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Case Report

Biodynamic Implantology. Immediate Loading and Full Mouth Restoration, Foreseeable Solution for Advanced Periodontal Disease Surgical and Prosthetic Relevance with Aesthetic Considerations

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Abstract

The purpose of current implantology is to achieve natural, functional and stable aesthetic results using purified techniques, within short term results and long-term stability. The objective of full mouth rehabilitation is its reconstruction, restoration and maintenance of the entire oral system, nevertheless if it is implant-supported or dent-supported. It demands rehabilitation within the physiological, functional and aesthetics wellness of the stomatognathic system.

Today patients with advanced periodontal disease and indications of serial extractions refuse to remain edentulous or to use some type of removable device while implants are healing, these patients go from dentulous to edentulous in minutes, there are huge aesthetics considerations in treatments offered; these dentulous patients expect to recover aesthetics, and function, immediately and dream to have individual teeth and be able to use dental floss as if the new implant supported crowns were natural teeth. But we know that the white aesthetic (teeth) is not enough to obtain a natural look in the mouth, the soft tissue must prevail natural. So, what kind of treatment can those patients be offered?

This type of treatment, performed in less than 48 hours, has significant advantages over the conventional protocol: immediate aesthetics and functionality, promoting osseointegration, achieving short and long term stability preservation of soft and hard anatomy, improving soft tissue aesthetics with the use of PRF, avoiding the maximum use of pink increments in final restorations, and offering to patients the option of having their individual and natural fixed teeth again, without the uncomfortable use of removable appliances while treatment is finished.

The aim of this article is to identify current opportunities for immediate implant placement, immediate loading and delayed prosthetic phase with single screwed implant supported crowns, for patients with type V, VI, VII, VIII periodontal disease [1]. Surgical and aesthetical considerations are presented, and protocol of clinical steps will be illustrated.

Keywords: Implants; Immediate Implant Placement; Immediate Loading; Functional Loading; Full Mouth Restoration, Restorative Considerations

Abbreviation

PRF: Platelet Rich Fibrin

Introduction

Immediate placement is considered when implants are placed immediately following tooth removal on fresh sockets [2-5]. The bio- logic advantage [6,7] is the argument that this procedure will prevent postsurgical bone resorption commonly seen after tooth extractions as a typical process of the socket healing. Resorption after multiple extractions has been documented in several studies and has been reported to result in a 45% reduction in the alveolar crest [8], if the implant is performed immediately. Most of this bone loss occurs over the first 6 months following extraction and the wearing of a denture.

Immediate loading [8] is considered when the prosthesis is placed between 0 and 48 hours of implant placement, the mechanical forces generated by the load of the provisional may explain the favorable biologic response of the bone and its surrounding tissue [9].

Functional loading [10] is considered when occlusal forces are in action. In full arch, fixed implant supported provisionals disperse load evenly. Some biological and structural advantages in the short and long term are, bone preservation [11,12], enhance function, phonetics and esthetics, masticatory efficiency, prosthesis design, improve jaws relationships, treatment timing, among others.

A great number of patients develop progressively failing dentition. There are several etiologies like severe periodontal decease, high susceptibility to cavities, bad prognosis of multiple prostheses, genetic disorders, fear of any dental treatment. Patients with this bad prognosis lose their teeth and require either a complete denture, implant supported overdenture, or a full arch implant supported prosthesis.

Generally, these dentulous patients keep their falling teeth because they are required to wear a full denture while implants are healing, or a prefabricated denture with a pink simulated gum is implant-supported as an esthetic and functional solution. Esthetics, social and emotionally aspects of that treatment are negative in many cases.

The precise indications of the immediate loading in fresh sockets [13,15] in both arches will be introduced, the key goal of this type of treatment is to achieve osseointegration and natural healthy soft tissue without any increment of pink ceramics, give back patients' self- steam, aesthetics and function, in less than 48 hours, and give them the possibility of having a final prosthesis with single crowns, similar as their individual natural dentition.

According to Jaffin and associates [3], Ganeles and associates [14], the success rates in this full arche functional immediate loading is more than 95%.

