IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 1 Ver. VIII (Jan. 2016), PP 71-79
www.iosrjournals.org

Immediate Implant Placement and Loading in Esthetic Zone

Abu-Hussein Muhamad[1], Chlorokostas Georges [2], Abusalih Ahmet[3], Ismail Hakki Bayraktar[4], Abdulgani Azzaldeen[5]
[1, 2,3,4,5] *Al-Quds University, Faculty of Dentistry,Jerusalem,Palestine*
Corresponding Author; Dr.Abu-Hussein Muhamad
DDS,MScD,MSc,MDentSci(PaedDent) ,FICD
123Argus Street 10441 Athens, Greece
Corresponding author:azzaldeenabdulgani@gmail.com

Abstract: *Immediate implant placement has been the acceptable procedure for the past two decades. Perhaps the most important aspect of any implant surgery in accordance with the successful procedure is implant surgery and bone to implant contact.The aim of this article is to describe a clinical case in which a fractured maxillary canine was replaced by an immediately loaded postextraction implant using a simplified technique, which permits a reduction of the number of implant components and consequently a lower cost of treatment, while at the same time maintaining acceptable aesthetic and functional outcomes.*

Key words: *Immediate implant placement, Immediate loading, Immediate provisionalisation, Esthetics*

I. Introduction

Immediate implant loading can be briefly defined as the loading of a dental implant immediately or few hours after being placed. Misch and coworkers defined as immediate occlusal loading within two weeks of implant insertion. Wang et al defined Immediate implant loading as an implant-based surgical technique in which the "implant supported restoration is placed into occlusal loading within at least 48 hours after implant placement." On basis of the consensus obtained from International Congress of Oral Implantologists meeting at Naples (Italy) in May 2006. The terms 'non-functional immediate loading' and 'immediate restoration' are used when a prostheses is fixed to the implants within 72 hrs without achieving full occlusal contact with the opposing dentition.[1]

Several investigators have suggested the loading of implants at different intervals of time. Mish et al (2004) has classified the implant loading as - immediate occlusal loading, early occlusal loading, non- functional immediate restoration, non- functional early restoration and delayed occlusal loading. Immediate D direct loading: the provisional D definitive prosthetic construction is attached to the implant within 24 hours of the implant being placed. Whereas Early loading D Early functional loading: the provisional D definitive prosthetic construction is attached to the implant within days D weeks of the implant being placed.[2]

Planning an implant treatment for a hopeless tooth starts prior to the extraction. The timing and technique of extraction and the timing of implant placement all play an important role in treatment outcome.3 With immediate implant placement becoming increasingly predictable as the parameters for successful treatment outcome with considerably reduced treatment time and increased patient compliance.[3]

Implant immediate loading includes all of the advantages of a one stage surgical approach. Also, during the osseointegration process, the patient does not have to use a removable denture, which increases function, speech, stability, comfort and improves certain psychological factors [1,4]. Splinted implants can decrease the risk of overload to each implant because of the greater surface area and improved biomechanical distribution.[4]

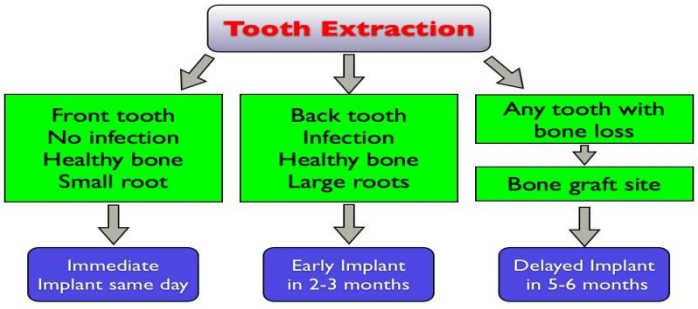

Table.1; Immediate implant placement

The concept of an immediate restoration includes a nonsubmerged first stage surgery and also implies that the occlusal surfaces and implants are loaded with a provisional of definitive restoration [5,6]. A delayed or staged loading refers to an implant prosthesis with occlusal load after more than 3 months (mandible) or 6 months (maxilla) post-implant insertion. Using a delayed approach allows you to use a 2 stage surgical procedure that covers implants with tissue or one stage approach that exposes a portion of the implant at the initial surgery.[7]

