

Case Series

Tall Tilted Pinhole Immediate Loading (TTPHIL®) - A Novel Technique Comprising of Bicortical Engagement, Subcrestal Placement and Restoration using Screw-Retained Prosthesis under Immediate Loading Protocol

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Abstract

Extraction of a tooth may lead to buccal bone loss and subsequent soft-tissue recession affecting the esthetics in the anterior region. The earlier protocol of implant insertion recommended a waiting period of several months between extraction and implant placement. This case series presents an overview of the evidence-based technique used in the area of esthetics. Immediate post-extraction implant placement has ascended as an alternative to traditional implants on a completely healed bone. The immediate loading of implants is highly recommended, especially where esthetic requirements are high. In the literature, alternatives have been evolving that demonstrate the effectiveness of immediate implant placement after tooth extraction that reduces treatment time, decreases the number of surgical procedures, and improved esthetics due to adequate osseointegration and mucointegration. The Tall Tilted Pin Hole Immediate Loading (TTPHIL®) concept provides maximum soft tissue stability by creating a biologic seal in the esthetic zone. By following this protocol, immediate and delayed implant placement was carried out followed by immediate loading with a screw-retained prosthesis, satisfying the patient's functional and esthetic needs. TTPHIL® technique is a combination of evidence-based practice, flapless approach, tall implants with bicortical implantology, tilted implantology, placed subcrestally, deliver permanent prosthesis in 2-5 days presented with good outcome and long term survival rate in the esthetic area.

Keywords: Extraction; TTPHIL®; Osseointegration; Tilted implant; Screw retained prosthesis; Soft tissue stability; Flapless

Introduction

The maxillary alveolar processes are the bony structures whose integrity is dependent on the presence of teeth. This bone process shows many structural changes such as tissue remodeling when teeth are missing or extracted due to trauma, periodontal disease, gross decay, any precancerous lesion and condition¹. Biological processes occurring after tooth extraction include physiological resorption of the alveolar process followed by a reduction in the volume of the maxillary bone reaching up to 50% in 12 months [1,2]. Hence, it is

an important need to rebuild oral tissues. Implant placement in the esthetic region is a challenging task for the dentist. The success in this region is achieved when a perfect harmony between the pink and the white esthetics is obtained. The success of implants depends not only on osseointegration but also full integration of healthy and esthetic peri-implant tissues framing the prosthesis [3]. The anterior region is more challenging after extraction of the tooth because of the predictable loss of hard and soft tissue. According to the conventional implant protocol, it is required to wait for several months after a tooth extraction before placement of the implants to permit alveolar bone healing [4]. In the literature, immediate insertion of implants in fresh extraction sockets have ascended as an alternative to traditional implants. The major advantages of this technique was that it reduces bone resorption, decreases treatment duration, reduces the number of surgical procedures, improved esthetics, allows placement of the implant in an ideal position from the prosthetic point of view, preserves the height of the alveolar bone and reduces marginal bone loss that occurs during socket healing after extraction [5,6]. Post extraction implant placement is not suitable in cases where the gap between implant and socket is greater than 5 mm [7]. TTPHIL® (Tall Tilted Pin Hole Immediate Loading) is an innovative technique that has evolved from various philosophies in implantology: basal, pterygoid and tilted/angulated implants. This technique utilizes the use of the long tilted bicortical implants in maxilla and mandible to maximize the success of rehabilitation. Tall implants (16 mm - 25 mm) and Tilted

Citation: Venkat Ratna Nag P, Sarika P, Bhagwatkar T, Bindushree K. Tall Tilted Pinhole Immediate Loading (TTPHIL®) - A Novel Technique Comprising of Bicortical Engagement, Subcrestal Placement and Restoration using Screw-Retained Prosthesis under Immediate Loading Protocol. J Dent Res. 2019; 1(2): 1008.

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Publisher Name: Medtext Publications LLC

Manuscript compiled: Dec 17th, 2019

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implants (TT) (30°-45°) are placed. Tall implants with bicortical anchorage offer primary stability which supports osseointegration [8]. Tilted implants bypass vital anatomical structures and reduce cantilever effect, help in stress distribution and anterior-posterior spread [9]. The Pinhole (PH) placement of implant flapless procedure reduces tissue trauma due to flap reflection, maintaining soft tissue profile and reduces postoperative discomfort [10,11]. The implants are Immediately Loaded (IL) within 48 hours when good stability of implants was achieved. In this article, a case series is presented where TTPHIL® (Tall Tilted Pin Hole Immediate Loading) technique was followed, an implant was placed and permanent prostheses was delivered within 2-5 days.

