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Resolution of a titanium implant fracture after a recurrent trauma

CASE REPORT

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Abstract – Post-traumatic complications occasionally lead to tooth loss as well as the need for future implants. However, rehabilitation with endosseous osseointegrated implants does not protect the patient from the risk of suffering a new trauma. Implant fracture and the damage of the hexagon are post-traumatic complications that guide the clinician to preparing a more intricate treatment plan. The authors present a clinical case of a recurrent trauma of maxillary implant fracture. The treatment plan was to remove the implants followed by autogenous bone grafting to correct the defect. Two titanium implants were replaced, followed by connective tissue graft after allowing complete the healing process of the bone graft to occur. In the postoperative period of 6 months, satisfactory results have been shown as regards soft and hard tissues wound healing.

The majority of dental trauma occurs in the maxillary anterior teeth (1). Falls, collisions with other persons and objects, sports, traffic accidents and violence are the main etiologic factors (2–4). Multiple loss of anterior teeth indicates a substantial increase in the number of esthetic difficulties. This is caused primarily by the associated alveolar bone loss, which may require both horizontal and vertical bone augmentation (5).

A thorough examination is critical to reach a correct diagnosis and treatment plan (6). Dental trauma remains one of the most challenging clinical situations for dentists because they present sporadically and require multidisciplinary diagnosis and treatment (7).

Post-traumatic complications occasionally lead to tooth loss as well as the need for future implants. However, rehabilitation with endosseous osseointegrated implants does not protect the patient from the risk of suffering a new trauma. Implant fracture and the damage of the hexagon are post-traumatic complications that guide the clinician to preparing a more intricate treatment plan.

The aim of this report was to describe an intricate treatment approach to traumatized anterior implants resulting in implant fracture and hexagon damage. The option was to remove the implants, followed by autogenous hard and soft tissue grafting to improve the esthetic outcome.

Case Report

The patient, a 32-year-old woman, sought attendance at the Integrated Clinic Course of the Dentistry Faculty of Aracatuba – UNESP 30 days after having suffered an implant fracture in the region of the maxillary anterior teeth as a consequence of a second motorcycle accident. In anamnesis, she related that at the age of 27 years-old, her teeth 11 and 21 were avulsed as a result of the first motorcycle accident. At that time, she received attendance at the Surgery Clinic Course of the Dentistry Faculty of Araçatuba – UNESP, where rehabilitation was performed with two titanium implants and implant-supported metal ceramic crowns.

The clinical examination showed absence of the implant-supported metal ceramic crowns and presence of a fractured prosthetic component with its fractured screw. Damage to the implant hexagon was observed after removing the component and its screw. The radiographic examination showed two implants, one with a fractured prosthetic component with its fractured screw and another with a fracture in the crown third of its body. In addition, the alveolar process of the tooth 22 was observed, suggesting an avulsion that was confirmed by the patient (Fig. 1).

Because of the damage of the implants, the treatment plan was removal of the implants, followed by an autogenous bone graft. After anesthesia and performing a sliding flap, the implants were removed with a trephine burr (Figs 2 and 3). Two blocks were harvested from the mandibular ramus and placed onto the recipient bed, and then proceeding with cortical perforations to facilitate revascularization of the graft. In addition, rigid fixation of the blocks with miniscrews was performed. Particulate autogenous bone graft was used to fill small bone defects (Fig. 4).

After 6 months of bone graft-healing time, two titanium implants (4.1 Tryon Implant System, SIN Ltda,

