TECHNICAL AND CLINICAL TECHNICAL DEFICIENCIES IN PERFORMING REMOVABLE PROSTHESES

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ABSTRACT

In terms of clinical technology, the various pure prostheses complicated settings skeleton is characterized by the wide range of clinical situations resolve these types of restaurants complicated settings. Skeletal mobilizable prostheses, by the possibility of their construction, are resistant prosthetic substitutes, with efficient possibilities of static and dynamic balancing and, very importantly, with the ability to physiologically transfer to oral biological structures a large amount of stress through the remaining teeth included in the prosthesis support perimeteThe aim of the study is to identify the causes of technical and clinical technological deficiencies in the performing of partially mobilizable skeletal prostheses, with the exact placement of the moment when it occurred and the tracing of the main landmarks in their avoidance. The factual material was represented by the evaluation of a number of 45 removable prostheses, which within 5 years from their elaboration presented a series of deficiencies, consequences of non-compliance with the strictly technical elements or found in clinical stages with implications on success or failure on a long term. On top of that, mastication affects the clasps by bending them and having a special importance in producing wear. If the wear is not observed at the level of the maximum convexity of the tooth, it can be evaluated that the fracture due to the wear of the metal in the case of inactive cobalt-chromium clasps can occur after approximately 7 years of use. Cobalt-chromium alloys can be used as metal alloys for partially removable dentures

Key words: Removable prostheses, dental alloy, biomechanical bevaviour, technological deficiencies

Introduction

The partially extended edentation represents a complex clinical situation, determined equally by the particularity of the clinical case and by the socio-economic and clinical-technical criteria. As modern techniques provide patients with treatment options that involve the use of implants, it can not be ignored that the techniques used to treat various clinical situations of partially extended edentation allow the realization of prostheses with a high level of functionality, while respecting , and the aesthetic principle. The need to emphasize the importance of knowing the pathology of partially extended edentulous for a correct evaluation of clinical cases is the basis for choosing the topic along with the need to select an optimal treatment, according to the particularities of the prosthetic field, to meet both functional and aesthetic requirements[1,2,3].

In terms of clinical technology, the various pure prostheses complicated settings skeleton is characterized by the wide range of clinical situations resolve these types of restaurants complicated settings. Skeletal removable prostheses, by the possibility of their construction, are resistant prosthetic substitutes, with efficient possibilities of static and dynamic balancing and, very importantly, with the ability to physiologically transfer to oral biological structures a large amount of stress through the remaining teeth included in the prosthesis support perimeter[4,5,6].

The aim of the study is to identify the causes of technical and clinical technological deficiencies in the performing of partially removable skeletal prostheses, with the exact placement of the moment when it occurred and the tracing of the main landmarks in their avoidance

Material and method

The factual material was represented by the evaluation of a number of 45 removable prostheses, which within 5 years from their elaboration presented a series of deficiencies, consequences of non-compliance with the strictly technical elements or found in clinical stages with implications on success or failure on a long term.

Results and discussions

Lack of accurate compliance with occlusal ratios at both static and dynamic levels can lead to fracture of the skeletal prosthesis.

In the case of classic acrylic prostheses, their fracture is related both to the certainty of rendering the mandibular dynamics and to the predictability of their prevention measures, both of a technical nature, mainly clinical and clinical as a concept.

The prefabricated clasps are made of Cr-Ni wire (wipla) by punching in different shapes, the punching giving these hooks a high degree of elasticity. They were put into circulation by various factories in Europe and America together with special pliers to be modeled and applied on the teeth.The most common forms of clasps are "T", "Y" and cross clasps. From the clasp made in the shape of T one can make clasps divided with the elastic arm in the shape of T or semi T or even a hook with two arms.The "cross" clasps allows the making of a circular hook with two arms, monoactive or biactive. Cast clasps are stabilizing elements that are made together with the metal frame of the partial prosthesis that can be mobilized by casting. Cast clasps have a surface contact with the tooth, unlike wire clasps, which have a lower, linear contact.From this point of view, cast clasps are more unhygienic than the wire ones. The deepening of the knowledge of dentistry as well as the improvement of the casting techniques have determined the appearance of a very large number of clasps so that, at present, there are a multitude of classifications[7,8,9].The clasps used on the removable partial denture are often made of cast metal alloys, similar to the metal in the prosthesis. The most common metal alloy used for this purpose is the cobalt-chromium alloy, but in addition to this there are also used gold and titanium alloys with the same weight. Several investigations report the retentive properties of the clasps, depending on the variability of the design, but only a few studies consider the effects of the wear of the clasps , in terms of their retentive properties at the level of the prosthesis.

