The effect of equilibrating mounted dental stone casts on the occlusal harmony of cast metal complete crowns

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Statement of problem
Fabrication of indirect complete crowns that are in occlusal harmony upon insertion remains a problem in restorative dentistry, and dental stone cast expansion may play a role.

Purpose
This 3-part investigation compared occlusal contacts in a simulated patient with a harmonious occlusion with centric occlusion equal to maximum intercuspation (CO=MC) and an inharmonious occlusion (CO=MM) with mounted stone casts, and compared the occlusal contacts after fabrication of a posterior complete crown fabricated on equilibrated and nonequilibrated dental stone casts.

Material and methods
A dentoform mounted in a semi-adjustable articulator served as the simulated patient and control. In part 1, a single set of maxillary and mandibular ADA type IV and V derived dental stone casts were fabricated and mounted (CO=MM), and occlusal contacts/near contacts were compared; in part 2, 10 type IV and 10 type V cast mountings (CO=MM) were compared. In part 3, 10 type IV cast mountings were fabricated for adjustment (experimental) and 10 for no adjustment (control). A mandibular ADA type IV gold alloy complete crown was fabricated and adjusted on each set of casts and then returned to the dentoform. Vinyl polybutyrene intraocclusal records of all mountings were scanned for optical density, and contacts were used to quantify occlusal contacts as exhibiting contact or near contact. Data were analyzed with Kruskal–Wallis ANOVA and Mann-Whitney U tests (α=0.05).

Results
The cast adjustment protocol (intervention) was successful in eliminating the majority of the occlusal disharmony in the casts believed to be caused by the effects of stone expansion. Actual and near contact areas for cast mountings of the equilibrated simulated patient were significantly different from those of the simulated patient (P<.001; P=.001, respectively). Actual and near contact areas for inserted crowns fabricated from adjusted casts were significantly different from those of the simulated patient (P<.001; P=.007, respectively), but actual contact areas were not different from those of the simulated patient with no crown inserted.

Conclusions
In this study, occlusal contacts of a simulated patient (dentoform) could not be accurately replicated with mounted dental stone casts. A cast adjustment procedure can aid in fabrication of a crown with a more accurate occlusion.
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