

2- AND 3-YEAR RESULTS OF ZIRCONIA POSTERIOR FIXED PARTIAL DENTURES, MADE BY DIRECT CERAMIC MACHINING (DCM)

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INTRODUCTION: Today, Fixed Partial Dentures (FPD), made of a metallic framework covered by tooth colored ceramics exhibit a well documented long-term stability for the molar region. However, the use of some metals in the oral cavity has been disputed because of the risk of biological incompatibility. Furthermore, a grayish mucosal discoloration of the marginal region may lead to esthetic problems despite the ceramic veneering. Hence, there is a need for all-ceramic restorations offering sufficient stability for molar replacement. Zirconia combines excellent mechanical properties, widely documented biocompatibility and desired esthetic advantages due to its white color. The purpose of this study was to evaluate the clinical behaviour of zirconia posterior FPDs fabricated by direct ceramic machining (DCM).

METHODS: In 45 patients 58 zirconia FPDs replacing 1 to 3 posterior teeth were cemented with two composite cements (Variolink[®], Panavia[®]). The zirconia frameworks were fabricated out of a porous pre-sintered TZP (tetragonal zirconia polycrystals) blank by milling a linearly enlarged copy of a framework model. Thereafter the frameworks were sintered to full density (DCM; ETH Zurich, Switzerland), allowing shrinkage to their final dimension. Subsequently they were veneered with porcelain. After 2 or 3 years respectively, the patients were re-examined and the following data were recorded on test- and control-teeth (neighbouring teeth, antagonists): i.)examination of the bridge for framework-fracture and chipping/fracture of the veneering material; ii.)recordings of pocket probing depth (PPD), probing attachment level (PAL), bleeding on probing (BOP), Plaque Index (PII) and tooth mobility (TM); iii.)radiographical examination using single tooth films.

RESULTS: 2-year follow-up: 23 patients with 29 bridges were examined. No framework-fracture was observed. 2 bridges had to be replaced due to biological complications (root fracture, endodontic problem). Therefore, the survival-rate in this group was 93%. Minor porcelain chipping was reported in 10% (n=3), and 18% (n=16) of the abutments exhibited marginal discrepancies leading to secondary caries in 3% of the cases. No statistically

significant differences were found between test- and control-teeth regarding PPD, PAL, BOP, PII and TM ($p>0.5$; Wilcoxon Signed Rank Test).

3-year follow-up: 13 patients with 18 bridges were examined. Again, no framework-fracture was observed. 3 bridges had to be replaced: 1 due to a biological complication (endodontic problem), 1 because it was not correctly cemented and 1 because of loss of retention. Therefore, the survival-rate in this group was 83%. Minor porcelain chipping was reported in 5% (n=1) and 18% (n=6) of the abutments showed marginal discrepancies leading to secondary caries in 9% of the cases. No statistically significant differences were found between test- and control-teeth regarding PPD, PAL, BOP, PII and TM.

DISCUSSION&CONCLUSIONS: Based on the results of this study it can be concluded, that zirconia-frameworks made by direct ceramic machining offer sufficient stability to be used for replacement of posterior teeth. Complications resulting from marginal discrepancies of the reconstructions need to be reduced by further refinements of the prototype DCM.

REFERENCES: ¹F Filser, H. Lüthy, P. Schärer, L. Gauckler (1998) *All-Ceramic Dental Bridges by Direct Ceramic Machining (DCM)* in: *Materials in Medicine*, Eds. M.O. Speidel et al.: vdf Hochschulverlag, ETH Zurich: Zurich.p.165-189. ²B Sturzenegger et al. (2000) *Klinische Studie von Zirkonoxidbrücken im Seitenzahngebiet hergestellt mit dem DCM-Verfahren*; *Acta Med Dent Helv* 5: 131-139

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