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Rehabilitation of atrophic mandible with implants. Strategy and case report of fracture complication

Reabilitação de mandíbula atrófica com implantes. Estratégia e relato de caso de uma complicação por fratura

Rehabilitación de mandibula atrofica con implantes. Estrategia y caso de complicación de una fractura

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Abstract

Rehabilitation through implant-supported prosthesis on atrophic jaws presents great deal of difficulty. Mandible fractures related to implants is not a common complication, however when it occurs, it represents serious damage. The aim of this paper was to report a clinical case of a 63-year-old patient with mandibular fracture after implant installation, treated through a buccal access and load-shearing plate system to stabilize the fractured bone and reduce the discomfort. The use of load shearing plate presented good results in this case, stabilizing the bone fracture, and helping with the repairing process, enabling subsequent rehabilitation of the patient, with a 3-year follow-up.

Keywords: Dental implantation; Prostheses and implants; Fractures; Bone.

Resumo

A reabilitação por meio de próteses implantossuportadas em maxilares atróficos apresenta grande dificuldade. A fratura de mandíbula relacionada a instalação de implantes não é uma complicação comum, porém quando ocorre representa um dano grave. O objetivo deste trabalho foi relatar o caso clínico de uma paciente de 63 anos com fratura mandibular após a instalação do implante, tratada por meio de acesso intra oral e sistema de placa load-shearing para estabilizar o osso fraturado e reduzir o desconforto do paciente. O uso da placa load shearing apresentou bons resultados neste caso, pois foi capaz de estabilizar a fratura óssea e auxiliar no processo de reparação, possibilitando a posterior reabilitação do paciente, com acompanhaemnto de 3 anos.

Palavras-chave: Implante dentário; Próteses e implantes; Fraturas; Osso.

Resumen

La rehabilitación con prótesis implantosoportadas en maxilares atróficos presenta una gran dificultad. La fractura de la mandíbula relacionada con la instalación de implantes no es una complicación común, pero cuando ocurre representa un daño grave. El objetivo de este estudio fue reportar el caso clínico de un paciente de 63 años con fractura mandibular tras la instalación del implante, tratado mediante acceso intraoral y un sistema de placa de carga

cizalla para estabilizar el hueso fracturado y reducir las molestias del paciente. El uso de la placa de cizallamiento de carga mostró buenos resultados en este caso, ya que logró estabilizar la fractura ósea y ayudar en el proceso de reparación, permitiendo la posterior rehabilitación del paciente, con un seguimiento de 3 años.

Palabras clave: Implante dental; Prótesis e implantes; Fracturas; Hueso.

1. Introduction

Maxillary atrophy is considered a condition of extensive bone resorption related to edentulism. For a long time, the rehabilitation of edentulous patients was performed through conventional total dentures (Awad, et al., 2003), however, the number of rehabilitations with implant-supported prostheses in atrophic jaws is increasing, since they offer better aesthetic and functional conditions to patients (Naert, et al., 2004; Meijer, et al., 2004).

Rehabilitation with implant-supported prostheses in atrophic jaws presents great deal of difficulty amongst reconstructive surgeries due to the high difficulty of insertion of implants, given the small bone availability, besides the high risk of complications, such as, for example, mandibular fractures, even though they are not very frequent (Raghoebar, et al., 2000; Ellis & Price, 2008). The treatment options for atrophic jaws reported in literature are short implants, bone grafts or inferior alveolar lateral nerve transposition, among others (Romeo, et al., 2006; Polo, et al., 2005).

In cases where fractures occur, the most common treatment described in literature is performed by means of extra-oral access and open reduction with reconstruction plates of load-bearing system (Bruce & Ellis, 1993; Toma, et al., 2003). However, the use of smaller and more malleable plates of load-shearing system may present better results on the treatment of these fracture types, because more robust plates often compromise the inferior alveolar vascular-nervous bundle (Frost, et al., 1991).

Thus, the aim of this paper was to report a clinical case of a patient with mandibular fracture with load-shearing plate system and buccal access to stabilize the fractured bone and reduce the discomfort.