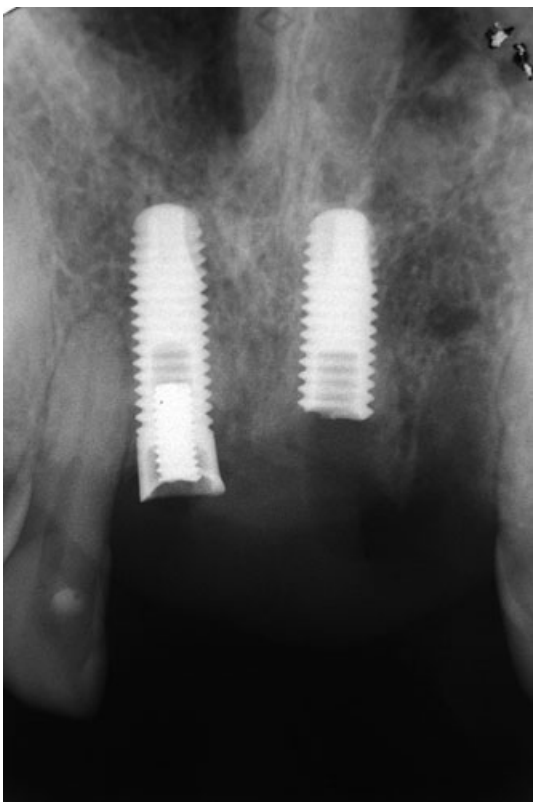

Fig. 1. Initial periapical radiograph. Observe the presence of two damaged implants and the alveolar healing process of the tooth 22. Left implant: fractured prosthetic component with its fractured screw; right implant: fracture in the crown third of its body.

São Paulo, SP, Brazil) were placed with the cover screws on top and the area was closed and sutured (Fig. 5). After osseointegration time, the implants were exposed to set the healing cap associated with connective tissue graft surgery (Fig. 6).

A temporary implant-supported fixed restoration was provided 4 months after connective tissue graft-healing time. Six months later, satisfactory results have been shown as regards soft and hard tissues wound healing and temporary prosthetic rehabilitation (Figs 7 and 8).

Fig. 2. Initial intraoral view of the damaged implants after anesthesia and sliding flap.

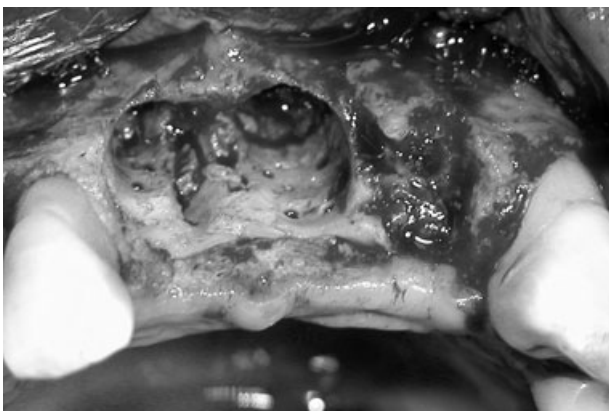

Fig. 3. Intraoral view of the bone defects after implants removal with a trephine burr.

Fig. 4. Intraoral view after fixation of the autogenous bone blocks onto the recipient bed with mini-screws.

Fig. 5. Intraoral view after titanium implants replacement.

The patient moved to the north of the country, and it was not possible to us to conclude the case report with implant-supported metal ceramic crowns.

Discussion

Despite the facilities of implant-supported rehabilitations, there are few prosthetic options to replace missing

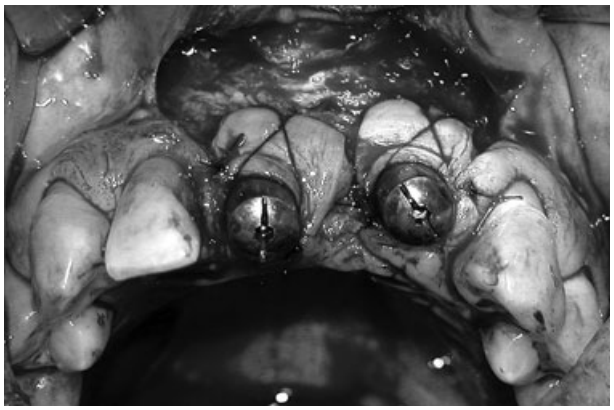

Fig. 6. Intraoral view after setting the healing cap associated with connective tissue graft.