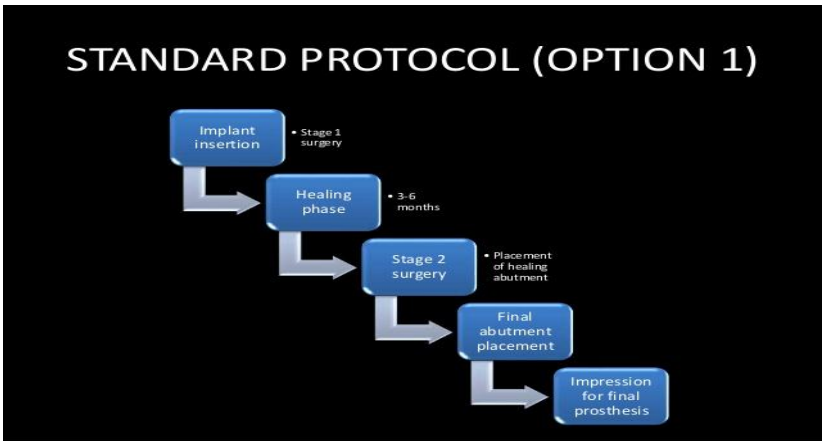

Table.2; Option I

Recently, single-stage, immediate loading of implants are done using flapless surgery. Single-stage protocol involves either one-piece implant, consisting of implant and abutment manufactured as one-piece or placement of two-piece implant system in one surgical procedure. Planning for immediate loading of dental implants is facilitated by advanced imaging techniques. These techniques allow for selection of implant sites that have the highest Hounsfield values, which correlate with denser bone[8,9] . In the flapless surgical procedure, a round tissue punch is used to remove the soft tissue on the crestal bone at the implant site, or the osteotomy is directly initiated through the soft tissue. Primarily two different options are available for immediate occlusal loading: First option loads the implants the same day as the surgery; Second option is to place the implant and make an impression at surgery and 7 to 12 days later, deliver
the transitional prosthesis.[9]

Option I: On the day of surgery, the implant is inserted into the pre established positions. After implant insertion the final abutment is placed and tightened. Final abutments are prepared intraorally for parallelism and proper height requirements. The transitional prosthesis relined with light cured composite to eliminate toxic contact of monomer with the bone. The transitional prosthesis is evaluated for harmonious occlusal contact in centric occlusion.

Option II: Implant positioning during surgery are same as in option I. However, in option II an impression with additional silicone impression of implant body position is recorded. After the impression, the abutments are removed from the implant body and replaced with permucosal extension. The laboratory inserts the implant body analogs connected to the abutment into the impression, pours the impression with die stone and mounts the cast to the opposing arch. The laboratory selects and prepares the abutment for restoration and fabricates a transitional prosthesis. After 7-14 days of surgery, per mucosal extensions are replaced with the selected and prepared abutments the transitional prosthesis is also cemented.