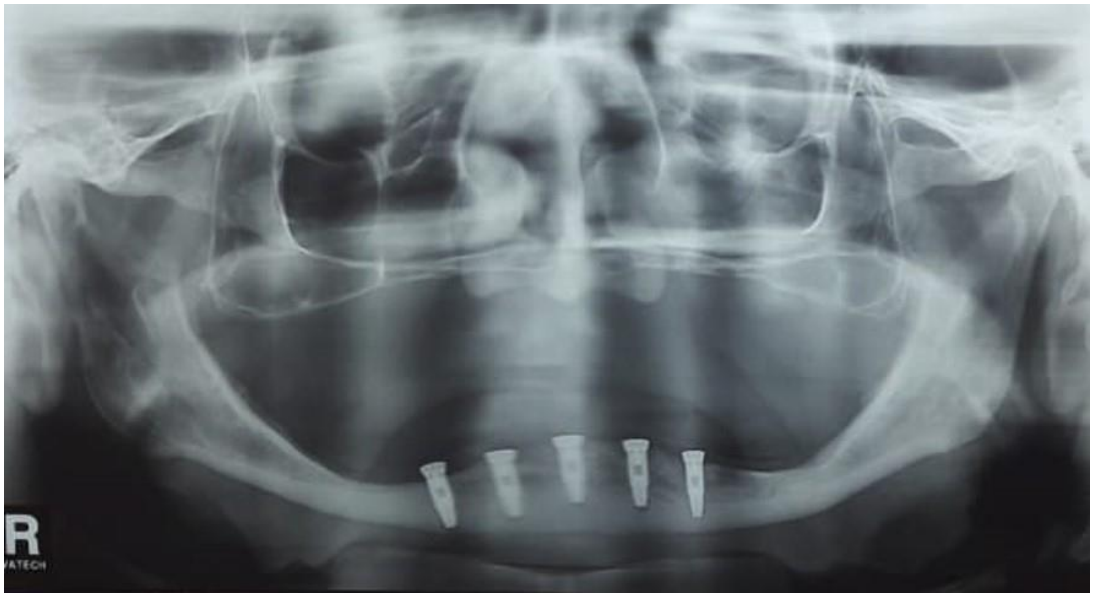
2. Methodology

This paper demostrated through descriptive and qualitative means a case report about a patient with atrofic maxillary fracture after implant placement and successfully treated with a load-shearing plate system that led to clinical stability of the fractured bone.

3. Case Presentation

A 63-year-old patient, toothless in both arches, was attended by the Implant Dentistry Service of the University, who was dissatisfied with the lower conventional prosthesis and complaining about aesthetic and function. Initial panoramic radiography showed atrophic maxilla and mandible. A new upper total prosthesis and lower protocol-type prosthesis was proposed as treatment. A surgical guide was used to install 5 implants 3.75 x 10mm (Conexão®, São Paulo, Brazil) (Figure 1).

Figure 1. Panoramic radiography after installation of 5 implants 3.75 x 10mm (Conexão®, São Paulo, Brazil).

