

Review of the Effect of Implant Position and Abutment Height on Removable Dentures Supported by Implants

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Abstract

The manufacture of partial removable dentures based on implants is becoming an increasingly popular type of orthopedic treatment. Compared with non-removable dental bridges supported by implants, prosthetics using partial removable dentures supported by implants is less invasive and reduces financial costs. Tooth loss can negatively affect the aesthetics of the face, affect the functions of speech and chewing. Removable prosthetics is a common type of treatment for partial adentia. Based on the physiological, anatomical and psychological needs of the patient, diagnosis and subsequent manufacture of a denture can significantly improve the quality of life of patients and positively affect the life expectancy of the elderly population. Nevertheless, some patients are dissatisfied after the treatment and cannot use their removable dentures

Keywords:

Introduction

The most common problems include increased salivation in the first 72 hours, pain and discomfort, as well as lack of stability and retention. Currently, the lack of teeth is an urgent problem for all mankind. Adentia accounts for 15% of the total pathology of the dental system [1]. In 40% of patients over 60 years of age, the absence of teeth was revealed [2]. Most often, patients lose their chewing teeth, mainly the first molars. Defects of the dentition in the frontal area amount to 8.55%; in the area of the lateral teeth - 63.19%. The included defects of the dentition account for 71.74% of the adentia; terminal defects - 28.26% [3]. Today, dental implantation is actively used for the rehabilitation of patients with partial and complete adentia. This is explained by the fact that prosthetics based on implants provides the most complete restoration of the chewing efficiency of the dental system, speech function and high aesthetics in comparison with other types of orthopedic treatment. Moreover, it definitely guarantees a faster adaptation of patients to prostheses [3]. In this regard, partial and complete removable plate prostheses are now recognized as a kind of sign of dental impotence [8]. Nevertheless, the issue of choosing the most rational design based on dental implants still remains unresolved. In the 70-80 years of the last century, when implantology was only recognized as a science thanks to amer. prof. L. Linkov and Swedish professor-anatomist P.I. Bronemark, the problem of "bone integration" of implants was in the first place. Prosthetics were given secondary importance. The technique of manufacturing the external structure of the restoration was practically not considered [11]. In this regard, for a long time,

classical concepts of prosthetics were used to manufacture structures based on dental implants, which did not take into account the fundamental difference between natural supporting teeth and implants [12-15].

Goal. The aim of the study was to assess the effect of the implant position and the height of the abutment on the supporting teeth, dentures and bone structure.

Materials and Methods

The treatment model assumed prosthetics using a partial removable denture supported by a single implant located in the area of the second premolar, or the first or second molar of the lower jaw on the left. In total, six models were analyzed: three used abutments at the mucosal level (ML abutments), the other three used abutments located 2 mm above the mucosal level (H abutments). The values of the displacement of the first premolars of the lower jaw on the left and right, the basis of the denture, as well as the minimum stress of the cortical bone in the neck of the implant were recorded. The assessment was carried out using a three-dimensional finite element analysis.

Results

In all models, there was a displacement of the denture base in the distal lingual direction, which was higher in the group with H abutments than in the group with ML abutments. In models with abutments H, the axes of the supporting teeth were significantly tilted distally, in models with abutments ML, a slight tilt to the buccal side was observed. In the group with abutments ML, the displacement of the supporting teeth was less when the implant was installed more distally from the supporting tooth; however, in the group with abutments H, with a more distal position of the implant, the displacement of the supporting teeth was higher. In all models, the minimum stress in the cortical layer was concentrated at the distal point of the implant neck. The minimum voltage values were higher for models with H abutments than for models with ML abutments. In models with ML abutments, the minimum stress values were higher when the implant was positioned distally; in models with H abutments, the minimum stress values were lower when the implant was distally positioned.

Conclusions

With the same position of the implant, the displacement of the denture when using higher abutments is less than with abutments located at the level of the mucous membrane. The displacement of the supporting teeth when using abutments at the level of the mucous membrane was less when implants were placed distally relative to the supporting teeth than with more medial positioning. When using abutments above the gum level, the displacement of the supporting teeth was less with a more medial position of the implants relative to the supporting teeth. The minimum stress values in the neck area of the implant were lower when it was distally positioned relative to the supporting tooth.

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