Title:

Study of the optimization of the surgical and prosthodontic treatment in implantology.

Summary:

The increase of implant supported prosthodontic treatments to replace lost teeth makes surgical therapy for implant insertion to become a usual activity in the dental office. To guarantee success implant surgery must follow some important guidelines such as avoiding excessive heating of bone during the drilling of the implant site, which can cause protein denaturalization and bone necrosis.

It is also necessary the maximum biocompatibility between the titanium implant and the prosthesis in order to avoid galvanic corrosion occurred when different metals are in contact in a conducting medium. This is why titanium is used as the metal for prosthesis, though there are certain difficulties in its manipulation and adhesion to porcelain that difficult its generalized clinical acceptation.

The first investigation was the in vitro study of bone temperature control during implant site drilling.

Three simulation models were used to measure differences between two physiological serum impulsion pumps, drills of two different lengths and three drill irrigation systems. It was observed that conditions in which physiological serum goes from the bottle to the quirurgical site have an influence on its heating, finding statistical differences beetwen the impulsion pumps used. There were no statistically significant differences between short and long drills with internal irrigation near the top.

The in vitro efficiency of three irrigation systems (external, internal in the base of the drill and internal in the top of the drill) to drive an adequate serum volume to the bottom

of the drilled site was also measured. It was observed that internal refrigeration near the top of the drill obtained the best results with statistically significant differences in respect to the other refrigeration systems.

The second investigation was designed to evaluate the adhesion beetwen prosthodontic structures made of different types of commercially pure titanium and several porcelains fused to it.

A preliminary study evaluated how properties of titanium grade 2 and grade 4 could influence their bonding with porcelains and their mechanical behaviour. This study results defined titanium grade and superficial treatment that optimizes bonding with porcelain. Taking it into account, a second study was made to compare cast and milled titanium.

To do the preliminary study simulation models were made with different combinations of titanium and porcelains, a three point bending test was used to measure fracture resistance and broken simulation models were observed through electronic microscope to analyze fractures. In this study the combination of titanium grade 4 and porcelain obtained the best results in bending resistance to fracture, though bonding between titanium grade 2 and porcelain was better due to higher superficial micro-rugosity of titanium grade 2.

The comparison between cast and milled titanium was done accoring to European Law EN ISO 9693:1999 printed in Spanish in September 2000. Combinations of Cr-Ni and Cr-Co with porcelain were used as negative control.

Bending resistance to fracture of either cast and milled titanium presented no statistically significant differences, moreover they widely overcame the minimum needed for the clinical application of this materials combination.