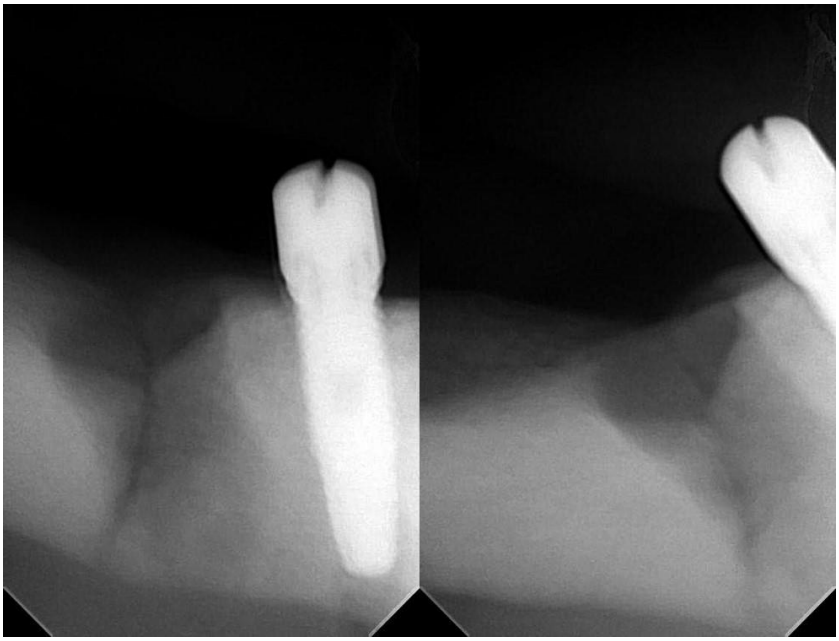


Source: Authors.

At the 5-month follow-up, re-opening for the installation of the healing cup and resurfacing of the lower prosthesis by resilient acrylic resin on the healing cup, followed by occlusal adjustment was performed. At the 6-month follow-up, the patient returned complaining of pain at the mandible. The periapical radiography revealed mandibular fracture

in the distal of the last implant at the right side (Figure 2).

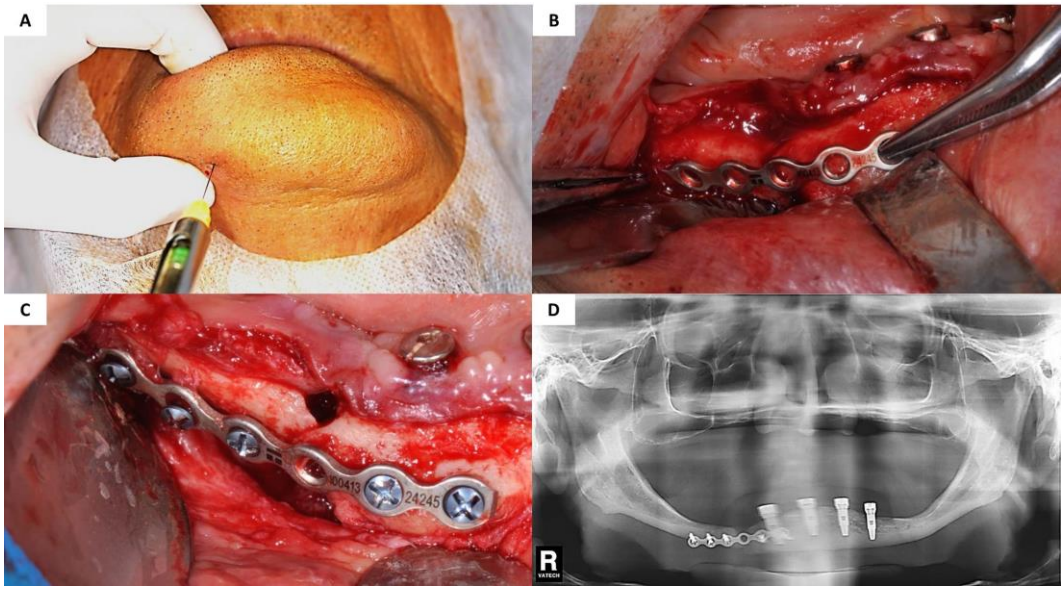
Figure 2. Periapical radiography after 6 months of implant placement showing the mandible fracture.



Source: Authors.

Due to the patient's condition, a treatment under local anesthesia through (Figure 3a) buccal access (Figure 3b) was performed to remove the implant near the fracture area and install a load-shearing system plate for fixation of the fracture and stabilization of the patient’s condition (Figure 3c) and an immediate panoramic radiography was made (Figure 3d).

