

Immediate Implant Placement in Anterior Extraction Sockets using a Synthetic Putty as Graft: A case series

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Abstract: Aim of this case series is to show that synthetic putty as a graft material gives great results in direct implant placement in extraction sockets in the anterior maxilla. Synthetic putty in 1-phase, 2-phase and direct loading cases is a valid alternative for grafting with xeno- or allograft materials.

Keywords: Immediate implant placement, bone grafting, synthetic putty, immediate loading, extraction socket.

Introduction

In the 1980's implant placement in extraction post extraction sockets has been introduced[1]. For more the two decades, the clinical protocol for immediate anterior implant placement into fresh extraction sockets has evolved from a two-stage protocol to a one stage protocol – often flapless. Sometimes with an immediate provisional restoration placed at the same appointment[2].

Most changes in ridge contours happen during the first 12 months post-extraction were predominantly horizontal and more pronounced buccally then lingually[3]. The buccal bone plate is more susceptible to resorption then the lingual plate, due to its thickness[4] . CT scan in 250 patients have showed anterior facial plate thickness ranges from 0.3-1mm with about 50% of the wall thickness is less than 0.5 mm. This suggests that for many patients' extraction of an anterior maxillary tooth will result in loss of the entire buccal plate, changing the ridge contour a lot[5]. The location of the implant, the thickness of the buccal bone crest, and the size of the horizontal buccal gap can significantly influence changes in bone crest after tooth extraction[6].

The mere implant placement into a fresh extraction socket cannot prevent crestal remodeling. However, filling the void between the extraction socket wall and the implant with mineralized collagen bone substitute provides additional amount of hard tissue healing at the entrance of the socket and improved the level of marginal bone- to-implant contact[7]. Immediate loading with a provisional prosthesis is possible, provided that it does not disturb implant osseointegration if the loading forces are well-oriented, and the implant has satisfactory primary stabilization[8].

In these cases, a dental putty can also be used to fill the buccal gap. The dental putty used in these cases is composed of a calcium phosphate silicate trapped in a carrier, it is a bioactive regenerative material that not only acts as an osteoconductive scaffold, but also interact with the surrounding tissues and imparts an osteostimulatory effect⁽¹⁾ The material is ready to be used, and has a transient hemostatic effect designed to provide a comfortable environment for the clinician to work with. It has a great retention and can adapt to the

defect shape[9]. Most studies indicate that 80-90 percent is absorbed within 4-6 months, while regenerating bone at the same time. The putty has consistently proven to regenerate bone when used for socket grafting, grafting of periodontal defects or in crestal sinus lift procedures[10,11,12,13,14].

Case presentation

A series of 8 patients presented themselves with single teeth that needed replacement with implants in the maxilla.

Materials and Methods

8 patients were selected for this case series between the age of 42 to 79 years old. All Patients received 2g Amoxicillin and 600 mg Ibuprofen 1 hour before surgery. Chlorhexidine mouth rinse was used 60 seconds before surgery. Surgery was performed using local anesthetics (Ultracain-DS forte).

The protocol of Goene and van Daelen[15] was followed, a flapless atraumatic extraction technique is essential for any anterior maxillary tooth for which immediate implant placement is being considered. After the tooth has been removed, the integrity of the labial plate should be verified with a periodontal probe.

