GUIDELINE FOR PLANNING THE MULTIDISCIPLINARY REHABILITATION OF DENTAL MUTILATED PATIENTS

PLANEJAMENTO DA REABILITAÇÃO MULTIDISCIPLINAR EM PACIENTES COM MUTILAÇÕES DENTÁRIAS

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SUMMARY

The present manuscript provides a literature review concerned to a severe dental mutilated patient requiring multidisciplinary approach to achieve adequate oral rehabilitation. The initial records were presented as well as the cephalometric prediction and setup models planning the final results. A practical mean to obtain the rationale of distraction vector was also described in the effort of better controlling the alveolar distraction osteogenesis process, improving the quality of rehabilitation concerning the functional and esthetical aspects. Dental mutilated patients with severe alveolar bone loss are better approached by a multidisciplinary team consisted by an orthodontist, a prosthesist, a surgeon and a periodontist.

UNITERMS: *alveolar distraction; implants; rehabilitation and orthodontic planning.*

RESUMO

O presente estudo disponibiliza revisão de literatura concernente a pacientes com mutilações dentárias severas, necessitando abordagem mutidisciplinar para obtenção de reabilitação oral adequada. Registros iniciais, assim como, a previsão cefalométrica e os modelos de *setup*, planejando o resultado final de um paciente, foram apresentados. Demonstrou-se também um método prático para determinar o vetor de distração osteogênica, com o objetivo de controlar melhor o processo de distração osteogênica alveolar, aumentando a qualidade estética e funcional da reabilitação. O tratamento de pacientes com mutilações dentárias e perda óssea alveolar severa deve ser abordado por uma equipe mutidisciplinar composta por um ortodontista, um protesista, um cirurgião bucomaxilofacial e um periodontista.

UNITERMOS: distração alveolar; implantes; reabilitação e planejamento ortodôntico.

INTRODUCTION

Oral rehabilitation of dental mutilated patients requires a multidisciplinary approach to overcome limitations often associated to this condition. Traditional possibilities of rehabilitation are bridge prosthesis, orthodontic space closure or osteointegrated implants, however the two last ones depend on the height and width of the alveolar bone in the missing teeth area.

Distraction osteogenesis is the biological process of new bone formation after corticotomy and gradual traction. Ilizarov[3] (1988) introduced the technique to orthopedic therapies of limb bone elongation in Medicine. Actually, the process is similar to that occurred on midpalatal suture

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splitting advocated by Haas[2] (1961), but carried out at any region along the bone. Dental and maxillofacial applications of distraction osteogenesis have been widespread, becoming a well-known procedure[1,4,9]. The development of intraoral devices improved the possibilities of alveolar applications. Tooth ankylosis, augmentation of alveolar ridge and closure of maxillary alveolar cleft have been corrected using this principles[5,7,10].

Despite the advanced knowledge concerning the biological process and rates of screw activation, the vector of osteogenesis remains a relevant factor to reach a successful rehabilitation[8]. The direction of bone dislocation is parallel to the screw vector and should be planned in order to place the implant in the desirable position. Bone segment can be displaced threedimensionally, in the horizontal direction, vertical direction or the combination vector of both[1,9].

The appropriate location of restorative implant is determined by a guide device, as Kokich (2000)[6] have proposed. Nevertheless, if adjacent teeth are not in the correct position, the simulation models are recommended, projecting the final teeth position to construct the guide device over the diagnostic setup models. Well-positioned teeth are not included into the wax, maintaining the reference of occlusion.

Discussions regarded on the dental rehabilitation requiring multidisciplinary approach are more understandable, when reporting a clinical case, as an example, than in literature reviews solely. Once distraction osteogenesis is a new technology in developmental process, retrospective studies are rarely reported and, thus case reports in the initial stage becomes relevant to clarify the rationale of approach.

The purpose of this manuscript was to clarify the rationale of the multidisciplinary approach, providing a literature review regarded on a dental mutilated patient that would undergo orthodontic treatment anchored in restorative implants. Initial case records were reported to illustrate the approaching sequence of treatment planning, emphasizing the desirable vector of alveolar distraction osteogenesis.

DENTAL DIAGNOSIS

Dental analysis is based on dental casts, clinical exam, panoramic survey, lateral telerradiography and intraoral photographs, which revealed, in the present case, Class I malocclusion, with excessive lower Spee curve associated with incisors lingual tipping and missing premolars and first and second molars in the lower arch. The distance between right lower canine and third molar was 25 mm (Fig. 1A). Left second molar migration occurred by mesial crown tipping, requiring further care when applying orthodontic mechanics (Fig. 1B). Right side segment in the upper arch presented premolars extrusion due to the antagonists' absence. The four missing upper incisors allowed for lower incisor extrusion and the upper teeth migration caused space loss, remaining 22 mm between upper canines. In addition, bone leak was noted at both missing teeth sites (Fig. 1C).

Figure 1 – Initial records: A) right side intraoral picture; B) left side intraoral picture; C) Panoramic essay.

