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Digital impressions and digital workflow for fixed prosthodontics, status of clinical research 2018

Statement of Problem: Few studies have objectively measured the clinical outcomes of using digital impressions and digital workflow (DFW) for fixed prosthodontics (FP). The accuracy of ceramic restorations made with a completely DWE, using no physical dies or casts, was evaluated.

Methodology: A clinical study evaluating 50 posterior CAD/CAM lithium disilicate (e.max, Ivoclar Vivadent) onlays and crowns cemented with Adhese Universal and Variolink Esthetic cement was performed digitally. That is digital impressions (intraoral scanning, IOS) (Trios, 3Shape), CAD (Dental Design, 3Shape), CAM (Wieland, Ivoclar Vivadent) and monolithic restorations with stain/glaze. Three operators performed IOS with scanning time recorded for Tooth Preparation Scan (TPS), Sextant Opposing Scan (SOS), Sextant Bite Scan (SBS), Operator 1 scanned from the most posterior tooth to sextant canine while Operators 2 and 3 scanned across the arch to contralateral canine. Mean scanning times were calculated for TPS, SOS and SBS. The amount of delivery adjustment required for proximal contacts, occlusal adjustment and marginal adaptation were recorded. An USPHS criterion was used to evaluate marginal integrity.

Results: Operators' 2 and 3 preparation scanning technique to the contralateral canine required 39% more scanning time than Operator 1. There was no difference in the amount of occlusal or proximal adjustment necessary between the three operators. To determine the effect of operator experience, restorations were divided into three in order of their placement over time. Delivery of restorations requiring no proximal contact adjustment was: 1st/3=0, 2nd/3=33%, 3rd/3=87%. No occlusal adjustment was: 1st/3=33%, 2nd/3=44%, 3rd/3=87%. All margins were USPHS rated "Alpha".

Conclusion: For tooth preparation scanning, capture of only the sextant was necessary to create an accurate occlusion and proximal contacts. Restorations fabricated with the completely digital CAD/CAM process required minimal to no adjustment on delivery. Other studies have yielded similar results for efficiency and minimal adjustment.

Recent Publications

1. Batson E R, Cooper L F, Duqum I and Mendonça G (2014) Clinical outcomes of three different crown systems with CAD/CAM technology. J Prosthet Dent. 112(4):770-7.
2. Tamim H, Skjerven H, Ekfeldt A and Ronold H J. Clinical evaluation of CAD/CAM metal-ceramic posterior crowns fabricated from intraoral digital impressions. Int J Prosthodont. 27(4):331-7.

Biography

John A Sorensen is a Professor in the Department of Restorative Dentistry; Director of Biomimetics Biomaterials Biophotonics Biomechanics and Technology Laboratory; Director of Research, Graduate Prosthodontics Program at the University of Washington. He is a Diplomate of the American Board of Prosthodontics. He was awarded the 2018 Clinician-Researcher Award by the American College of Prosthodontists. He has published over 85 research articles and chapters as well as over 140 research abstracts. He has given over 150 invited lectures in 34 countries as well as over 300 lectures courses, hands-on programs and patient-treatment classes.

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