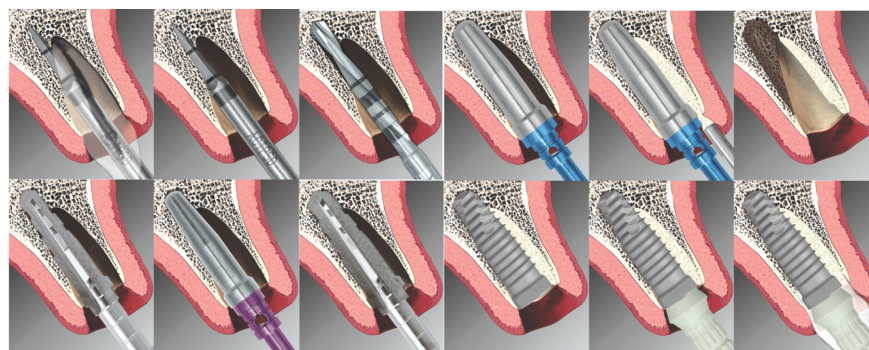


Fig. 1, Schematic overview of protocol

After preparation Biomet 3i ⁽²⁾ implants were placed. All cases were grafted with NovaBone ⁽¹⁾ putty 0.25ml using a locator to separate the putty from the preparation. A Peek healing abutment ⁽²⁾ was used and the temporary crown was made with Protemp 3 ⁽³⁾

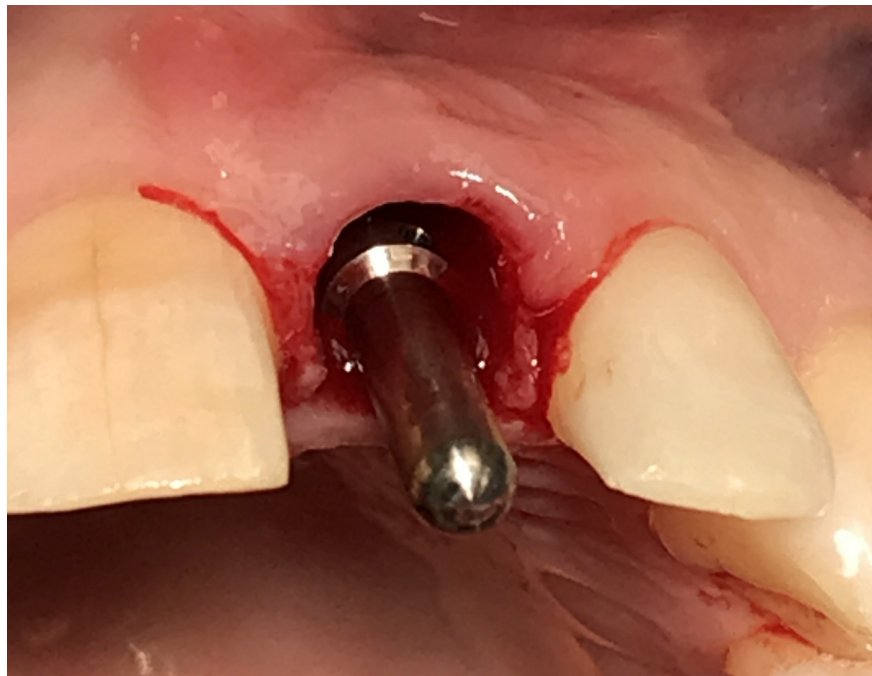




Fig. 2, 3. Placement of direction indicator and application of synthetic putty and temporary crown.

The 1-phase patients received a healing abutment since esthetics was not important for them, and a Bioplug⁽⁴⁾ was used to cover the buccal gap. The 2-phase patients received a Osseoguard flex⁽²⁾ completely covering the implant and extraction site. An example of each of the three methods will be shown below.

Immediate loading

The first patient is a 60-year-old healthy female. A 4mm(w)x3.4mm(p)x13mm(l) implant was placed with a 35Ncm Torque. The definite crown is placed 4.5 months later.



