Bending moments of zirconia and titanium abutments with internal and external implant–abutment connections after aging and chewing simulation

The replacement of missing teeth with implant-supported single crowns and fixed dental prostheses has become a standard treatment modality exhibiting high survival rates (Pettrusson et al. 2004, 2007; Jung et al. 2008). For the fixation of the reconstruction on the implant, different types of implant abutments are used. Metal abutments made out of titanium have proven to be durable and are therefore considered as “gold standard” (Andersson et al. 1995; Pettrusson et al. 2007; Sailer et al. 2007a, 2007b). Because of their dark color, however, metal abutments were reported to cause a grayish discoloration of the peri-implant mucosa compromising the esthetic outcome of the implant-borne reconstruction (Sailer et al. 2007a, 2007b; Jung et al. 2008). For this reason, all-ceramic abutments made out of high-strength ceramics such as alumina or zirconia have been developed (Prestipino & Inger 1993a, 1993b). Laboratory and clinical studies demonstrated a superior performance of zirconia over alumina abutments (Andersson et al. 2001; Yildirim et al. 2003; Glauser et al. 2004, Att el al. 2006a, 2006b). Furthermore, a recent randomized controlled clinical trial comparing implant-borne reconstructions supported by zirconia and titanium abutments demonstrated similar outcomes for both types of abutment materials (Zembic et al. 2009). Therefore today, zirconia can be considered as the ceramic abutment “material of choice.”

Zirconia abutments with various implant–abutment connection geometries exist for the currently available different types of implants. These implant–abutment connections encompass external (e.g. hexagonal) and internal (e.g. conical) connections. Furthermore, the internal connection of zirconia abutments can be obtained...