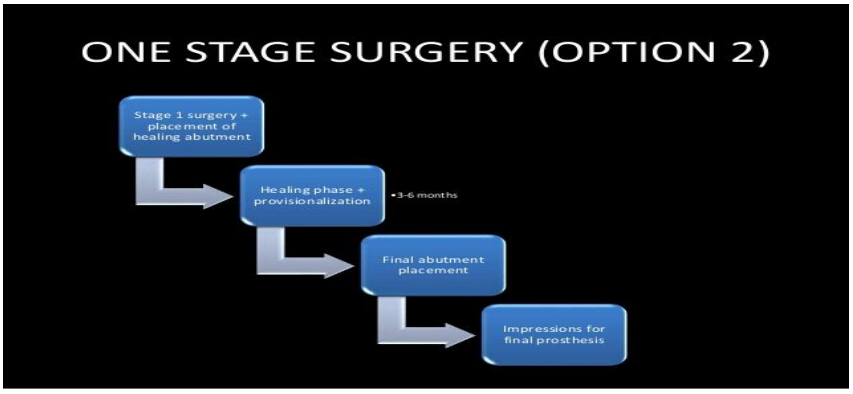

Table.2; Option II

The aim of this article is to describe a clinical case in which a fractured maxillary canine was replaced by an immediately loaded postextraction implant using a simplified technique, which permits a reduction of the number of implant components and consequently a lower cost of treatment, while at the same time maintaining acceptable aesthetic and functional outcomes.

Case Report

A 54-year-old male patient with a number of contraindications to treatment, such as smoking and chronic periodontitis, was referred to our pivate dental clinic with a non-restorable left maxillary canine to be removed due to a crown fracture. The patient expressed his desire to have a rehabilitation that could offer a satisfactory aesthetic outcome at a lower cost. Treatment options were reviewed, and informed consent was obtained. Based on the patient's express desire to reduce the treatment time, we decided to perform a postextraction implant placement with immediate provisionalization since his clinical and radiographic examinations revealed ideal hard and soft tissue contours for this procedure. A preliminary impression of the maxillary arch was made with alginate , a diagnostic waxing was prepared on the maxillary cast, and a provisional crown was fabricated for immediate provisionalisation of the implant. [Fig. **1**]

Before starting the surgical procedure, in order to permit the growth of soft tissue above the root, soft tissue was abraded and the residual crown was smoothed and cut down with a rosette bur. This provided more voluminous gingival tissue, making it possible to create a correct appearance profile on the part of the gingival architecture.

Fig. **1**; Preoperative oral

On the day of surgery the patient received 2 g of amoxicillin 1 hour before surgery, chlorhexidine and 1 g of amoxicillin 6 hours after surgery to reduce the risk of infection. Local anaesthetic was injected into the oral mucosa and palatally . An atraumatic extraction was performed without flap elevation to preserve the integrity of the interproximal papillae and remaining buccal and lingual bone plates. The tooth was carefully extracted using a luxator and forceps, the extraction being accomplished with light twisting movements to avoid breaking the bony margins of the alveolus. The extraction socket was debrided using a manual instrument and was irrigated with sterile saline. The alveolus showed the absence of fenestrations or dehiscences of the bone walls and a $\leq$ 2 mm residual gap between the implant surface and surrounding bone walls. The implant site was prepared at the bottom of the socket according to standard procedures.A conical implant with an MP-1 hydroxyapatite surface was placed completely within the confines of the socket using the sterile surgical technique prescribed by the manufacturer . Evaluating the three dimensions, the implant was guided by the provisional restoration using a surgical template to achieve the optimal prosthetic position. The implant shoulder was positioned 1.5-2 mm from the adjacent teeth, 3 mm apical to the anticipated gingival margin, and 1 mm apical to the height of the most coronal wall of the alveolus. After placement of the implant a marginal defect

area surrounding the implant was identified, measured as a distance of 1.5 mm mid-buccally and 1.2 mm mid-palatally.In order to obtain bone regeneration and bone integration in the circumferential defect area, autologous bone obtained during implant site preparation was lightly packed into the alveolus and then compressed and condensed by the implant placement; the residual gap was filled with a gelatin sponge . The implant was inserted with a torque of 35 Ncm to obtain optimal primary stability. After insertion the implant was first unscrewed and later screwed to control the torque between 35 and 50 Ncm and to permit appropriate passivity of the implant ithe prepared site . [Fig. **2,3**]

