

CASE REPORT

Single Immediate Implant Placement with Provisional Crown in the Esthetic Zone with 6 Years Follow-Up

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ABSTRACT

Introduction: Immediate implant placement (IIP) has become an attractive treatment for many patients. It reduces time and the number of appointments and protects soft and hard tissue, which, in many circumstances, leads to a better esthetic outcome. IIP with provisionalization (IIPP) may contribute to a more promising result due to the guidance of soft tissue and the preservation of the hard tissue. Indications for IIPP are quite strict, and cone beam computed tomography (CBCT) is a must for case selection.

Objective: This case report will demonstrate how IIP with immediate provisionalization can result in a high esthetic outcome and no discomfort for the patient. **Case presentation:** A 50-year-old female presented for implant placement following the extraction of a superior central incisor due to a vertical fracture. IIPP has been used. **Conclusion:** IIPP can accomplish a stable esthetic result in the case of ideal three-dimensional implant positioning, a well-polished provisional restoration with an S-shaped buccal emergence profile, and by respecting the mesial and distal embrasure spaces for papilla maturity.

Keywords: Dental, immediate implant placement, provisional crown, esthetic zone.

1. BACKGROUND

Immediate implant placement (IIP) has become a common dental treatment option. It reduces time and the number of appointments, and the esthetic result is stable over time, with survival rates as high as 93.9% to 100% (1).

It is an attractive solution for many patients. IIP with provisionalization (IIPP) may contribute to a more promising result (2), due to the guidance of soft tissue (the facial gingival margin and the papilla), particularly when using a customized provisional crown, and the preservation of the hard tissue by placing the implant in the ideal three-dimensional (3D) position (3).

This treatment choice has many advantages over the delayed one, such as shorter treatment times, protection of the soft and hard tissue, and better esthetic outcomes (4).

However, the indications for IIPP are quite strict, so not all the cases may match (5). Primary stability, adequate bone volume, and proper implant placement are all important factors in achieving reliable osseointegration and a sa-

tisfactory esthetic and functional outcome (2).

A cone beam computed tomography (CBCT) is a must to evaluate the relationship between the root and the alveolar crest.

Kan et al. in an article published in 2011, described the sagittal root position (SRP) and found four classes to help us make a good diagnosis and case selection for IIP.

Each SRP in relation to its osseous housing was classified as follows:

- Class I: The root is positioned against the labial cortical plate.
- Class II: The root is centered in the middle of the alveolar housing without engaging either the labial or the palatal cortical plates at the apical third of the root.
- Class III: The root is positioned against the palatal cortical plate.
- Class IV: At least two-thirds of the root is engaging both the labial and palatal cortical plates (Figure 1) (6).

This study highlights the value of

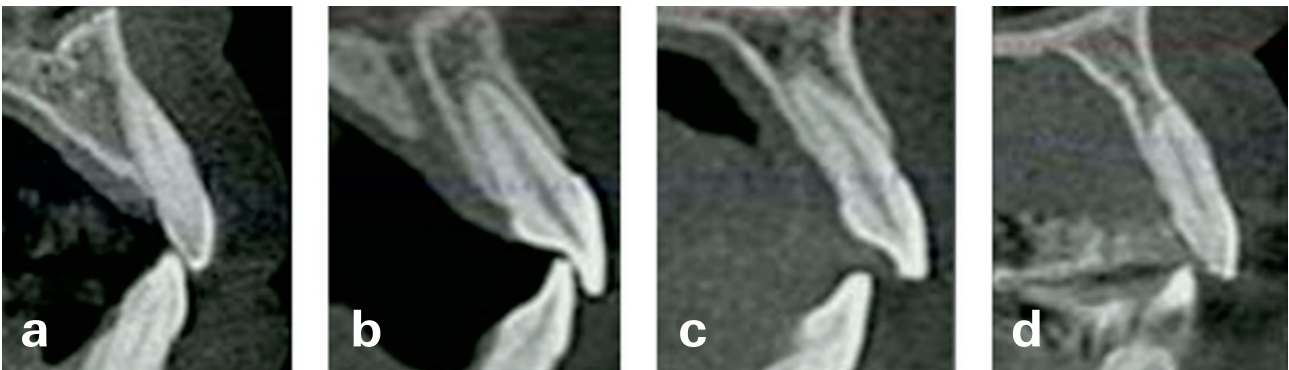


Figure 1, classification of Sagittal Root Position (SRP) : (a) class I ; (b) class II ; (c) class III ; (d) class IV (6).

