

Bite Registration Accuracies with Intraoral Scanning

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Digital impressions by intraoral scanning (IOS) have become an increasingly popular alternative to conventional or analog impressions. The collective evidence from a total of 132 studies (20 reviews, 78 clinical, and 34 *in vitro*) suggested that the current IOS is sufficiently accurate for fabricating a whole series of (a tooth or implant-supported) prosthetic restorations except the long-span restorations.¹ However, there is still a huge lacuna in the literature related to the clinical evidence on accuracies of bite registration with the IOS. Porter et al.² evaluated the accuracy of model articulation generated by one extraoral scanner with wax or vinyl polysiloxane bite registration, and three intraoral digital scanners utilizing confocal static, confocal continuous, and blue LED light technologies. They concluded that confocal imaging technology scanners produced accurately articulated models. Yee et al.³ evaluated the 3D static articulation accuracy of three model scanner-CAD systems using a coordinate measuring machine and concluded that the overall interarch global distortion did not exceed 0.6%. Edher et al.⁴ evaluated the accuracy of virtual interocclusal registration records made at different locations around the arch and found out that occlusal contacts obtained from interocclusal registration scans for quadrant scans had a higher sensitivity than did those for complete-arch scans. Wong et al.⁵ compared the three-dimensional accuracy of the digital static interocclusal registration of three IOS systems using the buccal bite scan function. They observed both interarch and interocclusal distortions that could affect the magnitude of occlusal contacts of restorations clinically and suggested the need for compensations during the CAD design stage or at restoration issue appointment. Gintaute et al.⁶ carried out *in vitro* study to evaluate the accuracy of bite registration produced by three intraoral scanners (CEREC, TRIOS, and PLANMECA) with six dental models scanned five times. They observed that the bite registrations from all three intraoral scanners created significantly different surface areas of full arch occlusal contacts. Posterior occlusions revealed lower precision for all scanners than anterior. Not many clinical studies have been carried out to evaluate the accuracies of virtual bite registration. Abdulateef et al.⁷ compared the accuracy and reproducibility of the virtual interocclusal records of the IOS with conventional polyvinyl siloxane (PVS) interocclusal records. They concluded that although the IOS records are clinically acceptable, this method tends to introduce false contacts resulting in perforations between the opposing virtual casts. Repeated buccal occlusal scans showed fair reproducibility.

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Looking at the current literature, the pieces of evidence are being built around the products and technologies to meet the need of specific restoration types. The measurement errors are inherent to the technologies employed and the software systems used to process the images.² Variations in virtual articulation algorithm and scanner technology may contribute to the possible distortions in digital interocclusal records.³ Dental practitioner must be mindful in integrating specific IOS system in practice by studying scientific evidence in relation to specific prosthetic type and span to make clinically acceptable restorations.

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