On CAD/CAM generated fixed dental prostheses, fit and effect of ceramic veneering

Avhandlingen baseras på följande delarbeten


On CAD/CAM generated fixed dental prostheses, fit and effect of ceramic veneering

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Abstract
Cobalt-chromium (CoCr) is extensively used as a material in fixed dental prostheses (FDPs) today, even though there are only a few clinical studies published. The manufacturing process of CoCr has changed in the last five years, from the lost wax technique to CNC-milling to additive manufacturing. Using a digital workflow from clinic to laboratory involves intraoral digital impressions. CoCr FDPs are usually not made as full-contour or full-anatomic reconstructions. They are instead designed using a cut back technique and then covered with a ceramic surface for a tooth-like appearance.

The general aims of this thesis were to study CAD/CAM production processes, material aspects on CoCr, clinical performance, and fit of tooth-, and implant-supported FDPs. A retrospective study of ceramic veneered CoCr FDPs was conducted to evaluate the performance of restorations made with the lost wax technique. One hundred forty-nine patients with 201 FDPs were followed for five years using patient records. To study CAD/CAM-techniques, the fit of CNC-milled CoCr three-unit FDPs on teeth, made using conventional and digital impression techniques, was compared. Also, the fit of CNC-milled and additively manufactured CoCr and titanium implant-supported FDPs were evaluated before and after ceramic veneering.

CoCr FDPs are a promising prosthodontic alternative to other dental alloys, presenting a low level of ceramic fractures, cement failure, caries, and other complications during the first five years in function. To evaluate their longer-term success and possible biologic adverse effects, further long-term randomized controlled studies are necessary. The digital impression technique produced FDPs with a significantly more accurate fit than conventional impressions using VPS impression material. Implant-supported frameworks can be produced in either titanium or CoCr using either CNC-milling or additive manufacturing with a fit well within the range of what is regarded as clinically acceptable. The fit of frameworks of both materials and production techniques are affected by the ceramic veneering procedure to a small extent, most likely of no clinical significance.

Keywords: Metal ceramic alloys, Titanium, Cobalt, Chromium, Dental Marginal Adaptation, Dental Prosthesis, CAD, CAM, Tooth-Supported, Implant-Supported, Additive Manufacturing