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Stress in Denture-supporting Tissues by Finite Element Analysis

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ABSTRACT
The stress and strain distributions in denture-supporting tissues were evaluated by the finite element method. The finite element model consists of a mandibular occlusion rim, mucosa, cortical bone, and cancellous bone. Gap and truss elements were employed as contact elements in order to simulate the dynamic behavior between the occlusion rim and mucosa. By applying the contact elements to construct the contact relation between the occlusion rim and mucosa, the components of upward stress and strain in the mucosa were eliminated. The displacement of the occlusion rim was minimized, although it was expected to be excessively increased by using the contact elements.
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INTRODUCTION

Stresses developed in the denture base, mucosa, bone, and various dental materials have been studied by photoelastic methods and electronic strain gauge appliances. Recently, a new method of evaluation, namely the finite element analysis, has been successfully used in dental research.[1-3]

However, almost all of the simulations, which were designed to evaluate the stress distribution in denture-supporting tissues, were constructed by connected parts, even though the relation of the denture base and mucosa,[4-6] and the dynamic behavior between the denture base and mucosa were often omitted.

In this study, a 2-dimensional finite element method was used to evaluate the stress and strain distributions in denture-supporting tissues. By applying contact elements, the dynamic behavior between the den-

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