Immediate implant placement in canine region using root membrane technique with follow up 2 years case report

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A B S T R A C T
Following tooth extraction the underlying bone would undergo a lot of a remodeling phases leading to horizontal and vertical bone loss especially in the anterior teeth which results in loss of buccal plate of bone. The presence of sufficient thickness of buccal bone is essential for preservation of natural look and installed implant. A technique was introduced to preserve the sufficient thickness of buccal plate in the anterior region known as root membrane (root shielding). This technique would aim to preserve the root periodontal ligament intact with the root to preserve the buccal plate of bone and prevent the ridge from collapsing thus achieving an esthetic appearance. This technique would Section of the teeth in two halves buccolingually, leaving the buccal fragment of root intact and then placing the implant lingual to it.

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1. Introduction

Recently esthetic have a great demand especially in patients restoring anterior teeth by dental implant. The main target for any dental implantologist is to achieve the highest esthetic result together with achieving successful osseointegration, Implant dentistry has become a prosthetically driven procedure.

Installation of dental implant in the anterior region is very challenging. Many surgical techniques utilizing a variety of loading protocols were introduced to improve the success rates of implants installed in the anterior region both esthetically and functionally [1,2]. Guided bone regeneration [3], Using membrane [4], preservation of papilla technique [5,6], are some of the surgical techniques used in the anterior region to reach to optimum esthetics. Schulte and Heimke in 1976 [2] used an Immediate implantation protocol in a fresh extraction socket.

A New technique was introduced by Hurzeler, 2010 [7] aims to sectioning the teeth buccolingually leaving the buccal fragment of root intact and implant placement lingual to it [7]. The main idea that to preserve the periodontal ligament in contact with the root to preserve the buccal plate of bone that prevent the ridge from collapse thus achieving the natural look of anterior teeth [7].

2. Case report

A 49 year old healthy male patient was referred to the outpatient clinic—Prosthodontic Department—Cairo University. The patient was suffering from loss of all posterior teeth in the upper right area with a remaining root in the canine area. He was seeking to have a posterior bridge to restore the lost posterior teeth (Fig. 1).

Primary upper and lower impression was taken to produce diagnostic casts. Then a maxillary face bow was used to mount the upper cast, and a centric relation record was used to mount the lower cast on a semi adjustable articulator. A diagnostic set up of teeth was made on the upper cast, and then later a radiographical stent was fabricated. The radiographic stent had a radio-opaque material corresponding to the area of implant installation. A CBCT was then carried out with the radiographic stent.

From CBCT, it was found that remaining root of the canine was of 12mm length and a pneumatized sinus on both sides (Fig. 2). The treatment option was discussed with the patient for open sinus lift but he refused thus the choice to have a short dental arch treatment option by placement of two dental implants; one implant installed in the second premolar area and an implant installed in the remaining root in canine area using a socket shielding technique.
2.1. Socket shielding technique

First the remaining root was sectioned mesio-distally using along fissure carbide bur. Conservative extraction of the palatal root fragment was carried out with periotome and forceps (Fig. 3), leaving the buccal part of the root intact plate intact (Fig. 4). After extraction of the palatal root, preparation for implant placement was carried out by drilling following the drilling sequence following the manufacturers instruction. The implant installed was of 14mm length and diameter of 3.7. The installed implant was palatal to the remaining buccal fragment.

2.2. Installation of an implant in the second premolar area

And other implant was installed of 10mm length and diameter of 4.5 in the second premolar using pyramidal flap and sequential drill using same type of implant (Fig. 5). A delayed (conventional) loading protocol was followed. After 4 month from implant installation, the patient was recalled and a healing abutment was screwed in the implant installed in the canine area following a socket shielding technique. For the implant installed in the second premolar a secondary stage surgery was carried out, then a healing collar was screwed to the implant. A final impression was carried out after 10 days from the placement of the healing abutment. After ensuring of proper healing, the healing abutment was unscrewed, and the transfer coping was screwed to the two implants; the canine and the second premolar area. A closed implant level impression was carried out, after setting of the impression material it was removed from the patient mouth and an implant analogue was screwed to the transfer copings. The impression was poured with extra hard stone, and then the transfer copings were unscrewed and the abutments were screwed and prepared to be parallel to each other. Metal try in was carried out then cemented porcelain fused to metal splinted crowns (fixed partial denture) were cemented. After delivery of the porcelain crowns a CBCT was made at the day of delivery, the patient was then followed up for 2 years, having a CBCT annually. The CBCT was used to monitor the bone height changes around the four surfaces of the implants; buccal, lingual, mesial and distal (Figs. 6 and 7) and the change in bone was observed to be 1mm resorption With no difference in clinical picture (Fig. 8).

