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Immediate prosthetic rehabilitation of lower molars with hybrid internal tapered implants: report of two cases

Reabilitação protética imediata de molares inferiores com implantes cônicos internos híbridos: relato de dois casos

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ABSTRACT

The immediate rehabilitation of the posterior region of the mandible with dental implants, expands the set of possible actions for the dental surgeon, in the face of tooth loss. The purpose of this study is to describe two cases of single rehabilitation of mandibular molars with hybrid internal tapered implants indicated for immediate loading in post-extraction socket, associated with the maintenance of the prosthetic and peri-implant space. Implants with macrogeometry and surface treatment (Hydrophilic) were used to optimize primary stability, as well as the type of internal connection and prosthetic abutments that allows better accommodation and healing of adjacent tissues, and protection of the bone graft. Different methodologies of surgical guides did not influence the final result. The predictability of associating techniques and components can be observed in the 2-year follow-up. The initial planning combined with the new technologies enable to achieve stable and functional final restorations.

Indexing terms: Dental implantation. Dental prosthesis. Dental restoration temporary. Molar. Mouth rehabilitation.

RESUMO

A reabilitação imediata da região posterior da mandíbula com implantes dentários, amplia o conjunto de ações possíveis ao cirurgião dentista, frente as perdas dentárias. O intuito desse estudo é descrever dois casos de reabilitação unitária de molares inferiores com

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implantes cônicos internos híbridos indicados para carregamento imediato em alvéolos pós-extração, associado a manutenção do espaço protético e peri-implantar. Foram utilizados implantes com macrogeometria e tratamento de superfície que otimizassem a estabilidade primária (Hidrofílicos), bem como o tipo de conexão interna e abutments protéticos que permitisse melhor acomodação e cicatrização dos tecidos adjacentes, e proteção do enxerto ósseo. Diferentes metodologias de guias cirúrgicos não influenciaram o resultado final. A previsibilidade da associação de técnicas e componentes pode ser observada no follow-up de 2 anos. O planejamento inicial aliado às novas tecnologias permite restaurações finais estáveis e funcionais.

Termos de indexação: *Implantação dentária. Prótese dentária. Restauração dentária temporária. Dente molar. Reabilitação bucal.*

INTRODUCTION

The removal of a tooth root always leads to a set of remodeling process on the remaining bone, being a limiting factor to achieve adequate aesthetic and functional results [1-3]. The are some alternatives for maintaining the available bone framework and preventing the failure of periodontal tissues, such as atraumatic tooth extraction, correct implant placement, bone graft procedures, immediate provisionalization, protecting the peri-implant tissues, maintenance the prosthetic space, with the absence of lateral force on the implant and infra-occlusion [4].

Growing expectations of treatments with a shorter duration of time have required significant changes in the macrogeometry of the implants to optimize primary stability, maintenance of peri-implant tissues and predictability of immediate protocols [5]. In order to place a temporary crown, the recommended primary implant stability torque must be of at least 35 N.cm [6]. The switching platform of the internal tapered implants provides a stable and resistant connection to achieve long-lasting results [7,8].

The use of techniques that use guides illustrate the infinite possibilities that the surgeon has at his disposal in the current scenario of implantology, to achieve the objectives outlined in the planning [9]. The conventional guided surgery or combined with tomography are fundamental for the excellence of the positioning that goes contribute, with all predictability of hygiene and force distribution, in addition to the exact direction of placement of the implants. "Digital" prosthetic planning generates accurate results, with accuracy very close to what was designed [9,10].

This article aimed to present two cases of single unit rehabilitation prosthetic of mandibular molars with hybrid internal tapered implants using different surgical guides. The study was conducted in accordance with the principles outlined in the Declaration of Helsinki on clinical research involving humans and was approved by the local Ethics Committee (Registration no. 02669218.1.0000.5688). All patients provided informed written consent.

