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Immediate Implant Placement in Infected Type II Socket with Immediate Temporization

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Abstract

A 35-year-old woman presented to the dental clinic complaining of pain and mobility in tooth 21. Clinical and radiographic (CBCT) examination revealed a horizontal root fracture apical to the cementoenamel junction, loss of the labial plate of bone, and periapical pathosis. Atraumatic tooth extraction was performed using a periotome, followed by thorough curettage to remove periapical pathosis. Drilling was performed and an immediate implant was placed. A collagen membrane was sutured to the buccal soft tissue, and a connective tissue graft harvested from the maxillary tuberosity was positioned at the coronal area of the soft tissue. Xenograft bone particles were added into the gap space between the implant and collagen membrane. Immediate temporization was performed using the patient's own crown after adjustment of the cervical contour with composite. At baseline, buccal bone thickness was 0 mm at the crest and 3 mm from crest, and 0.3 mm at 6 mm from the crest. Nine months postoperatively, buccal plate thickness increased to 1.46 mm at crest, 2.39 mm at 3 mm, and 2.53 mm at 6 mm from the crest. The pink esthetic score was excellent, with complete papillae and natural soft tissue contour, color, and texture compared to reference tooth (tooth 11). Immediate implant placement and temporization in an infected Type II socket with buccal bone loss can achieve favorable esthetic and functional outcomes when meticulous infection control, hard and soft tissue management, and immediate provisionalization are employed.

Keywords: Immediate implant, aesthetic zone implant, infected socket, immediate temporization

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1. Introduction

Modern aesthetic dentistry aims to restore or replace missing teeth with solutions that closely mimic natural dentition in both function and appearance. Anterior tooth loss—often due to endodontic failure, periodontal disease, trauma, or root fracture—frequently leads to significant bone and soft tissue loss, complicating restorative procedures. Despite these challenges, anterior implant treatments can achieve high satisfaction with facial and dental aesthetics and improve oral health-related quality of life [1]. Immediate implant placement-defined as the insertion of a dental implant at the time of tooth extraction-has gained popularity due to its potential to reduce treatment time, minimize surgical interventions, and preserve alveolar bone and soft tissue contours [2-3]. However, the predictability of this approach is challenged by the presence of infection, loss of the buccal bone plate, and compromised socket morphology [4]. The extraction socket can be classified according to the integrity

of the buccal plate and soft tissue, with Type II sockets characterized by partial or complete loss of the buccal (labial) bone plate while the soft tissue remains intact. Furthermore, Type II sockets can be sub classified based on the extent of the labial bone defect: Type 2A involves the absence of the coronal one-third of the labial bone plate, Type 2B involves the middle one-third, and Type 2C involves apical one-third of labial bone plate, the presented case in type 2A case [5].

A major concern with immediate implant placement in infected sites is the risk of residual infection compromising osseointegration and esthetic outcomes [4-6]. Nevertheless, recent systematic reviews and clinical studies indicate that, with meticulous debridement and appropriate antibiotic prophylaxis, immediate implant placement in previously infected sockets can achieve survival rates comparable to those in non-infected sites, critical factors for success include thorough removal of granulation tissue & use of perioperative antibiotics, both of which are essential for minimizing postoperative complications and ensuring predictable outcomes [7-8]. Restoration of the lost alveolar bone and soft tissue is essential for achieving optimal functional and esthetic results. Numerous techniques have been proposed, including guided bone regeneration (GBR) using autogenous, allogeneic, or xenogeneic grafts and various membranes, with or without subepithelial connective tissue grafts [9-10]. These interventions may be staged before, during, or after extraction and can involve multiple surgical phases. However, the feasibility of combining bone and soft tissue augmentation with immediate restoration in a single procedure remains a subject of ongoing research and debate [11].

