“Stress distribution of screw retained hybrid abutment crowns with different abutment connections”

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Dedication

This work is dedicated to

My dear family.

Without them, I will not be standing

where I am today

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Introduction

An implant abutment is an intermediate part between the implant and the restoration and is retained to the implant by a locking taper and a screw. Implant abutments can usually be separated from the implant, but in some cases, they may form part of the implant itself.

Implant abutments effectively help form the restorative part of the implant treatment. The retention, stability, support, and ideal position of the final restoration are provided by the abutment.

Implant abutments are connected to the implant fixture through several types of connections; external connections and internal connections. The most commonly used in internal connections are the internal hexagon (hex) and conical connections. Some variations arise from the conical connection according to the degree of conical taper such as the pure conical connection known as the Morse taper and those with less taper degrees and need screw retention.

Implant abutments are generally either prefabricated by implant manufacturer companies or custom made in a dental laboratory [(1)]. A prefabricated abutment is machine-made; it may be picked directly by an implant or fixture level impression or it may be directly adapted to an existing platform and pressed as a conventional crown. In order to fabricate a custom abutment, an implant or fixture level impression is taken of the implant platform with the help of an impression coping.

Another recently introduced concept type of abutments are the hybrid abutment crowns in which the custom abutment is developed as a

final restoration in function with an embedded screw channel to access the screw that hold the hybrid abutment crown in place.

Many materials are used to fabricate the hybrid abutment crowns such as lithium disilicate, different types of zirconia and hybrid ceramics that incorporate resin into the ceramic structure, but little is known about the stresses that are transmitted through different materials to the implant body and subsequently, the surrounding bone.

The most important reason to investigate the stress distribution in abutments and micro strain in crestal bone around implants is the possibility to provide enough information for implant planning, optimizing the implant installation in areas with different bone characteristics [(2)]. Despite this, masticatory overload is one of the primary factors for fractures and dental implant loss [(3)]. During the prosthetic phase of implant treatment, the choice between different materials with different elastic modulus can generate different stress and strain values in the implant and peri-implant bone [(4-6)].