



International College of Prosthodontists

19th Biennial Scientific Session - VIRTUAL - September 22 – 25, 2021

Program Speaker – Walaa Ahmed

Title

Fatigue and Fracture Resistance of Monolithic Zirconia Crowns: The Influence of Preparation Designs and Sintering Techniques

Abstract

The usage of monolithic zirconia crowns is significantly increased nowadays. Zirconia is regarded as one of the toughest materials available in dentistry. To prevent mechanical fracture of the full-contoured monolithic zirconia crowns, the thickness of zirconia crown and proper sintering process should be considered. The purpose of the presented project is to compare the effects of standard and fast sintering protocols on reliability and fracture resistance of CAD/CAM zirconia crowns using different preparation designs. Four titanium abutments were fabricated for receiving zirconia molar crowns. Crowns were designed virtually and milled from partially sintered zirconia blanks and divided into eight groups (n = 15). Crowns in groups 1 to 4 were sintered by standard sintering, while those in groups 5 to 8 were sintered by fast sintering. Groups were further categorized according to abutment finish line and crown thickness: G1/G5 (0.5 mm chamfer, 0.8 mm thick); G2/G6 (0.5 mm chamfer, 1.5 mm thick); G3/G7 (1.2 mm chamfer, 0.8 mm thick); G4/G8 (1.2 mm chamfer, 1.5 mm thick). All crowns were cemented to their corresponding NEMA G10 abutments using dual cure luting cement. Fatigue machine was used to subject all crowns to an accelerated fatigue test using step-stress accelerated life testing (from 4 up to 20 Hz). Testing was performed in a fluid bath with water at 37°C to mimic the oral conditions of mastication. Cyclic loading of each specimen was performed with an indenter (6mm diameter) positioned at the occlusal surface until failure or suspension. The linear mixed effect model analysis was performed at a significance level of 0.05. Weibull analysis was also performed to evaluate the probability of survival off each group. The specimens were thoroughly evaluated for cracks and/or bulk fracture with SEM and fractography.

Biography

Dr. Walaa Magdy Ahmed is currently an assistant professor of restorative and esthetic dentistry, King Abdulaziz University, Jeddah, Saudi Arabia. Dr. Ahmed obtained a bachelor degree of dental surgery from King Abdulaziz University, Jeddah, Saudi Arabia, a master degree in sciences from the University of Toronto, Ontario, Canada and a combined PhD in Craniofacial sciences and prosthodontic diploma from the University of British Columbia, Vancouver, Canada. Dr. Ahmed is a fellow of the Royal College of Dentists of Canada. Dr. Ahmed has been awarded the American College of Prosthodontics Educational Fellowship in 2016 and 2019, the third place in ACP John Sherry's competition 2018, and the second place in Pacific Coast Society of prosthodontics competition 2019. Dr. Ahmed was awarded 2020-2021 International college of prosthodontists (ICP)/Ivoclar vivadent research fellowship in dental restorative materials.