Case Report

Examination and diagnosis

A 52 years old married female patient presented to my private practice with a request for a solution to her oral condition. She was unpleasant with her buccal health, halitosis, impossibility to chew, and unaesthetic smile, she was very apprehensive of dental treatment and refused to wear any removable device or complete denture [15], the patient was unhappy about her appearance, was withdrawn, and showed signs of depression. The extra-oral examination did not establish any significant findings. She had no systemic conditions and a history of 35 years of smoking.

Several alternative treatments were offered, including overdentures, hybrid prostheses, and PPF implant supported, but all incorporated a removable device while implants integrate.

Clinical examination revealed partial edentulism and a failing dentition (Figure 1) because of severe periodontal disease (Figure 2), all remaining teeth and root stumps were periodontally compromised, and II, III-degree mobility of the teeth was found.

Figure 1

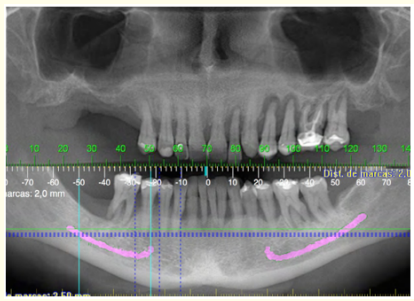

Figure 2

Treatment plan

Once it was established that the teeth could not be saved, pre-surgical planning was undertaken to ensure a flowing process on surgery day. A prosthetic evaluation was made: esthetic parameters, smile line, midline, tooth proportion, tooth position, tooth length, lip support, phonetics and type of occlusion. In addition, evaluation of the amount of soft tissue loss, occlusal patterns and habits are considered as well as patient's esthetic expectations and psychological make-up.

It was decided that the patient, would benefit from an immediate implant placement, immediate functional loading (Figure 3a and 3b) [16] and a final restoration of both arches with individual screwed crowns, so she would improve her confidence, appearance and functionality in less than 48 hours.

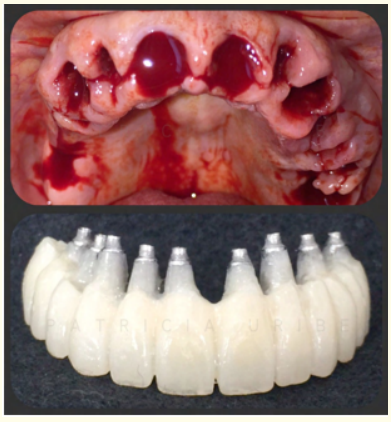

Figure 3a

Figure 3b

Intraoral and extraoral photographs were taken, panoramic radiographic evaluation, to review bone levels, apical bone volume, root proximity, anatomic structures (e.g. the mandibular canal and maxillary sinuses), periapical pathologist can be observed, an interactive CT was highly recommended which provided a more accurate assessment of bone and teeth, precise distances were measured, including tooth length, apical bone, distance to the mandibular canal, and election of the correct implant size. The complete case was planned beforehand, leading a great degree of predictability.

All sites were evaluated so at least 5.0 mm had to be submerged in sound bone with a density greater of 375 Hounsfield units [17,18]. The primary goal was to supply sufficient foundation to support a full arch of teeth for the immediate load [3] (and 12 individual teeth), to insert implants parallel to allow a screwed prosthesis without the use of multi- unit abutments and to keep all access chambers on the cingulum and central fossa. The secondary goal was to place each implant in the site of each natural tooth. If just the primary goal were required, six to eight implants are recommended in maxilla and six in the mandible. Placing an insufficient number of implants would lead to overload and implant loss [19]. By installing more than six implants in each arch, passivity becomes an issue, but placing a lesser number of implants subsequently reduces the even distribution of forces and increases the micro-motion which becomes an issue [11,20].

Surgical protocol

The patient was instructed to wash with 0,12 chlorhexidine digluconate, for 30 secs.

To keep the same vertical dimension of patient, a full mouth bite registration was taken with condensation silicone, it includes soft tissues like gum, mucogingival grove, palate, floor of mouth and teeth.

The upper maxilla was treated in the first instance, the same protocol was executed exactly in the lower maxilla, right after the upper arch was finished.

