

# Immediate Implant Placement with Static Three-Dimensional Surgical Guidance in the Maxillary Aesthetic Zone: A Case Report

Dr. Samina Timilsina,<sup>1</sup> Dr. Manoj Humagain,<sup>1</sup> Dr. Simant Lamichhane,<sup>1</sup> Dr. Arjun Hari Rijal,<sup>1</sup>  
Dr. Sachita Thapa,<sup>1</sup> Dr. Pratik Marhattha<sup>1</sup>

<sup>1</sup>Department of Periodontology and Oral Implantology, Kathmandu University School of Medical Sciences,  
Dhulikhel, Kavrepalanchok, Nepal

## ABSTRACT

Advances in implant technology have significantly improved outcomes through immediate implant placement in the anterior region. Immediate implant placement increases the risk of misalignment and incorrect angulation. To enhance precision, clinicians increasingly use digitally designed surgical guides created from cone beam computed tomography imaging and digital planning workflows allowing accurate control of implant depth, orientation, and position. This case report demonstrates virtual planning, three-dimensional static guided surgery, and immediate implant placement to restore a fractured maxillary left lateral incisor in a 30-year-old female patient. The outcome achieved excellent functional and esthetic results with preserved hard and soft tissues.

**Keywords:** Dental implants; esthetics; temporary dental restoration.

## INTRODUCTION

Immediate implant placement offers reduced treatment time, alveolar bone preservation, and improved esthetics.<sup>1</sup> Challenges include thin facial bone, delicate soft tissue, and anatomical defects, requiring careful case selection and precise implant positioning.<sup>2</sup> Digital planning and cone beam computed tomography (CBCT) guided surgical guides enhance accuracy, angulation and depth control.<sup>3</sup> Comprehensive protocols, such as the “Ten Keys for Successful Esthetic-Zone Single Immediate Implants”, provide a framework for predictable outcomes; therefore, all relevant components of this protocol were considered in the planning and management of the present case.<sup>4</sup> This report describes successful guided immediate implant placement for a fractured maxillary lateral incisor.<sup>5</sup>

## CASE REPORT

A 30-year-old female patient presented to the

Department of Periodontology and Oral Implantology at Kathmandu University School of Medical Sciences, Dhulikhel Hospital, Dhulikhel, Kavrepalanchok, Nepal with a chief complaint of a broken tooth in the upper front region of the jaw for one month and was willing to have it restored, as she felt self-conscious while speaking due to poor appearance (Figure 1). The patient was systemically healthy with no adverse habits. Intraoral clinical examination revealed a fractured maxillary left lateral incisor, which had fractured while biting a walnut and had a history of prior caries. Considering the esthetic importance and the patient's expectations for a rapid and predictable treatment outcome, an immediate implant placement protocol was considered. Prior to treatment, comprehensive diagnostic evaluation and treatment planning were carried out. CBCT imaging was performed to assess the three-dimensional (3D) morphology of the alveolar bone, evaluate the integrity of the buccal plate, and determine the availability of apical and palatal bone necessary for achieving primary implant stability (Figure 2). Diagnostic casts were obtained and a mock-up was prepared to enhance patient education and facilitate visualization of the proposed treatment outcome. The patient was informed about the treatment protocol, potential risks, and expected outcomes, and written informed consent was obtained.

