



Esthetic Transitional Fixed Dental Prosthesis Following Extraction: Case Report

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Abstract

Introduction: Replacing an anterior tooth could be challenging. Interim removable prosthesis might not be acceptable due to the compromise esthetic, speech and function. The aim of this case report is to present the use of Mini-Dental Implant (MDI) for esthetic immediate Fixed Dental Prosthesis (FDP) following extraction and ridge preservation.

Case Presentation: A 70-year-old female lawyer referred with fractured abutments for FPD, which deemed to be hopeless. Her chief complains "I want to have a non-removable replacement to my hopeless teeth". The fractured lines were at gingival level. A cone-beam computed tomography (CBCT) scan was taken to shows the available alveolar bone volume for implant placement. Delayed implant placement is recommended due to the large incisive foramen detected on radiographic analysis. On the day of treatment, occlusal index was made. Full thickness mucoperiosteal flap was reflected. FPD was removed and the retained roots of #7 and 9 were extracted. MDI was placed in the edentulous ridge. The existence FPD was prepared and adjusted to be cemented to the MDI. The sockets were grafted using demineralized freeze bone allograft and covered with double layers of collagen tape. Occlusal adjustment was done to ensure that the prosthesis is out of occlusion during functions. Three months later, another CBCT was taken to evaluate and plan for implant placement. Surgical guide was planned and constructed to place two 3.3 x 12 mm implants. New provisional FPD was constructed using integrity. Implants were restored with screw retained supported FPD 9 months later.

Conclusion: The presented case demonstrates the use of MDI during the healing phase following extraction when immediate implant placement is not predictable. Transitional implant is a feasible treatment option during rehabilitation of an esthetic area.

Keywords: Ridge Preservation; Immediate Fixed Dental Prosthesis (FDP); Dental Implants; Cone-Beam Computed Tomography (CBCT); Bone Graft

Abbreviations

MDI: Mini-Dental Implant; FDP: Fixed Dental Prosthesis; CBCT: Cone-Beam Computed Tomography

Introduction

Dental implant is a well-studied treatment modality. There is a strong evidence to proof that dental implant is a predictable treatment option with high success and survival rate [1,2]. Nowadays, immediately loaded dental implant showed to be comparable to delayed loading protocol. In 2017, Buser et al. reported that pri-

mary stability is the main factor implant placement timing [3]. If primary stability cannot be anticipated, delayed implant placement is recommended.

Schnitman and collaborator were the first to introduce the concept of transitional implant, which sever as support for the temporary prosthesis during the healing phase⁴. They placed 5 to 8 dental implants in seven edentulous mandibles [4]. Some of the implants were loaded immediately and the remaining were submerged for complete osseointegration. A study reported that immediate load-

ing presented similar implant failure rate, marginal bone loss and implant stability quotient value when compared to different protocols [5].

Mini-dental implant (MDI) has been defined as metal biocompatible device with similar form to the dental implant but with a narrower diameter [6]. It has been reported in the literature that MDI diameter range between 1.8 mm to 2.9 mm [7,8]. Traditionally, this type of dental implants was used transitional implant to support interim prosthesis. There is limited evidence to support the use of MDI for definitive fixed prosthesis.

The aim of this report is to present the use of MDI in the esthetic area to support a transitional fixed dental prosthesis (FPD) during the healing phase.

Case Report

The patient is a 70-year-old Caucasian female. The patient stated being in good general health with history of arthritis, controlled hypercholesterolemia and hypothyroidism. Patient reports taking Furosemide 40 mg, Levothyroxine 50 mcg, and Simvastatin 20 mg. The patient was referred to the clinic for extraction of tooth # 7 and 9, which serve as abutment for FDP. Upon clinical and radiographic examination, the crown of teeth # 7 and 9 were diagnosed with horizontal fracture at the level of the gingival margin with the prosthesis cemented temporarily. The site presented with probing depth ranging between 2-3 mm, interproximal papilla is relatively flat in between # 6-7 and 9-10, thick gingival biotype, and no facial concavity were detected. (Figure 1) Periapical radiograph revealed relatively large incisive foramen. (Figure 2) The teeth deemed to be non-restorable and recommended to be extracted. The patient requested fixed temporary protocol and refuse any removable possibility. Cone-beam computed tomography (CBCT) was taken to evaluate the predictability of immediate implant placement. CBCT analysis reveal that restorative driven implant position will be at the location of the incisive foramen, which will result in unpredictable primary stability. A staged treatment plan was presented to the patient including extraction, alveolar ridge preservation, immediate MDI placement, and immediate provisional restoration. After 3-4 months, definitive implant will be placed with immediate provisional restoration followed by final implant supported fixed partial denture.