The Immediate Dentoalveolar Restoration (IDR) technique was developed to address severe cases involving buccal bone defects, as seen in Type II sockets, by combining extraction, implant placement, and bone reconstruction using a cortico-cancellous graft from the maxillary tuberosity, often without flap elevation, this approach aims to restore the buccal plate, preserve the gingival architecture, and enable immediate loading with a provisional restoration, thus maximizing esthetic outcomes and patient satisfaction [12-13]. Immediate temporization, particularly in the anterior maxilla, has been shown to help preserve soft tissue contours and papillae, reducing the risk of recession and improving esthetic results [14]. However, achieving these outcomes in sockets with infection and buccal bone loss requires careful case selection, precise surgical technique, and a comprehensive understanding of the biological principles underlying bone and soft tissue healing [15]. This report presents a case of immediate implant placement and temporization in an infected Type II socket with complete loss of the labial plate, highlighting the clinical protocol, challenges, and outcomes, and situating the findings within the context of the current evidence base.

2. Materials and Methods

A 35-year-old woman presented with pain and mobility in tooth 21. Clinical and radiographic (cone beam computed tomography) examination revealed a horizontal root fracture below the cementoenamel junction, loss of the labial plate of bone, and periapical pathosis. Written informed consent was obtained for all surgical procedures. The patient was prescribed amoxicillin 500 mg, three times daily for 7 days, starting 1 day before surgery. The use of antibiotics in implant surgery is supported by systematic reviews showing a reduction in postoperative complications [16]. Local anesthesia (Articaine HCL 4% with epinephrine 1:100,000) was administered. Atraumatic extraction was performed using a periotome, followed by thorough curettage of the socket to remove all periapical pathology. Clinical examination confirmed absence of buccal plate. Drilling was performed more palatally to maintain the gap space between the implant and soft tissue. A 3.8 × 12 mm implant was placed with a torque of 45 Ncm. A collagen membrane was adapted buccally and apically over the socket then sutured to the buccal soft tissue, a connective tissue graft harvested from the maxillary tuberosity was later sutured at the coronal aspect of the buccal soft tissue. Xenograft bone was placed in the buccal gap between the implant and soft tissue. Socket seal was achieved by immediate temporization using the patient's own crown, with cervical contour adjusted using composite respecting critical and subcritical contour. The maxillary tuberosity is a reliable donor site for connective tissue grafts, offering dense tissue and favorable healing [17].