CASE REPORTS

First case

A 31-year-old man attended the Dental Hospital of the Federal University of Uberlandia (Uberlandia, Brazil) presenting complaints of pain and a coronary fracture of tooth 36, already treated endodontically. Examinations were requested to assess the patient's systemic conditions and radiographic examinations. On clinical examination, coronary fracture of tooth 36 was observed involving the mesial, distal and lingual surfaces. Radiographic examination revealed an extensive lesion involving the distal surface and the furcation defects of tooth 36, suggestive of endodontic-periodontal lesion (figure 1). The treatment proposed by the team of professionals was a minimally traumatic extraction of tooth 36 and immediate placement of a hybrid internal tapered implant (hydrophilic) with 16 degrees of internal taper connection and immediate provisionalization with a cemented retained single crown.

The extraction of tooth 36 was performed under local anesthesia, using periotomes and without flaps. A conventional surgical guide made of transparent acrylic resin (Classic, São Paulo/SP, Brazil) was positioned in the mouth and the milling sequence was performed as indicated by the manufacturer. Then, a Helix Grand Morse (GM) Acqua

Figure 1. Initial periapical radiography of the case.

implant - 4.3 x 11.5 mm (Neodent - Curitiba / PR, Brazil) with a torque of 60 Ncm was placed. Finally, the gap in the surgical socket was filled with biomaterial of bovine origin (Botiss, Cerabone, Berlin, Germany), which aimed to further improve the emergency profile.

With the lock obtained in the implant placement, it was possible to make a temporary crown in acrylic resin on the selected prosthetic abutment. The cemented prosthesis was chosen, seeking to obtain an emergence and aesthetic profile of the case. A GM Universal Abutment - 4.5 x 6 x 3.5 mm (Neodent) was installed on the implant with a torque of 20 Ncm. A GM Universal Provisional Cylinder - 4.5 x 6 mm (Neodent) was used to capture the provisional crown. The precise adaptation of the provisional cylinder to the abutment in a click system avoids the use of cement. Therefore, the provisional crown was installed only by compression. Finally, occlusal adjustments were made, relieving contacts that could generate excessive loads.

After 3 months, the patient returned for definitive rehabilitation. A Click Universal Abutment Impression Coping – 4.5 x 6 mm (Neodent) was placed on the abutment and the impression was made with addition silicone (Hydroxtreme, Coltene, Altstatten, Switzerland). The model was scanned on a bench scanner (Ceramill map400, Amann Girrbach, Pforzheim, Germany) to carry out the crown design in the software (Ceramill trusmile, Amann Girrbach).

With the crown design completed, the data was sent to a milling machine (Ceramill Motion II, Amann Girrbach) to perform crown milling using a ceramic block (Ceramill Zolid fx multilayer, Amann Girrbach). Finally, the zirconia crown was cemented using the dual resin cement RelyX U200 (3M, ESPE, St. Paul, USA).

After 2-years of follow-up, it was possible to observe minimal remodeling of the peri-implant soft tissues and good adaptation of the prosthetic abutments (figures 2 and 3).

Second case

A 34-year-old woman attended the Implantology Department at ILAPEO College (Curitiba, Brazil) with a complaint of coronary fracture of tooth 46, which had been endodontically treated for 6 months. Tests were requested to assess the patient's systemic conditions and radiographic tests. Upon initial clinical examination, coronary fracture of tooth 46 was observed involving the mesial, distal and lingual surfaces. Radiographic examination revealed a periapical lesion and leakage of endodontic material at the apex of the distal root (figure 4). The treatment proposed by the professionals was

Figure 2. Follow-up of 2-years of installation of the zirconia crown.