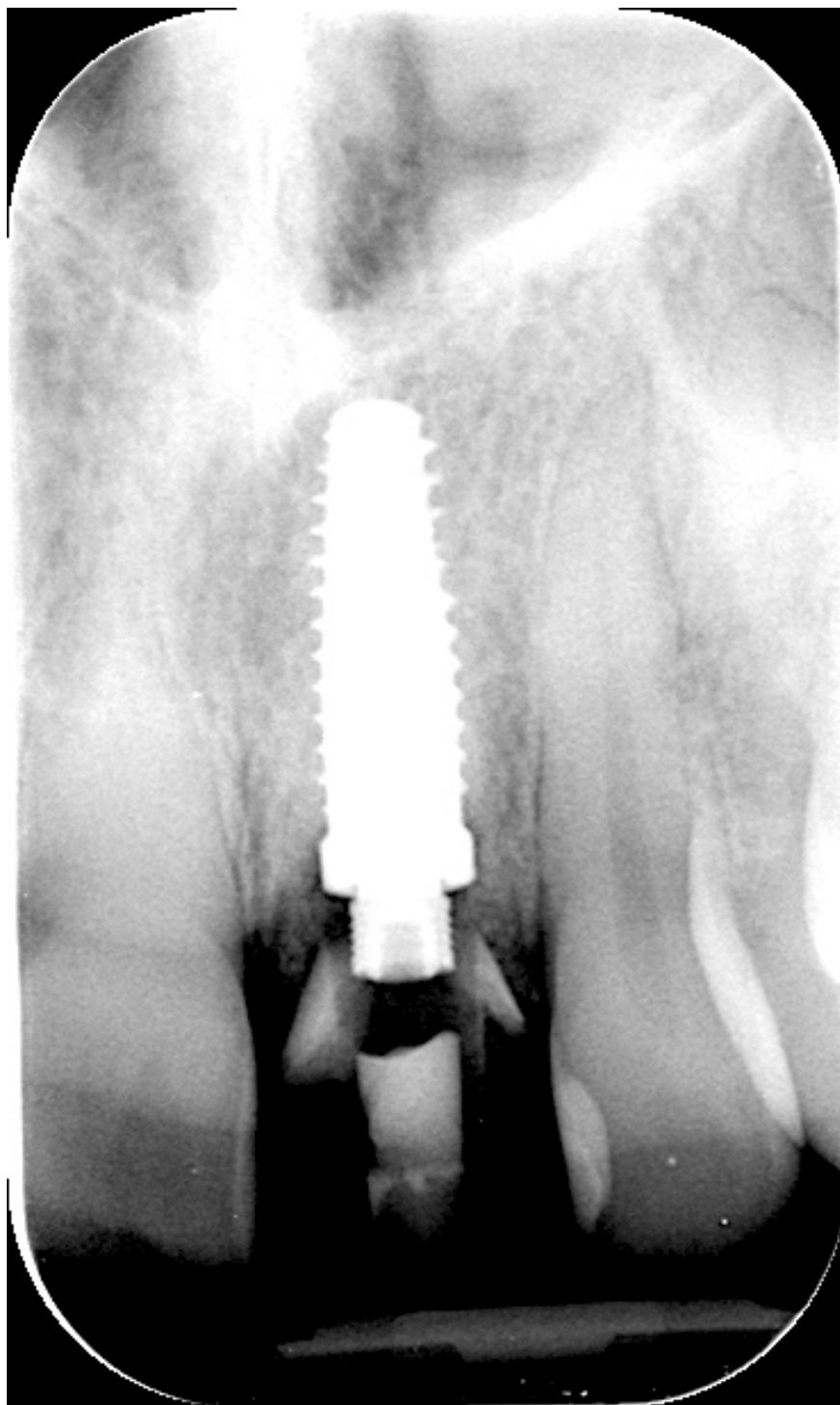


Fig.4, 5. Situation before treatment and implant placed

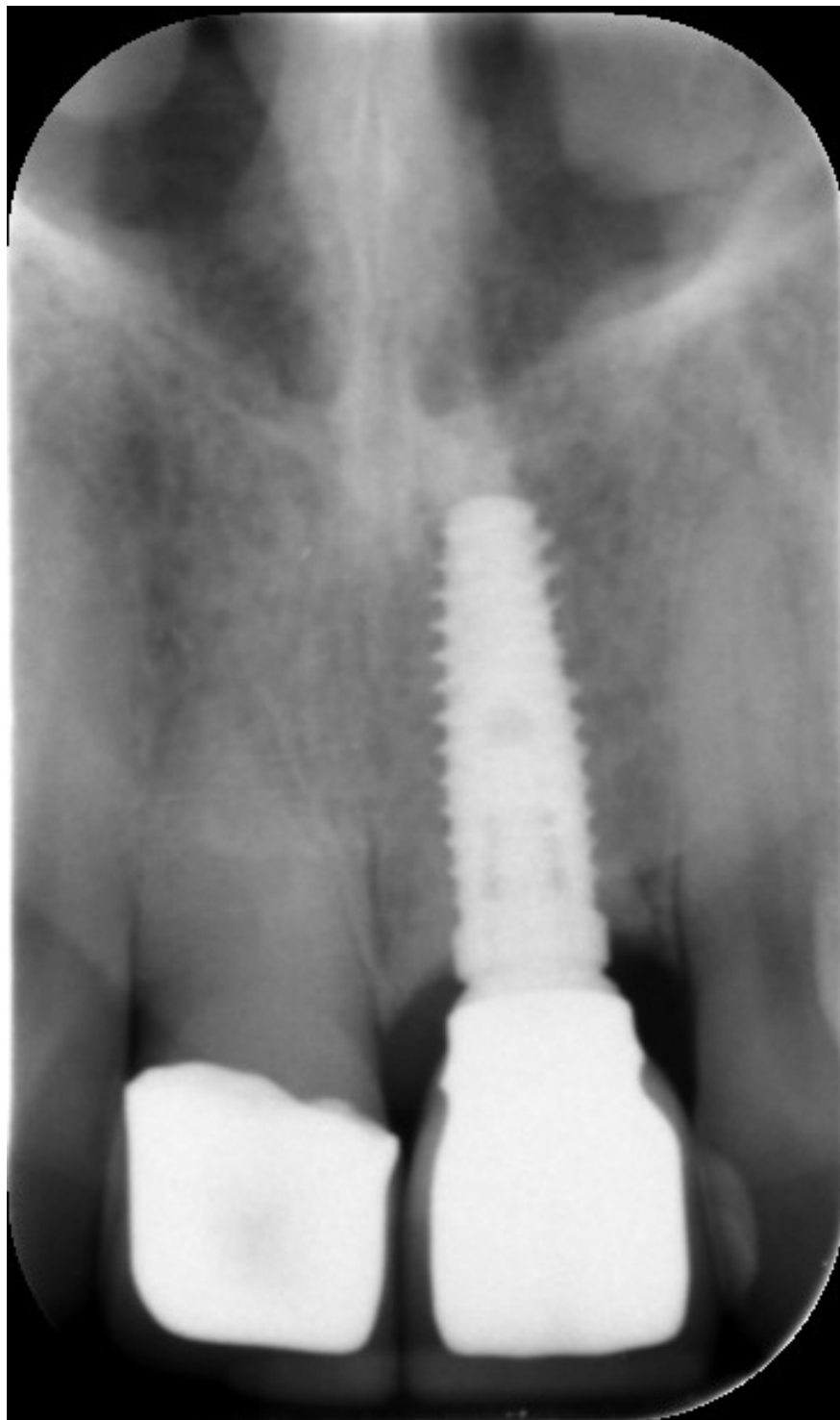




Fig. 6, 7. 3.5 years follow-up

1-phase

This patient is a 53-year-old male with no medical history. A 4mm(w)x3.4mm(p)8.5mm(l) implant was placed with a 35 Ncm Torque very close to the maxillary sinus. The definite crown is placed 5 months after implant placement.