A mount was prepared and refined to create an abutment, which was positioned on the implant. A provisional composite resin crown was then positioned on the abutment previously created with assessment of adjacent tooth reference points (occlusal stops) and was fixed in the correct position, filling the gap between the provisional crown and the abutment with flowable composite resin . In this way the provisional crown and the abutment were united to form a single structure. This was subsequently removed from the implant to eliminate the occlusal stops and refine and contour the surface profile so as to achieve proper adaptation of the gingival soft tissue. The occlusion was adjusted to clear all contacts in maximum intercuspation and in lateral and protrusive excursions: any occlusal contacts during centric and eccentric movements on the provisional restoration were eliminated. The screw-retained structure was connected to the implant to allow maturation and integration of the peri-implant soft tissues and to facilitate osseointegration. [Fig. 4]

Fig. **2**; Implant with healing abutment and suture around implant

The patient was instructed to consume a soft diet and to avoid placing food in the surgical area during the first 6 weeks and was instructed to rinse twice daily with 0.2% chlorhexidinedigluconate and avoid brushing the surgical site for the first 2 weeks. He was also given amoxicillin 1 g every 8 hours for one week and non-steroidal-anti-inflammatory drugs for 5 days.

Five weeks after surgery the soft tissues showed a favorable healing pattern with no inflammation, no recession, and preservation of the interdental papillae . A definitive abutment was prepared from the mount and refined, and a definitive metal-ceramic crown was created for aesthetic finalisation. The definitive abutment was positioned and screwed to the implant, and the definitive crown was positioned and cemented onto the abutment.The morphology of the occlusal surfaces was similar to that of natural teeth with occlusal contacts in maximum intercuspation and cusp inclination, and with functional contacts during lateral and protrusive excursions. The definitive restoration was placed seven weeks after implant placement. [Fig. **5**]

Fig. **3**; Provisional prosthesis cemented with flowable composite resin

When monitored at three months and one year, the hard tissues also showed a favourable healing pattern with no radiolucency around the implant and no resorption of the alveolar ridge. Post-surgical follow-up visits and professional oral hygiene were carried out at months 1, 3, 6, 12, 18, and 24 after the surgical procedure. At each follow-up visit a clinical evaluation was performed, and an intraoral radiograph was obtained using a customised right-angle holder. At month 36, the clinical and radiographic parameters were optimal: the interproximal papilla and gingival buccal margin levels remained stable, and the interproximal bone level also showed no change over this period of time. [Fig.6]

Fig. **4**; Soft tissue after five weeks and definitive abutment.

II. Discussion

Immediate implant placement, in which the clinician places the implant immediately following extraction, can be chosen if the periodontium is intact. This approach offers the advantages of decreased treatment time and morbidity, while exhibiting success rates similar to those of the traditional approach [11,12]. Additionally, it also offers the option of immediate provisionalization and enhanced esthetic outcomes.

Fig. **5**; Postoperative oral condition: it is noticeable the definitive left maxillary canine.

An immediate implant placement and provisionalization approach has been increasingly adopted by clinicians because the technique seems to predictably improve esthetic outcomes. Favorable results were originally reported over a decade ago [12, 13]. However, subsequent publications reported recession and loss of labial crest height [14]. Although buccal implant placement was the main cause of recession in many instances, biotype and factors affecting crestal bone maintenance may also play a role. A more recent animal study demonstrated that the labial plate is maintained when implants are placed in a lingual position [15].

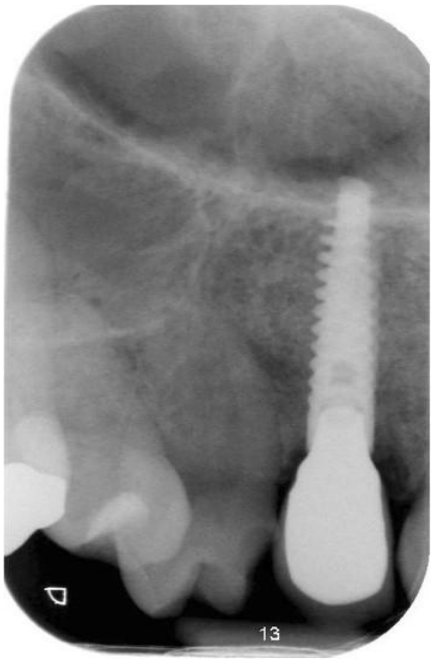

Fig. 6 ; Final radiograph obtained at 36months after implant placement

Immediate loading can be attempted in the edentulous mandible and maxilla, single tooth/ multiple teeth situations in extraction sockets. Immediate loading in the edentulous mandible is the most common indication for immediate loading. In single tooth implant cases, immediate restoration with or without occlusal contact have been advocated according to some studies.