SKELETAL DIAGNOSIS

Restorative implant anchorage is usually recommended to adults after growth ending. Therefore, growth changes were not often expected. The reported lateral telerradiography depicted a well balanced skeletal features in both planes, vertical (GoGnSn 32º, Y axis 60º) and anteroposterior (ANB 1º), even though alveolar bone leak was noted at the missing teeth area in the upper arch (Fig. 2).

SOFT PROFILE

The profile conditions are assessed in the clinical examination, lateral photographs and lateral cephalogram. In the present case, concave profile was observed due to the great amount of pogonium and the big nose associated with upper lip displacement due to the missing upper incisor free space (Fig. 2).

PLAN OF TREATMENT

The excessive extrusion of right upper premolars and exaggerated lower Spee curve are better corrected when anchored in restorative implants, avoiding undesirable extrusions of adjacent teeth. Thus, the implant position should be determined prior to orthodontic treatment. Assessment of maxillary anterior alveolar defect, corresponding to the missing teeth place, indicated the need of alveolar ridge augmentation in nine millimeters. The position of the extraosseous distractor screw determines the dislocation vector of bone segment and it is ideal to be proceeded parallel to the implant long axis planned to be positioned. Achievement of final implant position is based on cephalometric orthodontic movement prediction and diagnostic setup models (Figs. 2 and 3).

Initial treatment maxillary dental cast was copied accurately, including the base design to construct a distraction guide vector plate based on the occlusion of the upper original model and the lower incisors in the diagnostic setup. Distraction guide consists of an acrylic plate with calculated incisor crown size in the missing area and metal attachment located labially, holding the distraction screw in the desirable vector, which can be checked in the lateral cephalogram and desirable changes should be applied. McCormick[8] (2002) suggested a vertical vector associated with bone graft in severe bone loss cases.

In the case shown, two implants will be attached at the mandibular missing teeth area, a molar and a premolar one. Excessive mandibular Spee curve would be corrected by two millimeters of lower incisors intrusion anchored on the implants, allowing for slight labial crown tipping. Following the planning sequence, simulated setup models were manufactured (Fig. 3). Upper incisors implants position was achieved at duplicated initial treatment model in occlusion with the lower arch wax setup. The 22 mm between the upper canines was not enough to four incisors, and too large for two central incisors. The canines present suitable shape to be transformed into lateral incisors, thus upper teeth would be moved mesially and canines would be restored to mimetize lateral incisors and the molar relationship would be finalized in Class II. In the setup model, the achievement of proper intercuspidation determined seventeen millimiters of space between the upper canines, available for two central incisors implants placement.

A metal strip tie adjusted to a distraction screw was welded to a 0,9 mm connector wire and two acrylic central incisors crowns were adapted to the upper guide plate in occlusion with the lower incisor in the simulated setup (Fig. 4). Maxillary alveolar calotasis process is guided by this plate, which was manufactured over the original upper dental cast.

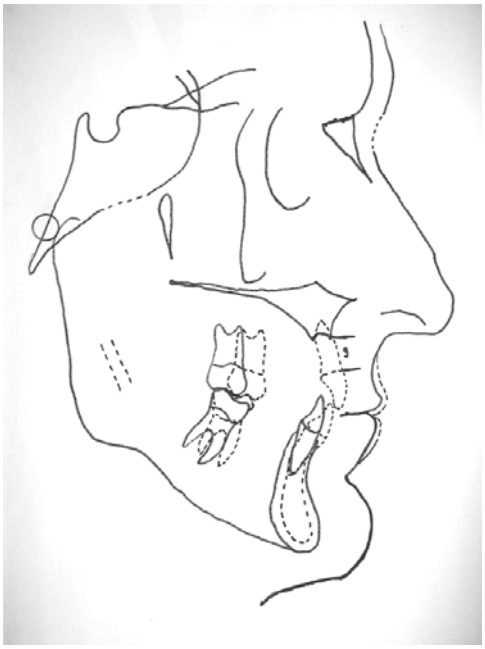

Figure 2 – Cephalometric tracing (continuous line) and treatment prediction (dotted lines).

