UDK: 616.314-089.843:004.9

A NOVEL TEMPLATE DESIGN FOR IMMEDIATE PROVISIONALIZATION OF ONE-PIECE IMPLANT IN ESTHETIC REGION: CLINICAL ASSESSMENT.

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ABSTRACT:

The use of a cervical contouring concept utilizing a customized provisional restoration to reshape the soft tissue around implants with a main focus on the marginal soft tissue level and the facial zenith position is highly recommended and widely used nowadays. Digital dentistry has its contribution for this part, introducing a customized template "One-piece template" crated by Dr.Ahmed Halim Ayoub., for fabrication of such provisional restoration.

Keywords: Provisional restoration; peri-implant soft tissue; esthetic zone; gingival emergence profile; one-piece implant; template for customization; one-piece template for compressive implants

INTRODUCTION:

An implant-supported restoration in the esthetic zone is considered to be successful when perfectly integrated with the adjacent teeth (1). The extraction may compromise this aim due to the associated changes on both hard and soft tissues that occurs affecting the ridge dimensions (2). Several surgical techniques have been introduced to maintain the volume of the ridge as much as possible or improve it if defective. Furthermore, correct implant-positioning guidelines have been documented to help produce a favorable esthetic outcome (3).

The popularity of immediate loading implants has increased considerably among patients and dentists (4). The advantages of immediate loading are to reduce the number of interventions and time of prosthetic (5). Furthermore, the success of immediate loading is related to the primary implant stability and loading control. Although two-piece implants have shown great success for a long time, the two stages of surgical procedures, the infiltration of bacteria in the microgap between abutment and implant, and the screw fracture after loading, are considered complications that could be overcome by the use of one-piece implants (6). In addition, the one-piece compressive implant allows a minimally invasive flapless surgery which is very well accepted by patients (7).

As important as the surgical phase is the prosthetic phase. In fact, precise prosthetic work is critical to duplicate the adjacent teeth shape and shade, and the time of placement of the restoration affects the buccal ridge contour (8). Therefore, careful and appropriate management of a provisional restoration may help to create the shape of the peri-implant soft tissue so that an ideal gingival emergence profile can be mimicked. Currently, the use of a temporary restoration is a well-accepted means of predictably creating a natural-looking implant-supported restoration in clinical practice (9).

Bichacho and Landsberg (10) recommended the use of a cervical contouring concept utilizing a customized temporary restoration to reshape the soft tissue around implants with a main focus on the marginal soft tissue level and the facial zenith position. Rompen et al advocated the use of a concave transmucosal profile in order to minimize facial gingival recession (11). More recently, Su et al (12) defined two different areas within the transgingival zone based on the response of the peri-implant gingival tissues to abutment/ crown contour modifications: the critical and subcritical contours.

In the second scenario, the aim is generally to place pressure on the soft tissues and guide their remodeling so that the dental emergence profile may be optimized. Depending on the clinical dimensions of the soft tissues, the tridimensional implant position and the timing of placement, temporary restorations may require different shapes (8).

The immediate prosthetic of a one-piece system allows for better tissue healing (13), better adhesion of the gingival mucosa to form a collar which is healthy and adherent to the implant, and avoiding a second surgical procedure (14).

The prosthetic procedure of a one-piece implant enables the physiology of the natural tooth. The one-piece implant enables a borderline preparation following the contour of the gingival margin leading to a better preservation of mucous seal (15). One-piece

immediate loading implants have a survival rate similar to delayed loading implants (16).

Since immediate loading of one-piece implants has become a widely used procedure for rehabilitation of partially edentulous patients, and since there is growing interest in the ideal design characteristics of the supracrestal component of the implant restoration through provisional restorations for immediate or delayed implants, we decided to analyze the effect of immediate custom made provisional restoration to mimic and create the gingival contour required for such cases especially in esthetic zone, using special template “One piece template”, pre-designed on Blender software then modified for one piece implant on Meshmixer software by Dr.Ahmed Halim Ayoub. (Figure 1a, 1b)

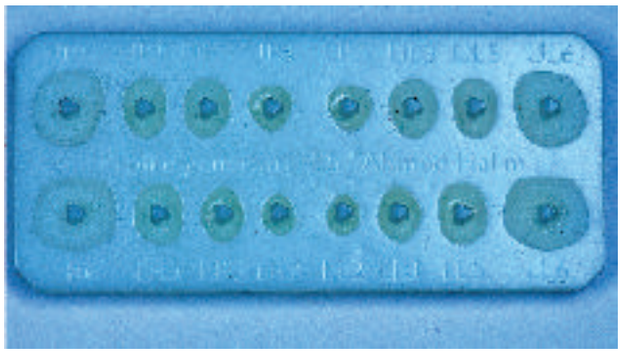

Fig 1a.

