

Specificities of Canine Replacement by an Implant Supported Crown

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Introduction

In the 1980s, the work of Professors Bräne mark and Schroeder led to the introduction of a new surgical technique: implantology. In the beginning, the position of the implant depended mainly on the available bone volume. Successful treatment was based solely on osteo integration. In a few years, the reliability of this therapy has allowed the treatment from single tooth replacement to full-archrestoration, thus paving the way for an additional requirement: an aesthetic integration. Consequently, the position of the implant had to coincide with the future prosthesis. We moved from an implant ology paradigm guided by bone anatomy to implant ology guided by prosthetic requirements. When it concerns a canine replacement, both functional and esthetic requirements are considered. In fact, the replacement of a canine tooth by an implant will, in its neuro physiologic consequences, exchange a protection system based on the presence of periodontal membrane receptors with one that depends on an implant ankylosed in bone that can transmit only feeble information to be filtered by sensitive superior ganglia. A bonded bridge on lateral incisor and first premolar can be a temporary solution during peri-implant bone healing, it requires a reversible tooth preparation limited to enamel.

Case Presentation

A healthy 50-year-old patient, was referred to the fixed prosthodontic department to replace her missed canine # 23 with an implant-supported prosthesis. The patient reported that the # 23 was impacted in a high and horizontal position and the deciduous tooth was in arch showing a high mobility that led her dentist to extract them. Following the extraction, the dentist placed a bonded metal-ceramic bridge with palatal wings on the # 22 and # 24. The clinical examination showed that, the bridge was partially debonded and the patient declared that it debonded frequently (Figure 1).

The patient has good oral hygiene with effective and regular brushing three times a day.

The edentulous ridge is thin in the bucco-lingual direction while the mesio-distal space was sufficient (7 mm) by measuring it in the mouth using a graduated periodontal probe. Contacts areas included in the functional guide (anterior and lateral guide) were the replaced canine, first and second premolars. The space included between the edentulous ridge and the antagonist tooth suitable for a sufficient height of the #23.

The panoramic view confirmed the absence of any impacted tooth, and showed a good healing of post extractional site. Scanner was used to measure the available three dimensional bone quantity and assess the bone thickness available at the site of the canine (Figure 2). As result, 7 mm was present in the mesio-distal direction and 5 mm in the bucco-lingual direction.



Figure 1: Initial intraoral view.

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Figure 2: Scanner showing the coronal section of the residual crest.

The thickness as well as the residual height of the crestal bone were in favor of an implant supported prosthesis. The dimensions of the corresponding implant were 10 mm of length and 3,5 of diameter to support a future metal-ceramic crown after osseo integration.

During the surgical phase, a total thickness flap was removed in order to position the implant in the optimal position. The shoulder of the implant was placed at a depth of 3 mm apical to the buccal and cervical aspect of the prospective clinical crown to provide soft tissue to develop an adequate emergence profile.

After checking the good primary stability, the cover screw was placed and the flap was repositioned and sutured.

The bonded bridge has been reshaped in front of the implant not to compromise osseo integration and to allow good hygiene control, while maintaining aesthetics. The excess of the cement has been carefully eliminated (Figure 3a, 3b).

The patient was given antibiotics (Clamoxyl 500 mg for 7 days) and was instructed to rinse daily with 0,12% Chlorhexidine.

Two weeks following surgery, the sutures were removed. Proper mucosal healing was checked. The patient was advised again for adequate hygiene protocols.

After checking the osseo integration around the implant, clinical assessment was in favor of a good stability with out any symptoms



Figure 3a, 3b: Bridge temporarily seated after being reshaped in front of implant site.



Figure 4: Periapical radiograph showing a good healing bone around the implant.

and peri-apical examination confirmed the absence of trans lucency around the implant (Figure 4).

The cover screw was removed and the healing abutment was placed to create a peri-implant mucosa, shaping adequate, room for the emergence profile of the future restoration.

The impression was made using a modified tray where it was perforated in the site of the canine #23, with high and low viscosity silicone using pick up technique (direct technique) (Figures 5 and 6).

The impression of the antagonist arch was made with alginate, the two impressions were sent to the laboratory with a straight titanium prosthetic abutment (the implant was well trimensionally positionned and didn't require any axial modification), 3 mm high (corresponding to the height of the peri-implant gingiva).

After casting of the impression, the abutment was fixed on the working cast and modified by the laboratory technician to properly respond to the clinical situation. The frame work was intra orally tried, the procedure included removing the healing abutment followed by placing the prosthetic one. An X-ray control was performed to check the perfect abutment-implant adaptation. Then, the the space necessary for the crown was asses sedall around the abutment (Figure 7). The following step was to check the fitting of the frame work regarding its passive insertion on the prosthetic abutment. The spaceleft for the cosmetic ceramic was enough. This step was completed by aradiographic control of the marginal fit (Figure 8).