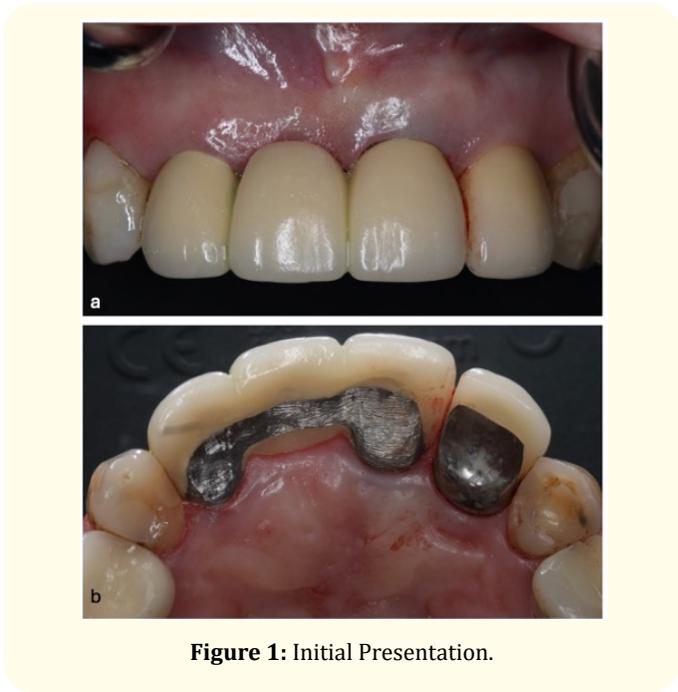


Figure 1: Initial Presentation.

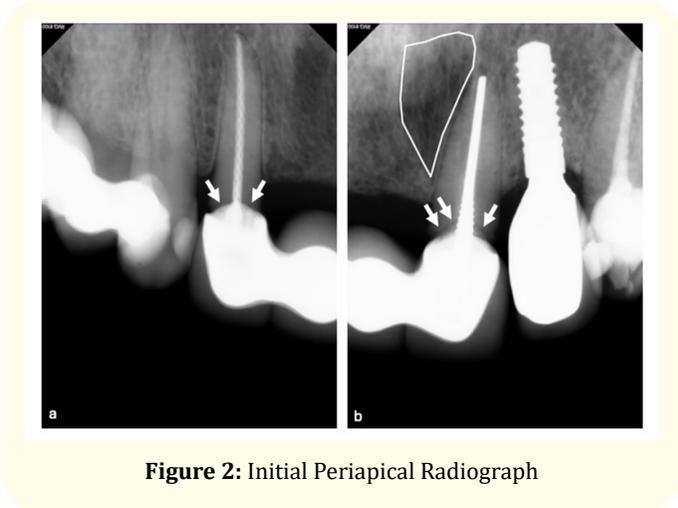


Figure 2: Initial Periapical Radiograph

Before the removing the existing prosthesis, occlusal index was fabricated using light cure resin based material (Triad® VLC Ivory Provisional Material, De Trey Dentsply, Dreieich, Germany) to reposition the prosthesis to the same location after MDI placement. (Figure 3) Upon removing the prosthesis, midcrestal incision extended from the mesial aspect of # 7 to the mesial aspect of # 9 connecting the intrasulcular incisions around teeth # 7 and 9. Full thickness flap was reflected. (Figure 4a) The teeth were extracted atraumatically as possible using straight elevator and universal forceps. (Figure 4b) The tooth sockets were degranulated and inspected for any osseous defect. The tooth sockets were intact. Two MDI were placed in the pontic area in relation to the connector

of the existing prosthesis. Started by using 1.6mm twist drill and followed by placement of is 2.0 x 11.5 mm MDI (MDL[®], Intralock, International Inc., Boca Raton FL, USA.). (Figure 5) Demineralized freeze dried bone allograft were hydrated and used to graft the extraction sockets. (Figure 6) According to manufacturer recommendation, abutments (Cement-Over[®], Intralock, International Inc., Boca Raton FL, USA.) were adjusted and connected to the existing prosthesis using dual cure acrylic resin (UnifastTM LC, GC America, Alsip, IL) utilizing the occlusal index. (Figure 7) The grafted site was covered with doubled layers of collagen tape (Col-latape[®], Zimmer Dental, Carlsbad, USA). Final provisional prosthesis was finished and polished and cemented using risen cement (RelyX[®] Luting 2 Cment-3M ESPE and Enforce-Dentsply). Excess cement was removed, and occlusal adjustment was performed removing occlusal contact during mandibular functional movement. The flaps were sutured and stabilized with 4-0 chromic gut (Hu-Friedy[®] Inc, Chicago, IL). (Figure 8).