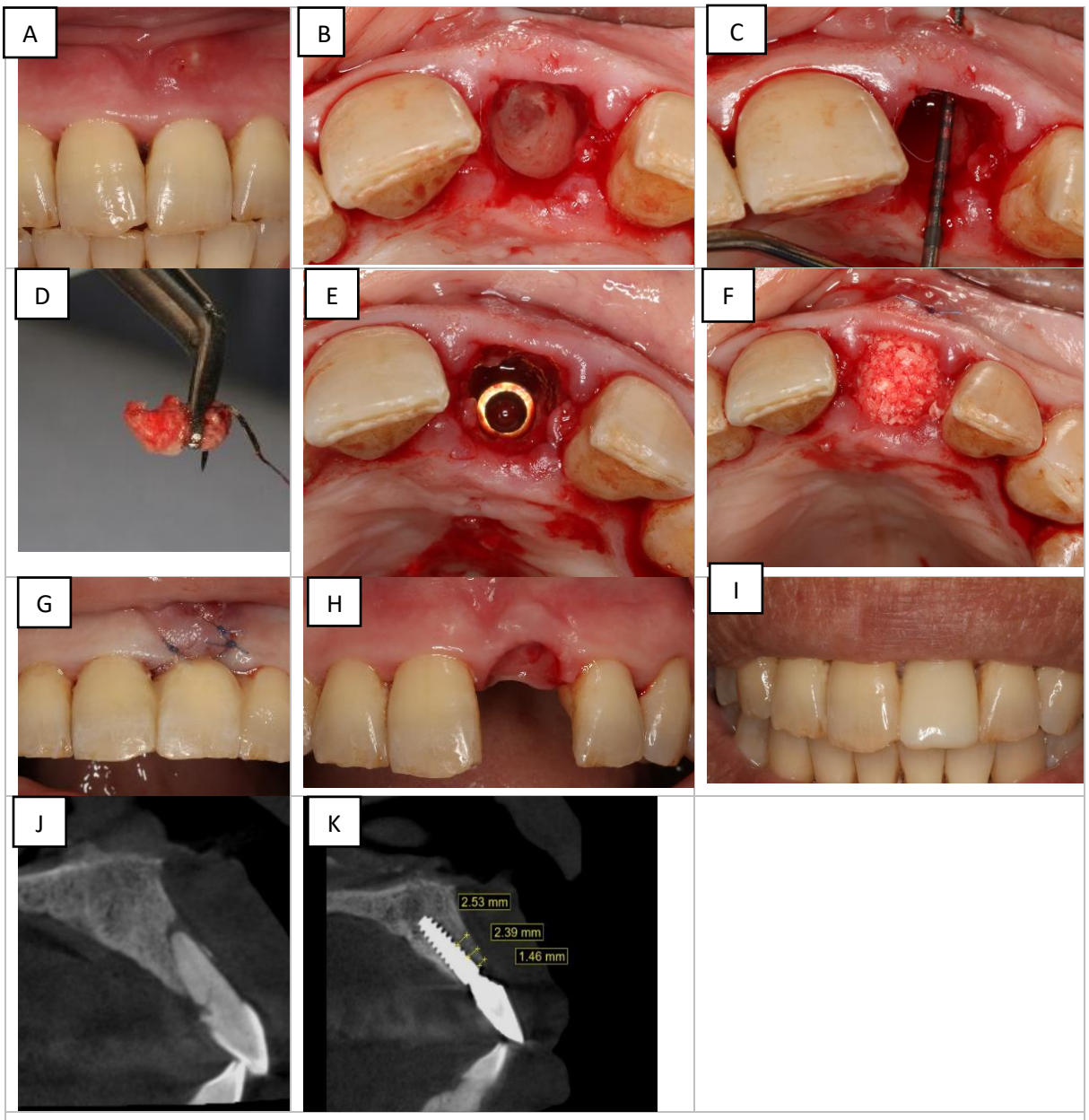
3. Results and discussion

3.1. Results

The buccal bone thickness at baseline was 0 mm at the crest and at 3 mm from the crest, and 0.3 mm at 6 mm from the crest. Nine months postoperatively, buccal plate thickness at the crest was 1.46 mm, at 3 mm from the crest was 2.39 mm, and at 6 mm from the crest was 2.53 mm. The pink esthetic score was excellent, with complete papillae and a natural soft tissue contour, color, and texture matching the adjacent reference tooth (tooth 11). These results are consistent with previous findings that immediate temporization and careful management can preserve soft tissue esthetics [18].

3.2. Discussion

Immediate implant placement in infected sockets has traditionally been approached with caution due to concerns about the residual infection compromising osseointegration and esthetic outcomes. However, the present case illustrates that with careful patient selection, meticulous surgical technique, and appropriate adjunctive therapies, immediate implantation-even in a compromised Type II socket with periapical pathology and complete loss of the labial bone plate-can yield excellent clinical and esthetic results. Recent systematic reviews have shown that immediate implant placement in fresh extraction sockets, including those with infection, can achieve high survival and success rates when proper protocols are followed [19-20]. One of the greatest challenges in immediate implant placement in infected sites is managing the infection to prevent implant failure. In this case, the patient was prescribed amoxicillin starting one day before surgery, and the socket was thoroughly curetted to remove all granulation tissue and periapical pathology. This approach aligns with findings from several systematic reviews and clinical studies that emphasize the importance of aggressive debridement combined with antibiotic coverage to reduce bacterial load and promote healing [21]. The absence of postoperative complications or signs of infection in this patient supports the effectiveness of this protocol. Achieving primary stability is another critical factor. The implant was placed with a torque of 45 Ncm, exceeding the commonly recommended minimum for immediate loading in compromised sites.



