

ارزیابی تنشهای منتقل شده از پانتیک به پایه‌های بریج دندانی با تغییر طول پانتیک به روش اجزاء محدود

دکتر جلیل قنبر زاده*، دکتر محمدرضا صابونی*، دکتر مسعود کشاورز**

* استادیار گروه پروتزهای دندانی دانشکده دندانپزشکی و مرکز تحقیقات دندانپزشکی دانشگاه علوم پزشکی مشهد

** استادیار گروه پروتزهای دندانی دانشکده دندانپزشکی دانشگاه علوم پزشکی کرمان

تاریخ ارائه مقاله: ۸۵/۱۱/۲ - تاریخ پذیرش: ۸۶/۵/۱۳

Title: Finite Element Stress Analysis on the Effects of the Changes in Length of Pontic on the Stresses Carried from Pontic to Abutments

Authors: Ghanbarzadeh J*#, Sabooni MR*, Keshavarz M**

* Assistant Professor, Dept of Prosthodontics, School of Dentistry and Dental Research Center of Mashhad University of Medical Sciences, Mashhad, Iran.

** Assistant Professor, Dept of Prosthodontics, Dental School, Kerman University of Medical Sciences, Kerman, Iran.

Introduction: Stress in fixed partial dentures is different in pattern and quantity compared with single restoration. Length of bridge has a direct effects on stress of abutments. This study evaluates the changes in pattern and quantity of stress with the pontic length variation. We can use the results to design the dimension of pontic and also in fixed partial denture treatment planning when the load applied to bridge is important.

Materials & Methods: In this in vitro study, the finite element method was used to analyze mechanical behavior of prosthesis and its supporting structures when a fixed prosthesis with two designs replaces a mandibular first molar. In finite element stress analysis method, models were designed similar to the actual one with ANSYS computer software. Two PFM bridge models with normal pontic were designed which one of them was 3-unit F.P.D and the other was 4-unit F.P.D. Physical properties of Ni-Cr-Be alloy, dentine, PDL, spongy and compact bone were determined for the software program. A 700 N load was applied vertically to the center of pontic, and then stress in abutment, bone and prosthesis were analyzed by ANSYS software.

Results: Stress concentration was in the mesial of premolar, apex of premolar and distal of molar (13.4 MPa) in the supporting bone of 3-unit F.P.D. Stress pattern in the bone was the same in 3-unit F.P.D and 4-unit F.P.D. When the length of pontic was doubled, stress in the bone was doubled too (26.2 MPa). Stress concentration in 3-unit F.P.D was in distal of premolar (cervical region), mesial of molar (cervical region) and Furca in tooth structure (45.8 MPa). Maximum stress in 3-unit F.P.D prosthesis was respectively in joints (511 MPa), distal margin of premolar and mesial margin of molar. Maximum stress in 4-unit F.P.D was in the joint of two pontic (1903 MPa).

Conclusion: When the length of pontic was doubled, stress in the bone was doubled too. Maximum stress concentration in 3-unit F.P.D was in the distal joint. In 4-unit F.P.D, maximum stress was in the joint between the pontics.

Key words: Stress, Bridge, Finite element.

Corresponding Author: Jalil5290@yahoo.com

Journal of Mashhad Dental School 2007; 31(3): 231-8.