Distribusi Tekanan dari Gaya Geser Berdasarkan Rumus Bangun Braket Ortodonti Non Mesh: Analisis Finite Element = Stress Distribution of Shear Stress on Non Mesh Orthodontic Bracket Base Design : A Finite Element Analysis

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Abstrak

Di Indonesia, pengembangan produksi braket ortodonti dalam negeri sedang dikerjakan dan dibutuhkan studi lebih lanjut untuk mengetahui desain rumus bangun geometri dasar braket yang memiliki retensi terbaik. Braket ortodonti metal dapat melekat pada gigi mengandalkan retensi mekanis pada dasar braket. Analisis finite element suatu analisis dengan menggunakan model tiga dimensi untuk mempelajari dan menilai distribusi stress yang terjadi akibat aplikasi gaya geser dengan besaran dan arah tertentu. Letak konsentrasi stress yang besar diprediksi berisiko terjadi deformitas atau kegagalan. Penelitian ini menggunakan tiga jenis braket ortodonti metal insisif pertama rahang atas dengan tipe dasar braket non mesh yang ada di pasaran. Pembentukan model tiga dimensi berupa gigi insisif pertama rahang atas dengan blok tulang, tiga tipe braket, dan adhesif ortodonti. Proses simulasi dengan aplikasi gaya geser mesio-distal dan serviko-insisal sebesar 1 N. Hasil analisis finite element menunjukkan adanya perbedaan distribusi stress dari gaya geser mesio-distal dan serviko-insisal pada tiga jenis rumus bangun dasar braket di permukaan dasar braket, lapisan adhesif ortodonti, permukaan email, dan jaringan periodontal.
.....In Indonesia, the development of domestic production of orthodontic brackets is underway and further studies are needed to find out the design of the basic bracket geometry formula that has the best retention. Metal orthodontic bracket can adhere to teeth surface by relying on mechanical retention in the base of the brackets. Finite element analysis is an analysis using three dimensional model to asses the stress distribution that occurs due to application of shear forces with certain magnitude and direction. The stress concentration and the distribution can be predicted and assumed to be the potential risk of deformity or failure. This study used three types of metal orthodontic brackets which available on the market. Three maxillary first incisors brackets with different bases, maxillary right incisor with periodontal tissue ,bone block, and orthodontic adhesive were construct using a software as a three dimensional model. The model were simulated with the application of shear stress mesio-distal and cervical- incisal one Newton each. Finite element analysis showed there are difference in stress distribution of mesio-distal and cervical-incisal shear stress on three types of different geometry of bracket base on the bracket base surface, orthodontic adhesive layer, enamel surface, and periodontal tissue.