Perbedaan ukuran gigi dan besaran crowding antara model plaster, digital, dan 3D-printed pada berbagai derajat keparahan crowding = Digital and 3D-printed model as alternative diagnostic casts for tooth size measurements on different degrees of crowding

Stephanie Zabrina, author

Abstrak

Tujuan: (1) Untuk menganalisis perbedaan ukuran linier gigi dan besaran crowding antara model plaster, digital, dan 3D-printed dengan berbagai derajat keparahan crowding, (2) untuk mengetahui hubungan antara derajat keparahan crowding dengan perbedaan ukuran linier gigi dan besaran crowding antara ketiga jenis model studi.
Metode penelitian: 30 model studi dibagi menjadi tiga kelompok: crowding ringan (0-4 mm, n=10), sedang (4.01-8 mm, n=10), dan berat (8.01 mm, n=10). Model studi plaster direplikasi menjadi model digital melalui pemindaian dengan intraoral scanner Trios3. Data digital dicetak menjadi model 3D-printed berbahan resin dengan 3D-printer Formlabs2. Pengukuran dilakukan pada bidang mesiodistal, bukolingual, servikoinsisal, dan besaran crowding (selisih antara required space dibandingkan available space) pada 12 gigi di setiap model studi.
Hasil: Uji statistik komparatif numerik menunjukkan perbedaan ukuran linier mesiodistal, bukolingual, servikoinsisal, dan besaran crowding yang bermakna secara statistik antara ketiga jenis model studi, baik pada kondisi crowding ringan, sedang, dan berat. Perbedaan signifikan ditemukan antara model plaster-digital dan plaster-3D-printed. Analisis Bland-Altman menunjukkan level of agreement yang tinggi antara ketiga jenis model studi terlepas dari keparahan crowding. Hasil pengukuran model digital dan 3D-printed memiliki tendensi lebih besar dibandingkan dengan model plaster, namun perbedaan pengukuran antar model studi relatif kecil (<0.5 mm).
Kesimpulan: Terdapat perbedaan ukuran linier gigi dan besaran crowding antara model plaster, digital, dan 3D-printed yang siginifikan secara statistik namun tidak relevan secara klinis, terlepas dari keparahan crowding. Derajat keparahan crowding tidak mempengaruhi besar perbedaan pengukuran gigi pada ketiga jenis model studi.
.....Objectives: (1) To analyze tooth size and crowding measurement differences between plaster, digital, and 3D-printed models with different degrees of crowding, (2) to find the association between severity of crowding with tooth size and crowding measurement differences on three types of study models.
Methods: 30 models were divided into three groups; mild crowding (0-4 mm; n=10), moderate crowding (4.01-8 mm, n=10), and severe crowding (8.01 mm, n=10). Plaster models were scanned with Trios3 intraoral scanner into digital models. .STL data were then produced into resin models with Formlabs2 3D-printer. Mesiodistal, buccolingual, servicoincisal, and crowding were measured on 12 teeth in each model.
Results: Comparative statistical test found significant tooth size and crowding measurement differences between three types of study models in all category of crowding. Post-hoc tests showed significant differences between plaster-digital models and plaster-3D-printed models. Bland-Altman plots displayed high level of agreement between three types of study models regardless of severity of crowding. Digital and 3D-printed model measurements were found likely to be larger than plaster model, although the differences

in four measured parameters were relatively small (<0.5 mm).
Conclusions: Differences of linier tooth size and crowding measurements on plaster, digital, and 3D-printed models were found to be statistically significant, although clinically irrelevant, irrespective of degrees of crowding. No association was established between severity of crowding and measurement differences between three types of study models.