Buccal Bone Reconstruction (A–K) A: Preoperative assessment showing fistula B: Atraumatic extraction C: Assessment of the buccal bone plate defect D: Harvested connective tissue graft from the maxillary tuberosity E: Implant placement maintaining buccal gap space and graft suturing F:Xenograft placement within the gap space G: Immediate temporization H: Emergence profile assessment I: Final crown placement J: Preoperative CBCT showing the buccal defect K: Postoperative CBCT showing buccal bone gain

Buccal Bone gain measured at 3 different points		
Measurement Level	Baseline Thickness (mm)	9 Months Post-op Thickness (mm)
Crest	0.0	1.46
3 mm from crest	0.0	2.39
6 mm from crest	0.3	2.53

This high insertion torque likely contributed to the successful osseointegration and stability observed during follow-up, highlighting the importance of precise osteotomy preparation-especially when the buccal plate is missing and palatal positioning is necessary to optimize bone contact and soft tissue support [22-23]. The loss of the labial bone plate posed a significant challenge for maintaining ridge contour and esthetics. Use of a xenograft bone substitute combined with a collagen membrane to fill the buccal gap is consistent with established GBR protocols, which have demonstrated predictable bone augmentation and preservation of ridge dimensions [24-25]. The increase in buccal bone thickness from 0 mm at baseline to 1.46 mm at the crest after 9 months attests to efficacy of this approach. Additionally, the connective tissue graft harvested from maxillary tuberosity played a pivotal role in enhancing the thickness and quality of peri-implant mucosa. A thick, stable soft tissue biotype is well known to correlate with better long-term esthetic outcomes and reduced marginal bone loss, tuberosity is an advantageous donor site due to its dense connective tissue and minimal morbidity, supporting soft tissue seal & contributing to natural contour observed in this case [26-27]. Immediate temporization using patient's own crown preserved soft tissue architecture and papillae, which are often compromised when provisionalization is delayed or omitted.

Clinical studies support that immediate provisional restorations help maintain gingival contours and reduce soft tissue recession, especially in the esthetic zone, the excellent pink esthetic score in this case reflects the success of this strategy, with no noticeable differences in color, texture, or papillary fill compared to the adjacent tooth [28-29]. While the 9-month follow-up period is encouraging, longer-term data are necessary to confirm the stability of both hard and soft tissues. Marginal bone remodeling may continue beyond the first year, and esthetic changes may evolve, particularly in areas with initial bone defects [30]. Although the maxillary tuberosity is an excellent donor site, its availability may be limited in some patients; comparative studies with other donor sites (e.g., palate) could further optimize soft tissue management protocols [31]. Future research should focus on randomized controlled trials comparing immediate implantation in infected sockets with delayed protocols, evaluating not only survival rates but also patient-centered outcomes such as esthetics, function, and satisfaction. The integration of digital workflows and 3D printing for customized membranes or scaffolds may further enhance the predictability of these complex cases.

4. Conclusions

This case supports expanding paradigm that immediate implant placement with immediate temporization can be successfully performed in infected Type II sockets when a comprehensive protocol is followed. Key factors include:

- Rigorous infection control through preoperative antibiotics and thorough socket debridement
- Careful implant positioning with adequate primary stability
- Use of xenograft and collagen membrane for buccal bone augmentation
- Connective tissue grafting from the maxillary tuberosity to enhance soft tissue thickness
- Immediate provisionalization using the patient's own crown to preserve gingival architecture

Such an approach can yield excellent functional and esthetic outcomes, reducing treatment time and improving patient satisfaction.

Author Contributions

The authors confirm their contribution to the paper as follows: contributed to the study conception, design and practical work; Ahmed H. Mohamed & Mohamed Wagdi; data collection and were performed by Tarek Mohamed El Tayeb; manuscript preparation was performed by Ahmed H. Mohamed and Hala Abuel-Ela. All authors reviewed the results and approved the final version of the case report.

Conflict Of Interest Statement

The author declares no conflicts of interest.

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