Fig 1b.

CASE DESCRIPTION: CASE 1:

A 40-year-old male patient presented with edentulous area at upper left lateral incisor region. He required an implant supported fixed restoration. Upon radiological and clinical examination (figure 2-5), the case was ready to receive implant to restore the missing tooth with immediate load.

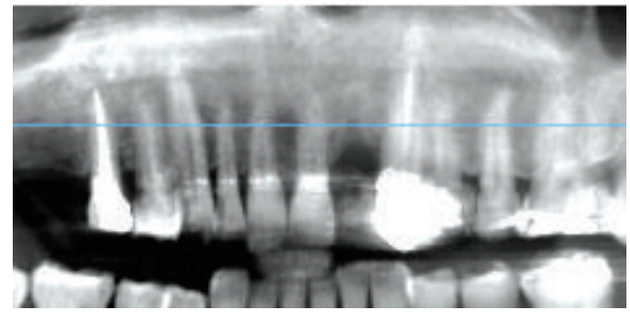

Fig.2

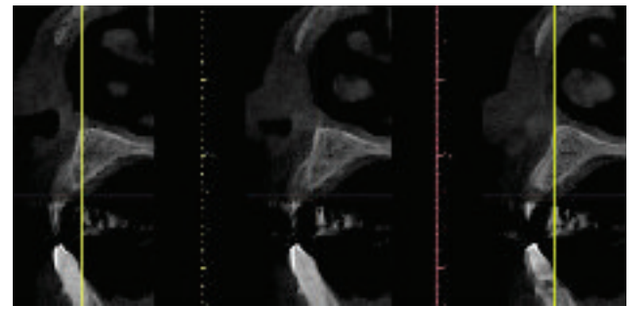

Fig.3

Fig.4

Fig.5

We decide to place a one piece implant without flap "flapless technique" in order to preserve both hard and soft tissues (Figure 6), which had been inserted with 40N, which is suitable for immediate load (Figure 7).

Fig.6

Fig.7

A provisional restoration was fabricated to create a suitable emergence profile for the restoration, especially we are in esthetic area, using a special template made by Blender software and modified for one-piece implant on Meshmixer software (Figure 8).

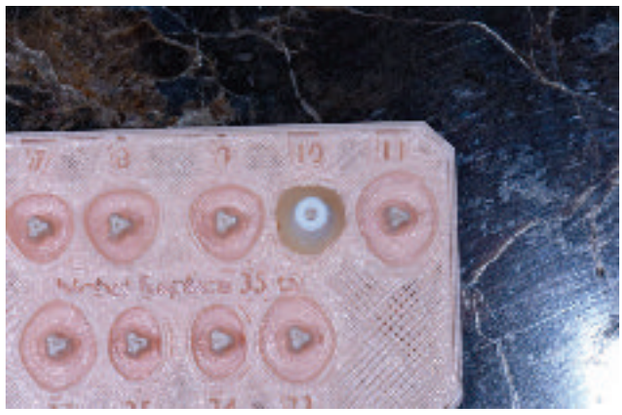

Fig.8

Adding flowable composite around the burning out plastic cap supplied by the implant system after creating some roughness using diamond stone (Figure 9).

Fig.9

A ready-made temporary crown was adopted over the plastic cap and cemented over the abutment (Figure 10).

Fig.10

Excess cementation was removed and an oral hygiene instruction was prescribed to the patient. After 3 month a recall for follow up and to start the steps for final restoration fabrication was carried out, a nice peri-implant soft tissue with an ideal gingival emergence profile was created around the abutment (Figure 11a,11b) and final restoration was fabricated and delivered (Figure 12a,12b).

Fig 11a.

Fig.11b

Fig.12a

Fig.12b

CASE 2:

A 33-year-old female patient presented with edentulous area at upper right first premolar region, which compromise her esthetic and present difficulties in eating. Upon radiological and clinical examination (figure 13-14), the case was ready to receive implant to restore the missing tooth.

Fig.13.

