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**ABSTRACTS**

Póvoa de Varzim

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# FRACTURE RESISTANCE OF SINGLE-TOOTH IMPLANT-SUPPORTED

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## Introduction

The purpose of this study is to identify and compare the fracture behaviour of the ceramic used in a single tooth implanted supported, see figure 1.

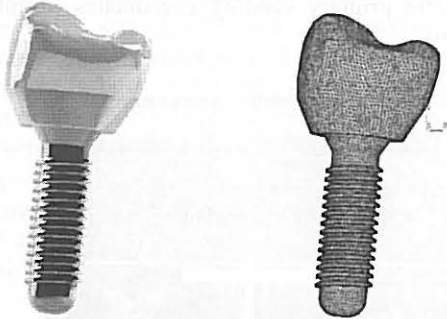


Figure 1: Geometric and finite element model of a single tooth implant supported.

Two different materials are tested in the abutment (ceramic and titanium). The implant is made of Titanium. Different fracture behaviour is expected, depending on the abutment material.

Considering the existence of two or more different materials, with different biomechanical properties (thermal and mechanical) and also the adherence between them (bond strength), it is expectable to foresee problems under clinical conditions.

Failure of the restoration is dependent on several factors. Optimum clinical design should require knowledge of failure mechanism. Besides the previous mentioned factors affecting failure, adverse environmental conditions, such as moisture and other fluids may also contribute to decrease life of this implant.

## Materials and methods

This study intends to analyse the brittle behaviour of ceramic material, using the concept of continuous damage mechanics. In this concept, the smear of a crack and crush is predicted by the stress level determined by tension or compression, maintaining the continuity of the displacement field where the material becomes ineffective [1].

This model is able to predict damage on ceramic material, depending on load type and level. An incremental loading step was applied until the maximum load bearing was reached, using point load on the cusp zone.

The ceramic material should be considered brittle, using adequate constitutive relations and the titanium should be considered normal ductile metallic behaviour.

The geometry of this model was defined as parasolid format in SOLIDWORKS (modelling software) and then fully transferred to ANSYS (analysis software). The geometry is mathematically modified to finite solid elements, see figure 1.

## Results and discussion

Fracture resistance was determined for each load step. Progressive damage leads to crack initiation and growth, as represented in figure 2.

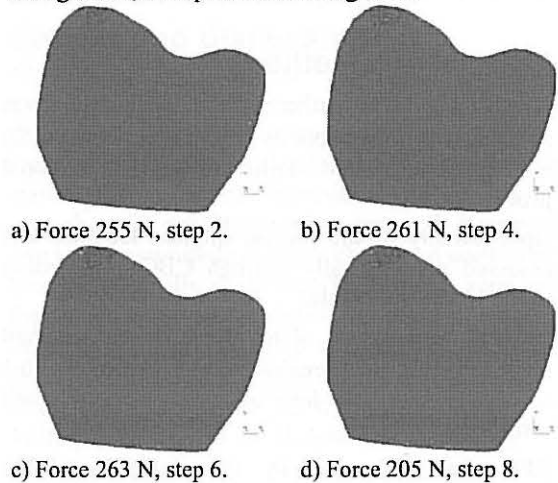


Figure 2: Load step increment and extension of the progressive damage on the crown, with metallic abutment.

Different results should be presented with ceramic abutment.

## References

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