Morse taper implant: A case report

Abstract / Introduction: *Improvements in oral rehabilitation techniques allow esthetically demanding treatments to yield better and more predictable results.* Methods: *This paper reports a case of root fracture of tooth #11 treated by means of reverse planning comprising the following steps: tooth extraction, immediate implant placement associated with guided bone regeneration and immediate temporary crown placement. Due to its biomechanical stability and bacterial sealing properties, a Morse taper connection implant was used to reduce peri-implant bone resorption, preserve periodontal tissue health and yield highly satisfactory esthetic results. The temporary tooth had been previously fabricated in accordance with the symmetry of adjacent teeth, lips and gingival tissue, which resulted in a pleasant smile.* Conclusion: *It is reasonable to conclude that establishing an appropriate three-dimensional positioning of implants is not enough for Implantodontics. It requires that an appropriate planning be associated with an efficient connection so as to place an implant in accordance with patient's periodontal biotype, thus predicting a satisfactory emergence profile, in addition to recovering patient's esthetics, function and speech.*

Keywords: *Three-dimensional imaging. Dental implant immediate loading. Dental implant design.*

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» The authors report no commercial, proprietary or financial interest in the products or companies described in this article.

» The patient displayed in this article previously approved the use of her facial and intraoral photographs.

INTRODUCTION

Root fractures are adverse injuries often seen in dental clinics. However, when extraction and immediate implant placement in esthetic zones are required, oral rehabilitation often becomes a clinical challenge.[1]

After extraction, the socket may be immediately filled with an implant so as to minimize physiological reactions associated with bone loss, either in height or thickness.[2]

The bone surrounding the peri-implant area determines not only implant longevity, but also its biomimetic adaptation.[3] Bone crest preservation increases the probability of papilla formation, a key factor for yielding good esthetic results.[4]

After implant placement, bone crest undergoes resorption and remodeling. Some of the factors that contribute to this process are as follows: the distance between implants (minimum: 3 mm) or between the implant and the tooth (minimum: 2 mm); the distance between the contact point and the bone crest (minimum: 5 mm); the depth at which the implant is placed; the type of implant or connection, and the macro design of the cervical area of the implant.[5]

In the clinical case reported herein, a Morse taper connections were used to ensure minimal peri-implant bone resorption and to yield optimal esthetic results.

Morse taper connections have been widely used, whether commercially or clinically, due to their great biomechanical stability and efficient bacterial sealing, both of which are a result of the connection design.[6] Planning in Implantology should not be limited to achive correct three-dimensional positioning of implants; but should ensure that implants be positioned in a way that predicts a viable prosthetic solution, an efficient connection and an optimal esthetic performance.[7]

OBJECTIVE

This study describes a protocol used for the three-dimensional positioning of a Morse taper connection as well as for immediate esthetic restoration performed by means of reverse planning.

CLINICAL CASE REPORT

A female patient sought dental care with chieft complaint of tooth mobility. Initial examination revealed that she was in good general health. Clinical and radiographic examinations revealed root fracture (Fig 1).

Figure 1. Periapical radiograph (tooth #11).

Impressions of the maxilla and mandible were taken, and casts were mounted on an articulator. After examining extra- and intraoral photographs as well as laboratory tests, treatment was planned on the basis of the following: shape, function, esthetics and gingival zenith of the ceramic crown placed over tooth #11 were in harmony with adjacent teeth and tissues; consequently, diagnostic waxing was not performed. Finally, a surgical guide was prepared using 1-mm-thick acetate film.

The first part of the surgery was the administration of infiltration anesthesia with 4% articaine hydrochloride and 1:100,000 epinephrine into the bottom of the sulcus of tooth #21 using an electronic anesthesia machine (Morpheus). Additional anesthesia was administered to the branches between the nasopalatine and the greater palatine nerves, and completed with mucosal anesthesia.

After positioning the surgical guide, the socket was perforated to prepare the bone bed to receive the implant (Fig 4). A paralleling pin was placed in the surgical socket to assess the three-dimensional positioning of the implant (Fig 5). Perforation was performed

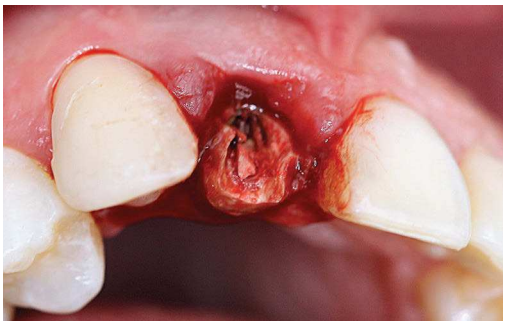

Figure 2. Tooth #11 and its root fractured into two fragments.

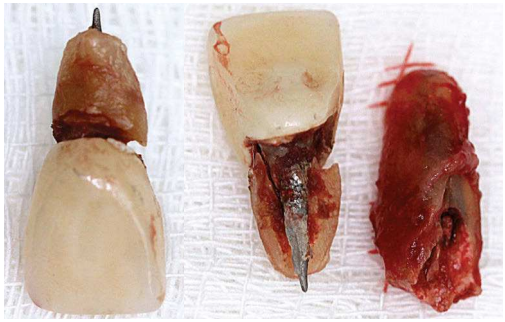

Figure 3. Tooth # 11 after extraction.

