Ideal position of anteroinferior implants in hybrid prosthesis rehabilitations to avoid biological complications

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Abstract

Aim/Hypothesis: The aim of this study is to define the factors associated with calculus accumulation in hybrid prosthesis in the anterior zone of the mandible, describe a critic mesio-distal distance where this calculus is more frequent and its influence on the implants in this zone. **Material and Methods:** We present a pilot observacional retrospective study done in the service of Oral Implantology of the European University of Madrid from 2007 to 2014. 29 medical records were reviewed with a mean age of 59 years old. All patients were treated with hybrid prostheses rehabilitation in the lower jaw. A standardized form was used to collect patient data. The following study variables were assessed: age, gender, smoking habits, hygiene habits, salivary PH, history of prior periodontal disease, BOP (bleeding on probing),PPD(pocket probing depth), PI(plaque index), absence/presence of keratinized gingiva, marginal bone loss (MBL), prostheses design and the relation between the extension of calculus and Salivary excretory ducts. Analytic and descriptive Statistical analysis was performed using SPSS version 22.0 (IBM,USA).**Results:** According to the given definition, 72.4% of the patients presented peri-implant mucositis. There was statistically significant association between mucositis and concave prosthesis pontics, high PH, low maintenance (therapy compliance), high plaque index and absence of keratinized gingiva. The means of calculus extension in the anterior area near the salivary ducts was 7.83 mm ± 1.28. Of the total of implants in the anterior area (61), 81.9% (50) had calculus around the implant 68.5%(37) presented mucositis. The rest 18.1% situated in the area of influence but without calculus accumulation only 27.27% presented mucositis **Conclusions:** The most frequent biological complication in implant-supported lower hybrids is mucositis. A basic oral pH (> 7) favors calculus accumulation which facilitates the adhesion of bacterial biofilm. A distance of approximately 3.5 mm on each side of the salivary ducts and implants is advisable. Proper hygiene by the patient and professional is essential to maintain the health of peri-implant tissues. More studies would be needed with a larger sample size and a higher follow-up.

Background and Aim

Implant hybrid prosthesis has been a treatment successfully used for many years¹ One of the main problems of this type of rehabilitation is the difficulty for the patients to carry a correct oral hygiene² , this factor joined to the deposition of supragingival calculus very frequently observed in the anterior lower mandible³, can drift into more incidence of mucositis around the implants located in this position^{4,5,6}. The aim of this retrospective observational study is to investigate if: “High accumulation of calculus in the anterior zone of the mandible in patients treated with hybrid prostheses have peri-implant tissue effects in the implants placed in this zone”

Methods and Materials

This is a retrospective observational study carried out at the Oral Implantology Master of the Universidad Europea of Madrid. Patients treated with Hybrid Prostheses in the lower jaw between 2007 and 2014 were evaluated in their revision appointment at the clinic. 29 patients were reviewed: 15 female patients and 14 male patients aged 43 to 74 years (mean, 59.76). All the prosthesis were placed over 6 titanium implants, with parallel walls, osseotite surface and external hex connection of 3i Biomet®. All the prostheses were metal-resin with resin directly in contact with soft tissue. A standardized form was used to collect patient data with all the factors that can affect on our results⁷. The following study variables were assessed: age, gender, smoking habits, salivary PH, history of prior periodontal disease, BOP (bleeding on probing),PPD(pocket probing depth), PI(plaque index), absence/presence of keratinized gingiva, marginal bone loss (MBL) and the relation between the extension of calculus and Salivary excretory ducts(Table 1). Patients who didn’t follow a correct maintenance calendar of visits (once a year) were excluded from the study.

PH measures: Patient was told not to eat or drink alcohol 2 hours prior to appointment. Specific saliva PH strips with values from 4.5 to 9 were used to determine PH value.

Determine the calculus distance in the anterior zone: Before unscrewed the prostheses a line was marked at the lingual size of it. This line corresponds to the position of the lingual frenulum. Once the prostheses is out of the mouth is cleaned of wastes leaving only the calculus. The distance is measured with a caliber (Figure 1).

Reporting of mucositis: plaque-induced inflammation caused by bacterial biofilm is characterized by reddening, swelling and bleeding on probing of the peri-implant soft tissue⁸

Reporting of peri-Implantitis: the values obtained were accorded to the VII and VIII European Workshop of Periodontology^{9,10}: “changes in the level of crestal bone, presence of bleeding on probing and/or suppuration; with or without concomitant deepening of peri-implant pockets”

Radiographic analyses: Periapical radiographs were taken with the patient wearing a customized plastic bite block (Rinn, Dentsply Rinn, Elgin, IL) to ensure a parallel technique. A calibration step of the radiograph measures was performed using known implant dimensions and the observed implant dimensions in the X-ray. The distance between the mesial and distal crestal bone–implant intersection point and a reference line (which was placed on the implant–abutment interface) was used to score the crestal bone height.

Table 1

1- PATIENT NUMBER						
2- NUMBER OF IMPLANTS						
3- DATE OF HYBRID PLACED						
4- LAST REVIEW APPOINTMENT						
5- AGE						
6- SEX						
7- SMOKER	XEROSTOMIA	PRIOR PERIODONTAL DISEASE				
10- V						
11- PH LEVEL						
12- PERI-IMPLANT MEASURES						
IMPLANT POSITION	PI	BOP	QI	PPD	MBL	
13- PROSTHESIS MEASURES						
IMPLANT POSITION	PROSTHESIS DESIGN (convex/flat/concave)	DISTANCE OF CALCULUS ACCUMULATION (mm)		IMPLANT IN RELATION WITH THIS CALCULUS		
14- HYGIENE TECHNIQUES						
WATER PICK						
TOOTHBRUSH						
INTERPROXIMAL TOOTHBRUSHES						

Fig. 1

Results

The results of this study out of the 178 implants, the main problem related to this type of prostheses was mucositis, 72.4% of the implants presented BOP on more than one surface area- From a deeper analysis by means of periapical X-rays, mean marginal bone loss was 1.15mm. 24% of the patients were smokers (7) 51% have a history of periodontal disease (15) and the 62%(16) went to maintenance therapy every year .34% of patients have a basic PH and 58% had a concave prosthesis pontics design. There was a statistically significant association between mucositis and concave prosthesis pontics (p=0.004), high PH(p=0.0042), maintenance therapy compliance (p<0.001),plaque index (p=0.009) and absence of keratinized gingiva (p=0.003) (Figures 2-4)

Fig. 2

Fig. 3

Fig. 4

The number of implants situated in the anterior region from canine to canine and consequently could be affected for the calculus were 61. The means of calculus extension in the anterior area near the salivary ducts was 7.83 mm ± 1.28. Of the total of implants in the anterior area (61), 81.9% (50) had calculus around the implant 68.5%(37) presented mucositis. The rest 18.1% situated in the area of influence but without calculus accumulation only 27.27% presented mucositis (Figure 5).

Fig. 5

Conclusions

Conclusions: The most frequent biological complication in implant-supported lower hybrids is mucositis. A basic oral pH (> 7) favors calculus accumulation which facilitates the adhesion of bacterial biofilm. A distance of approximately 3.5 mm on each side of the salivary ducts and implants could be advisable. Proper hygiene by the patient and professional is essential to maintain the health of peri-implant tissues. More studies would be needed with a larger sample size and a higher follow-up.

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