

**Bar and Ball Joint Overdentures Surface Roughness and Microbial Adherence**

**NCT (not available)**

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## STUDY PROTOCOL

In the treatment of the mandibular edentulous the implant-retained overdenture has been shown to have advantages in support, retention, stability and esthetics (Stellingsma et al., 2005; Portmann and Galuser, 2006) improving masticatory efficiency, decreasing anterior bone loss and injury in soft tissues, increasing comfort, satisfaction and improvement of the patient's health quality (Visser et al., 2006). According to the type of anchorage recommended we have the implant-retained mandibular bar overdenture (BOD) and implant-retained ball joint overdenture (BJOD). Bar anchors are retention systems that provided adequate support for rehabilitation (Degidi and Piatelli, 2003; Elsyad et al., 2014). By the other side the ball joint are axial anchors with retention system through threaded connections for mandibular prosthetic reconstruction. It is considered that regardless of the retention system the adjustment must be passive to the implants (Van Kampen et al., 2003). The structure of the overdentures consists of thermoplastic polymethacrylates which are derived from ethylene and contain a vinyl group resulting from the polymerization of methacrylic acid or its derivatives (Lang et al., 2003). These polymethacrylates must be resistant to fracture and flexion, properties that can be increased through zirconia or amorphous silica particles (Panyayong et al., 2002; Uzun and Keyf, 2003). Possibly the immersion of some oral restorations in agents cleaners alter their structural stability (Senna et al., 2011). It is considered that the absence of porosity and dimensional stability increase the surface quality of the restorations, influencing the preservation of the mucous tissues through surfaces that facilitate the patient's oral hygiene. Therefore, an important factor in reference to the quality of the mouth restorations is the surface roughness with importance in the preservation of the oral health in relation to the surrounding tissue (Yap et al., 2004; Guler et al., 2005; Bollen et al., 1997). There are differences in roughness values in various thermoplastic polymethacrylates (Berger et al., 2006). The surface quality of the restorations and their relationship with the gingival tissues enable smoother surfaces to maintain the health of oral tissues avoiding the inflammation of them. The surfaces of the overdentures are available as substrates for the development and growth of microorganisms. The oral cavity presents more than

seven hundred bacterial species (Busscher and Van der Mei, 1997) and overdentures implant-retained are susceptible to the accumulation of microorganisms with adhesion capacity such mold and yeast and mesophyll aerobe. The yeasts are unicellular fungi which reproduce by budding and transverse division and the mold is formed by hyphae the whole of which forms a mycelium. The mold and yeast which cause pathology in humans are dimorphic 2 to 4  $\mu\text{m}$  in diameter (Radford et al., 1999). Other microorganisms with adhesion capacity are mesophyll aerobes which include bacteria that develop in the presence of free oxygen of 0.5 to 2  $\mu\text{m}$  in diameter (Daniluk et al., 2006; Busscher et al., 1986). The permanence of BOD and BJOD depends on several factors, one of them being the surface roughness (Ra) and its relation with the adhesion of microorganisms. The objective of the study was to compare the surface roughness (Ra) of BOD compared to BJOD in relation to the adhesion of mold and yeast and mesophyll aerobe at 30 and 180 days of permanence in the oral cavity in order to establish if there are differences in surface roughness and which of these overdentures are characterized by their lower roughness and adherence of mold and yeast and mesophyll aerobe which is an important aspect to be considered in the rehabilitation of mandibular total edentulous patients with implants due to their influence on oral health.

## **MATERIALS AND METHODS**

The study presents the results of a sample of ten patients randomly assigned to receive implant-retained overdentures and divided into two parallel groups of five participants in a single-blind trial at a follow-up period of 30 and 180 days permanence in the mouth. Five overdentures were made for each group: Group 1: BOD: five systems titanium bar CARES® and synOcta® Straumann® Dental Implant System, Holding AG Inc., Basel, Switzerland (BOD). Group 2: BJOD: five systems ball joint Klockner® Implant System; Soadco Inc., Escaldes-Engordany, Andorra were used in two parallel groups of five participants, in an essay to simple blind person. The protocol was approved by Institutional Review Boards affiliated with the researcher. All participants gave informed consent. The inclusion criteria of

the patients for the study were: Total edentulous mandible from 50 to 60 years of age and absence of systemic conditions. The exclusion criteria of the patients for the study were: hyperplasia and history of periodontal disease, patients with local and/or systemic antimicrobial treatment within 72 hours prior to evaluation during the study and signs of severe oral parafunction (Figure). Selected patients underwent surgery with Tapered Effect Implants Straumann® and Klockner Implant System®. For the manufacture of the overdentures in both groups it was used as material of choice Lucitone 199® (Dentsply International Inc. York, PA) and for the adaptation of the retention systems it was used Softreliner Tough Soft® Tocuyama Dental Corporation Inc., Japan. The working protocol for determining the BOD Ra and BJOD Ra and the adhesion of molds and yeasts and mesophyll aerobics was carried out entirely by an investigator and the following working methodology was considered: Information to the patient of the research work to be performed. Obtainment of clinical data and patient informed consent. Patients were randomly assigned to group 1 and group 2. The saliva sample was obtained in each patient for the microbiological before the installation of the overdentures. BODs and BJODs were installed in each patient and according to each case. The BOD and BJOD were removed at 30 days for surface roughness evaluation (Ra:µm) and the evaluation of the adhesion of mold and yeast and mesophyll aerobe (CFU/ml). For the study at 180 days the BODs and the BJODs were installed in each patient. BODs and BJODs were removed after this time to proceed to the evaluation of surface roughness and adhesion of mold and yeast and mesophyll aerobe under the same parameters mentioned above.

### **Adherence mold and yeast and mesophyll aerobe to BOD and BJOD, Surface roughness (Ra), and Statistical Analyses**

Microbial populations have been controlled in the saliva at initial time and adherence at 30 and 180 days after the overdentures in the mouth. The saliva sample was obtained from the

patient in a sterile sputum collection bottle through a sterile solution. The overdenture samples were extracted and processed for analysis. Each sample was submerged in ¼ sterile Ringer and subjected to vigorous ultrasound shaking. From each of the microbial suspensions, successive dilutions were made to determine the total number of viable microorganisms present. Total count of mold and yeast and total count of mesophyll aerobe were performed.

The surface roughness of BOD and BJOD was determined with the rugosimeter the Mitutoyo Surfest SJ-301® (Mitutoyo Corporation Inc., Kanagawa, Japan), through a displacement force of 4mN and of the tray to 0.5 mm/s and back to 1 mm/s (Murtra and Arcís,1999). The roughness profile Ra was evaluated and determined in microns ( $\mu\text{m}$ ) through five readings for each of the samples in the study respectively.

The results of BOD and BJOD were compared for the determination of Ra and the adherence of mold and yeast and mesophyll aerobe. For this, we used the statistics Shapiro-Wilk, T and the Pearson Correlation Coefficient to determinate the relationship between the study variables. For data processing and analysis the Software Package for Social Sciences (SPSS) version 24.0 was used.