Premedication and local anesthesia

The patient was intravenously sedated by an anesthesiologist (propofol and dexmedetomidine), then, she was premedicated with standard antibiotic prophylactic protocol (e.g. amoxicillin 2.0 gm), analgesics and anti-inflammatory drugs one hour prior procedure. Local anesthesia was administered by submucosal infiltration labially, buccally, and lingually using lidocaine 2% with 1 in 80.000 epinephrine.

Extractions

Atraumatic extractions preserve bone, gingival architecture, and allow the option of immediate implant placement [2] an a shorter period than using traditional forceps or elevator extractions because the trauma from these conventional techniques are intermittent. Atraumatic extractions were performed and all sockets were thoroughly debrided [21,22].

Incision

A crestal Incision was made on the middle of the ridge, if any crest is in uneven, it should be slight flattened to avoid height discrepancies so the implant shoulders are at an equal level height. Mucoperiosteal flap was raised, and full alveolar ridge was exposed.

Sinus lift

Anatomic limitations were found in the right side of the maxilla, deficient alveolar height, inadequate posterior alveolus, increased pneumatization of the maxillary sinus, and close approximation of the sinus to crestal bone, so a sinus lift was performed simultaneously to the surgery [23]. Sinus floor augmentation was performed by an external lateral approach, followed by a 3.75 by 13 mm immediate implant placement (in terms of primary implant stability). Implant was not loaded simultaneously.

Implants placement

All implants were inserted in a parallel way. Then implants were inserted from incisives to molars, the parallelism is usually hard to achievable due to the resorption pattern of the maxilla. Implants were immersed in sound bone at least 4 mm in each fresh socket [13,24] implant manufacturer's instructions were followed, (implant site preparation and implant insertion procedure). Osteotomy was performed to place 12 tapered implants (3.75 x 13 - Seven, MIs Technology) at least 2 mm palatal [25] of root apex insertion (Figure 4); since a gap was prevalence in all sites between implants and the labial plate, they were lately filled with small particles of BioOss bone graft; the graft was prepared with PFR. Primary stability was assessed by setting the insertion torque to 32Nw, because of the immediate screw-retained rigid provisional and the future single screw crowns were planned, all screw chambers should be accessed by cingulum and central fossa.

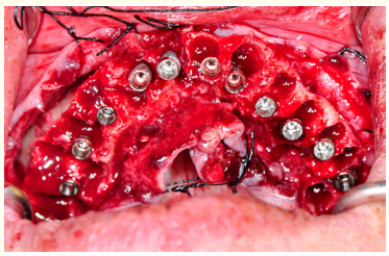

Figure 4

Impression technique

Once all 12 implants were inserted in the fresh sockets, and all shoulders and internal connections are free of blood and tissue, long screwed transfers for open tray are positioned on each implant.

Regeneration process

While the impression is taken, 12 tubes of A-PRF (Figure 5) were filled with peripheral blood from the patient, right after those tubes were positioned on the centrifuge with the pre-set time by Dr. Choukroun's protocol, and blood was centrifuged, the tubes were removed and placed on the tube holder, minutes later a clog of white cells was organized, a great amount of monocytes are founded in the PRF, not just to make it more active in stimulating bone grafts, but also to turn to a more rapid transformation of monocytes into macrophages to increase the effect bone stimulation [26]. Those clogs were transferred to a PRF Box, to let them drain, so flat, strong and resistant mem- branes were formed. Two of twelve membranes were cut in small pieces, to be mixed with the granulated bone, and the drain from APRF so a condensed graft is formed. Then 4 yellow tubes were filled with peripheral blood from the patient, after spinning in the centrifuge, injectable PRF was obtained, bone graft was hydrated with drops of i-PRF, graft coagulates and gets a "solid" free of all movements granules, called steaky bone.

Figure 5

Steaky bone (Figure 6) was placed on gaps between buccal bone wall (Figure 7) [27] and implants to prevent bone resorption, addition- ally to that filling, steaky bone was placed on buccal mucco-periosteal bone wall in order to promote bone regeneration [28] and improve thickness of alveolar ridge, on top of the regenerated site, collagen membranes (Bio-Gide reabsorbable bilayer membrane by Geistlich), were sited on top of the grafting to seek to maintain an effective barrier for better regeneration and to prevent entry of epidermal tissue into the osseous graft,

that would alters the histologic structure of the bone graft; two or three layers of A-PRF membranes were placed over collagen membrane to stimulate soft tissue healing [29]. While copping transfers were still in mouth, suturing process was per- formed with a polyglycolic acid 4/0 (a synthetic absorbable suture) to induce primary intention healing.