Case Series

Case 1

A 35-year-old female patient complained of pain in the front region of the upper jaw since a few days. The patient gave no relevant medical history. Past dental history revealed root canal treatment and crown with respect to tooth 12. Clinical examination revealed a crown with fractured core, grade II mobility and pain on percussion (Figure 1a). A thorough radiographic examination such as orthopantomogram and CBCT were advised. The radiographic evaluation suggested a fractured core (Figure 1b). The treatment option given to the patient was extraction followed by immediate implant placement and immediate loading using TTPHIL® technique considering the poor prognosis of Re RCT. Routine blood investigations were done and physical fitness was obtained. Patient's consent was taken for the surgery. Under local anesthesia (2% lignocaine with 1:200000 adrenaline), atraumatic tooth extraction was performed. The socket was mechanically curetted followed by saline irrigation. Sequential osteotomies through the extraction site were performed with a pilot drill of diameter 1.2 mm followed by long drill 2.0 mm (diameter) using a single drill concept. The osteotomies were performed at least 3 mm apical to the extraction socket as recommended in the literature to obtain primary stability. Using the bony walls as guides, with maximum use of bone apical to the extraction sockets (minimum 3 mm, maximum reaching the compact bone of the nasal floor). BiolineiSurface Implant (3.75 mm diameter, 18 mm length) (Figure 2a) was placed with higher insertion torque of 45 N/cm² to engage the cortical bone. Subcrestal placement was done using TTPHIL® technique. Post implant placement RVG was taken. Angulated screw channel was placed (Figure 2b). Abutment level open tray impression was made. Coping trial was done followed by shade selection using a Vita shade guide and was sent to the lab for a final prosthesis. Using CAD-CAM technique implants were loaded within 48 hours with zirconia crown (Figure 3a). Postoperative OPG showing implant and prosthesis (Figure 3b). Oral hygiene instructions were given to the patients and a soft diet was recommended for a few days. The patient was recalled after 2 days, soft tissue healing was observed (mucointegration). After 2 weeks, good esthetic result and stable bone levels were achieved by the preservation of gingival papillae. The tissues were healthy with no signs of inflammation and showed a perfect harmony of white and pink esthetics in the final smile (Figure 4).

Case 2

A 26-year-old male patient complained of missing upper front tooth and wants a replacement. The medical history was not relevant and past dental history revealed the use of removable partial denture for missing upper front tooth for 2 years. Clinical examination revealed a missing tooth with respect to 11 showing firm & resilient



Figure 1a and b: Preoperative view showing composite crown placed labially and OPG showing Root canal treated tooth with respect to 12.



Figure 2a and b: BiolineiSurface Implant placement and Angulated screw channel.



Figure 3a and b: Zirconia crown and Post-operative OPG showing implant and prosthesis.



Figure 4: Healthy gingiva after 2 weeks.

mucosa. A thorough radiographic examination showed sufficient bone height (Figure 5a and b). Routine blood investigations were done and patient's consent was taken. Surgery was planned and discussed with the patient. Surgery was performed under local anesthesia (2% lignocaine with 1:200000 adrenaline). Using a single drill concept, sequential osteotomies were performed under copious irrigation followed by placement of Bioline Hybrid implant of (3.75 mm diameter and 20 mm length) placed subcrestal with a final torque of 45 N/cm² showing good primary stability (Figure 6a and b) Intraoral Radiographs (RVG) were taken and proper angulations,

depth of osteotomy were evaluated. The straight abutment was placed which creates mucolock (Figure 6c). After surgical intervention, the temporary prosthesis was fabricated using composite resin. The definitive prosthesis was fabricated with a zirconia crown 'within 2-5 days (Figure 7a). Post prosthesis OPG was exposed (Figure 7b). After 2 weeks, good esthetic result and stable bone levels were achieved by the preservation of gingival papillae (Figure 8).

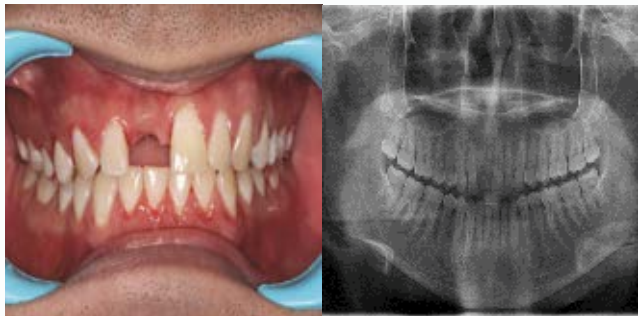


Figure 5a and b: Preoperative view showing missing upper front tooth and OPG showing missing tooth with respect to 11.



Figure 6a and b: Pilot drill was used and BiolineiHybrid implant placement.



Figure 6c: Straight abutment.



Figure 7a and b: Zirconia crown and Post-operative OPG showing implant and prosthesis.

