

## Immediate Implant Placement in the Anterior Maxilla with Customized Impression Coping: A Clinical Case Presentation

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### Abstract

Implant placement in the anterior maxilla remains a challenge to even the most experienced clinician. Immediate implant placement is a risky procedure in itself and only successful in limited cases. To combine these modalities is expected to have a variety of complications and possible negative outcome. Due to the pressure of patients' lifestyles and time constricting careers, there is an increased demand for combined procedures.

Immediate implant placement have been researched extensively and with the increased success rate of dental implants it is becoming the preferred choice of treatment by clinician and patient. Optimal aesthetics is difficult to obtain after surgical implant placement, especially when treating the anterior maxillary incisor area. Various guidelines have been put in place with regards to the planning, surgical execution and restorative phases of implant treatments in order to optimize the clinical results.

This clinical case study is representative of such instance, when following the correct guidelines, a successful outcome is made possible. The case report includes the planning, execution and outcome stages of an immediate implant in the anterior maxilla.

**Keywords:** *Immediate Implant; Customized Impression Coping; Anterior Maxilla*

### Introduction

Trauma to the anterior teeth, especially the maxilla, is a debilitating occurrence and causes the patient not only physical pain, but has a huge psychological and social impact as well. The survival rates of both the dental implant and restoration are high, and thus in great demand by more and more patients [1].

In the specific case of a missing anterior maxillary incisor, the various treatment options includes implant placement and single crown, fixed dental bridge placement, fixed Maryland bridge and a removable partial denture. Should the root rest of the fractured tooth be of use in the construction of a possible post-and core build-up and single crown placement, this should be the first option to treat such case. The next treatment option to consider is the placement of a dental implant which can then be restored by means of a single crown. Though this entails a surgical procedure, it is seen as a minimally invasive procedure, as the adjacent healthy teeth are not altered.

The first successful titanium implants were placed by Dr Brånemark in 1965, and the science of implant dentistry has been on the rise ever since. Various protocols, including immediate implant placement, have been researched to such an extent that certain guidelines and

techniques have been published in journal articles, books and volumes in order to assist the treating clinician when facing a similar case. It has been made evident in various studies that should the clinician be able to follow the prescribed guidelines, a positive prognosis may be expected [2].

Restoration of a single implant in the aesthetic zone is a challenging case for not only the clinician, but for the lab technician as well. Working in the aesthetic zone poses challenges in terms of achieving correct pink and white aesthetics. Patient expectation and evaluation in the aesthetic zone is increased and is of high importance as this plays a major role in the implant success criteria [1]. Translation of information to the lab technician by means of dental implant impressions are vital for the construction of a dental prosthesis which will match the criteria not only of the clinician but of the patient. Many research has gone into the development of the correct impression techniques in order to capture the appropriate information for the manufacturing of dental prosthesis [3].

The following clinical case report displays the utilization of published guidelines in all stages of immediate implant placement (planning, surgical execution and final outcome), reinforcing the possibility of implant success when adhering to protocols.

## Case Report

### Initial examination and history

A female patient, aged 35, presented at the practice with the complaint of a fractured anterior maxillary central incisor (Figure 1a, 1b). Previous treatments performed include root canal therapy and post-core retained porcelain-fused-to-metal crown placement.



Figure 1a.



Figure 1b.

Upon examination, it revealed a horizontal fracture of the tooth no 11 at the gingival margin. No residual ferrule existed in order to manufacture a new post-core retained crown and the patient was informed that alternative options should be discussed to replace the missing tooth (Figure 2). An emergency removable denture was manufactured on the day of the initial visit.



Figure 2.

**Treatment planning**

All treatment options were discussed with the patient in detail and the patient opted for the suggested implant placement. A CBCT scan was obtained in order to plan the implant placement protocol (Figure 3a). Due to the absence of sufficient buccal bone, it was decided that the immediate placement of the dental implant with simultaneous bone augmentation in the extraction socket will be the best treatment option (Figure 3b, 3c). A surgical risk assessment (SAC Tool) was performed in order to classify the procedure accordingly and to assess possible complications that may arise (Figure 3d). The complete procedure was discussed with the patient and consent obtained to continue with the procedure.