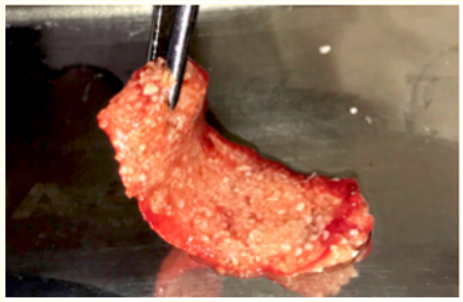

Figure 6

Figure 7

Subsequently the copings [31-33] were splinted [30] with a hard bite registration material, which is based on bisacrylate formula (LuxaBite, DMG), to avoid any micro-movement during impression and obtain an accurate plaster cast.

Light body of vinyl polysiloxane impression material (Panasil initial contact light, Kettenbach) was placed on the copings, between the implants and under the LuxaBite material. An open tray, and putty soft vinyl polysiloxane impression material (Panasil, Kettenbach), was used to take impression, after time recommended by manufacturer, screws of transfers were unscrewed and impression tray was removed from mouth, healing covers were seated on every implant and suture protocol with single stiches complete the procedure (Figure 8).

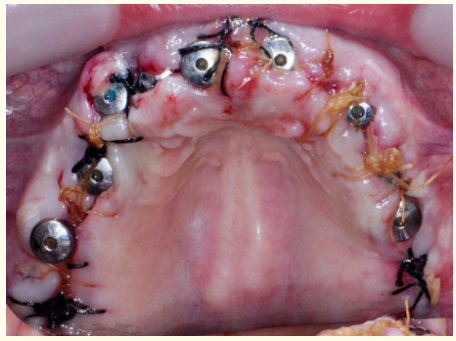

Figure 8

Hereafter, the patient was induced to awaken, the full mouth bite registration (Figure 9) taken previously to treatment is filled in its maxillary side with light condense silicone and positioned into the patient mouth, she was instructed to bite hard, so the material copies and record soft tissues.

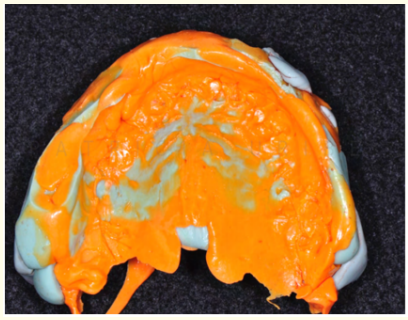

Figure 9

Same protocol as upper maxilla was performed in lower jaw immediately.

Laboratory process

Both Impressions were submerged for ten minutes in 1% Sodium hypochlorite as disinfectant. Analogs were screwed on each implant. Plaster casts was made with gingifast silicone made by Shermack. Casts models were fabricated with type V plaster and sent to the laboratory along with 21 UCLAs to complete lab process. A design wax up was made under parameters sent to our technician. The assembly was made in semi- adjustable articulator. A solid rigid frame was casting in Cr-Co (Figure 10), then esthetic framework was made with thermocured acrylic (Figure 11 and 12).

Figure 10

Figure 11

Figure 12

Second surgery stage

36 hours later the patient arrived at the clinic without any pain, inflammation or bruise, but with a very low sign of swallow in the right upper maxilla, she did not report any uncomfortable situations. She followed instructions about medication and asepsis. A panoramic X- Ray was review, before load the implants, and no any adjustment had to be made. Because of no template was used, the risk of un-parallel implants was an issue but divergence amongst implants was less than 4 degrades. Upper and lower rigid provisional are inspected, and sterilized before incorporated to the patient.