Factors Affecting the Success of Immediate Implant Loading

a.Surgical factors

A.a-Primary implant stability: It is evident in the literature that stability seems to be the most important factor for immediate implant loading. If an implant is placed in the soft spongy bone poor initial stability, it usually results in the formation of connective tissue encapsulation, similar to the pseudoarthrosis observed in an unstabilized fracture site. Micro movements of more than 100 mm are sufficient to jeopardize healing with direct BIC (16). This observation was also reported by Szmukler-Moncler et al. and Jo et al. supported the fact that the main factor influencing the success of immediate loading is the primary stability of the implants at the time of the loading (17,18).

A.b-Surgical technique: Gentle surgical placement is also a key element for implant success regardless of the applied treatment protocol. Excessive surgical trauma and thermal injury may lead to osteonecrosis and result in fibrous encapsulation of the implant ( ). Heat generated during drilling without adequate cooling is associated with bone damage (19,20).

b.Implant factors

B.a-Dimensions of the implant: The implant length may also influence the outcome of immediate implant loading. For every 3mm increase in length of a cylinder-shaped implant, the surface area increases by an average mof 20–30%. The majority of studies have suggested that implants should be 10mm long to ensure high success rates. Therefore, the critical length and diameter of immediately loaded implants remains to be determined. surfaces render a significant increase of BIC. The shear strength of implants with a rough surface was shown to be about 5 times as high as that of implants with a smooth surface. In addition, greater forces are required to remove implants with a rougher surface compared to implants with a smoother surface. Rough implant surfaces render a significant increase of BIC (21). In addition, greater forces are required to remove implants with a rougher surface compared to implants with a smoother surface (2 2). Future studies should still be conducted in regions with softer bone to evaluate if implant surfaces play a relevant role in immediate implant loading success.

b.b-Designs/Configurations: Implant configuration has been considered as an essential requirement for implant success. The screw implant design develops higher mechanical retention as well as greater ability to transfer compressive forces. The screw design not only minimizes micro motion of the implant but also improves the initial stability, the principal requirement for immediate loading success. Use of threaded implants results in

high percentage of the implants in contact with bone cortex. Threaded implants show a greater functional area effecting a better stress distribution at the implant bone interface. As a general concept, the screw implant design develops higher mechanical retention as well as greater ability to transfer compressive forces.

b.c-Surface Textures: Rough implant surfaces render a significant increase of BIC. The shear strength of implants with a rough surface was shown to be about 5 times as high as that of implants with a smooth surface. In addition, greater forces are required to remove implants with a rougher surface compared to implants with a smoother surface. Rough implant surfaces render a significant increase of BIC (21). In addition, greater forces are required to remove implants with a rougher surface compared to implants with a smoother surface (22). Future studies should still be conducted in regions with softer bone to evaluate if implant surfaces play a relevant role in immediate implant loading success.

c.Occlusal Factors

The occlusal scheme may be another key factor for a successful outcome with immediately loaded implants Basic principles of implant occlusion may include bilateral stability in centric (habitual) occlusion, evenly distributed occlusal contacts and force. There should be no interferences between retruded position and centric Position and smooth, even, lateral excursive movements.

d.Host Factors

d.a.Wound Healing: Metabolic diseases that directly affect bone metabolism may significantly influence implant wound healing. In fact, some data have demonstrated that early load increased BIC and allowed a faster remodeling process when compared to unloaded controls (23). This concept of the mechanical stimulation of bone around implants was also evaluated and confirmed by Rubin and McLeod (24). It can be speculated that immediate loading of dental implants may accelerate bone formation, but primary stability is essential for this process to occur.