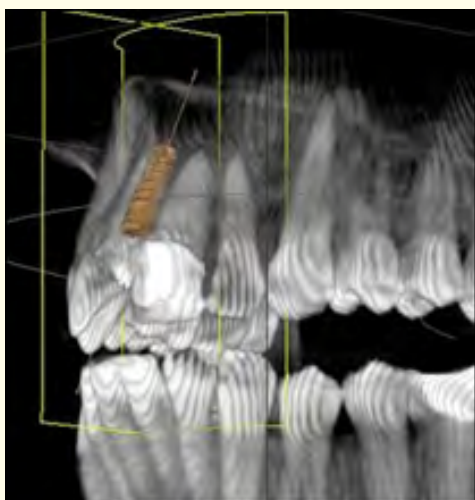


Figure 3a.



Figure 3b.

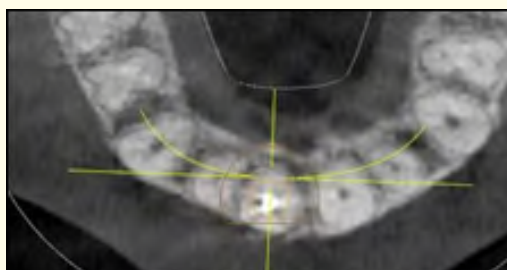


Figure 3c.

Assessment of Surgical Cases: Single-tooth gap				IT <sup>®</sup>
Defining Characteristics: One missing tooth to be replaced by one implant.				
Placement protocol	Immediate implant placement			
Socket integrity	Sufficient, with intact bone walls			
Tooth site	Maxillary incisor or canine			
Socket morphology	Single-root socket			
Anatomic Risk	Esthetic Risk	Complexity	Risk of Complications	
Low	High	Moderate	High	
Additional procedures that may be required	<ul style="list-style-type: none"> <li>Simultaneous bone augmentation</li> <li>Adjunctive soft tissue graft</li> </ul>			
Additional risks	<ul style="list-style-type: none"> <li>None</li> </ul>			
Normative SAC Classification	<b>Complex</b>			
<b>Modifiers</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lip Line</li> <li><input type="checkbox"/> Exposure of papillae</li> <li><input type="checkbox"/> Gingival Biotype</li> <li><input type="checkbox"/> Medium-scalloped, medium-thick</li> <li><input type="checkbox"/> Shape of Tooth Crowns</li> <li><input type="checkbox"/> Triangular</li> <li><input type="checkbox"/> Infection at Implant Site</li> <li><input type="checkbox"/> None</li> <li><input type="checkbox"/> Bone Level at Adjacent Teeth</li> <li><input type="checkbox"/> ≤ 5 mm to contact point</li> <li><input type="checkbox"/> Restorative Status of Neighboring Teeth</li> <li><input type="checkbox"/> Restored</li> <li><input type="checkbox"/> Width of Edentulous Span</li> <li><input type="checkbox"/> 1 tooth (≥ 7 mm)</li> <li><input type="checkbox"/> Soft Tissue Anatomy</li> <li><input type="checkbox"/> Intact</li> <li><input type="checkbox"/> Loading Protocol</li> <li><input type="checkbox"/> Conventional</li> </ul>				
Additional complexity/risk based on modifiers				
<div style="display: flex; justify-content: space-between; width: 100%;"> <span>None</span> <span>Moderate</span> <span>High</span> </div>				

Figure 3d.

**Surgical treatment phase**

The patient’s removable partial denture was modified and utilized as a surgical stent on the day of treatment. (Figure 4a, 4b) The remaining root rest of tooth 11 was removed using a low-trauma technique (Figure 4c). The buccal bone plate was assessed for any defects and/or fenestrations by means of probing the inside of the extraction socket. Should any defects be present on the buccal bone plate, the immediate placement of the implant is contra-indicated. No defects were evident and the preparation of the implant site was continued (figure 4d, 4e).