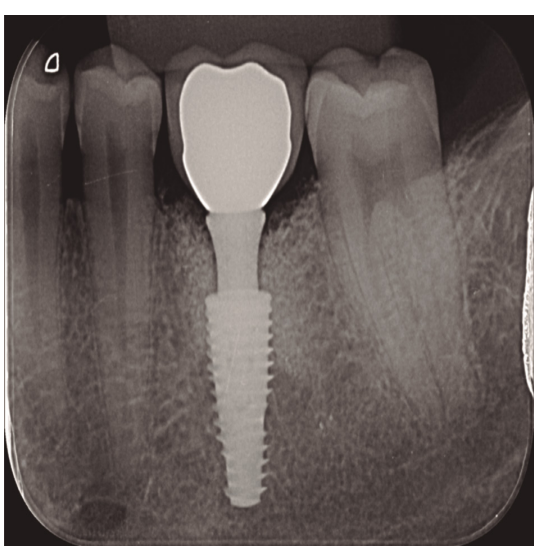

Figure 3. Periapical radiograph 2-years after implant placement.

the extraction of tooth 46 and immediate placement of a hybrid internal tapered implant (hydrophilic) with 16 degrees of internal taper and immediate provisionalization with a screwed retained provisional crown. For the ideal positioning of the implant, the use of a prototyped surgical guide (NGS, Neodent) was proposed.

A cone beam computed tomography (CBCT) and virtual models were obtained to perform the virtual surgical planning, using the CoDiagnostiX software (Dental Wings, Chemnitz, Germany). Favorable bone availability was observed for the implant placement. After planning approval, the surgical guide was made using 3D printing. A temporary crown in self-curing acrylic resin was made on the provisional titanium abutment cylinder.

Minimally traumatic extraction of tooth 46 was performed under local anesthesia with the aid of a Dental Extractor (Neodent). With the surgical guide in position, the milling sequence was performed as indicated by the manufacturer, using the NGS (Neodent) technique and a Helix Grand Morse (GM) Acqua implant - 5.0 x 10 mm (Neodent) was placed

Figure 4. Initial periapical radiograph of the case.

with a torque of 60 Ncm. Finally, the bovine biomaterial Botiss Cerabone® (Botiss biomaterials GmbH, Zossen, Germany) was placed in order to improve the emergence profile.

With the lock obtained in the implant placement, it was possible to install a screwed retained provisional single crown. A GM Abutment - 4.8 x 4.5 mm (Neodent) was installed on the implant with a torque of 20 Ncm. The provisional crown was used to capture the Abutment Titanium Coping (Neodent) in the mouth. Finally, the crown was screwed on the abutment and the occlusal adjustments were performed, relieving the contacts that could generate excessive loads during the osseointegration period.

After 1-year, definitive rehabilitation was performed. An intraoral scan (3Shape, TRIOS, Copenhagen, Denmark) was performed to make a zirconia coping. Then, coping in the mouth, occlusal registration with acrylic resin (Pattern Resin, GC America - Alsip, USA) and transfer impression with addition silicone (Hydroxtreme, Coltene, Altstatten, Switzerland) were performed. Based on the scanning, it was decided to make a screwed lithium disilicate crown.

After a 2-year follow-up, it was possible to observe minimal remodeling of the peri-implant soft tissues and good adaptation of the crown and prosthetic components (figures 5 and 6).

The Oral Health Impact Profile 14 (OHIP-14Br) [11] was applied to measure the influence of oral health on the well-being of individuals on 2-years follow-up returns after implant placement. OHIP-14 is divided into the following items: functional limitation (items 1 and 2), physical pain (items 3 and 4), psychological discomfort (items 5 and 6), physical disability (items 7 and 8), psychological disability (items 9 and 10), social disability (items 11 and 12) and social disadvantage (items 13 and 14). Questions were scored on a scale: 0 indicates never; 1 rarely; 2 sometimes; 3 constantly and 4 always. The highest score represents the worst quality of life and vice versa. The score of each patient was 4. All but one of the items were answered as "never", with a score of "0". Only the item 5, which refers to psychological discomfort and asks the patient about the self-conscience of their prostheses, was reported as "always", giving a final score of "4" for each patient.

Figure 5. Clinical aspect 2-years after implant placement.

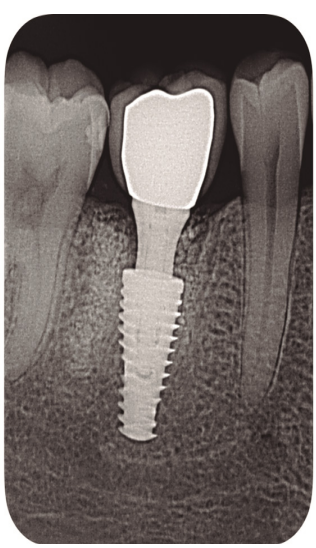

Figure 6. Periapical radiograph 2-years after implant placement.