Fig. 7. Intraoral view 6 months after the temporary implant-supported fixed restoration.

teeth until the patient reaches the end of the growing stage. Nevertheless, after reaching this stage, rehabilitation with osseointegrated implants is the best solution to solve esthetic and functional problems, with or without autogenous tissue grafting, if necessary. However, filling an anterior space with an implant-supported porcelain crown is a major challenge from both esthetic and functional aspects. Clinical success depends not only on persistent osseointegration but also on harmonious integration of the crown in the dental arch (8).

Trauma to the anterior maxillary area is very common (1); however, severe implant-alveolar trauma is a rare situation especially as a result of a recurrent trauma. When it happens, it is often associated with implant loss and defect of the alveolar crest. The situation guides the clinician to preparing a more intricate treatment plan that often leads to the need for removing the damaged implants followed by the reconstruction of the alveolar crest before placing a new implant.

The large size of the defect caused by the removal of the damaged implants required bone harvesting. The mandibular ramus was the choice of donor site because of the amount of bone needed and the lower incidence of morbidity, when compared with the mandibular symphyses (9). Moreover, rigid fixation of a bone block graft with miniscrews was performed because of its

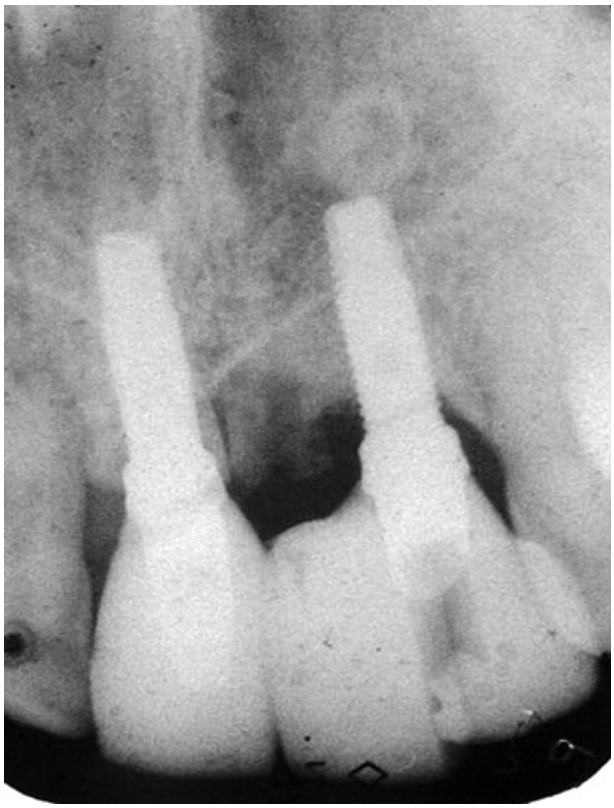

Fig. 8. Final periapical radiograph of the temporary prosthetic rehabilitation.

importance in the healing process, as this prevents the ingrowth of fibrous tissue between the graft and the recipient bone (10).

Autogenous bone is the gold standard biomaterial for reconstructing defects caused by traumas, and particularly for reconstructing the edges, enabling titanium implants to be installed (11–14). The properties of the material were the main reason for the choice: (I) osseointegration, the capacity to unite chemically with the bone surface without the intervention of a layer of fibrous tissue (15); (II) osteoconduction, the capacity to sustain bone growth on this surface (15); (III) osteoinduction, the capacity to induce mesenchymal cell differentiation (pluripotent) of the circumjacent tissue (receptor bed) into osteoblastic cells (16); and (IV) osteogenesis, bone neoformation by the osteoblastic cells present in the grafted material, are the differential characteristics of autogenous bone which provide its high success rate (17, 18).

The volume of soft tissue augmentation that can simultaneously be performed with bone-grafting procedures is limited because of the need for flap closure and the compromised blood supply at the soft tissue recipient site (19). Therefore, soft tissue grafting was performed at the same stage as the healing cap and not at the time of bone grafting.

Conclusion

The clinical case presented here allowed one to conclude that when implant fracture and damage of hexagon are

post-traumatic complications, a complex treatment plan is needed to obtain satisfactory results, and consequently, successful treatment.

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