Case 3

A 46-year-old male patient complained of pain and poor esthetics in the upper front region of jaw since few months. Medical history of the patient revealed allergy to penicillin and given a history of trauma 15 years back. Past dental history revealed root canal treatment followed by a crown with respect to tooth 11, 12. Clinical examination revealed a crown with poor esthetic margins and tender on percussion with 11, 12 (Figure 9a). Radiographic evaluation (orthopantomograph and CBCT) suggested fractured core, showing poor prognosis for Re RCT (Figure 9b). Routine blood investigations were done and physician consent for fitness was obtained. After taking the patient's consent, under local anesthesia (2% lignocaine with 1:200000 adrenaline), atraumatic tooth extraction was performed (Figure 10a). The socket was curetted mechanically and saline irrigation was done. Using a single drill concept, osteotomy extended 3 mm apical to the extraction socket. Bioline i Hybrid Implants (3.75 mm diameter, 18 mm length and 3.75 mm diameter, 16 mm length respectively) (Figure 10b) were placed subcrestally with higher insertion torque of 45 N/cm² to engage the cortical bone using TTPHIL® technique. Post implant placement RVG was taken. The straight abutment was placed (Figure 10b). Prosthetic rehabilitation followed the surgical intervention, open tray impression was made. Using CAD-CAM technique implants were loaded within 48 hours with zirconia crowns (Figure 11a). Postoperative OPG was exposed showing implant and prostheses (Figure 11b). The patient was recalled after 2 days, soft tissue healing was observed (muointegration). After 2 weeks, the good esthetic result was achieved with no signs of inflammation (Figure 12).

Case 4

A 30-year-old male patient complained of the missing tooth in the upper front region and wanted a permanent solution. History of trauma was revealed 6 months back. Past dental history revealed the use of removable partial denture for missing upper front tooth



Figure 8: Healthy gingiva after 2 weeks.



Figure 9a and b: Preoperative view showing poor esthetic upper front tooth and OPG showing Root canal treated tooth with respect to 11, 12.

since few months. On clinical examination, missing tooth with respect to 11, 12, 21, showing firm mucosa. A thorough radiographic examination shows sufficient bone height and width (Figure 13a and b). Routine blood investigations were done and patient's consent was taken. Under the aseptic condition, surgery was performed under local anesthesia. The flapless procedure was carried out using single drill concept followed by placement of Bioline i Surface implant of (3.75 mm diameter and 20 mm length, 3.75 mm diameter and 18 mm length) placed subcrestally with insertion torque up to 45 N/cm² (Figure 14). The temporary restoration was fabricated using composite resin and later replaced with permanent restoration after a few days. The definitive prosthesis was fabricated with zirconia crowns. Post prostheses OPG was exposed (Figure 15a and b). After 2 weeks, the good esthetic result was achieved with no signs of inflammation.



Figure 10a and b: Atraumatic extraction and implant placement followed by straight abutment.



Figure 11a and b: Zirconia crowns and Post-operative OPG showing implant and prosthesis.



Figure 12: Healthy gingiva after 2 weeks.

Discussion

The principal requirement for placing the implants is the implant site and the alveolus which get completely healed after tooth extraction. Earlier the technique used for the implant placement, the required time for healing after tooth extraction and also after implant placement [12]. The time required for healing after tooth



Figure 13a and b: Preoperative view showing missing upper front tooth and OPG showing missing tooth with respect to 11, 12, 21.



Figure 14: Implant placement followed by straight abutment.



Figure 15a and b: Zirconia crowns and Post-operative OPG showing implant and prosthesis.

extraction prolongs the treatment plan [13]. The problem with having long periods of the healing time is the considerable reduction in bone volume, compromised implant position and restoration [14]. Schulte [15] was the first to place implants into fresh extraction sites in humans. Atraumatic extraction is advantageous for immediate implant placement as it helps in the preservation of buccal plate of bone from perforations or fracture. The success of immediate implant placement is very high which is approximately 95%, depends on atraumatic extraction as it preserves the maximum amount of bone engaging the implant. Other studies show consistent results discussed by Wagenberg et al, Rosenquist B et al. [16,17]. Perry et al. [18] performed a 5-year retrospective study to compare immediate implants with delayed implant placement. They found survival rates of 90.03 % and 90.04 % respectively. Immediate loading protocol has been widely accepted over time due to the many advantages such as shortening of treatment time, maintenance of alveolar process, esthetics and reduction in operating time [19]. In literature Tall and Tilted Pin Hole Immediately Loaded implants (TTPHIL®) technique is a newer approach and proves to have higher success rates [20-23]. TTPHIL® technique is a graft less solution, characterized by the elimination of cantileverage, minimal invasiveness (simplified flapless

surgery), high bone-implant contact, screw-retained prosthetic solution and establishing mucolock by creating a biologic seal of connective tissue fibers that protects and maintains the crestal bone and reduces pocket depth [24-27]. TTPHIL® technique reduces treatment time and number of surgical procedures and improved esthetics [28-30]. After a 1 year follow-up, there were no mechanical or biological complications. The patient gave high satisfaction marks for the overall treatment.

Conclusion

Tall and Tilted Pin Hole Immediately Loaded implants- TTPHIL® is a modern technique of forthcoming implant placement and immediate loading with definitive preservation of soft tissue in the esthetic zone. The major advantage is that it fulfills the patient's expectations wherein perfect harmony between pink and white esthetics can be achieved with minimal surgical intervention and minimal financial burden.

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