10, 11 and 22, maxillary sinus grafting and alveolar ridge reconstruction on the upper right, extraction of #5 and for a 3-unit implant supported restoration, functional crown lengthening on the upper and lower arch and crowns on all teeth.

Implant site development on the upper right was performed using a combination of rhBMP-2 (8.4 mg) in a collagen sponge carrier, allograft particles (FDBA+DFDBA) and a long-lasting absorbable collagen membrane.

After healing period of 6 months, a bone core biopsy was obtained at the time of implant placement for histological processing.

Full-mouth rehabilitation of natural teeth in conjunction with dental implants was then completed using lithium disilicate crowns.

A second surgery to remove the cover screw and place healing abutment was performed 2 months after implant placement. At this point also endodontic treatment in #6, 10, 11 and 12 was carried out.

Radiograph examination after healing sinus graft

Radiographic exam was carried out after healing of sinus grafting to plan the implant position. A diagnostic wax-up was done to plan the anticipated occlusion.

Implant placement in #3 and 5

Two bone level implants were placed and a bone core biopsy was obtained.

CLINICAL OUTCOMES

Full-mouth rehabilitation of natural teeth in conjunction with dental implants was then completed using lithium disilicate crowns.

HISTOMORPHOMETRY AND IMMUNOHISTOCHEMISTRY

Histomorphometry

<table>
<thead>
<tr>
<th>Marker</th>
<th>Mineralized Tissue</th>
<th>Connective Tissue</th>
<th>Biomaterial</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>44.38</td>
<td>22.02</td>
<td>28.16</td>
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Immunohistochemistry

Marker CD34 (endothelial cells)

Other markers such as H-caldesmon, Vimentin, Actina ML were also studied.

References