### Correspondence

Dr. Samina Timilsina

Email: timilsinasamina@gmail.com

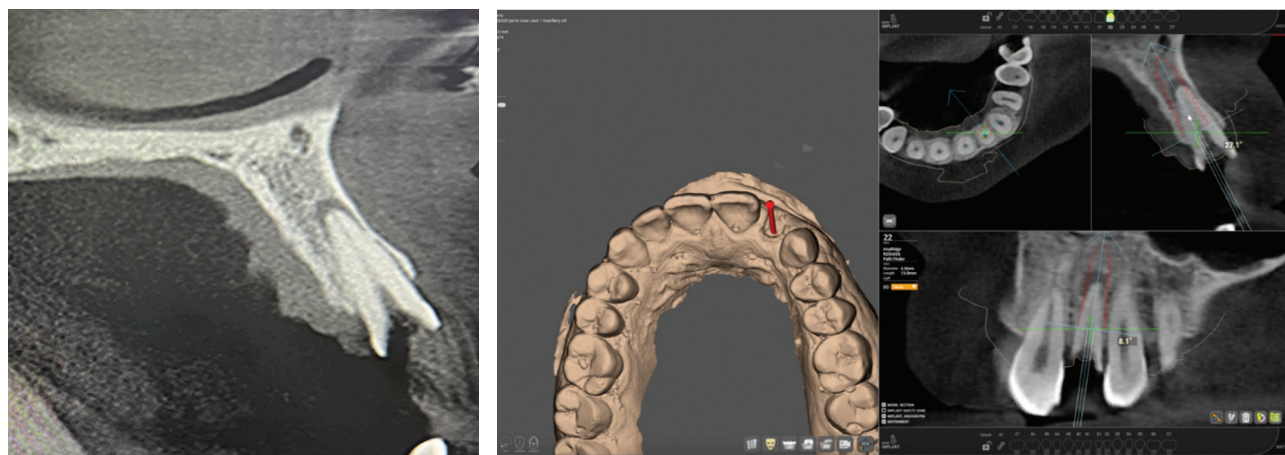


### Citation

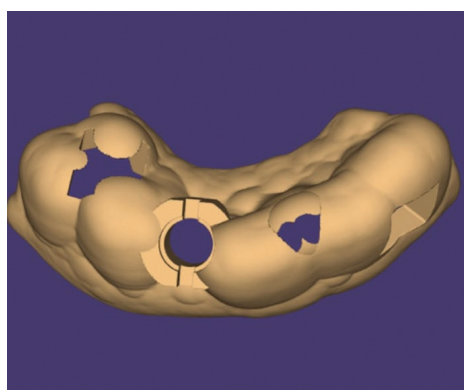
Timilsina S, Humagain M, Lamichhane S, Rijal AH, Thapa S, Marhattha P. Immediate Implant Placement with Static Three-Dimensional Surgical Guidance in the Maxillary Aesthetic Zone: A Case Report. J Nepal Soc Perio Oral Implantol. 2025 Jul-Dec;9(18):111-5.



**Figure 1: Preoperative intraoral view showing a fractured maxillary left lateral incisor with extensive loss of coronal tooth structure.**



**Figure 2: Preoperative CBCT sagittal view demonstrating a periapical radiolucency associated with the involved tooth, along with widening of the periodontal ligament space on the buccal aspect.**



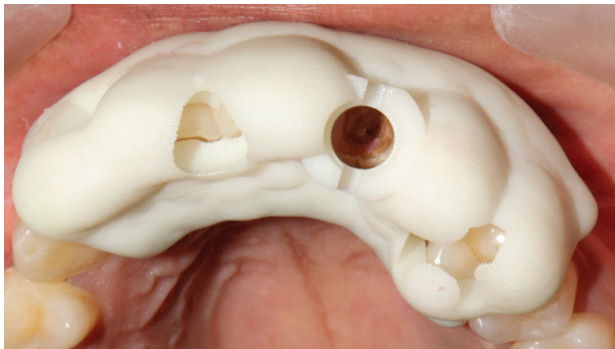
**Figure 3: Preoperative 3D implant treatment planning illustrating virtual implant placement in the maxillary anterior region using CBCT-based software.**

A digital implant planning workflow was initiated (Figure 3). The CBCT data and diagnostic information were integrated into digital planning software (R2GATE, MegaGen Implant Co., Ltd.) to design a surgical guide.

The patient's complete blood count, coagulation profile and blood glucose level were all within normal limits. Following injection of 2% lignocaine hydrochloride with 1:200,000 epinephrine, atraumatic extraction of the fractured maxillary left lateral incisor was

performed using periosteal and K file. The surgical guide was positioned to facilitate guided osteotomy preparation according to the digital treatment plan (Figure 4). Implant osteotomy was performed through the guide, ensuring accurate control of spatial positioning. Implant measuring 4\*11.5 mm (MEGAGEN Anyridge, South Korea) was placed into the osteotomy site (Figure 5). Primary implant stability was confirmed by achieving a torque value of 40 Ncm using a ratchet (Figure 6). The jumping distance was carefully evaluated and filled by bone grafts (*Geistlich Bio-Oss®*). A 3D-printed immediate provisional restoration (Figure 7) was delivered on the same day as implant placement. Provisional crown was torqued to 25 Ncm. Amoxicillin and Clavulanic acid combination 625 mg eight hourly for seven days was prescribed. Serratiopeptidase 10 mg was prescribed six hourly for five days as an adjunctive

proteolytic anti-inflammatory agent, aiming to reduce postoperative inflammation, edema, and pain. Paracetamol and Ibuprofen combination eight hourly for three days followed by intake if necessary and 0.2% Chlorhexidine mouthwash 10 ml twice a day for 30 seconds for two weeks were prescribed. Postoperative instructions were provided to the patient and follow-up appointments were scheduled to monitor healing and evaluate peri-implant tissue response. At five months, the temporary crown was removed and the emergence profile had already been established; therefore, no additional emergence profile duplication step was required. After shade selection final zirconia crown was also printed digitally and cemented using type, I glass ionomer cement (GIC). Intraoral periapical radiograph was taken after final prosthesis (Figure 8).