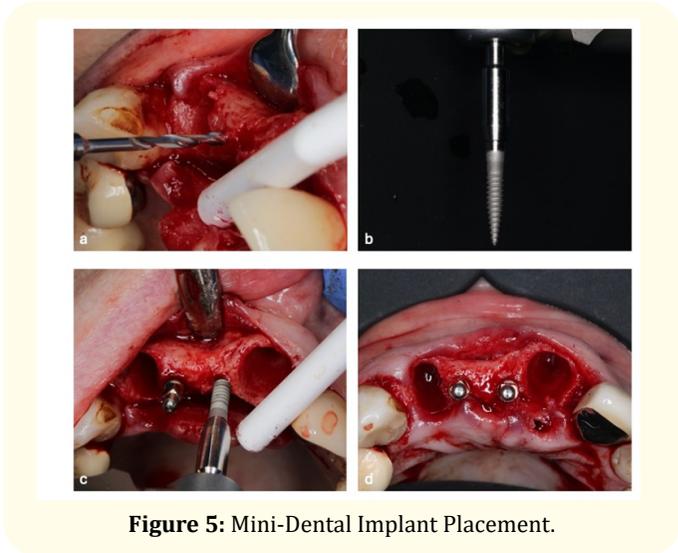


Figure 5: Mini-Dental Implant Placement.

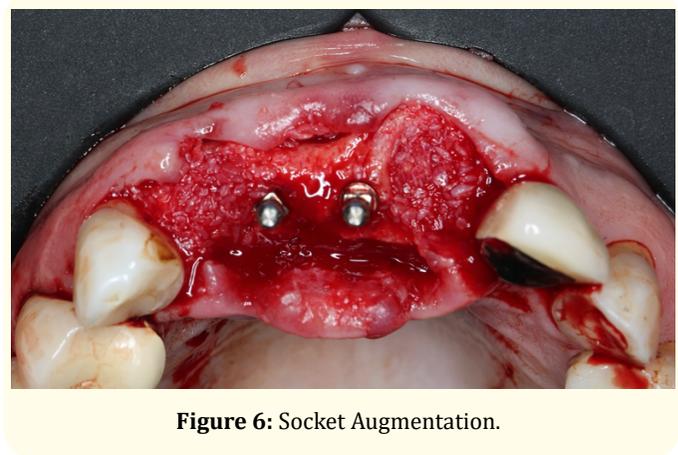


Figure 6: Socket Augmentation.

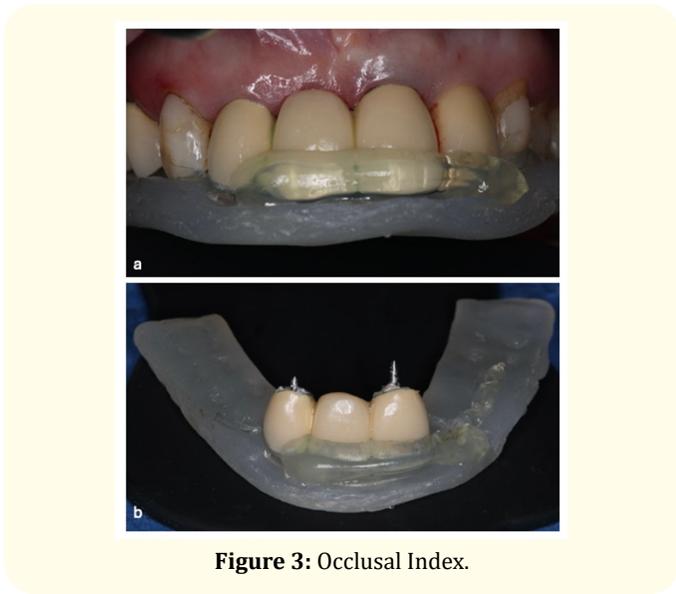


Figure 3: Occlusal Index.