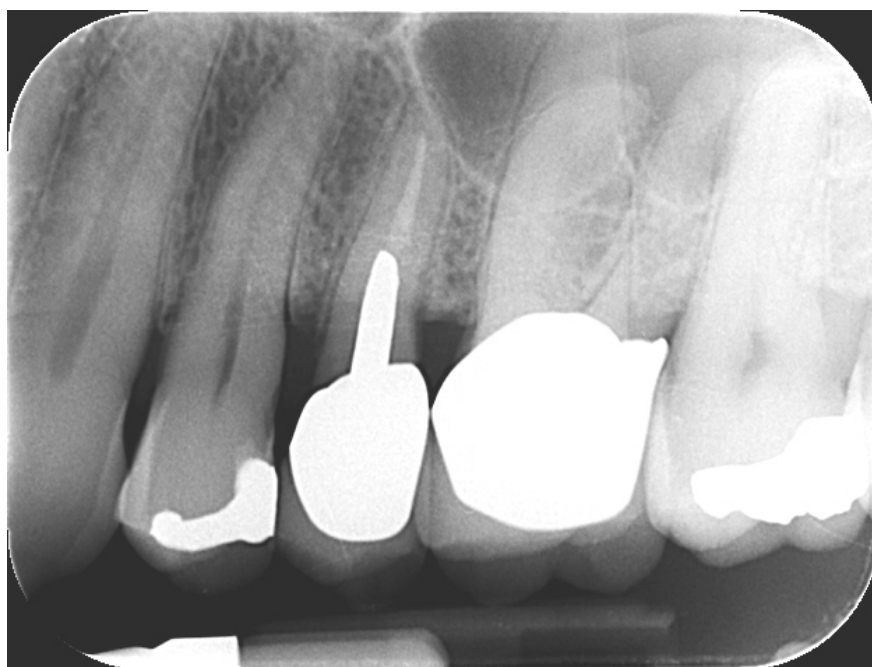




Fig. 8, 9. Situation pretreatment, Implant placement





Fig. 10, 11. 24 months follow-up

2-phase

The 8th patient is 72 yr. old male, without medication. After extraction a big bony defect presented itself, which was fully excavated, and a Biomet 3i implant 5mm(w) x 4.1mm(p) x 10mm(l) was placed at a 25Ncm Torque. Because of the low initial stability, a 2-phase protocol was followed. The putty was placed to fill the defect. After 3 months the healing abutment was placed. The crown was placed after 9 months, since the implant stability was not sufficient after placing the healing abutment. As a provisional the patient received a partial single tooth prosthesis.

