Stress Analysis of Different Wall Thicknesses of Implant Fixture with Various Boundary Levels.

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Abstract

The aim of the present work is to develop 3D finite element models of implant fixture with different wall thicknesses to predict maximum stress concentration sites and distribution contours after loading. A maximum lateral force of 150 N was applied to simulate horizontal occlusal forces. When the fixtures were constrained to simulate different boundary levels, the maximum equivalent stress (max EQV) was always located at the implant-bone interface. Max EQV increased when the wall thickness or boundary level was reduced to a certain extent. The fixture with a wall thickness of 0.97 mm demonstrated the smallest stress increase ratio when the boundary level was lowered. Our results indicated that both wall thickness and the boundary level played important roles in maintaining a well-distributed stress level within the fixture. The stress concentration decreased when the fixture wall became thicker, however, this effect was less significant when the surrounding bone level was reduced.