Healing covers were removed and immature connective tissue of emergency profile was exposed, tissue was examined, no inflammation, redness or bleeding sites were found, so we continued with the insertion of rigid prostheses (Figure 13). Generally, the framework misfit in integrated implants may lead to mechanical and biological complications [12,31], mechanical problems are not as harmful as biological complications thus it may lead in loss of osseointegration [32]. In this specific treatment of immediate functional loading passive fit [3,10,33,34] is NOT vital because osseointegration has not begun yet, healing process stars simultaneously precluding any micro- movement [30,35] to the implants because of the benefit of the rigid frame, enhancing osseointegration and healing process. Provisional prostheses were sited and screws were torqued to 25 Nw. Teflon tape was placed into titanium cylinders, access holes were filled with opaque tooth-colored composite. Finally, precise sited of framework [36] to implants was evaluated on a Panoramic X-Ray (Figure 14) and occlusal adjustment is made.

Figure 13

Figure 14

Main objectives of completed treatment were evaluated if they were accomplished: vertical dimension, phonetics, shewing, lip sup- port, smile line and the patient's aesthetic expectations as well as the clinic's, biologics, functional and mechanical professional team's goal.

Post-operative instructions

Patient was advised to follow liquid diet for 1 week, and then change to soft diet for 6 more weeks. 7 days with amoxicillin (500 mg q.i.d.) was prescribed. Hydrocodone with acetaminophen was given in case of pain. Patient was advised to use 2% Chlorhexidine gluconate mouthwash once every two days and gel daily. Panoramic X-Ray was reviewed, routine follow up every 5 days for the first month, then every two weeks for occlusal adjustments. The patient returned to social life and work the same day.

Two months follow up

60 days after the surgery, composites and Teflon tapes were removed from titanium cylinders of the rigid provisional framework [36]. Once all Screws were re-torqued to 35 Ncm with electrical torque calibrator (iSD900, NSK), Teflon and composite filled the hole chambers. Occlusal adjustment was made, and composites were polished and shined Panoramic X-Ray reveals no radiolucent areas around implants.

Final prosthetic phase

Four months after surgery the provisional prostheses are removed, healthy soft tissue (Figure 15) on emergency profile [6,29,37] is exposed. Impression coping were splinted and conventional Impression protocol for screw-retained crowns were used. 48 hours later, 24 PFM single crowns (Figure 16) were sited and torque to 32 Ncm, Teflon tape and opaque tooth-colored composite was used to close access chambers (Figure 17). Occlusal adjustment was carried out using articulation film and a fine diamond bur. The occlusal surfaces were then polished with ceramic polishing discs (Axis Dental). Patient was very happy with the results (Figures 17-21). A postoperative radiograph was (Figure 21) taken to assure all individual crowns were completely seated. An occlusal guard (Figure 21) is fabricated and delivery on one-week 5 days after second surgery; follow up, 3-months, 6-months and then 12-months recall appointments were completed.

Figure 15

Figure 16

Figure 17

Figure 18

Figure 19

Figure 20

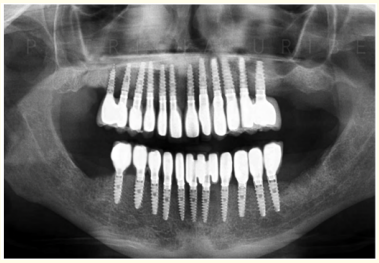

Figure 21

Conclusion

A predetermined protocol was developed to transform a full mouth of highly unsatisfactory appearance to an aesthetic fixed implant individual crowns prosthesis, performing immediate placement, immediate loading [38], resulting in a natural look.

The implant success rate exceeds 97% on the mandible and 92% in the maxilla. The immediate load protocol permits patients who are losing their teeth to be transitioned into implants and remain in fixed dentitions while foregoing multiple surgeries and provisionals.

The major cause of implant failure is micro motion. This is created by patient interference (i.e. eating a hard diet during the four to six weeks after implant placement) or as a result of an improperly fitted provisional restoration or the use of non-rigid materials like resin, acrylics, composites to splint implants during healing process.

Extensive presurgical planning is crucial to ensure a successful case. Papillary anatomy and emergency profile could be accomplished easily if immediate implants, grafting and immediate functional load is precisely planned and performed. Moreover, immediate loading in fresh sockets could preserve dental arch integrity, occlusion, and patient satisfaction, especially in full mouth freestanding situations.

There are numerous factors to review before considering immediate implants for bimaxillary protocol, immediate loading and delayed restauration with single crowns regardless of individual case. However, further experimental validation is necessary before incorporating these various expedited therapeutic approaches into your practice.