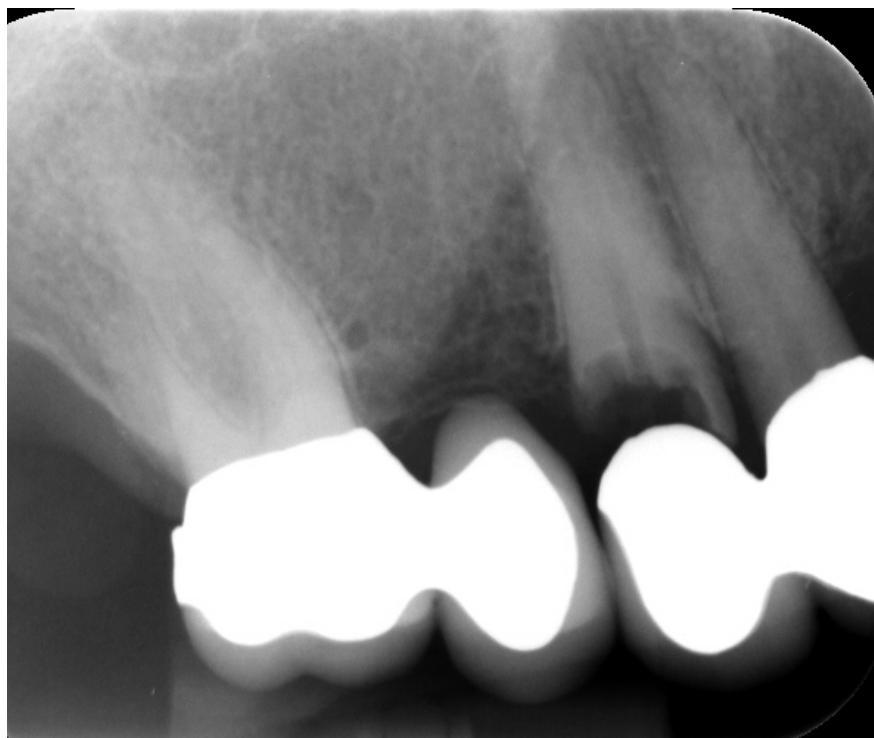
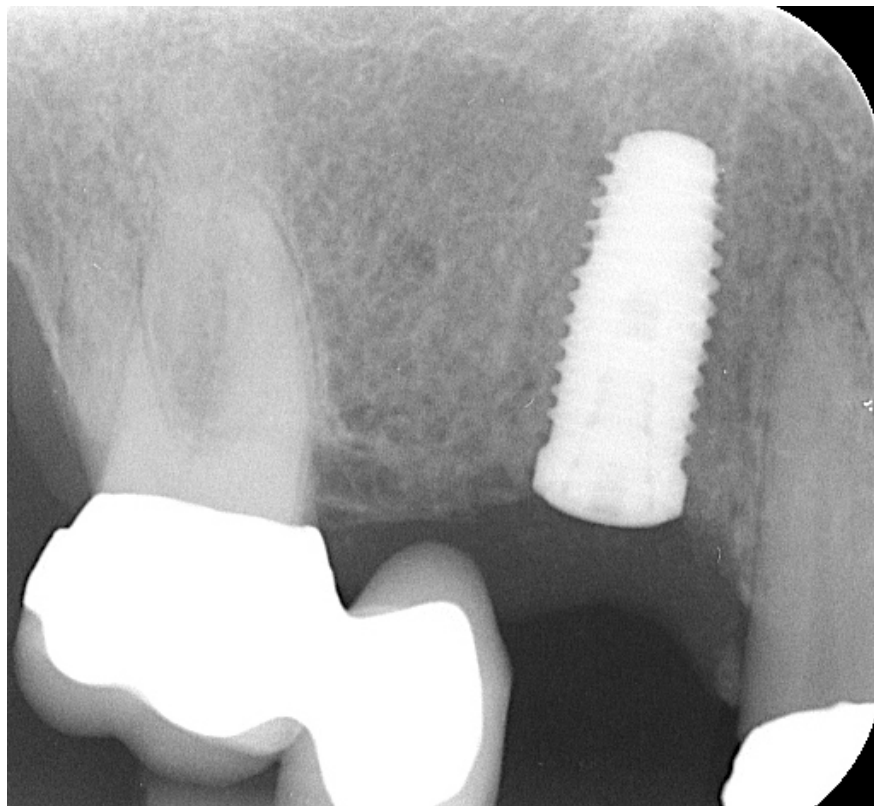


Fig. 12, 13. Clinical situation and implant placement



Fig. 14,15 . 16 months Follow-up showing nice pink tissue and bone level

Results

The results of the 8 patients were evaluated with Pink Esthetic Score (PES). The PES is a tool evaluating the esthetic appearance of the soft tissue around single tooth implants. Each variable is assessed with a

2-1-0 score, with 2 being the best and 0 being the lowest, which results in a maximum score of 14. The PES can change over time and therefor is a useful tool for monitoring long-term soft tissue alterations [16].