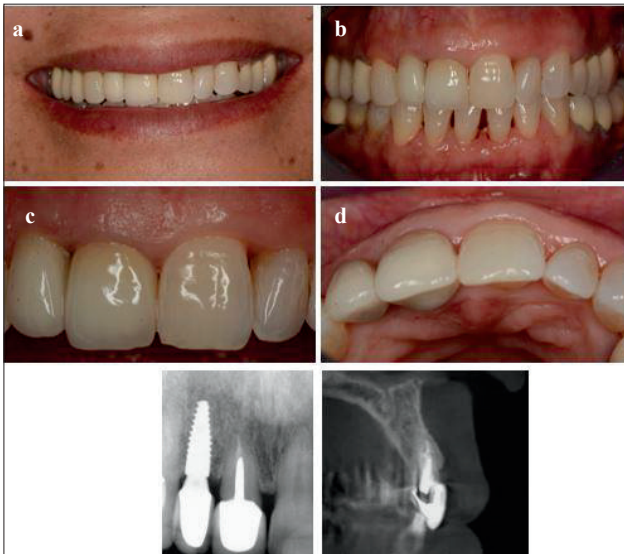


Figure 2: (a) full smile showing a medium lip line with ceramic crowns on teeth #11, #12, from #14 to #16, and from #23 to #26; (b) frontal view showing a thick periodontium with a gingival inflammation on tooth #11, black triangles between lower anterior teeth, non-carious cervical lesions on teeth #44 and #45, and the presence of ceramic crowns on several upper and lower teeth; (c) a close up photo on central incisors showing the healthy pink gingiva with orange peel texture on tooth #11; (d) occlusal view showing the normal symmetrical gingival shape and volume between teeth #11 and #21; (e) a periapical radiographic image on tooth #11 revealing the unfavorable crown/root ratio; (f) para-axial cut on tooth #11 presenting a palatal vertical fracture.

CBCT as a supplemental tool for implant treatment planning (7). Preoperative planning and accurate assessment will enable clinicians to distinguish between sites that are suitable for IIP (Class I SRP), sites that require additional care and are more technique-sensitive (Class II and III SRP), and sites that are not suitable for IIP and necessitate hard and/or soft tissue augmentation before implant placement (Class IV SRP) (6).

The challenge in immediate implant treatment is that the implant is placed in a socket with a deficient wall (a “deficient socket”), which has a dehiscence-type or fenestration defect resulting from a tooth fracture, deep caries, endodontic lesion, trauma, or periodontal disease (1).

2. OBJECTIVE

This case report will show how IIP with immediate provisionalization following extraction of a superior central incisor due to a vertical fracture can result in a high esthetic result with absence of discomfort for the patient.

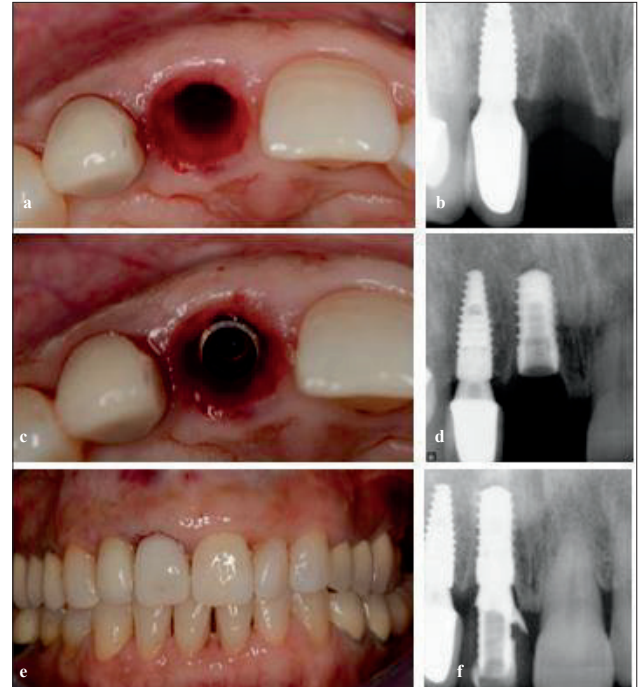


Figure 3: (a) occlusal view showing the alveolar socket after atraumatic extraction of tooth #11; (b) periapical radiographic image presenting the alveolar socket after atraumatic extraction of tooth #11; (c) occlusal view of the implant after its placement; (d) periapical radiographic image of the implant on site #11, note the ideal mesio-distal position and axis; (e) frontal view showing the polished provisional crown. Note the xenograft particles on the gingival margin of the provisional restoration; (f) periapical radiographic image presenting the immediate implant placement with immediate provisionalization.

3. CASE PRESENTATION

A 50-year-old non-smoking female was presented with pain and mobility on a non-vitally restored maxillary right central incisor. The clinical exam of the maxillary arch revealed a thick periodontium with a gingival inflammation on tooth #11 and the presence of ceramic crowns on teeth #11, #12, from #14 to #16, and from #23 to #26, and the periapical radiographic image on tooth #11 showed the presence of a post and core on the latter with an unfavorable crown/root ratio, and an implant with a cemented crown on site #12.

The mandibular arch presented black triangles between anterior teeth; non-carious cervical lesions on teeth #44 and #45; ceramic restorations on teeth #46; and from #34 to #37.

In order to eliminate the gingival inflammation and maintain good oral hygiene and plaque control, the patient received a session of scaling and root planning.

After 1 month, the clinical examination of tooth #11 showed



Figure 4, (a) two weeks post-op close up frontal view photo. Note the scalloped, normal shaped, orange peel appearance gingiva on site #11; (b) six weeks post-op close up frontal view photo showing a healthy gingival appearance on implant site #11; (c) three months post-op close up frontal view photo showing the preservation of the healthy gingival appearance on implant site #11; (d) three months post-op occlusal view showing the preservation of the normal gingival shape and volume on implant site #11; (e) three months post-op periapical radiographic image. Note the absence of cervical bone loss and absence of any radiolucent or abnormal radiographic image.