3. Discussion

Implant installation in the anterior region has been very challenging for both the dentist and the patient. To reach to optimum esthetic results would require the availability of sufficient bone height and width in this region. In many cases resorption of the buccal plate of bone is very common in this region due to several
reasons; traumatic extraction, teeth that have been extracted long time ago and bone has undergone a lot of remodeling resulting in resorption. Many solutions have been offered to increase bone height and width in the anterior region as Guided bone regeneration [3]. Using membrane [4], preservation of papilla technique [5,6], all of these techniques have proved to be reliable treatment options but they have some disadvantages as to increase number of surgical site, operation number, wait of healing and success rate.

In order to overcome all of the disadvantages of such surgical techniques a recent conservative technique introduced by Hürzeler [7] aims to preserve the buccal plate of bone by sectioning of the teeth bucco-lingually, leaving the buccal part of the root to maintain the buccal plate of bone. The results of this case report is consistent with the report by Hürzeler and coworkers, that root shielding achieved successful osseointegration without loss of the buccal plate of bone [7].

Salama and coworkers reported on preserving the entirety of the attachment apparatus as well as complete preservation of the alveolar ridge when developing pontic sites beneath fixed partial denture 9 [8]. This technique typically decorates the tooth at the bone crest or preferably 1 mm above it so as to preserve the supracrestal fibers with epithelial and connective tissue attachment.

The intentional preservation of the buccal part of the root fragment has shown decreased bone changes at the implant area [9]. Hurzeler reported that no restorative process could be noticed on the buccal plate of bone related to the remaining part of the root fragment [7]. These findings can be explained as no bone remodeling would take place in the remaining the buccal compartment of the periodontal ligament (PDL) and the coronal soft tissue demonstrated a physiologic junctional epithelium also free of any inflammatory response. Another explanation for such results is that one of the main factors contributing to post-extraction buccal plate resorption is the reduced blood supply [10], but in this case the presence of the buccal root fragment would help to maintain the blood supply thus reduce the rate of resorption. The blood supply from preserved PDL seems to be one of the main etiological factor in the dimensional stability of the hard and soft tissues. Animal studies showed that a healthy periodontium is preserved in the area of the root fragment, with a healthy PDL remained between
the bone of the alveolar process and the root fragment [9,10,11]. Also recent Histological studies showed new bone synthesis in between a small area between implant and the tooth fragment [10].

In spite of this histological studies on root shielding technique, along term clinical studies are required so in this article authors mentioned bone changes after 2 years Also Cherel & Etienne also reported amidification of root shielding to preserve papillae [12].

But it should be noted that ther is no absolute preservation. A mean of 1 mm horizontal loss after final restoration also Chen and coworkers reported 0.72 mm of buccal resorption [13,14].

There is increasing evidence in the literature reveals a widespread use of this protocol. Due to providing dimensional stability in addition to the preservation of the dentogingival fibers by reservation of PDL the retained root fragment seem to increase soft tissue by preservation of the mucosal zenith [15].

4. Conclusion

It was clearly shown that socket shield technique with immediate implant placement preserves the buccal cortical plate, and healthy peri-implant tissue has been observed during 2 years follow up.

Also it is case report and cannot give a strong clinical evidence but it can generate hyposis and give such promising results with that technique Moreover, this technique has clinical and social implication concerning minimally invasive procedures with minimal surgical procedure and Cost is another factor which needs to be considered that reduce bone substitute material and so this technique will be incorporated as a routine procedure in ridge preservation.

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Conflict of interest

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References