The biomechanical behavior of implant-supported overdentures under masticatory load may change with periimplant marginal bone loss or ridge resorption. A periimplant bone loss of about 1 mm in the first year and 0.1 mm annually has been reported as normal (Jung et al., 1996; Kitamura et al., 2005).

Objective

This 3D-finite elements method study evaluated the effect of bone levels on the stress distribution in overdentures with periimplant marginal bone loss and resorption of the distal ridge.

Materials and Methods

The geometric models of implants and abutments were mounted at the canine region to build the reference model 1 with absence of bone resorption or bone loss. To build the test models the mandible geometric solid was modified to simulate 2-mm vertical bone loss surrounding the implants (model 2) and model 2 + resorption of the distal ridge (model 3).

Results

The stress concentration at marginal bone and implants occurred on the same side of the vertical load application for all models (right side). The von Mises stresses were qualitatively analyzed in selected areas:

- Periimplant bone (internal/external views)
- Implants & prosthetic components

The combination of 2-mm vertical bone loss and resorption of the distal ridge (model 3) did not increase the stresses compared with the model with only periimplant marginal bone loss (model 2).

Conclusion

The results suggest that the periimplant marginal bone loss increases stress concentration in dental implants, abutments, and marginal bone independently from the bone resorption of the distal ridge.