DISCUSSION

The quality of life related to oral health is important when the dentist wants to determine the success of the treatment. Among the reported cases, the highest score obtained with the OHIP-14Br was "4". This indicates less impact of the treatment modality on quality of life. The only negative aspect among patients was self-awareness about the rehabilitation used. In a previous study, the authors state that this factor is really difficult to determine regardless of the quality of the prosthesis, but it must be considered to determine the success of the treatment [12]. In general, both patients were satisfied with fonetics, aesthetics and function obtained.

Although systematic reviews indicate that there is a slightly higher risk of early implant loss compared to late placement, immediate placement of implants in the extraction sites is assumed to be a reliable treatment option for single unit treatments [2,3,13,14]. In the present study, an implant with a hydrophilic surface and switching platform was used,

which accelerated the osseointegration process and favored the maintenance of peri-implant tissues, in addition to the 16-degree internal angulation of the implant provided greater stability of the implant-abutment junction.

Some authors have reported high survival rates for immediate implant placement in molar regions. These studies suggested that wide diameter implants have better results in the molar region than regular diameter implants [4,5]. However, in addition to the diameter, the implant macrogeometry and the type of connection are also important for the success of immediate rehabilitation of molars [5,15], and in the present study a hybrid implant (cylindrical body and conical apex) was used, with dynamic progressive threads, which allowed for good initial stability.

The use of surgical guides increases the precision of the surgical procedure [16,17]. The technique simplifies rehabilitation for the surgeon, increasing the probability of obtaining primary stability and predicting the placement of the implant in an ideal position [17-19]. In the present study, the conventional and prototyped surgical guides were used for drilling. However, the implant placement was only possible with the prototyped in case 2. In addition, the primary stability was ideal in both cases. The limitation of the patient's mouth opening must be evaluated, due to the fact that surgery with prototyped guides requires drills of greater lengths.

The technique of immediate provisionalization decreases the collapse of hard and soft tissues, avoiding a second reopening surgery [6,20-22]. There is scientific evidence stating that immediate provisionalization favors the maintenance of tissue volume by the micro stimulus generated in the bone [19,23]. It is also suggested to notice that the filling of the socket should be performed whenever a tooth is extracted and has a gap greater than 2 mm [23]. In the present study, the use of implants with internal tapered connection and immediate provisionalization were important to minimize bone and tissue remodeling. It was also important to allow and preserve the filling with biomaterial. The prosthetic emergence profile was established by installation the temporary crowns.

Based on currently published controlled studies, there is still a lack of evidence for an ideal protocol for immediate implant placement in the molar region [3-5]. Therefore, the objective of the present study was to evaluate two cases of immediate implant placement in post-extraction sites of molars with immediate provisionalization, which showed excellent results during a 2-year follow-up period.

CONCLUSION

The immediate placement of hybrid internal tapered implants (hydrophilic), using conventional or tomographic guides and immediate cemented or screwed retained temporary crowns proved to be a successful treatment protocol for single lower molar substitution, being able to minimize bone and tissue remodeling after 2-years. The overall quality of life related to oral health was good and the patients were satisfied with the treatment received. Prospective clinical studies should be performed, involving biological and prosthetic aspects, but mainly the patients' self-perception, in order to fully understand the immediate rehabilitation of single unit molars with implants.

Collaborators

MB MOURA and G THOMÉ, performed the patient's surgery on the case reports and participated in the final approval of the work. CA CARTELLI and PC SIMAMOTO-JÚNIOR, performed the prosthetic part and follow-up of the patients, contributed with the conception of the work; acquisition and analysis of data, preparation of the work. KRT LOUREIRO and J UHLENDORF, contributed to the design of the work; revising and final approval of the work.

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