Wear, which leads to the loss of mechanical properties of the material after repeated stresses, affects the realization of the prosthesis(Fig. 1)

Fig. 1 Aspects of technological deficiencies of removable sckeletal prostheses related with traumatical occlusion

The fracture caused by wear on the surface of the clasps was examined with the scanning electron microscope.

The results show that the fracture due to wear occurs, in the case of cobalt-chrome hooks after approximately 25,000 load cycles, in the case of pure titanium hooks after 4500 load cycles, in the case of titanium alloy clasps after 20,000 cycles, and to gold alloy hooks after 21,000 cycles. The methods are significantly different

Activating the clasps by bending it 0.5mm increases the wear resistance of cobalt-chromium and gold alloy hooks, but decreases the wear resistance of hooks made of titanium and pure titanium alloys

In 1970 *Morris et al.* studies the stress distribution at the level of the clasps in the prosthesis and reports the theoretical possibilities of failure, in case of wear of these clasps

Biffar and Appel investigate the granular structure of the cobalt-chromium alloy and this structural situation of the alloy demonstrates the low wear of the clasps. In any case, they did not test this experimental hypothesis regarding the level of wear. Bates' statements, in other sources, are controversial, he claiming that the fracture is unlikely to occur due to wear, in the case of hooks used on the removable partial denture. These are, in any case, not very obvious for the failure of the clasps, which currently can suffer fractures due to wear. Wear in the case of prosthetic hooks is based on their strength when inserted into the partially removable prosthesis, and further when inserted into the oral cavity and also when the maximum convexity of the tooth is exceeded.

The need to exceed the maximum convexity of the tooth is important and this depends on the length, width and material of which the clasps are made and in any case, do not compare traditional cobalt-chrome and gold alloys with new titanium.

The types of metals sold and used to make the hooks of partially removable skeletal prostheses include five types of cobalt-chromium alloys (Wironit, Wironium, Vitalium, Vitalium 2; Remanium GS800), pure titanium and titanium and gold alloys).

The detection of possible porosities during casting, in the case of pure titanium hooks and titanium alloys, were examined, radiographs were made with the intraoral X-ray apparatus (Oralix 65X, Phillips) and subsequently its performances were tested .

The clasps were divided into 2 categories of activated hooks and inactivated hooks. They were activated by bending the hooks of 0, 5 mm, and it was found that this activation improved the retention of the partial removable protheses "in situ".

Surface fractures due to wear, in the case of gold-blown cast clasps, were examined with a scanning electron microscope (SEM) at a potential rate of l SkV. SEM photomicrography was performed for visual analysis of fracture surfaces[10,11].

Mean values and standard deviations were calculated and it was found that the initial force is required to cause a deflection of 0.6 mm, and the number of stress cycles is required to reduce the deflection force by 20%, but the same number of cycles on request, can cause fracture due to wear in the case of clasps.

The radiographs reveal the existence of several free spaces in the case of casting pure titanium hooks, especially in the case of casting titanium alloy clasps. Clasps without gaps were selected for further studies. The interactions between the types of metals and the types of activations have been demonstrated, so the activation of the hooks affects the number of stress cycles required to produce the fracture due to wear, in the case of all metals. It has been shown in the literature for partially removable prosthesis with wire or cast clasps, that a convexity of 0.25 mm provides adequate retention.

Later, after testing the cast wire clasps, Ikebe et al. They have reported that a camber greater than 0, 5mm, is too demanding for wire clasps. The high modulus of elasticity of the hooks in cobalt-chromium alloys made it possible to use them, in case of a maximum convexity of less than 0.5 mm. It can be roughly estimated that at the level of the removable partial denture hooks bent 10 times a day for the insertion and disinsertion of the prosthesis, there are around 3600 deflections per year.

On top of that, mastication affects the clasps by bending them and having a special importance in producing wear. If the wear is not observed at the level of the maximum convexity of the tooth, it can be evaluated that the fracture due to the wear of the metal in the case of inactive cobalt-chromium clasps can occur after approximately 7 years of use. Cobalt-chromium alloys can be used as metal alloys for partially removable dentures.

Fig. 2 Aspects of removable prostheses with Co-Cr infrastructure

The mechanical properties of cobalt-chromium alloys have been demonstrated in several studies, but unfortunately, fewer studies have dealt with the wear of these alloys(Fig.2). An important factor that affects the hardness of these alloys is their granular structure. Biffar and Appel examined the size of the cobalt-chromium alloy granules in various places at the level of the partial movable prosthesis and noticed that they can decrease permanently from the crochet type to near extinction. The counting of the granules at the level of the hooks in cross section, led to the detection of their reduction to 2 or 3. Subsequent studies with SEM confirmed a low number of granules in cobalt-chromium alloys. On the other hand, more than 100 granules can be seen on the cross section of the gold alloy hooks. It has also been shown that heat treatment does not change the structure of the granules.

