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Immediate implantation and loading in just two days with TTPHIL technique using CAD/CAM Prosthesis

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Abstract

Background: Two fractured tooth cases were reported, one with a front tooth missing, and the other with left lower back region of the jaw. Both of them need immediate replacement for esthetic and the pain relief and immediate function. These patients were highly apprehensive and do not want second stage surgeries.

Discussion: Immediate implantation by newer technique called Tall and Tilted Pin Hole Immediately Loaded implants (TTPHIL) is explained in this article. In immediate implant procedure, implants are placed in sockets just after the extraction of the tooth. The main reason to go for immediate implantation is to preserve the contour of the tissue and dimension. Delivering the tooth within a day after the implantation procedure is considered a boon in implant dentistry as the gingival tissue grows according to the contoured crown which is considered advantageous unlike where the gingival tissue grows prior to the placement of the crown. Digital dentistry is an emerging field which incorporates digital or computer aided components. Most commonly thought area of digital dentistry is the CAD/CAM (Computer Aided Design/Computer aided Manufacturing).

Conclusion: This case series describes two cases in which the crown was fabricated and delivered within a day after placement of a dental implant by TTPHIL technique using CAD CAM technology.

Keywords: CAD/CAM, TTPHIL, immediate implant

1. Introduction

TTPHIL concept is the newer technique which not only overcomes limitations of axial implants but also disadvantages of All-on-4 concept and All-on-6 concept. Tall (16mm-25mm), Tilted (TT) implants (30°-45°) are placed. Tall implants help for good osseointegration as it provides more surface area and also engaged to the cortical bone i.e. bicortical anchorage. The implants are placed in Pinhole (PH) manner i.e. flapless ^[1, 2]. The term 'CAD/CAM' in dental technology used as a synonym for prostheses created by 'milling technology'. This is not completely correct ^[3]. CAD is an ellipsis for Computer-aided design and CAM stands for Computer-aided manufacturing. CAD/CAM dentistry is a field of dentistry and prosthodontics to improve the design and creation of dental prostheses. CAD / CAM technology permits to generate a two-dimensional and three-dimensional models and their materialization by numerical controlled machines ^[4]. Dentists and dental lab technicians use this technology to design the anatomical features of prosthesis on a computer. Nowadays CAD/CAM systems may be either chair side or laboratory systems ^[5]. CAD/CAM computer screen displays a 3-D custom image of the teeth and gingiva, help the dentists to draw the precise design of the prosthesis ^[6].

Digital scans have the potential to be faster and easier than conventional impressions because casts, wax-ups, investing, casting, and firing are eliminated ^[7]. The machine fabricates the restoration through a milling chamber that crafts the tooth-like ceramic material into a precise replica of the drawing. The advantages of CAD/CAM include speed, ease of use, and quality ^[5]. One of the other advantages of CAD/CAM technology apart from the prosthesis delivery timing is that there may be no need for a temporary restoration ^[7]. Immediate implant is the extraction of a natural tooth followed by immediate placement of an endosseous dental implant. The extraction socket acts as a guide determining the appropriate parallelism and alignment ^[8].

In our case reports we are discussing two cases in which immediate implantation has been performed and the crown was delivered on the next day using the CAD/CAM technology.

2. Case Report 1

2.1 Diagnosis and treatment planning

A 35 year old male patient came with a chief complaint of missing front tooth [fig. 1. a] A complete case history was recorded followed by thorough intraoral examination. He had undergone a traumatic injury involving this tooth and also underwent root canal treatment 15 years back. Intraoral periapical radiograph and OPG were taken [fig 1.b.], demonstrated only root stump which will go for extraction and bone height to the nasal floor was 17 mm was available. Immediate implant placement using TTPHIL technique was planned. Routine blood investigations were done and fitness obtained for surgical procedure.



Fig 1: Failing right central incisor



Fig 1 b: OPG showing root stump with 21

2.2 Implantation Surgery

Patient consent was obtained prior to surgical procedure. Under local anaesthesia 2% lignocaine hydrochloride with adrenaline (1:200000) extraction of teeth and immediate implant was placed. To proceed with 18mm implant was selected to engage nasal cortical plate. The 18 mm Bioline-I-spiral implant guaranteed the primary stability, extending the preparation 4 mm further from the apex level of the extracted tooth. Lancet drill (1.2mm up to 6 mm) was used which act as guidance point [fig.2] Subcrestal implant placement was done using TTPHIL technique. OPG showing tall and tilted implant after placement [Fig. 3] and abutment is placed [fig.4].

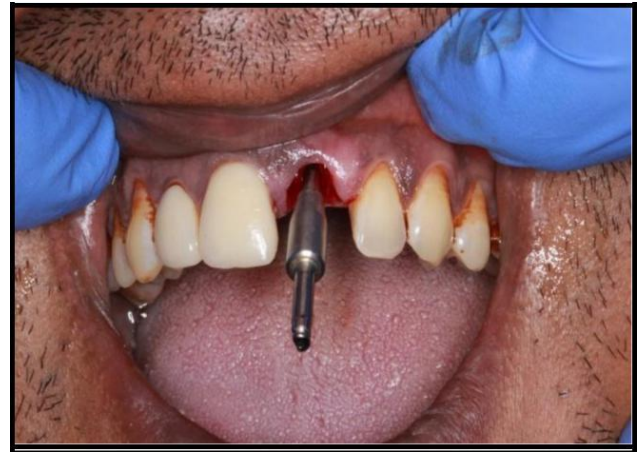


Fig 2: Lancet drill (1.2mm, 500 rpm) is used



Fig 3: OPG showing the implant placement

2.3 Prosthetic reconstruction

Implant level open tray impressions were made. Shade matching was done on the same day and was sent to lab for the final prosthesis. 25° prefabricated abutment was milled and finish line made sublingually according to adjacent tooth [fig.4] on the cast and the zirconia crown was designed in Exocad. Immediately zirconia crown was fabricated in the laboratory. Immediate loading of the implant was done with the zirconia crown on the next day