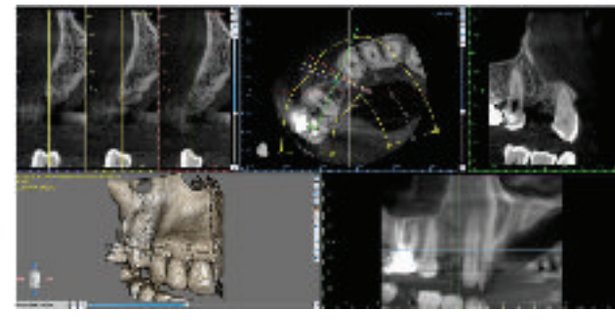

Fig.14

We decide to place a one piece implant without flap "flapless technique" in order to preserve both hard and soft tissues. A provisional restoration was fabricated using a special template made by "One piece template", as described in the previous case. A ready-made temporary crown was adopted over the plastic cap and cemented over the abutment and oral hygiene instruction was prescribed to the patient. After 3 month a recall for follow up and to start the steps for final restoration fabrication was carried out, a CBCT was ordered to ensure the implant stability and bone integrity (Figure 15).

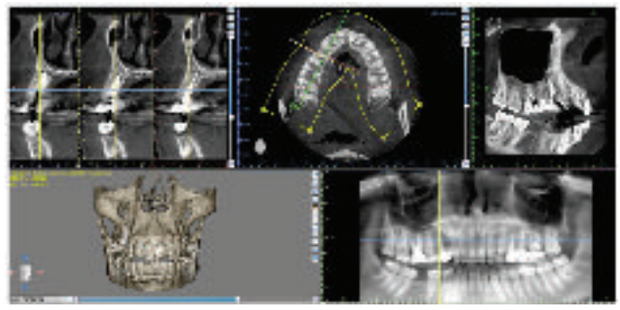

Fig.15

A nice peri-implant soft tissue with a perfect gingival emergence profile was created around the abutment (Figure 16) and final restoration was fabricated and delivered (Figure 17).

Fig.16

Fig.17

CASE 3:

A young female patient, 24 years old suffering from congenitally missing upper left lateral incisor, which compromise her esthetic, as she has an average lip line. Upon radiological and clinical examination (figure 18), the case was ready to receive implant to restore the missing tooth.

Fig.18

A one-piece implant was placed through a flapless approach, in order to preserve both hard and soft tissues (Figure 19).

Fig.19

A provisional restoration was fabricated using a "One piece template". A temporary crown was adopted over the plastic cap and cemented over the abutment allowing for progressive loading (Figure 20).

Fig.20

After 3 month a recall for follow up and to start the steps for final restoration fabrication was carried out (Figure 21).

Fig.21

A nice peri-implant soft tissue with a perfect gingival emergence profile was created around the abutment and final restoration was fabricated and delivered (Figure 22a-22b).

Fig.22a

Fig.22b

CASE 4:

A 45-year-old male patient presented with edentulous area at upper right first premolar region, which compromise his esthetic and present difficulties in eating. Upon radiological and clinical examination (figure 23a,23b), the case was ready to receive implant to restore the missing tooth.

Fig.23a

Fig.23b

We decide to place a one piece implant without flap "flapless technique". A provisional restoration was fabricated "One-piece template", as described in the previous cases. A ready-made temporary crown was adopted over the plastic cap and cemented over the abutment (figure 24) and oral hygiene instruction was prescribed to the patient.

Fig.24

After 3 month a recall for follow up and to start the steps for final restoration fabrication was carried out. A nice peri-implant soft tissue with a perfect gingival emergence profile was created around the abutment (Figure 25) and final restoration was fabricated and delivered (Figure 26).

Fig.25

Fig.26

CASE 5:

A young lady, 27 years-old complaining of missing her upper right lateral incisor tooth, which compromise her smile. She is seeking for a fixed restoration without interfering with her adjacent teeth "she refused fixed bridge restoration" and she required a minimal surgical interfering to manage her problem. Upon radiological and clinical examination (figure 27a,27b), we decide to place a one piece implant without flap "flapless technique" in order to preserve both hard and soft tissues and meet the patient desire (Figure 28).