To avoid casting errors in the handling of Ni-Cr alloys, it is indicated:

- the preparation of the investment material to the vacuum mixer, its application conformation of the mate rial plastic in one time. This way facilitates maximum expansion of the pattern (grip, hygroscopic and thermal);
- use of silico-phosphate packing masses, with high expansion coefficients (3.1-3.4%), in order to compensate the high contraction of the solidified alloy;
- the heating temperature of the mold will not exceed 950 ° C, in the thermal range 650-950 ° C the thermal expansion remains constant;
- use of the melting range specific to the alloy, specified by the manufacturer;
- melting the alloy with a large flame, with many holes to quickly reach the melting temperature of the alloy. Spot flame is contraindicated, which due to the intensity of heat can overheat the alloy and volatilize some metallic elements;
- 15 minutes before melting, the alloy melting pellets will be placed in the furnace, the mold cone or the crucible in the preheating furnace, in order to avoid overheating the alloy at the time of melting;
- rigorous assessment of the moment of melting of alloy pills. Visually one will notice the loss of the geometric shape of the pills and their collapse in the cone of the pattern. Due to the metal oxides, the molten pellets do not form a glossy sphere typical of noble alloys;
- use of induction currents to melt these alloys. It is the ideal technological process for melting Ni-Cr alloys. Oxygen gas, or oxyacetylene flame, will be used with caution when melting directly in the cone of the mold. It is the current source of casting errors;
- apparatus for centrifugal casting, semi-automatic or automatic, to develop the strength necesary to jump pushing the details pattern of the molten alloy. Ni-Cr alloys are viscous, flow hard due to low density, and have the phenomenon of lamellar flow with the appearance of vertigo;

- correct sizing of the rod system (4.5-5mm) to ensure a quantity of molten metal in the mold before rapid cooling of the alloy. The channels will be wide and short, in order to increase the metal pressure in the mold and their absorption from the metal tank (contraction spheres);

- in the thermal center of the mold will be placed the metal tanks (contraction spheres), or the unique casting channel. The model will always be positioned eccentrically, in order to keep the alloy in a fluid state for a longer time;

- unique casting, from united elements of the prosthetic parts, because the Ni-Cr alloys do not have a specific batch, for gluing the separate component elements;

- castings from Ni-Cr alloys will be subjected to heat treatment, for their rehomogenization and recrystallization. The heat treatment is carried out by heating the casting to 1000 ° C followed by sudden cooling.

In the case of the wear test, the stiffness of the clasps in cobalt-chromium alloys decreases the resistance to repeated stresses, with one exception the hooks in inactive Vitallium alloy retain the stiffness until finally breaking occurs.

This finding is useful and indicated in the good retention of the prosthesis for a long time, when using Vitallium alloyclasps. Inactive cobalt-chrome alloy clasps work similarly. Activating the clasps by 0.5 mm before testing the wear decreases the load required by the hook in terms of strength and increases its wear resistance, especially those of Wironium and Vitallium 2 alloys.The evolution in time of these prostheses are according with clinical case particularities.[12-17] .

They are castable alloys, they have in composition two main alloying metals: Ni (60-70%) and Cr (15-20%) to which are added microprocents of: Mo, Al, Mn, and, Be, Cu, Co, Ga , Fe, for balancing the alloy.

The main metals of these alloys are Ni and Cr, which gives the alloy a certain proportion, a maximum corrosion resistance. Resistance to oxidation and corrosion is due to the formation of the protective chromium oxide microlayer on the surface of the ingot or casting of this alloy.

Modern Ni-Cr alloys have a variable composition and can contain a maximum percentage of Ni, up to 88% (Albond product), with a decrease in Cr content (11.5%). Ni-Cr alloys are that the standard percentage nickel in the composition (product Titacrom, 45%), which is com pension Cr content (20%) and Co (20%). In general, Ni-Cr alloys, with a content higher than 16% Cr and Co, are hard alloys, with high mechanical strength, and implicitly very difficult to process.

CONCLUSIONS

1. Local-regional aspects and clinical biological periodontal and mucous bony clues dictates design construction tert get p

rosthetic final and choice of means of maintenance, support and s tabilization .

2. Superiority of special sistems are resounding in biomechanical and aesthetic plan, prosthesis overcome deficiencies of classical protheses both aspects dictated by the particularities of the prosthetic field.

3. Therapeutic decision is the final result of clinical and laboratory evaluation, including therapy-induced overall complexity, something that often is a decisive focus.

4. Therapeutic solution chosen is notably influenced by the biomechanical aspects in conjunction with morphological support, vital part of a comprehensive treatment without circumvent the general particularities generated by the edentation topography .

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