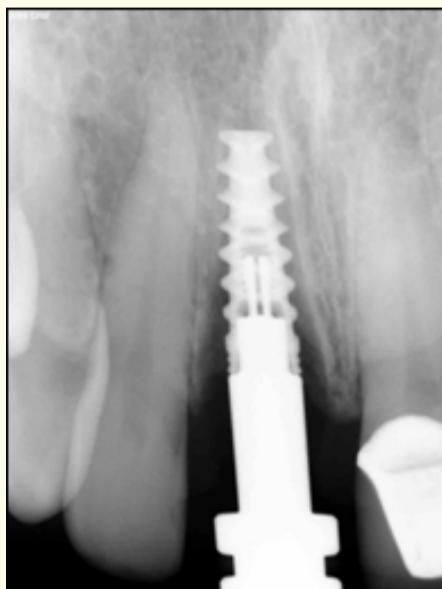
*Figure 4a.*



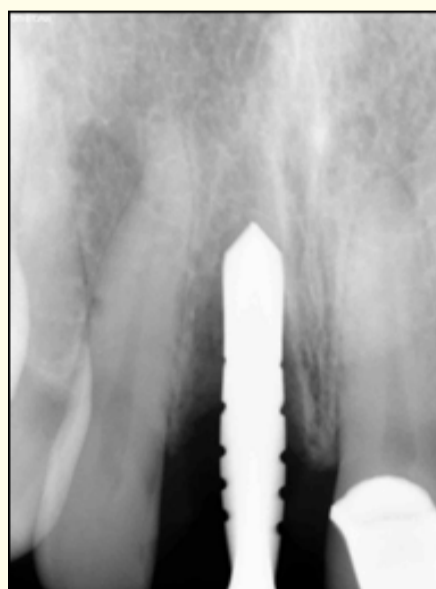
*Figure 4b.*



*Figure 4c.*



*Figure 4d.*



*Figure 4e.*

A bone-level 3.5mmØ x 10mmL implant (Adin Touareg CloseFit) was placed towards the palatal aspect of the extraction socket as prescribed in the guidelines, with a jump gap of 2 - 3 mm from the implant body to the buccal bone plate (Figure 5a). Due to the jump gap being more than 1.5 mm, it was augmented by means of using a low resorbable bone ceramic (Figure 5b). The three-dimensional position



of the placed implant is of vital importance to ensure the correct position of the planned prosthesis. The dimensions to take into consideration are mesiodistal, orofacial and coronoapical dimensions [4]. Referring to figures 5c, 5d and 5e, one can see the green safe zones and the red danger zones (Figures 5c, 5d, 5e) [4]. Primary stability was not ideal for immediate loading in this case, and it was decided that submerged healing was the best option until osseointegration is achieved. The patient was informed regarding this decision, and was comfortable in decreasing the risk of implant failure by means of wearing the removable partial denture as temporary restorative measure. The closure of the implant site was achieved by means of secondary closure using a double collagen membrane (Geistlich Bio-Guide collagen membranes) sutured over the extraction socket and the implant (Figure 5f) [5]. Non-resorbable nylon (Ethilon 6-0) sutures was used to hold the membrane in place to cover the extraction site.



Figure 5a.



Figure 5b.

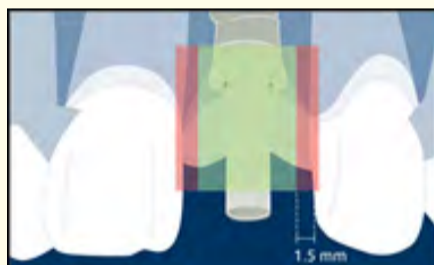


Figure 5c.



Figure 5d.

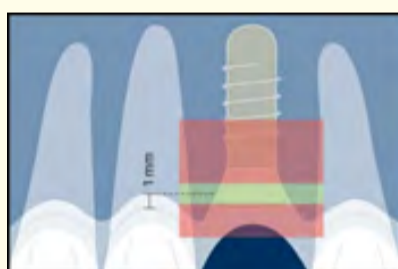


Figure 5e.



Figure 5f.

### Restorative phase

The implant remained submerged to reach osseointegration for 12 weeks. It was surgically exposed and a healing abutment was placed in order to create access to the implant and allow peri-implant soft tissue healing (Figure 6a) The patient’s removable denture was adapted to fit passively over the healing abutment. The patient was recalled after 7 days for the construction of a temporary crown. The temporary crown was adjusted every four weeks for a duration of eight weeks until sufficient blanching of the soft tissues were visible and the gingival tissues presented the correct three dimensional shape in relation to the adjacent incisors (Figure 6b, 6c) [6].