Fig 4: Abutment placed over the implant



Fig 5: Final restoration was given

Final restoration was given to patient [fig.5]. OPG was taken which show implant over which abutment and crown [fig.6]



Fig 6: OPG showing abutment with crown and implant

3. Case Report 2

3.1 Diagnosis and treatment planning

A 40 year old male patient reported with chief complaint of broken tooth in the left lower back teeth region 2 days ago. Complete case history was recorded followed by thorough intraoral examination. On examination, vertical fracture was observed in relation to 37 associated with pain and discomfort while eating [fig.7]. OPG showing vertical fracture i.r.t 37 [fig.8] the treatment option of immediate implant placement was suggested to the patient and the patient agreed to the option of having an immediate implant. Routine blood investigations were done and fitness obtained for surgical procedure.



Fig 7: Vertical fracture observed i.r.t.37 till the furcation



Fig 8: OPG showing vertical fracture i.r.t 37 till the furcation

3.2 Implantation Surgery

Patient consent was obtained prior to surgical procedure. Under local anaesthesia 2% lignocaine hydrochloride with adrenaline (1:200000) extraction of teeth was carried out followed by implant placement. Tooth 37 was hemisected [fig.9] and the 2 roots were removed carefully to preserve all remaining interradicular bone [fig.10]. The socket was curetted carefully and irrigated with sterile saline solution. A Bioline-I-Basal implant of 4.2 mm diameter and length 16 mm was placed into the interradicular bone [fig.11].



Fig 9: Hemisection was done i.r.t 37 with the airtoror



Fig 10: Roots removed carefully with periotomes

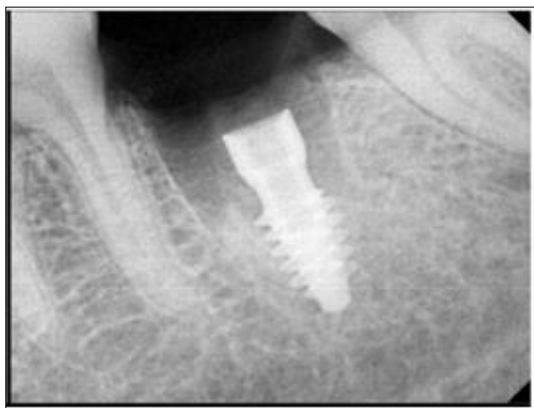


Fig 11: Implant placed into interradicular bone

To prepare the implant bed, a punch cut was made 1.5 mm mesial of the interradicular bone median using an externally irrigated 2.3-mm-round bur. This was followed by deep drilling along the implant axial line to allow the implant to have adequate bone contact at the distal site. After placement of the implant, adequate primary stability was achieved. Wide healing customised abutment was placed to maintain the emergence profile. [fig.12]



Fig 12: clinical picture showing placement of implant into the interradicular bone

3.3 Prosthetic reconstruction

Indirect implant level impressions were made on the same day. Zirconia crown on 15° prefabricated abutment was milled and finish line was made with the access hole for excess cement to escape was fabricated using the CAD/CAM technology and was cemented with resin cement immediately the next day [fig.13 a and b].

The abutment screw was untwined through the crown abutment access hole and the crown was removed from the implant along with the abutment. The excess cement around the abutment crown margin was removed and polished. The polished crown is inserted back and torque to 35 NC.



Fig 13 a: Zirconia restoration with access hole i.r.t 37



Fig 13 b: Zirconia restoration with access hole i.r.t 37

OPG was taken which shows implant over which abutment and crown [fig.14]



Fig 14: OPG showing abutment with crown and implant

4. Discussion

Tooth loss can be emotionally difficult, especially when it is in the esthetic zone and important for mastication. To attain bone-to-implant contact (i.e. osseointegration), oral implants were placed in a two-stage surgical procedure and require 3-6 months for a healing [9]. Immediate implantation and loading achieve better and faster functional results with a predictable treatment strategy and a very high rate of success. The reduced number of surgical appointments, reduction of time of edentulism, prevention of bone loss and preservation of soft tissue architecture are considered to be the major advantages [10, 11, 12].

In literature Tall and Tilted Pin Hole Immediately Loaded implants (TTPHIL) technique is a newer technique and proves to have higher success rates with immediate restoration [13].

CAD/CAM technologies have started a new age in dentistry. Using CAD/CAM technique we are able to deliver the zirconia prosthesis on the next day. Therefore, this method of digital dentistry has become the procedure of choice. Able to create inlays, onlays, veneers, crowns, fixed partial dentures, implant abutments, and full-mouth reconstruction using CAD/CAM [14].

Zirconia with access hole was preferred for the excess cement to come out and for retrievability solution in case of any complications. The zirconia coping is made very thin below the gum level so that the emergence profile of the crown can be maintained. This will allow the crown to seat and also help in the retention.

5. Conclusion

Delivering the prosthesis within a day after the implant procedure fulfills both functional and esthetic requirements which are considered as the primary treatment modalities. This case series concludes that it is possible to achieve good

efficiency in the efforts to render the patient with sound, timely and economical treatment using the CAD/CAM technology. The technique is blooming in digital dentistry making both the dentist as well as the patients happy.

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