Before treatment	Immediate loading			1-phase		2-phase		total
case	1	2	3	4	5	6	7	8
Mesial papilla	1	1	1	1	1	1	0	0
Distal papilla	2	1	1	2	1	1	1	0
Level of soft tissue margin	2	2	2	2	2	2	2	2
Soft tissue contour	2	2	2	2	2	2	2	2
Alveolar process	1	2	2	1	2	2	2	2
Soft-tissue color	2	2	2	2	2	2	2	0
Soft tissue texture	2	2	2	2	2	2	2	0
PES total	12	12	12	12	12	12	11	6
								89
After treatment	Immediate loading			1-phase		2-phase		total
case	1	2	3	4	5	6	7	8
Mesial papilla	2	1	1	1	1	1	0	0
Distal papilla	2	1	1	2	1	1	1	0
Level of soft tissue margin	2	2	2	2	2	2	2	2
Soft tissue contour	2	2	2	2	2	2	2	2
Alveolar process	1	2	0	1	2	1	1	1
Soft-tissue color	2	2	2	2	2	2	2	2
Soft tissue texture	2	2	2	2	2	2	2	2
PES total	13	12	10	12	12	11	10	9
Difference	1	0	-2	0	0	-1	-1	3
								0

Table 1.

Discussion

Proper patient selection, atraumatic tooth extraction, palatal implant placement coupled with bone augmentation and careful prosthetic management are all important components in immediate implant placement[15,17,18].

Difference between thick and thin biotypes is not significant, since implants positioned buccally showed three times more recession than ones with a lingual shoulder position[6].

Placing a Bone graft and provisional restauration at the time of anterior tooth extraction increases both the vertical and labial-palatal dimensions between 0.5-1mm, as compared to not placing a bone graft nor a provisional restoration at the time of flapless immediate post-extraction[19].

All implants placed in extraction sockets without flap elevation showed some negative contour change, however it was minimal compared with studies that elevated full periosteal flaps to extract teeth[18]. The smallest amount of facial-palatal contour change was achieved using bone grafting of the extraction socket at the time of implant placement and stabilization of the graft either by placing a contoured healing abutment or a custom-contoured provisional restoration[18]. A recent study shows minimal soft tissue changes in the horizontal and vertical dimension at single tooth immediate implant placement and provisionalisation in fresh extraction sites in the esthetic zone[8]. The most important feature of this provisional is the transmucosal area which creates an emergence profile for the final esthetic result[17].

The absence of a filler material can contribute to shortening of the marginal gingival margin compromising the aesthetics in immediate implants, especially in the aesthetic region. Therefore, it is suggested that less resorption appears when the space is filled with a low resorption biomaterial, such as bovine bone[4]. Other studies show the same, while grafting extraction sockets does not prevent alveolar bone remodeling, it does minimize buccal bone collapse[17,18].

In these cases, a synthetic putty has been used instead of an xeno- or allograft. Synthetic putty's have shown to preserve good ridge dimension and have favorable bone density values for implant placement as compared to Bio-oss[12].

In these cases, you see a slight decrease in the PES score that can be explained, due to slight sub-crestal implant placement, and case number three had a loose temporary provisional, causing some bone remodeling causing the PES to be lower. Case number 8 had inflamed gingiva due to caries activity, healing perfectly

after the treatment, causing a higher PES score. In the end there was no difference in PES score before and after treatment (both 11 with 14 being the maximum score), showing nice results overall.

Conclusion

These case studies are different from the others because of the use of a synthetic putty, and to the best of my knowledge no other article has been written about this. The procedure is simplified because filling the complete gap is easy due to the consistency of the putty, and easy handling with the cartridge.

More research is required to assess the comparison of immediate placement and a synthetic putty in anterior maxillary cases. These cases show a great result in different treatment protocols, and appear to be a good alternative to auto-, xeno- and allograft bone regeneration and immediate placement.

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(1)- NovaBone Dental Putty, Jacksonville, FL, USA

(2)- Biomet 3i, West Palm Beach, FL, USA

(3)- Protemp 3, 3M ESPE, Seefeld, Germany

(4)- BioHorizons, Birmingham, AL, USA

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