**Figure 4: The digitally prepared surgical guide was placed in position.**



**Figure 5: Implant measuring 4\*11.5 mm (MEGAGEN Anyridge, South Korea) was placed into the osteotomy site**



**Figure 6: Primary implant stability was confirmed using a ratchet**



**Figure 7: 3D designing of temporary crown and its printed form**





**Figure 8: a) Final Zirconia prosthesis b) Post-prosthesis intraoral periapical radiograph**

## DISCUSSION

Immediate implant placement in the anterior maxilla has become an increasingly accepted treatment modality due to its ability to reduce treatment time, preserve alveolar bone morphology, and enhance patient satisfaction compared with delayed implant protocols.<sup>6</sup> However, the anterior maxilla remains one of the most challenging regions for implant therapy due to its complex anatomical and aesthetic demands.<sup>8</sup> One of the key determinants of success in immediate implant placement is accurate 3D positioning of the implant. Malposition in the esthetic zone may result in complications such as gingival recession, compromised emergence profile, and prosthetic difficulties.<sup>8</sup> Introduction of digital implant planning and computer-guided surgery has significantly enhanced accuracy and predictability by enabling prosthetically driven implant placement prior to surgery.<sup>9</sup> CBCT data integrated with digital planning software allows determination of ideal implant position, angulation, and depth, which can be accurately transferred intraoperatively using a surgical guide.<sup>6</sup> Surgical guides enhance surgical precision and minimize the risk of damage to adjacent anatomical structures.<sup>9</sup> Moreover, Zhao et al. emphasized that guided surgery facilitates restoration-oriented implant placement.<sup>10</sup> Gonzalez-Martín et al. highlighted the importance of provisional restorations in guiding peri-implant soft tissue maturation. Provisional restorations allows gradual conditioning of the gingival architecture and supports the development of a harmonious emergence profile that closely replicates natural tooth contours.<sup>10</sup> In addition, structured clinical decision making based on factors such as buccal bone integrity, soft tissue biotype, implant design,

and availability of apical bone for primary stability remains fundamental in determining the suitability of immediate implant placement.<sup>7</sup> The present case demonstrates the successful integration of digital implant planning, static guided surgery, and immediate provisionalization for predictable implant placement in the esthetic zone.

Furthermore, the minimally invasive approach adopted in this case contributed to preservation of the extraction socket architecture and maintenance of peri-implant tissue contours. Preservation of the buccal bone plate and soft tissue profile is widely recognized as essential for long-term stability and optimal esthetic outcomes in anterior implant therapy.<sup>9</sup>

## SUMMARY

Clinical outcome of this case supports evidence that immediate implant placement with static three-dimensional surgical guidance in the maxillary esthetic zone provides predictable functional and esthetic results with proper case selection and meticulous surgical technique.

## ACKNOWLEDGEMENTS

The author is thankful to the Department of Oral and Maxillofacial Pathology, Kathmandu University School of Medical Sciences, Dhulikhel, Kavrepalanchok, Nepal, for providing support and encouragement to complete this case.

**CONFLICT OF INTEREST:** None.

## REFERENCES

1. Jurado CA, Villalobos-Tinoco J, Montealvan-Aguilar DA, Rojas-Rueda S, Karimi K, Fischer NG. Achieving Optimal Esthetics with Immediate Implants and Veneers in the Smile Zone: A Case Study. *Biomimetics*. 2025 Feb 12;10(2):2-14.
2. Zuiderveld EG, Meijer HJ, Gareb B, Vissink A, Raghoobar GM. Single immediate implant placement in the maxillary aesthetic zone with and without connective tissue grafting: results of a 5-year randomized controlled trial. *J Clin Periodontol*. 2024 Apr;51(4):487-98.
3. Nulty A. A literature review on prosthetically designed guided implant placement and the factors influencing dental implant success. *Br Dent J*. 2024 Feb 9;236(3):169-80.
4. Levine RA, Ganeles J, Gonzaga L, Kan JK, Randel H, Evans CD, et al. 10 keys for successful esthetic-zone single immediate implants. *Compend Contin Educ Dent*. 2017 Apr;38(4):248-60.
5. Katahira N, Takegawa H, Nlkaido S, Seki K. Immediate Implant Placement and Provisionalization Without Guided Bone Regeneration or Connective Tissue Grafting: A Case Report. *Cureus*. 2025 Oct 13;17(10):1-10.
6. Kanewoff E, Alhallak R, de Carvalho Machado V, Chrcanovic BR. Immediate implant placement in the anterior mandible: a cone beam computed tomography study. *BMC Oral Health*. 2024 Mar 27;24(1):1-12.
7. Yang Z, Chen X, Chen J, Li Y, Liang Q. Immediate implant placement for single failed maxillary anterior teeth after trauma: a case-series study. *BMC Oral Health*. 2025 Oct 14;25(1):1-9.
8. Tonetti MS, Jung RE, Avila-Ortiz G, Blanco J, Cosyn J, Fickl S, et al. Management of the extraction socket and timing of implant placement: Consensus report and clinical recommendations of group 3 of the XV European Workshop in Periodontology. *J Clin Periodontol*. 2019 Jun;46(sup21):183-94.
9. KR SC, Goyal M, Mittal N, George JS. Accuracy of freehand versus guided immediate implant placement: A randomized controlled trial. *J Dent*. 2023 Sep 1; 136:1-8.
10. González-Martín O, Lee E, Weisgold A, Veltri M, Su H. Contour management of implant restorations for optimal emergence profiles: guidelines for immediate and delayed provisional restorations. *Int J Periodontics Restorative Dent*. 2020 Jan 1;40(1):61-70.