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Conflict of Interest

Authors have no conflict of interest to declare.

Bibliography

1. "1999 International Workshop for a Classification of Periodontal Diseases and Conditions". Papers. Oak Brook, Illinois, October 30-November 2, 1999". Ann Periodontol. 1999;4(1):1-112.
2. Chen ST, Wilson TG Jr, Hämmerle CH. "Immediate or early placement of implants following tooth extraction: review of biologic basis, clinical procedures, and outcomes". Int J Oral Maxillofac Implants. 2004;19:12-25.
3. Jaffin RA, Kumar A, Berman CL. "Immediate loading of implants in partially and fully edentulous jaws: a series of 27 case reports". J Periodontol. 2000;71(5):833-838.

4. Hammerle CH, Chen ST, Wilson TG Jr. "Consensus statements and recommended clinical procedures regarding the placement of implants in extraction sockets". Int J Oral Maxillofac Implants. 2004;19:26-28.

5. Chung DM, Oh TJ, Shotwell JL, Misch CE, Wang HL. "Significance of keratinized mucosa in maintenance of dental implants with different surfaces". J Periodontol. 2006;77(8):1410-1420.

6. Bouri A Jr, Bissada N, Al-Zahrani MS, Faddoul F, Nouneh I. "Width of keratinized gingival and the health status of the supporting tissues around dental implants". Int J Oral Maxillofac Implants. 2008;23(2):323-326.

7. Branemark PI. "Osseointegration and its experimental background". J Prosthet Dent. 1983;50(3):399-410.

8. Cochran DL, Morton D, Weber HP. "Consensus statements and recommended clinical procedures regarding loading protocols for endosseous dental implants". Int J Oral Maxillofac Implants. 2004;19:109-113.

9. Tan WL, Wong TL, Wong MC, Lang NP. "A systematic review of post-extractional alveolar hard and soft tissue dimensional changes in humans". Clin Oral Implants Res. 2012;23(5):1-21.

10. Pieri F, Aldini NN, Fini M, Marchetti C, Corinaldesi G. "Immediate functional loading of dental implants supporting a bar- retained maxillary over- denture: preliminary 12-month results". J Periodontol. 2009;80(11):1883-1893.

11. Misch CE, Wang HL, Misch CM, Sharawy M, Lemons J, Judy KW. "Rationale for the application of immediate load in implant dentistry: Part I". Implant Dent. 2004;13(3):207-217.

12. Tarnow DP, Emtiaz S, Classi A. "Immediate loading of threaded implants at stage 1 surgery in edentulous arches: ten consecutive case reports with 1-5 year data". Int J Oral Maxillofac Implants. 1997;12(3):319-324.

13. Lazzara RJ. "Immediate implant placement into extraction sites. Surgical and restorative advantages". Int J Periodontics Restorative Dent. 1989;9(5):332-343.

14. Ganeles J, Rosenberg MM, Holt RL, Reichman LH. "Immediate loading of implants with fixed restorations in the completely edentulous mandible: report of 27 patients from a private practice". Int J Oral Maxillofac Implants. 2001;16(3):418-426.

15. Simonpieri A, Del Corso M, Sammartino G, Dohan Ehrenfest DM. "The relevance of Choukroun's platelet-rich fibrin and metronidazole during complex maxillary rehabilitations using bone allograft. Part II: Implant surgery, prosthodontics and survival". Implant Dent. 2009;18(3):220-229.

16. Misch CE. "Dental Implant Prosthetics, Progressive bone loading. 2nd Edition". St Louis, Mo: Elsievier Mosby (2005):511-530.

17. Cooper L, De Kok IJ, Reside GJ, Pungpapong P, Rojas-Vizcaya F. "Immediate fixed restoration of the edentulous maxilla after implant placement". J Oral Maxillofac Surg. 2005;63(9):97-110.

18. Ottoni JM, Oliveira ZF, Mansini R, Cabral AM. "Correlation between placement torque and survival of single- tooth implants". Int J Oral Maxillofac Implants. 2005;20(5):769-776.

19. Schnitman P, Wohrle PS, Rubenstein JE. "Immediate fixed interim prostheses supported by two-stage threaded implants: methodology and results". J Oral Implantol. 1990;16(2):96-105.

