PENGARUH JUMLAH *PITCH* DAN BESAR *TAPER* PADA *FILE* ENDODONTIK KONTINU BERBAHAN NIKEL TITANIUM DENGAN BENTUK PENAMPANG VARIABEL TERHADAP NILAI KELELAHAN SIKLIK KAJIAN *IN SILICO*

INTISARI

Desain geometri sebuah *file* endodontik diantaranya adalah bentuk penampang, *taper* dan *pitch*. *File* endodontik NiTi jenis *OneCurve* (*MicroMega*) memiliki modifikasi dua variasi penampang yaitu *double-s shaped* dan *triple helix.* Berbagai jenis modifikasi dibuat untuk meningkatkan ketahanan *file* endodontik NiTi dari fraktur. Kelelahan siklik adalah faktor yang paling sering menyebabkan patahnya *file* endodontik. Tujuan penelitian ini untuk mendapatkan desain yang memiliki ketahanan terhadap kelelahan siklik yang paling baik dari jumlah *pitch* dan besar *taper* pada *file* endodontik kontinu berbahan NiTi.

Penelitian ini menggunakan *file OneCurve* ukuran 25.06 (*MicroMega*) kemudian dilakukan pemindaian dengan *MicroCT Scan* dan modifikasi desain. Jumlah modifikasi *file* adalah sembilan dengan jenis modifikasi yaitu besar *taper* 4%, 6% dan 8% serta jumlah *pitch* dikurangi tiga, tetap dan ditambah tiga. Simulasi pengukuran kelelahan siklik dilakukan dengan metode elemen hingga sebanyak masing-masing tiga kali. Data hasil penelitian dianalisis uji Anava satu jalur kemudian dilanjutkan dengan LSD.

Hasil uji statistik menunjukkan bahwa terdapat pengaruh besar *taper* terhadap nilai kelelahan siklik. Besar *taper* 4% pada *file* endodontik memiliki nilai kelelahan siklik paling rendah. Kesimpulannya besar *taper* mempengaruhi nilai kelelahan siklik pada *file* endodontik kontinu berbahan nikel titanium dengan bentuk penampang variabel. Jumlah *pitch* tidak menunjukkan pengaruh yang signifikan terhadap nilai kelelahan siklik.

Kata kunci: kelelahan siklik, jumlah *pitch*, besar *taper*, penampang variabel, *file* endodontik NiTi, *in silico*

THE EFFECT OF TAPER SIZE AND NUMBER OF PITCH ON NICKEL TITANIUM CONTINOUS FILE WITH VARIABLE CROSS SECTION TO ITS CYCLIC FATIGUE
(In Silico Study)

ABSTRACT

The geometric design of an endodontic file includes cross sectional shape, taper and pitch. NiTi endodontic files of OneCurve (MicroMega) is made of two variations cross sectional shape, that is double-s shaped and triple helix. Various kinds of modifications were made to increase the resistance of the NiTi endodontic files from fracture. Cyclic fatigue is the most common factor that caused fracture of endodontic file. The purpose of this study was to obtain a NiTi endodontic file design that has the best cyclic resistance value based on its taper size and number of pitch.

This study used OneCurve endodontic file size 25.06 (MicroMega) then scanned with MicroCT Scan and modified the geometric design. The number of file modifications was nine. Taper size modifications was 4%, 6% and 8%, number of pitch modification was reduced by three, fixed and added by three. Cyclic fatigue measurement simulations were carried out using the finite element method three times each. The result data were analyzed using two-way ANOVA test and then continued with LSD.

The results of statistic test showed that there was an effect of the size of taper on the cyclic fatigue values. Endodontic file with size of taper 4% had the lowest cyclic fatigue value. Conclusion in this research was the taper size affects the value of cyclic fatigue in continues endodontic file made of nickel titanium with variable cross section. The number of pitch did not show a significant effect on the cyclic value.

Keyword: cyclic fatigue, number of pitch, taper size, variable cross section, NiTi endodontic file, in silico