d.B.Quality And Quantity Of Cortical And Trabecular Bone: In most of the studies on immediate loading, good bone quality has been mentioned as an important prognostic factor for the success of the procedure. The prime factor that determines the success of immediate loading is the quality of the bone, the suggested best type being type II. Host bone density plays an important role in determining the predictability of the immediate implant loading success. An implant placed in compact dense bone is more likely to ensure initial stability and thus, better will be able to sustain such immediate forces. This clinical case shows that an immediate implant restoration placed in a postextraction site can constitute a safe and successful treatment procedure. Several authors have shown that immediately loaded postextraction implants have a survival rate of 94.5-100% after twelve months of follow-up. Correct clinical, prosthetic and surgical management of endosseous implants replacing missing teeth in the anterior maxilla enables the dental surgeon to achieve predictable aesthetic outcomes. The immediate placement in postextraction sites is a surgical option capable of ensuring ideal peri-implant tissue healing, while at the same time preserving the pre-surgical gingiva and bone [24,25]. To achieve prosthetic success, it is essential to understand the patient's expectations and desires, paying particular attention to his or her psychological and socio-economic status, as well as to his or her oral condition [26]. The prosthesis should integrate itself from the biological, functional and aesthetic points of view [27]. Some patients seek a rehabilitation capable of yielding the best aesthetic outcome possible despite the cost, whereas others request a rehabilitation capable of affording a satisfactory aesthetic result at a lower cost [28]. In cases such as the one reported here, we propose a simplified technique, which makes it possible to reduce the number of implant components and materials involved, and consequently to reduce the cost of treatment, while maintaining acceptable aesthetic and functional outcomes.

The technique described in this report is characterised by the immediate loading of a conical implant in a postextraction site, with no flap elevation, filling the socket not with heterologous bone but with a fibrin sponge, the use of a mount as transfer and abutment, and finalisation with a metal-ceramic crown.[11,12,13,14] The advantages of placing implants in fresh extraction sockets and putting them in immediate/early function are many. A predictable protocol affords the possibility of performing a single surgical procedure, giving the patient a temporary prosthesis immediately, and minimising the shrinkage of hard tissue and soft tissue recession [11,12]. There is a risk of mucosal recession and adverse soft tissue aesthetics with immediate implant placement. However, this risk may be reduced by avoiding a buccal position of the implant in the extraction socket [13,14,15].

Immediate provisionalisation of dental implants enables the patient to avoid the physical discomfort of wearing a removable interim prosthesis or the psychological trauma of a compromised smile [29]. The provisionalisation makes it possible to condition implant soft tissues in order to preserve the interproximal papillae and restore a curved/rounded appearance of the gingival margin; it also permits immediate healing of

the soft tissue with the formation of an adequate mucosal seal [11,12]. For a predictable aesthetic result, an important aspect seems to be the height and thickness of the buccal bone wall, which remains after immediate placement of the fixture [11]. The immediate replacement of the missing root with a postextraction implant avoids the loss of bone in height and width [12].

A number of studies indicate that there is no evidence of different responses and behavior of the peri-implant marginal bone and soft tissue when titanium or gold-alloy abutments are used in conjunction with cemented single-tooth implant restorations [.29,30].

The choice of a metal-ceramic crown was based on the patient's limited economic resources as well as on his limited aesthetic requirements as a result of his poor general oral condition . It was, however, possible to obtain a prosthesis integrated aesthetically and biologically with the remaining denture. The prosthesis presents a natural appearance without dark or opaque gingival margins due to metal prosthetic margins covered by gingival tissue[29].