Figure 4. Surgical guide positioned for three-dimensional implant placement.

Figure 5. Paralleling pin already in place.

so as to position the paralleling pin along the incisal edge of teeth # 21 and #12 (Fig 6).Implant positioning was previously determined according to the type of fixation of the prosthesis to be installed, a cemented prosthesis.

Subsequently, the implant was placed at 40 rpm (Fig 9). In this clinical case, an Axiom Anthogyr Ø 4.0 x 14.0-mm Morse taper connection implant was used (Figs 7, 8).

The gap formed between the implant and the tooth socket was filled with Extra Graft XG 13, an osteoconductive biomaterial composed of bovine hydroxyapatite and type I collagen (Fig 10). Sutures were not necessary, as the flapless technique was used for immediate implant placement.

After the surgical phase, the prosthetic phase was initiated: an Anthogyr abutment (4 mm diameter, 7 degrees inclination and 3 mm transmucosal length) was screwed onto the implant (Fig 11). The temporary tooth, previously manufactured in acrylic resin according to implant shape, function and esthetics, was then cemented. The abutment screw orifice was sealed with 2% chlorhexidine gel, Styrofoam and light-curing resin (Fig 12).

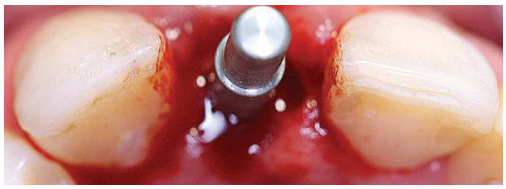

Figure 6. Occlusal view of paralleling pin and adjacent teeth.

Figure 7. Axiom Anthogyr Ø 4.0 x 14.0mm implant.

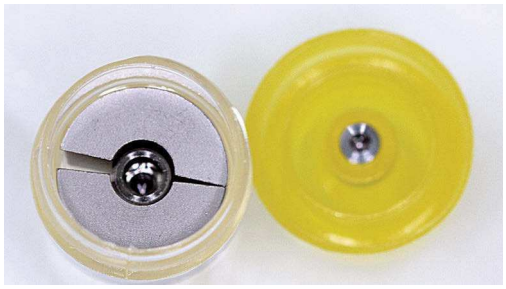

Figure 8. Axiom Anthogyr Ø 4.0 x 14.0mm implant.

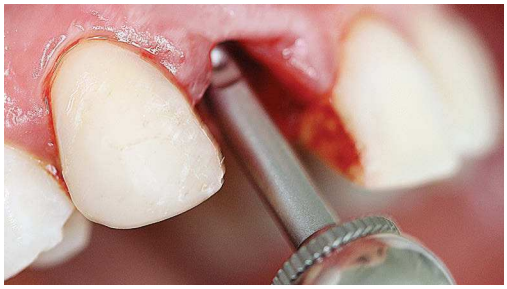

Figure 9. Implant placement.

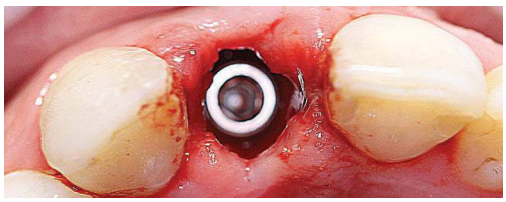

Figure 10. Gap between tooth socket and implant.

Figure 11. Anthogyr abutment (4.0mm / 7 degrees / 3 mm).

To adapt the temporary tooth to the prosthetic abutment, an acrylic resin ring was prepared over the abutment analog.[7] This ring was manufactured by means of the brush-on (Nealon) technique: resin was applied from the cervical to the occlusal region of the prosthetic element, except for the area of the abutment screw, so as to allow the correct placement of the ring over the prosthetic element (Figs 13 to 16). This ring was installed over the abutment already in place, and resin was placed inside the temporary tooth to keep the ring in place. The correct positioning of this set was achieved by placing the temporary tooth inside the surgical guide and taking the whole set to the adequate position in the mouth (Figs 17, 18).

Given that the temporary tooth was manufactured by means of reverse planning, after finishing and polishing, it required minimal occlusal adjustments, which ensured the adequate three-dimensional positioning of this element (Fig 18).

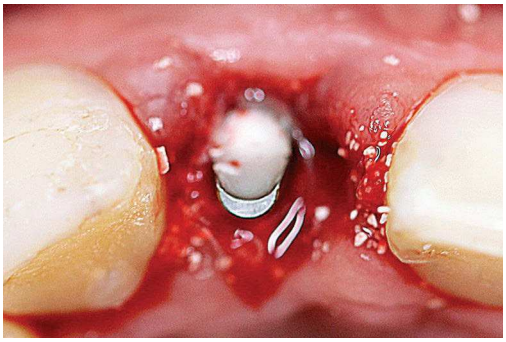

Figure 12. Abutment screw orifice sealed with 2% chlorhexidine gel, Styrofoam and light-curing resin.