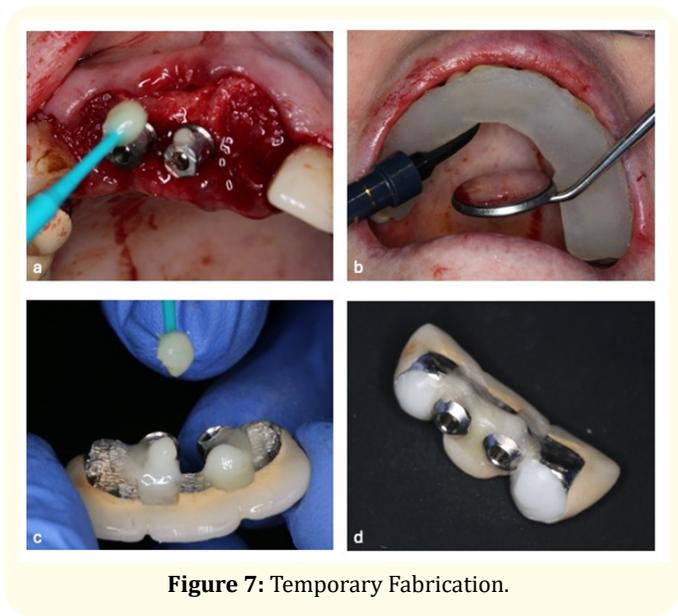


Figure 7: Temporary Fabrication.

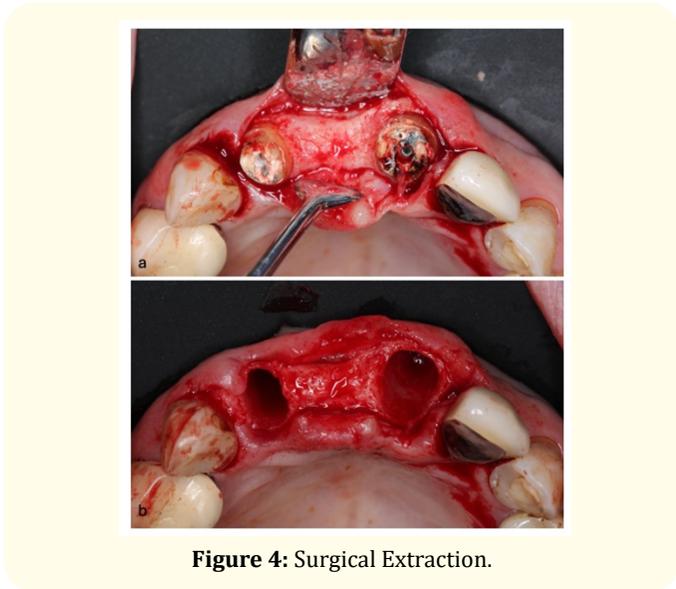


Figure 4: Surgical Extraction.



Figure 8: Suturing and Cementation of the Temporary Prosthesis.

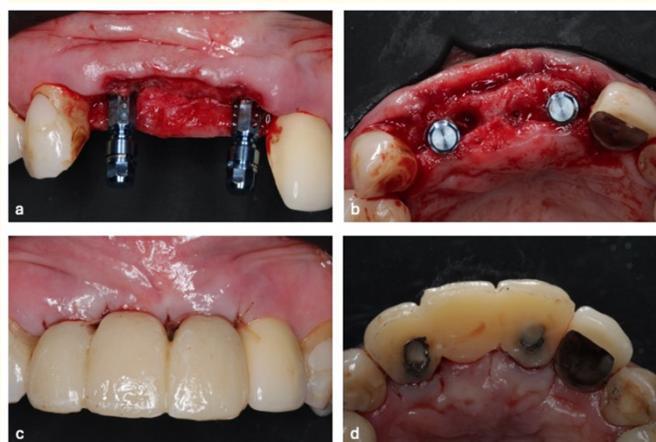


Figure 10: Final implant Placement and temporary prosthesis.

4 months later, the site was reentered to remove the transitional implants and place the definitive one. The prosthesis were separated from the cemented abutments. MDIs were removed by untorquing the implant to counter-clockwise direction. Midcrestal incision joining the intrasulcular incisions around tooth # 6 and implant #10. Full thickness flaps were reflected. (Figure 9) Sites were degranulated and definitive implant sites osteotomy were performed using surgical guide to place two bone level taper 3.3 x 10 mm at sites # 7 and 9. Implants position were planned to support screw retained FPD. Screw retained provisional prosthesis were made using A3.5 bis-acryl-methacrylate-based resin (Integrity®, Dentsply International, York, Pa). (Figure 10).

