Biological stability of Zirconia/Alumina composite ceramic implant abutment

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Purpose
The purpose of the present study is to evaluate the biological stability of the zirconia/alumina composite abutment by histologic and radiographic examination in clinical cases.

Materials & Methods
17 partially edentulous patients (5 men and 12 women, mean age 47) were treated with 37 implants. The implants were placed following the standard two-stage protocol. After a healing period of 3 to 6 months, zirconia/alumina composite abutments were connected. All radiographs were taken using paralleling technique with individually fabricated impression bite block. Following insertion of the prosthesis and at the 3-, 6-, 12-month re-examinations. After processing the obtained images, the osseous level was calculated using the digital image in the mesial and distal aspect in each implant. An ANOVA and t-test were used to test for difference between the baseline and 3-, 6-, 12 months re-examinations, and for difference between maxilla and mandible. Differences at P<0.05 were considered statistically significant. For histologic examination, sample was obtained from the palatal gingiva which implant functioned for 12 months. Sections were examined under light microscope under various magnifications.

Results
Clinically, no abutment fracture or crack as well as periimplantitis was observed during the period of study. The mean bone level reduction (±standard deviation) was 0.34mm(±0.26) at 3-months, 0.42mm(±0.30) at 6-months, 0.62mm(±0.28) at 12-months respectively. No statistically significant difference was found between baseline and 3-, 6-, 12 months re-examinations(p>0.05). The mean bone level reduction in maxilla was 0.33(±0.25) at 3 months, 0.36(±0.33) at 6 months, 0.56(±0.26) at 12-months. And the mean bone level reduction in mandible was 0.35(±0.27) at 3 months, 0.49(±0.27) at 6 months, 0.68(±0.30) at 12 months. No statistical difference in bone level reduction between implants placed in the maxilla and mandible.

Histologically, the height of the junctional epithelium was about 2.09mm. And the width was about 0.51mm. Scattered fibroblasts and inflammatory cells, and dense collagen network with few vascular structures characterized portion of connective tissue. The inflammatory cell infiltration was observed just beneath the apical end of junctional epithelium and the area of direct in contact with zirconia/alumina abutment.

Conclusion
These results suggest the zirconia/alumina composite abutment can be used in variable intraoral condition, in posterior segment as well as anterior segment without adverse effects.