Figure 13. Beginning of resin ring manufacturing using the Nealon technique.

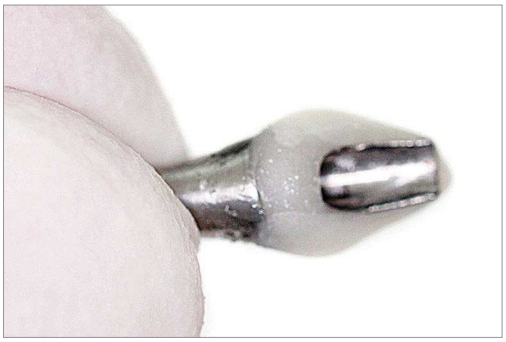

Figure 14. Resin ring with opening in the area corresponding to the abutment screw.

Figure 15. Resin ring manufactured over abutment analog.

Final treatment results should be predictable when substantial esthetic rehabilitation is planned,[7] in which case reverse planning plays an important role, as it simulates the end result before the patient undergoes any procedure. This planning is based on an initial evaluation conducted according to a careful clinical analysis of imaging studies and models mounted on articulators, as well as on diagnostic waxing[8]. This sequence of procedures enables the patient to visualize treatment plan, and the dentist to ensure predictability of treatment results. Together with reverse planning, the Morse taper connection implant, chosen to treat the case reported herein, also contributed to treatment success.

The Morse taper connection favors the stability of soft tissues around the implant, and provides better biological sealing between the implant and the abutment, which results in less bacterial infiltration[9]. Another advantage is the fact that it provides greater stability between the abutment and the implant, which reduces the need for cauterization and, consequently, preserves the health of peri-implant tissues.

The Morse taper connection implant may be subdivided into surgical and prosthetic platforms, whereas in other connections both platforms are very close to each other. This characteristic allows it to be placed according to the patient's

Figure 16. Temporary tooth positioned inside the surgical guide.

Figure 17. Temporary tooth inside the surgical guide and placed in the patient's mouth.

Figure 18. Adequate three-dimensional positioning of the temporary tooth in relation to adjacent teeth.

periodontal biotype. For example, when the patient has a thin biotype and low bone line, the Morse taper connection implant should be used to ensure that the prosthesis has a satisfactory emergence profile.[7]

The patient reported herein had an intermediate profile, but, as esthetic demands were high, the implant was placed 3 mm subcrestally (Fig 19). Moreover, the depth at which the surgical platform was placed was determined according to the type of prosthetic element to be used and the periodontal biotype, so that the resulting emergence profile was adequate.

Other factors of great importance in selecting the prosthesis were as follows: the inter-occlusal space, between the implant of tooth # 11 and the opposing tooth; and sufficient thickness for the placement of metal, opaque, ceramics and its texture. These dimensions may be measured by checking the space between the prosthetic abutment already in place and the surgical guide, which should be at least 4 mm.

The characteristics of the final ceramic crown, such as thickness, size, fit and esthetics; should coincide with the temporary tooth, since the latter is the prototype of the future prosthesis.

Finally, after placing the temporary tooth and fitting the emergence profile, adjacent tissues have to be conditioned to ensure repair — even if secondary — and their stabilization in the long run. In the case reported herein, the temporary tooth was placed inside the surgical guide and taken to the mouth, which ensured proper fit and adequate three-dimensional positioning.

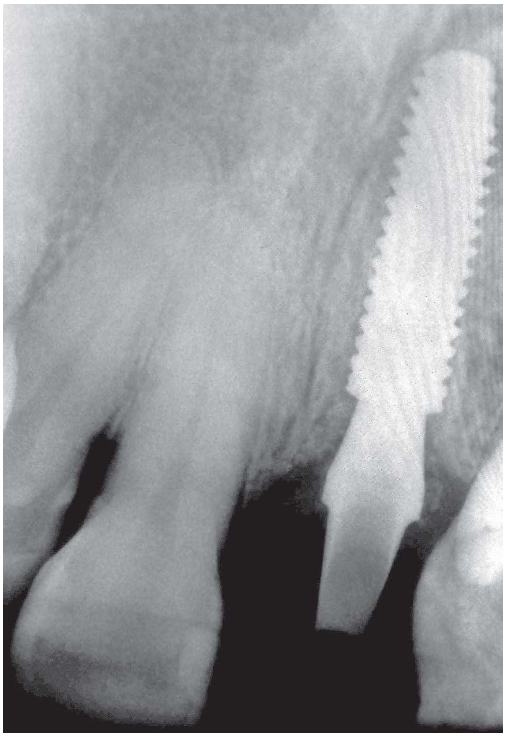

Figure 19. Implant placed 3 mm subcrestally.

CONCLUSION

Planning in Implantology is not limited to achieving correct three-dimensional positioning of an implant, but also to placing it at a position that ensures a viable prosthetic solution, combined with an efficient connection and an optimal esthetic performance. Such results are possible when using reverse planning, since it predicts prosthetic results and provides restoration of esthetics, form and function, thus ensuring dentist's safety and patient's satisfaction.

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