After the extraction procedure, the patient was evaluated at 2 weeks, 1 and 3 months. Healing was uneventful and patient was satisfied with the esthetics. (Figure 11) Oral hygiene instructions including the use of superfloss were reviewed and reinforced periodically to insure low plaque accumulation. CBCT was taken 3 months post-extraction, which revealed favorable ridge height and width. Substantial healing was noted after implants placement. Provisional prosthesis was adjusted at 3 months. Final prosthesis was delivered at 6 months. (Figure 12).

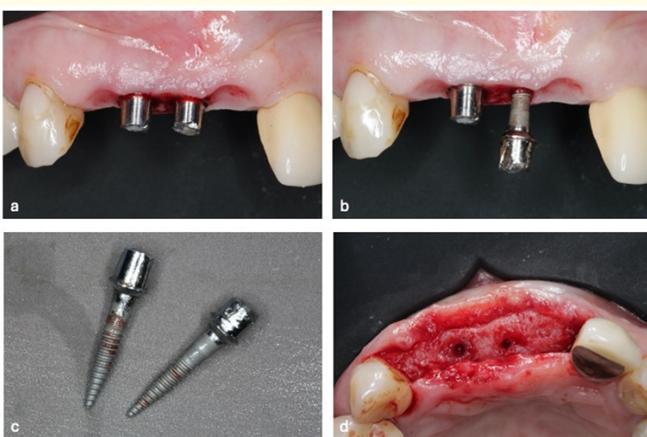


Figure 9: MDI removal.



Figure 11: Preoperative and 3 months follow up of MDI and Temporary prosthesis.



Figure 12: Pre- and Post-operative.

Discussion

This case report highlights the complexities and considerations involved in managing dental extractions and immediate implant placements in elderly patients with multiple comorbidities. The patient, a 70-year-old female with a history of arthritis, controlled hypercholesterolemia, and hypothyroidism, presented with fractured crowns on teeth #7 and #9, necessitating their extraction. The decision to proceed with a staged treatment plan, including alveolar ridge preservation and immediate mini dental implant (MDI) placement, underscores the importance of individualized treatment planning in achieving optimal outcomes.

The use of cone-beam computed tomography (CBCT) was pivotal in this case, as it revealed that the ideal restorative-driven implant position coincided with the location of the incisive foramen, posing a challenge for achieving primary stability. This finding necessitated a staged approach, allowing for alveolar ridge preservation and subsequent definitive implant placement. The literature supports the use of CBCT in preoperative planning to enhance the predictability and success of implant procedures [9,10].

This report presents the application of MDI in the transitional healing phase with a fixed provisional prosthesis when staged implant placement is planned. Immediate dental implants are more commonly used when the aim is to fabricate a fixed provisional prosthesis. However, in this case, the immediate implant option was unpredictable due to the planned restorative-driven position of implant #9, which would be into the large incisive foramen. Typically, primary stability of an immediate implant is gained by engaging with the lingual and apical bone of the socket, which was not possible here. There were no complications detected during surgery or the follow-up period.

The patient's preference for a fixed temporary protocol over removable options was a critical factor in the treatment plan. This preference aligns with findings from studies indicating that patients often favor fixed prostheses due to their comfort and functional advantages [11]. The fabrication of an occlusal index prior to the removal of the existing prosthesis ensured accurate repositioning post-MDI placement, highlighting the importance of meticulous preoperative planning.

The restorative treatment plan was critical in this case. The location and angulation of MDIs were planned in relation to the connectors of the existing fixed partial denture (FPD). The transitional implants were placed away from the extraction site to gain more stability and to not interfere with the healing of the extraction socket. The atraumatic extraction technique employed, along with the use of demineralized freeze-dried bone allograft for socket preservation, is well-documented in the literature as effective in maintaining alveolar ridge dimensions and promoting osseous healing [12-14]. The placement of MDIs in the pontic area provided immediate stability and facilitated the provisional restoration, which was crucial for maintaining the patient's esthetics and function during the healing period.