Figure 5: Impression coping screwed up.

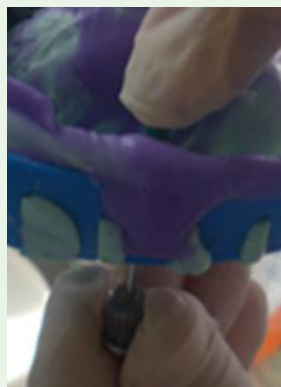


Figure 6: Implant analog placed with due care.



Figure 7: Prosthetic abutment on the implant.



Figure 8: The frame work is tried in the oral cavity.

After veneering, the ceramic is tried intra-orally to assess the esthetic outcome in terms of color and shape of the crown. Contact surfaces and their intensity are proportional to adequate creation of prosthetic embrasures which should allow the correct practice of hygiene habits.

The occlusal areas included in the dynamic trajectory were adjusted in favour of an appropriate functional guidance.

After glazing ceramic, the prosthesis was intra-orally checked. A final and well controlled screwing of the abutment was carried out using the torque ratchet. Before sealing, the crown using poly-carboxylate, the head of the screw should be covered by a cotton (Figure 9). Due care must be given to the elimination of cement excess not to initiate any inflammatory process. This had to be confirmed by a peri apical radiograph.



Figure 9: The seated implant supported crown.



Figure 10: Final view.

The constraints exerted on the implant must be minimised. In this case, it is an implant supported single crown, so the occlusal concept of implant protection is followed especially that it concerns maxillary canine antagonistic to a natural tooth (Figure 10).

Indeed, the palatal faces of the # 22 and the # 24 were excessively prepared to receive the bonded bridge which would create a problem of hyper sensitivity. We opted for two onlays on the # 22 and # 24 to free the occlusal loads on the crown support implant and to protect the exposed dentine.

In static occlusion: the concept of differential occlusion is adopted: absence of contact in centric occlusion, and slight contact on the implant-supported prosthesis in tight centric occlusion.

In dynamic occlusion, contacts are avoided on the # 23 and the occlusal load is supported by the natural teeth with a slight contact located on the free edge of the canine at the end of the dynamic path (# 22 and # 24) to accomplish a satisfying esthetic and functional outcome.

Discussion

The replacement of a canine with an implant supported crown has many specificities as it concerns the replacement of a system of protection based on periodontal reception by ankylosed system in the bone and transmitting only weak and filtered information to the sensory nuclei [1]. In addition, the canine influences mandible movements and thus the importance of its role in occlusal concepts. Therefore, its replacement by an implant supported prosthesis must be well conducted [2].

The implant surgery took place in two steps. This protocol was chosen for aesthetic reasons, in order to better manage the papillae

and to better prepare the emergence profile of the prosthesis. In addition, osseointegration occurs in the absence of the oral flora. The absence of early loading prevents the risk of fibro-integration. Finally, this so-called conventional protocol has been proved to be successful, with significant success rates and clinical decline [3,4].

During healing, in order to obtain osseointegration despite the forces exerted on the implant, it is necessary to keep the micro movements below the threshold of tolerance of the implant in question. To do this, the stresses exerted on the bone / implant interface must be optimized [5].

In this case, exploring the old bonded bridge was a useful temporary fixed solution without parasitic micro movements, making it possible to manage the soft tissues by the reshaping at the gingival face of the pontic which has been modified for a better hygiene control by the patient and to release the site of any constraint. This technique also has an aesthetic advantage as it is included in the patient's smile [6].

This bonded bridge consists as a waiting solution for replacing the canine with a supra-implant prosthesis in the future. In general, pre-implantation bonded bridges don't require mutilating preparation of the palatal faces of the support teeth in order to maintain reversibility [7,8].

However, the patient consulted with prepared areas with dentine exposing, the # 24 palatal cuspid was prepared, with a sensitivity of the two teeth. The patient expressed a discomfort related to localized hypersensitivity of these teeth.

To restore the lateral incisor and the first premolar as well as to unload the implant supported crown, two onlays were bonded to the palatal faces of the # 22 and # 24. These onlays were manufactured using the indirect CAD / CAM technique on lithium disilicate blocks, this ceramic combines high strength [9] and better aesthetics which increases the predictability of possible results of restorations using the CAD / CAM technique [10].

Concerning the occlusion, a functional anterior guide was restored. In lateral mandibular excursion, and since the implant is antagonistic to a natural tooth, the group protection was more adequate to induce the protective response of the upper centres [11].

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