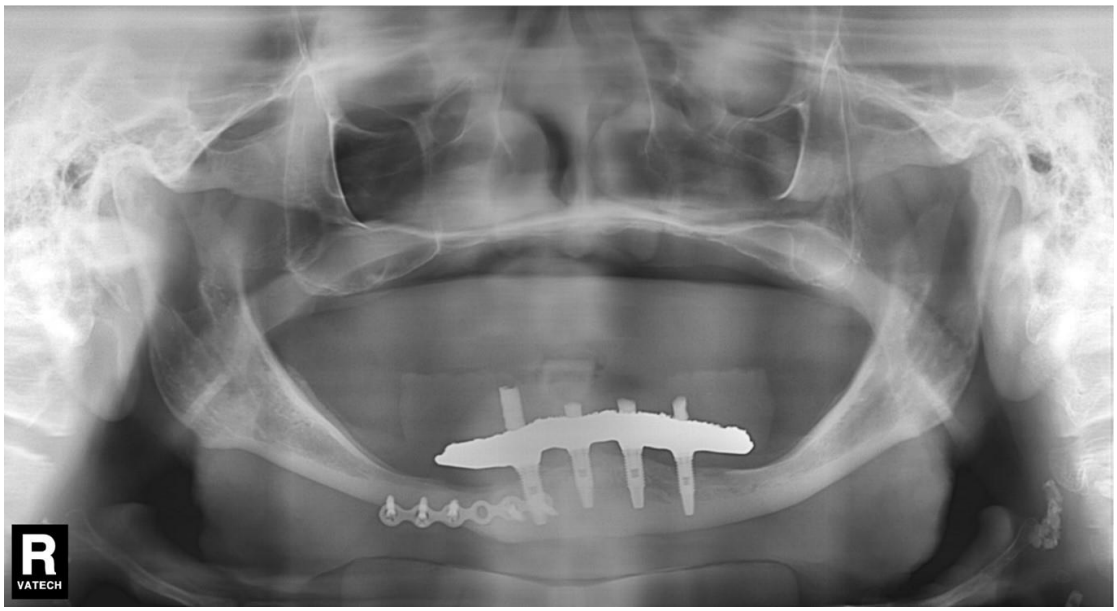
Figure 3. a. Extraoral anesthesia; 3b. Buccal access for bone exposure; 3c. Use of load-shearing system plate for fixation of the fracture and stabilization; 3d. Immediate panoramic radiography after plate placement.



Source: Authors.

After this, monthly follow-ups of the patient were carried out and it was possible to observe a bone consolidation area (Figure 4).

Figure 4. Panoramic radiography after one year of mandible fracture and load-shearing plate installation.



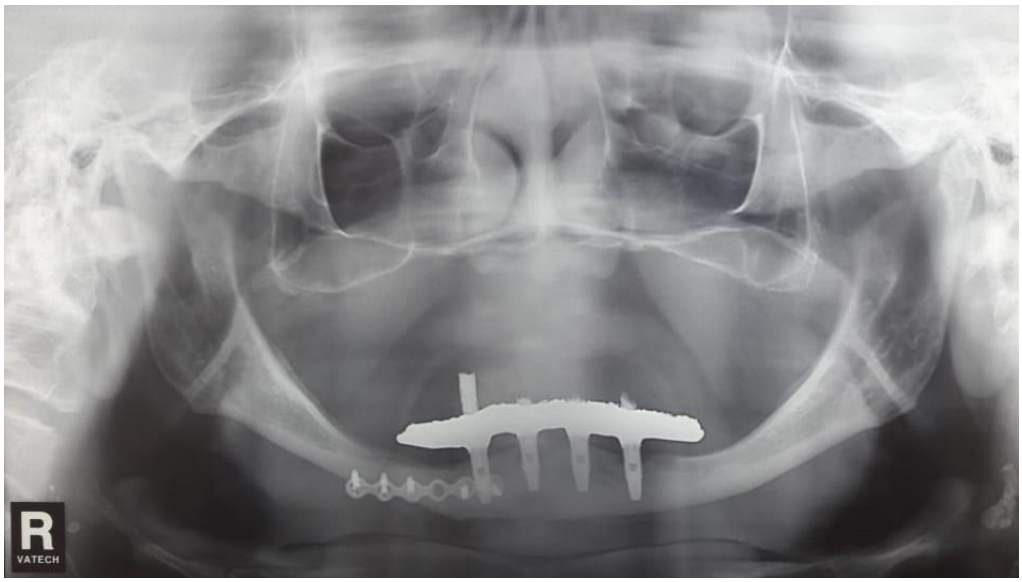
Source: Authors.