Placement of MDIs should be planned with extreme caution. There is no strong long-term evidence to advocate the use of MDIs as definitive implants. MDIs have the disadvantage of increasing the difficulty of performing good plaque control when supporting a fixed prosthesis. In a recent meta-analysis, MDIs were shown to be comparable to narrow diameter dental implants for mandibular overdentures in short-term survival and success rates and patient satisfaction. However, the same meta-analysis indicated more marginal bone loss associated with MDIs.

The staged approach, culminating in the placement of definitive implants after 4 months, allowed for adequate osseointegration and soft tissue healing. This method is supported by studies demonstrating the benefits of delayed implant placement in achieving higher success rates and better long-term outcomes [15,16].

Conclusion

In conclusion, this case underscores the importance of comprehensive preoperative assessment, patient-centered treatment planning, and the use of advanced imaging techniques in managing complex dental cases. The patient experienced notable esthetic satisfaction after receiving a combination of Mini Dental Implants and an immediate temporary prosthesis. The successful outcome achieved in this case can be attributed to the careful consideration of anatomical, functional, and patient-specific factors, as well as adherence to evidence-based clinical protocols.

Acknowledgement

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Conflict of Interest

The author has no relevant financial or non-financial interests to disclose.

Bibliography

- 1 Sartoretto SC., et al. "Comparing the long-term success rates of tooth preservation and dental implants: a critical review". *Journal of Functional Biomaterials* 14 (2023): 142.
- 2 Silva AS., et al. "Clinical evaluation of the implant survival rate in patients subjected to immediate implant loading protocols". *Dental and Medical Problems* 58 (2021): 61-68.
- 3 Buser D., et al. "Implant placement post extraction in esthetic single tooth sites: when immediate, when early, when late?" *Periodontology 2000* 73 (2017): 84-102.
- 4 Schnitman PA., et al. "Immediate fixed interim prostheses supported by two-stage threaded implants: methodology and results". *Journal of Oral Implantology* 16 (1990): 96-105.
- 5 Moraschini V and dos SP Barboza E. "Quality assessment of systematic reviews on alveolar socket preservation". *International Journal of Oral and Maxillofacial Surgery* 45 (2016): 1126-1134.
- 6 Flanagan D. "Rationale for mini dental implant treatment". *Journal of Oral Implantology* 47 (2021): 437-444.
- 7 Choi K., et al. "Immediate Provisionalization of Mini-Implants with Friction-Engaging Abutments in the Mandibular Anterior Region: A 1-year Retrospective Study". *International Journal of Prosthodontics and Restorative Dentistry* (2013): 33.
- 8 Marcello-Machado RM., et al. "Mini-implants and narrow diameter implants as mandibular overdenture retainers: A systematic review and meta-analysis of clinical and radiographic outcomes". *Journal of Oral Rehabilitation* 45 (2018): 161-183.
- 9 Bornstein MM., et al. "Cone beam computed tomography in implant dentistry: a systematic review focusing on guidelines, indications, and radiation dose risks". *The International Journal of Oral and Maxillofacial Implants* (2014): 29.
- 10 Guerrero ME., et al. "Does cone-beam CT alter treatment plans? Comparison of preoperative implant planning using panoramic versus cone-beam CT images". *Imaging Science in Dentistry* 44 (2014): 121-128.
- 11 Pjetursson BE., et al. "A systematic review of the survival and complication rates of fixed partial dentures (FPDs) after an observation period of at least 5 years: I. Implant-supported FPDs". *Clinical Oral Implants Research* 15 (2004): 625-642.
- 12 Kalburgi V., et al. "Clinical Effectiveness of Immediate Implant Placement along with Demineralized Freeze-dried Bone Allograft-A Systematic Review and Meta-analysis". *Journal of Head and Neck Physicians and Surgeons* 12 (2024): 18-27.
- 13 Darby I., et al. "Ridge preservation: what is it and when should it be considered". *Australian Dental Journal* 53 (2008): 11-21.
- 14 Horowitz R., et al. "A review on alveolar ridge preservation following tooth extraction". *Journal of Evidence-Based Dental Practice* 12 (2012): 149-160.
- 15 Esposito M., et al. "Timing of implant placement after tooth extraction: immediate, immediate-delayed or delayed implants? A Cochrane systematic review". *European Journal of Oral Implantology* 3 (2010): 189-205.
- 16 Lang NP., et al. "A systematic review on survival and success rates of implants placed immediately into fresh extraction sockets after at least 1 year". *Clinical Oral Implants Research* 23 (2012): 39-66.