Fig.27a

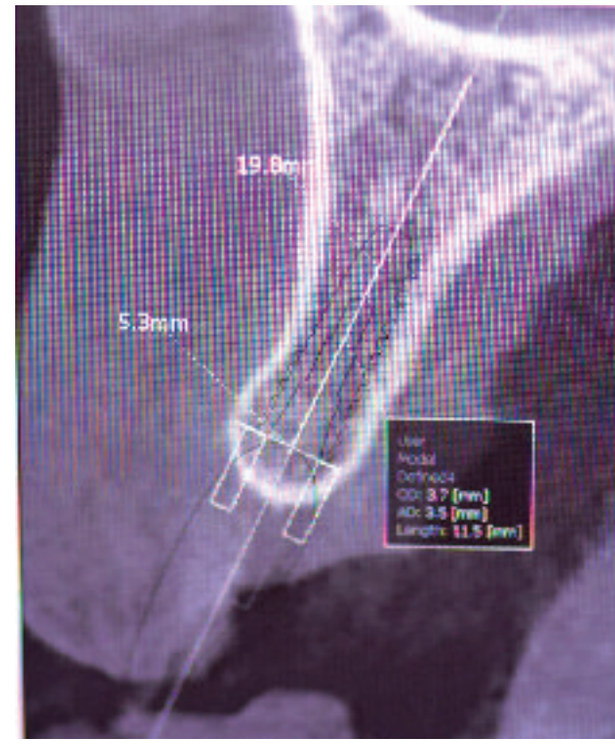

Fig.27b

Fig.28

A provisional restoration was fabricated using a special template “One-piece template”. A ready-made temporary crown was adopted over the plastic cap and cemented over the abutment and oral hygiene instruction was prescribed to the patient (Figure 29).

Fig.29

After 3 month a recall for follow up and to start the steps for final restoration fabrication was carried out. A nice peri-implant soft tissue with a perfect gingival emergence profile was created around the abutment (Figure 30) and final restoration was fabricated and delivered (Figure 31a-31b).

Fig.30

Fig.31a

Fig.31b

DISCUSSION:

A one-piece implant is a type of dental implant in which the endosseous and abutment portions consist of one unit. The one-piece implant was originally designed to address the structural weakness issues that were part of the two-piece implant. The one-piece implant increases the strength and stability of the prosthesis by eliminating the weakest point of the two-piece implant, the abutment interface. In addition, the one-piece implant is an effective choice for patients or surgical sites where there is not enough bone to properly support prosthesis (17).

Single piece implants are cost-effective when compared to conventional implants, as they eliminate the need for cover screws, healing abutments, subsequent separate implant attachments or separate implant abutments. They are time effective as they eliminate the need for second stage surgery, mucosal healing period, and they also decrease patient exposure to additional unnecessary pain and discomfort (18). They provide fast, painless replacement of missed teeth. Single-piece Implants are less invasive and are either: immedia-

tely loaded in case of good bone quality, or progressively loaded in case of less than ideal bone quality (19).

Despite these advantages, one-piece dental implants do have a disadvantage in that they are less flexible than the two-piece implant due to their single-unit construction. This lack of flexibility prevents more detailed adjustments once placed. After imaging and a careful evaluation of the patient's dentition and underlying bone, the dental practitioner will determine which type of implant will best fit the patient's needs (20).

Problems in angulation could be avoided by the use of parallel pins after each drill so any deviation could be corrected with the subsequent drill, or by combining the slanted implant with angled abutment. Dentium Slim Line provides (15 and 25 degree) angled abutments which can be oriented in any direction, and are cost effective (21).

Placement of a provisional restoration at the same time as insertion of an immediate implant has been advocated to help preserve the gingival tissue height and profile (22). This is becoming increasingly popular as advances in surgical techniques and developments in implant macrogeometry facilitate the achievement of primary stability necessary for immediate implant placement and function (23).

The current rationale is based on the idea that the temporary restoration will support the soft tissue contours, thus avoiding collapses of the buccal and inter-proximal tissues.

Despite widespread clinical application, very few guidelines have been proposed in the literature regarding the ideal configuration for this type of restoration (24).

The main objectives of temporary restorations at immediate implants, besides patient comfort and esthetics during healing are: 1) maintaining the existing soft tissue architecture, 2) supporting the existing gingival margin and papilla height, 3) a smooth and polished surface that will help create a gentle transition and minimize contamination during healing (25).

A special template made by Blender software and modified for one piece implant on Meshmixer software is introduced to facilitate the fabrication of a temporary restoration, that help to produce a fast produced, well designed, easy adapted restoration that needs minor interfering for finishing and polishing. The temporization phase helped to create a peri-implant tissue with good gingival emergence profile and support the soft tissue during primary period of healing after implant insertion, allowing for fabricating a final restoration in a previously create and stable gingival emergence profile, which guarantee stable and fixed relation between restoration and peri-implant tissue, especially if the case is not ready for immediate load and progressive load is planned.

It is the first template that is designed digitally and is printed for provisional restoration for one-piece implant and it needs further investigations for larger number of cases with long term follow up.

CONCLUSIONS:

The important purpose and practical application of provisional restorations is essential to achieve functional and esthetic success. The clinician must consider utilizing the provisional stage to improve and refine the final outcome, part of a continuum of care where the patient sees a progressive improvement from the beginning to completion of prosthodontics treatment. This continuum, in turn, can improve patient satisfaction, clinician/patient rapport and confidence leading to predictable success. Using digitally produced template "One piece template", a new innovation made by Blender software and modified for one piece implant on Meshmixer software to fabricate such provisional is considered a predictable, accurate, cost effective, chair-side and time saving method that is highly recommended to use.

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