*Figure 6a.*



*Figure 6b.*



*Figure 6c.*

The final impression is the stage where most clinicians struggle to undertake and get the desired emergence profile on the final restoration. Upon removal of the temporary crown, the peri-implant soft tissue collapses in a matter of a few seconds. Support of the peri-implant soft tissue is needed in order to prevent this collapse and ensure the correct information is sent with the impression to the lab technician. The temporary crown is removed from the patient's implant and fixed to a lab analog (Figure 7a). A lab putty material is used to take an impression of the emergence profile of the temporary crown (Figure 7b). The impression coping is then inserted in the place of the temporary crown on the lab analog and the temporary crown returned to the oral cavity in order to prevent peri-implant soft tissue collapse during the preparation of the customised impression coping. Flow-able resin composite material is inserted around the impression coping and light cured to capture the emergence profile of the temporary crown (Figure 7c, 7d). This customised impression coping is then used to take the final impression [6,9]. In this case report, an open-tray impression was taken and sent to the lab technician for the construction of a screw-retained all-ceramic crown on a customised zirconium-metal hybrid abutment (Figure 7e, 7f).



Figure 7a.



Figure 7b.



Figure 7c.

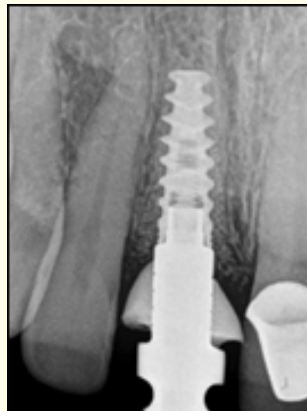


Figure 7d.

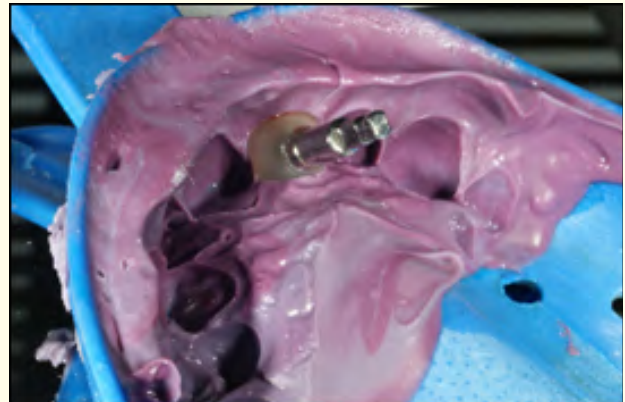


Figure 7e.



Figure 7f.

The final restoration was delivered within 10 days of taking the impression (Figure 8). The patient was recalled in a week for a follow-up and to evaluate the shape of the peri-implant soft tissues. The completed result met all the criteria and was seen as a successful

outcome [1] (figure 9). The patient was placed on an implant maintenance program in order to closely monitor the implant stability, peri-implant soft tissues and general oral health.



Figure 8.



Figure 9.

### Discussion

Several placement protocols exist for the surgical placement of dental implants, with diverse recommendations existing in literature. The dilemma which many clinicians face is which methodology to follow. Immediate placement of dental implants into fresh extraction sockets has been reviewed as early as the 90's, with the resultant implant survival rate ranging from 93% to 100%. These high survival rates have changed the opinion of patients towards implant treatments to a very high demand as opposed to other available options. The success of immediate implants is however, subjective to following the correct protocol, which includes meticulous planning, execution and maintenance [7,11].



Planning the placement of immediate implants in the anterior maxilla involves a thorough knowledge of anatomy, biology, surgical technique and restorative protocols. The use of CBCT with the details of appropriate anatomical landmarks visible to the clinician, helps to provide the patient with a more comprehensive treatment plan and possible prognosis [8]. Following the suggested surgical protocol in placing immediate implants in fresh extraction sockets allows the clinician to successfully place the implant in the correct three-dimensional aspect with the confidence of relatively low risk of complications [4,10].

Various impression techniques are available for the communication of the clinical situation and implant position to the technician. The use of pre-fabricated impression copings does not take into consideration the unique variation of peri-implant soft tissue form [3]. By means of using the customised impression coping, the technician is able to recreate this unique shape and emergence profile which results in a higher success rate according to pink and white aesthetics criteria [1,9].

### Conclusion

This case report displays the fact that allowing easier communication between the patient, clinician and the dental technician, by means of planning software, visual simulation and adaptive clinical techniques, reduces the fear towards implant dentistry for the patient as well as the clinician. Literature on implant planning, surgical protocols and restorative techniques is a vast area in the dental field. By means of combining all the relevant and scientifically sound literature into a volume of guidelines was the next step into the future of more and more successful outcomes with implant treatments. Using these readily available and easy to use guidelines and following protocols, implant failure should eventually become a rarity in the field of dentistry.

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