The case presented consisted of a maxillary canine extraction and immediate non-functional implant loading.This approach preserved both soft and hard tissues, and created a harmonious relationship among the implant, the restoration and the surrounding tissues. What should be emphasized is the necessity of the appropriate case evaluation and selection as well as the careful treatment planning.These parameters along with patient's compliance are of utmost importance for a successful outcome.Implant overloading attributes to clinical complications such as screw loosening, screw fractures, fractures of veneering materials, prosthesis fractures, continuing marginal bone loss below the first thread along the implant, implant fractures, and implant loss. These complications can be prevented by application of sound biomechanical principles such as passive fit of the prosthesis, narrowing the buccolingual/ mesio-distal width of implant prosthesis, reducing cantilever length, maintaining implant load within the physiological limits of individualized occlusion. For accomplishing these objectives, improved force direction, increased support area and reduced force magnification are indispensable.[29]

III. Conclusion

Immediate implants are increasingly predictable and are described in this case report with all parameters being favorable to success and can provide esthetically superior results. Immediate loading protocol can be successful in judiciously selected cases where in high implant stability has been achieved in good bone volume quality.

References

[1]. Wang TM, Leu LJ, Wang J, Lin LD. Effects of prosthesis materials and prosthesis
[2]. splinting on peri-implant bone stress around implants in poor-quality bone: a numeric analysis. International Journal of Oral and Maxillofacial Implants. 2002;17(2): 231-7.
[3]. Misch CE. Bone Density: A Key Determinant for Treatment Planning. In: Contemporary Implant Dentistry, (Misch CE) 3rd ed. Mosby Elsevier, St. Louis, Missouri;2008. pp. 130-146.
[4]. Wohrle PS. Single tooth replacement in esthetic zone with immediate provisionalization: 14 consecutive case reports. Practical periodontics and Aesthetic Dentistry 1998; **10**:1107-1114.
[5]. Alphonse Gargilo etal. Immediate molar implant placement: A clinical investigation. The journal of implant and advancedclinical dentistry 2011; **3**(6):37-44.
[6]. Turkyilmaz I, Suarez JC, Company AM. Immediate implant placement and provisional crown fabrication after a minimally invasive extraction of a peg-shaped maxillary lateral incisor: a clinical report. The Journal of Contemporary Dental Practice. 2009;10(5):e73-80.
[7]. Turkyilmaz I. Alternative method to fabricating an immediately loaded mandibular hybrid prosthesis without impressions: a clinical report. The International Journal of Periodontics and Restorative Dentistry. 2012;32(3):339-45.
[8]. Abboud M, Wahl G, Guirado JL, Orentlicher G. Application and success of two stereolithographicsurgical guide systems for implant placement with immediate loading. International Journal of Oral and Maxillofacial Implants. 2012;27(3):634-43.
[9]. Siddiqui AA, Ismail JY, Kukunas S. Immediate loading of dental implants in the edentulous mandible: a preliminary case report from an international prospective multicenter study. Compend Contin Educ Dent 2001; 22(10): 867-70.
[10]. Ormianer Z , Garg AK, Palti A. Immediate loading of implant overdentures using modified loading protocol. Impl Dent 2006;15(1):3540.
[11]. Abu-Hussein M., Abdulgani A., Watted N .Zahalka M.; Congenitally Missing Lateral Incisor with Orthodontics, Bone Grafting and Single-Tooth Implant: A Case Report. Journal of Dental and Medical Sciences2015, 14(4),124-130
[12]. Abdulgani A.,. Kontoes N., Chlorokostas G.,Abu-Hussein M .;Interdisciplinary Management Of Maxillary Lateral Incisors Agenesis With Mini Implant Prostheses: A Case Report; IOSR-JDMS 2015,14 (12) , 36-42
[13]. Abu-Hussein M., Abdulgani A., Watted N .Zahalka M.; Congenitally Missing Lateral Incisor with Orthodontics, Bone Grafting and Single-Tooth Implant: A Case Report. Journal of Dental and Medical Sciences2015, 14(4),124-130
[14]. Abu-Hussein M. , Abdulgani A., Bajali M., Chlorokostas G .; The Mandibular Two-Implant Overdenture.Journal of Dental and Allied Sciences , 2014 , Vol 3,1; 58-62
[15]. Abdulgani Azzaldeen , Abusalih Ahmet ,Hakki Ismail ,Chlorokostas Georges, Abu-Hussein Muhamad; IMMEDIATE LOADING WITH MINI DENTAL IMPLANTS IN THE FULLY EDENTULOUS MANDIBLE Int J Dent Health Sci 2015; 2(6):1071-1079
[16]. Abu-Hussein M., Watted N., Abdulgani A., Kontoes N.; Prosthodontic-Orthodontic Treatment Plan with Two-UnitCantilevered Resin-Bonded Fixed Partial Denture, IOSR-JDMS 2015,14(12) , 131-136
[17]. 16. Brunski JB. Avoid pitfalls of overloading and micro motion of intraosseous implants. Dental Implantology Update1993; 4: 77–81.