20. Degidi M, Piattelli A. "Immediate functional and non-functional loading of dental implants: a 2- to 60- month follow-up study of 646 titanium implants". J Periodontol. 2003;74(2):225-241.

21. Siegenthaler DW, Jung RE, Holderegger C, Roos M, Hämmerle CH. "Replacement of teeth exhibiting periapical pathology by immediate implants: a prospective, controlled clinical trial". Clin Oral Implants Res. 2007;18(6):727-737.

22. Casap N, Zeltser C, Wexler A, Tarazi E, Zeltser R. "Immediate placement of dental implants into debrided infected dentoalveolar sockets". J Oral Maxillofac Surg. 2007;65(3):384-392.

23. Esposito M, Felice P, Worthington HV.. "Interventions for replacing missing teeth: augmentation procedures of the maxillary sinus". Cochrane Database Syst Rev. 2014;5:CD008397.

24. Crespi R, Capparè P, Gherlone E. "Fresh-socket implants in periapical infected sites in humans". J Periodontol. 2010;81(3):378-383.

25. Rosenquist B, Grenthe B. "Immediate placement of implants into extraction sockets: implant survival". Int J Oral Maxillofac Implants. 1996;11(2):205-209.

26. Anitua E, Orive G, Aguirre JJ, Andía I. "Clinical outcome of immediately loaded dental implants bioactivated with plasma rich in growth factors: a 5-year retrospective study". J Periodontol. 2008;79(7):1168-1176.

27. Covani U, Bortolaia C, Barone A, Sbordone L. "Bucco-lingual crestal bone changes after immediate and delayed implant placement". J Periodontol. 2004;75(12):1605-1612.

28. Hassan KS, Kassim A, Al Ogaly AU. "A comparative evaluation of immediate dental implant with autogenous versus synthetic guided bone regeneration". Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008;106(5):e8-e15.

29. Maksoud MA. "Manipulation of the peri-implant tissue for better maintenance: a periodontal perspective". J Oral Implantol. 2003;29(3):120-123.

30. Trisi P, Perfetti G, Baldoni E, Berardi D, Colagiovanni M, Scogna G. "Implant micromotion is related to peak insertion torque and bone density". Clin Oral Implants Res. 2009 May;20(5):467-471.

31. Chu SJ, Salama MA, Salama H, Garber DA, Saito H, Sarnachiaro GO, Tarnow DP. "The dual-zone therapeutic concept of managing immediate implant placement and provisional restoration in anterior extraction sockets". Compend Contin Educ Dent. 2012;33(7):524-534.

32. Schwartz-Arad D and Levin L. "Symphysis revisited: clinical and histologic evaluation of newly formed bone and reharvesting potential previously used symphyseal donor sites for onlay bone grafting". J Periodontol. 2009;80(5): 865-869.

33. Jemt T. "Failures and complications in 391 consecutively inserted fixed prostheses supported by Branemark implants in edentulous jaws: a study of treatment from the time of prosthesis placement to the first annual checkup". Int J Oral Maxillofac Implants. 1991;6(3):270-276.

34. Collaert B, De Bruyn H. "Early loading of four or five Astra Tech fixtures with a fixed cross-arch restoration in the mandible". Clin Implant Dent Relat Res. 2002;4(3):133-135.

35. Lioubavina-Hack N, Lang NP, Karring T. "Significance of primary stability for osseointegration of dental implants". Clin Oral Implants Res. 2006;17(3):244-250.

36. Degidi M, Nardi D, Piattelli A. "Immediate loading of the edentulous maxilla with a final restoration supported by an intraoral welded titanium bar: a case series of 20 consecutive cases". J Periodontol. 2008;79(11):2207-2213.

37. Cairo F, Pagliaro U, Nieri M. "Soft tissue management at implant sites". J Clin Periodontol. 2008;35(8):163-167.

38. Glauser R, Lundgren AK, Gottlow J, Sennerby L, Portmann M, Ruhstaller P, Hämmerle CH. "Immediate occlusal loading of Branemark TiUnite implants placed predominantly in soft bone: 1-year results of a prospective clinical study". Clin Implant Dent Relat Res. 2003;5(1):47-56.

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