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Metal ceramic fixed partial denture - fracture resistance

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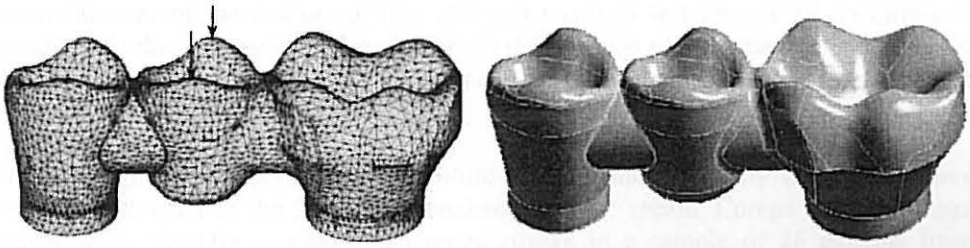
Abstract

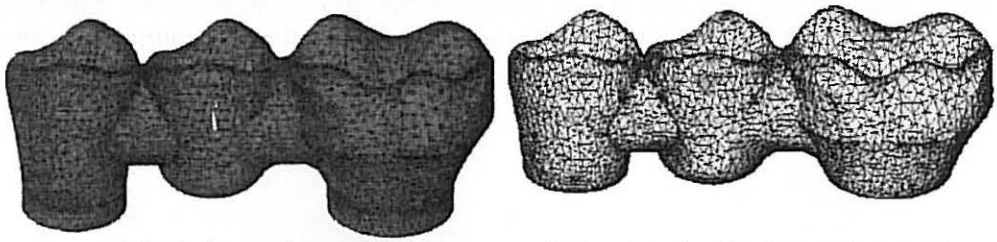
Metal ceramic fixed Partial dentures (FPD) are suitable to increase fracture resistance presenting higher clinical longevity. This type of prosthesis is mainly used when a great number of teeth replacements are need. The FPD under analysis is represented in figure 1, defined by a metallic infrastructure (titanium) and by a ceramic coating.



a) Finite element model. b) Geometry model.

Figure 1- Model for metal ceramic fixed partial denture.

The advantages of hybrid FPD lie in their predictable biomechanical behaviour, versatility and cost. The main disadvantage is related to aesthetic functionality. Different authors [1-3] quantified the life time for hybrid FPD, referring 10 years in service to be a survival of break point. The connector design is of great importance to improve stress pattern into that zone. This region is also restrained by biological and aesthetic reasons. Ceramics present elevated failure rate in FPD due to brittleness. This work presents results for fracture prediction, depending on load level. Figure 2 presents cracks (damage by tension) and stress result in x direction, for limiting load level, based on two point force load, located on top of the supported tooth.



a) Cracks in ceramic material. b) Stress in x direction for ceramic material.

Figure 2- Results for the ultimate limit state (damage of ceramic material).

REFERENCES

[1] - Karlsson S. A clinical evaluation of fixed bridges, 10 years following insertion. J Oral Rehabil 1986;13:423–32.
[2] - Palmqvist S, Swartz B. Artificial crowns and fixed partial dentures 18 to 23 years after placement. Int J Prosthodont, 1993;6:279–85.
[3] - Lindquist E, Karlsson S. Success rate and failures for fixed partial dentures after 20 years of service: part I. Int J Prosthodont 1998;11:133–8.