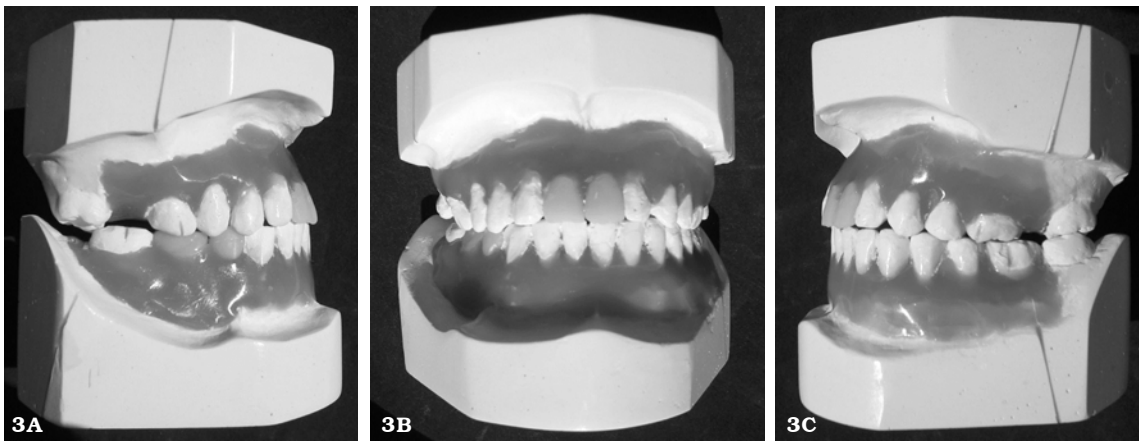

Figure 3 – Diagnostic setup model: A) right side; B) frontal aspect; C) left side.

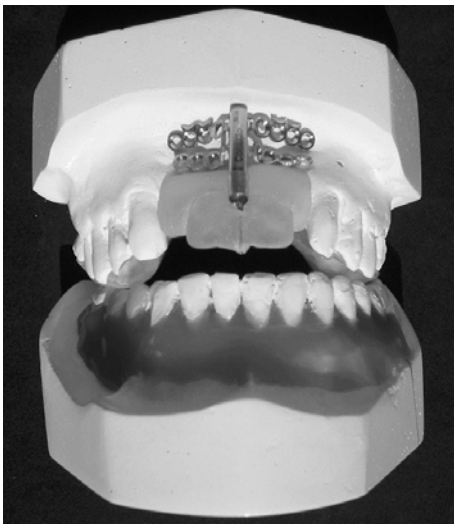

Figure 4 – Upper plate guiding distraction vector at the anterior superior missing teeth area.

The knife edge noted in the presented mandibular alveolar ridge brings the need to associate distraction osteogenesis and bone graft[7]. This situation indicates that the distraction vector is parallel in relation to the host bone cortical plate and, then, enlarge mandibular alveolar ridge with bone graft. Thus, lower arch distraction vector would be determined parallel to the buccal cortical plate, dismissing a lower guide plate.

The implants are placed right after the healing stage, three months at least, due to the possibility of new bone resorption[9]. The orthodontic treatment only begins when temporary acrylic crowns are installed, in spite of the relevance of an orthodontic treatment plan since the initial stage to plan space management and implants position. It is clear that temporary crowns would be occluso-cervically shorter due to the extrusion of antagonists. However, the orthodontic mechanics regards, on the right upper and anterior lower segments, dental intrusion anchored in the implants, allowing for the application of appropriate size crown in the final of the treatment.

DISCUSSION

The improvement of intraoral bone distractor occasioned the development of intraosseous and extraosseous devices to alveolar distraction[10]. The first group of devices is similar to the implant design and may be more favorable in controlling the vector of bone displacement; nevertheless, it provides greater bone loss at the screw removal procedure. The other group is usually attached by titanium screws through the distractor fixation chains in variable designs[1,10].

The present study recommended the use of a guide plate to improve direction control of extraosseous devices. Similar device was suggested by McCormick[8] (2002), except for the absence of the metal tube in the plate holding the screw, guiding its location at the surgical procedure. Block et al.[1] (1996) indicated an intraosseous screw to benefit the vector controlling of new alveolar bone formation process, despite the greater amount of bone loss.

There is relevant relationship between the predicted position of implants and the vector of distraction to achieve success in the rehabilitation. However, severe cases indicate vertical vector associated to bone graft, as planned to the lower arch in the reported treatment planning[4].

Successful results in rehabilitation also depend on the correct implant positioning and adequate width and height of alveolar bone allowing for a more accurate and stable procedure[6].

Restorative implants used as anchorage in the case shown would be suitable to vertical control in leveling extruded teeth in both upper and lower arches. One of the first premises to reach esthetics in the oral rehabilitation is the healthy appearance of alveolar bone, with appropriate height and width[4]. Distraction osteogenesis is a suitable method to obtain this premise[1,4,10] which might be guided to the desirable vector[8]. Sometimes, such technique should be associated to bone grafting and collagen membranes, in order to improve the alveolar ridge quality and esthetic results[9].

Finally, the oral rehabilitation has received many contributions to improve esthetics and longevity of the treatment. Different specialties in Dentistry have presented relevant contributions in each own area, thus the rehabilitation for severe dental mutilated patient must be managed by a multidisciplinary team. All the members of team should bring the knowledge about the hole treatment planning, nevertheless each specialist would deal in each own area.

CONCLUSION

Oral rehabilitation of dental mutilated patients with alveolar bone loss is better approached with a multidisciplinary treatment since the beginning when a plan of treatment is established in agreement with an orthodontist, a prosthesist, a surgeon and a periodontist.

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Recebido para publicação em:05/09/2005; aceito em: 07/12/2005.

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