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MAXILLA BONE EVALUATION AND IMPLANT SURGICAL PLANNING IN A PERIODONTAL DISEASE PATIENT

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ABSTRACT

Knowing the value of biomodeling techniques - associating medical image segmentation with additive manufacturing, as a complimentary diagnose mean in the bone evaluation in complex and sensible anatomical areas (Queijo et al., 2010) it has been possible to support the diagnostic of a 50 years old female patient suffering from periodontitis who has lost an large amount of maxilla bone. At same time, by determining quantity and quality of maxilla bone in the affected area, the surgical planning have been made supported by complete and fractioned biomodels in order to correctly define implants placement.

INTRODUCTION

With bone loss possibly caused by several reasons as a major constriction for dental implant placement, it is absolutely imperative that dental surgeons perform a correct evaluation of bone quantity and quality in actuation areas. Even that some different material and techniques have been developed in the attempt to promote bone regeneration, in most cases that isn’t a common practice, being preferable an accurate tool that allows correct bone evaluation. Actually dental surgeons have at their disposal different complementary diagnose means that allow them to quantify maxilla’s bone improving, this way, accuracy in surgical planning for a correct implant placement. This is the case of biomodeling techniques.

Biomodeling technique, that associates image segmentation to additive manufacturing has revealed itself as a valuable clinical activity valuable tool. Starting with bi-dimensional medical images from computerized tomography (CT) or magnetic resonance (MRI) is possible to obtain digital tridimensional models with the ability of being produced as physical models. These present major benefits when compared with conventional techniques once personalized tridimensional anatomical models can be visualized, manipulated and shown to the patient to better understand the nature of surgical intervention as well as the possibility of manufacturing dedicated surgical guides (Queijo et al., 2010).

In this study, patient is a 50 years old woman who suffered from chronic periodontitis without knowing it until the symptoms have revealed it. When presented to the dental surgeon, 12th, 13th, and 14th teeth shifted so severely that almost had been lost when taking dental prints. They had to be removed in order to perform treatment and to allow posterior implant placement.

Periodontitis disease is the destruction of the supporting structures housing the tooth. If a sufficiently large amount of supporting bone and ligamentous attachment is lost, then the patient may present with a chief symptom of tooth migration or movement, loose teeth, and...
even tooth loss (Zwetchkenbaum and Taichman, 2008). Chronic periodontitis is usually asymptomatic until the disease is so severe that teeth shift, loosen, or are lost. Individuals with advanced periodontitis may also have recurrent periodontal abscesses and halitosis (Pihlstrom et al.).

![Fig. 1 - Evaluation digital model](image)

During work, with TC exam images and using image segmentation have been possible to create several masks and render digital models to elucidate the severe maxilla bone loss and affected teeth conditions as is shown in figure 1.

After study area definition some sections had been digitally performed to better allow bone structures visualization and through additive manufacturing physical models had been constructed to allow a proper evaluation of the area to be treated and confirm if bone conditions allowed implants placement. With the complete maxilla model, implants positions and orientation were defined.

RESULTS AND CONCLUSIONS
With this work biomodeling prove itself as a valuable complementary diagnose tool in bone condition evaluation when applied in dental disease situations. In this case it has been fundamental to allow proper surgical planning and implant placement definition once maxilla bone near nasal sinus in the concerned area was in a sensible situation. The option for not performing any kind of bone regeneration treatment was based in the fact of available bone be sufficient and to do not extend patient’s treatment.

REFERENCES