After one year, the prosthetics rehabilitation was continued, (Figure 5) and this technique showed total success as it can be observed in the 3-year-follow-up panoramic radiography (Figure 6).

Figure 5. Prosthetics rehabilitation after stabilization of bone fracture.

Source: Authors.

Figure 6. Panoramic radiography after three years of mandible fracture and load-shearing plate installation.



Source: Authors.

4. Discussion

Most fractures in atrophic mandibles occur in the region of the mandibular body, especially when the residual bone is less than 10mm (Ellis & Price, 2008; Wittwer, et al., 2006). The great difficulty in rehabilitating these patients is related to the residual atrophic ridge bone with insufficient minimal height required for implant installation. This residual basal bone is highly cortical, dense and with inadequate blood supply (Ellis & Price, 2008). There is no consensus in literature about the optimal treatment for atrophic jaw fracture approaches (Nasser, et al., 2008). Regarding treatment options for atrophic borders, autogenous or biomaterial bone grafts, guided bone regeneration, osteogenic distraction, lateralization of the inferior alveolar nerve or even the use of short implants are reported in literature (Romeo, et al., 2006; Polo, et al., 2005).

Short implants present as an attractive treatment option for cases of severe atrophy, since they do not require additional reconstructive surgeries and present a success rate as good as the conventional implants installed after vertical bone augmentation, with lower complication rates (Stellisgma, et al., 2004; Nisand, et al., 2015). The use of larger diameter short implants for atrophic borders optimizes clinical outcomes as it improves the distribution of forces and reduces strain on bone crest (Petrie & Williams, 2005). Authors believe that, in this case, the use of short implants would be indicated and could have reduced the risk of mandible fracture, since the use of conventional-sized implants was installed crossing the two bony cortices, weakening the mandibular base.

The predominantly cortical bone, characteristic of atrophic mandibles, makes these structures very susceptible to fractures, during or after the procedure, in the presence or absence of associated masticatory load (Ellis & Price, 2008). In atrophic fractures, literature shows the use of load-bearing system plates as the main choice (Bruce & Ellis, 1993; Toma, et al., 2003), but if the patient presents a systemic condition that contraindicates this type of procedure, alternatives may be viable (Wittwer, et al., 2006; Hachleitner, et al., 2013). In this case, the option for local anesthesia, intraoral incision and installation of a 2.0 system plate for fixation of the fracture was taken into consideration only to stabilize the fractured bone and reduce discomfort, until appropriate time for a second intervention, under general anesthesia, with extra-oral access and open reduction with load-bearing plates. However, the patient presented a good evolution throughout the postoperative follow-up, so the treatment became definitive, due to the effectiveness achieved.

The use of a provisional prosthesis over the healing cup can act as a lever and

concentrate the tension on the distal implant, resulting in fracture. Thus, it is necessary to perform the oral prosthesis replacement with soft material, providing better distribution of the functional load. The installation of 4 - 6 implants in the anterior region provides adequate stability to support the cantilever extensions that are generated in the posterior region (Adell, et al., 1981). The success in implant-supported prostheses is related to the uniform distribution of mastication load.

5. Final Considerations

After the explanation of this case and with the findings of literature, it was possible to conclude that

1) Although literature indicates the use of the load-bearing system for atrophic mandible fractures, the use of load-shearing system plates presented good results in this case, stabilizing the bone fracture and helping in the repair process, enabling subsequent rehabilitation of the patient.
2) Another feasible option for the planning of this case would be the installation of short implants with larger diameter for better distribution of functional loads, reducing the possibility of complications

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