[18]. Jo HY, Hobo PK, Hobo S. Freestanding and multiunit immediate loading of the expandable implant: an up-to-40-month prospective survival study. J Prosthet Dent 2001;**85**:148-55.
[19]. Szmukler-Moncler S, Salama H, Reingewirtz Y, Dubruille JH. Timing of loading and effect of micro motion on bone–dental implant interface: review of experimental literature. J Biomed Mat Res 1998;**43**:192–203.
[20]. Eriksson A, Albrektsson T, Grane B,McQueen D. Thermal injury to bone. A vital microscopic description of heat effects. Int J Oral Surg 1982;**11**:115–21.
[21]. Eriksson RA, Albrektsson T. The effect of heat on bone regeneration: an experimental study in the rabbit using the bone growth chamber. J Oral Maxillofac Surg 1984;**42**:705–11.
[22]. Buser D, Schenk RK, Steinemann S, Fiorellini JP, Fox CH, Stich H. Influence of surface characteristics on bone integration of titanium implants: Ahistomorphometric study in miniature pigs. J Biomed Mat Res 1991;**25**:889–902.
[23]. Wennerberg A, Albrektsson T, Andersson B, Krol JJ. A histomorphometric and removal torque study of screw-shaped titanium implants with three different surface topographies. Clin Oral Implants Res 1995;**6**:24–30.
[24]. Randow K, Ericsson I, Nilner K, Petersson A, Glantz PO. Immediate functional loading of Branemark dental implants. An 18-month clinical follow- up study. Clin Oral Imp Res 1999;**10**:8-15
[25]. Rubin CT, McLeod KJ. Promotion of bony in growth by frequency-specific, low-amplitude mechanical strain. Clin Orthopaed Relat Res 1994;**298**:165–74
[26]. Sammartino G, Marenzi G, Espedito di Lauro A, et al. Aesthetics in oral implantology: biological, clinical, surgical, and prosthetic aspects, Implant Dent 2007; 16: 54-65.
[27]. Somanathan RV, Sim nek A, Bukac J, et al. Soft tissue esthetics in implant dentistry, Acta Medica (Hradec Kralove) 2007; 50: 183-6.
[28]. Fradeani M. Fradeani M, Barducci GConstructing and finalizing the prosthetic rehabilitation, Esthetic rehabilitation in fixed prosthodontics, Volume 2 - Prosthetic Treatment: A Systematic Approach to Esthetic, Biologic, and Functional Integration. Chicago: Quintessence 2008; vol 2
[29]. Vallittu PK, Vallittu AS, Lassila VP. Dental aesthetics: a survey of the attitudes in different groups of patients, J Dent 1996; 24: 335-8.
[30]. Chen S, Darby I, Reynolds E. A prospective clinical study of nonsubmerged immediate implants: clinical outcomes and aesthetic results, Clin Oral Implants Res 2007; 18: 552-62.
[31]. Abu-Hussein M , Azzaldeen A, Aspasia SA, Nikos K. Implants into fresh extraction site: A literature review, case immediate placement report. J Dent Implant 2013 ;3:160-4
[32]. Vigolo P, Givani A, Majozub Z, et al. A 4-year prospective study to assess peri-implant hard and soft tissue adjacent to titanium versus gold-alloy abutments in cemented single implant crowns, J Prosthodont **2006;** 15: 250-6.