Figure 5, (a) frontal view showing the good esthetic appearance of the definitive crown on implant site #11; (b) close up frontal view photo of the definitive crown on implant site #11. Note the symmetrical healthy gingival appearance between the two central incisors crowns; (c) close up occlusal view photo presenting the symmetrical shape and volume of the healthy gingiva on the two central incisors; (d) full smile photo after definitive crown placement on implant site #11; (e) periapical radiographic image on implant site #11 after definitive crown cemented on the definitive abutment. Note the excellent crown fitting and absence of any gap between the crown and the abutment.

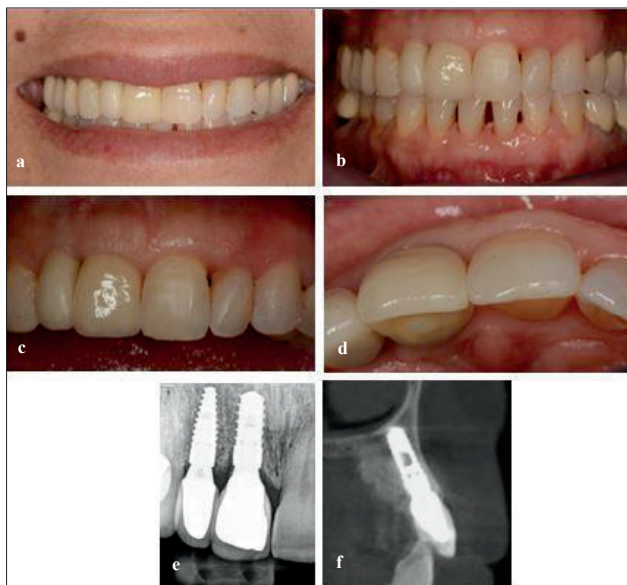


Figure 6, (a) four years post-op full smile photo showing the well esthetic result; (b) four years post-op frontal view photo; (c) four years post-op close up frontal view photo. Note the stability of the healthy appearance gingiva on implant site #11; (d) four years post-op close up occlusal view photo showing minor reduced gingival volume on implant site #11 in comparison with tooth #21; (e) four years post op periapical radiographic image on implant site #11, note the absence of cervical bone loss or any radiolucent or abnormal radiographic image; (f) para-axial cut on implant site #11 showing an ideal bucco-palatal implant placement, absence of any abnormal radiographic image and the stability and preservation of the buccal plate four years after implant placement surgery.

a healthy gingiva with an orange peel texture; there was no bleeding on probing, but the patient revealed an increase in pain and mobility. The tooth has a normal gingival shape and volume symmetrical to tooth #21 in the occlusal view, with no depression or unusual appearance.

A cone-beam computed tomography (CBCT) was



Figure 7, (a) six years post-op full smile photo showing a perfect esthetic stability; (b) six years post-op frontal view photo; (c)(d) six years post-op close up frontal view photos showing the healthy gingiva with orange peel texture on implant site #11; (e) six years post-op close up occlusal view photo showing minor reduced buccal gingival volume on implant site #11 in comparison with tooth #21; (f) six years post-op periapical radiographic image on implant site #11, note the stability of cervical bone level and absence of any radiolucent or abnormal radiographic image.

requested for a better diagnosis of the unrevealed problem. A palatal vertical fracture was noticed on a para-axial cut on tooth #11 (Figure 2).

Dealing with these data, the treatment plan was to extract tooth #11 atraumatically and place an implant immediately with provisionalization and bone grafting. The final restoration will be placed after 4 months of surgery.

The patient received a session of scaling and roots planing (SRP) one week prior to the surgery so that good oral hygiene would be maintained.

Under local anesthesia using 4% articaine HCl (with 1:100,000 epinephrine), an atraumatic flapless extraction of tooth #11 was done. The granulation tissues were eliminated using a surgical curette, and the extraction socket was then irrigated with saline solution. A periapical radiograph was done to examine the extraction site. A periodontal probe was used to measure the distance between the mid-facial gingival margin and the mid-buccal alveolar crest, which was 3 mm, and interproximally the distance from the tip of the papilla to the interproximal bone, which was 5 mm. The surgery was continued by implant bed preparation in an ideal 3D position (mesio-distally, bucco-palatally, and apico-coronally).

The drilling protocol was carried out at mid-palatal using lanceolate, pilot, and twist drills (\varnothing 2.35, \varnothing 2.8, \varnothing 3.3, \varnothing 3.6 mm). The gauge was used to check the position mesio-distally and bucco-palatally of the implant bed preparation clinically and radiographically.

A 4*10 mm bone level implant (Klockner®, VEGA® implant, Spain) was placed in the ideal 3D position: mesio-distally at 2mm from the adjacent teeth, bucco-palatally in palatal position creating a gap of at least 3mm between the implant and the buccal plate, apico-coronally at 4mm from the facial gingival margin, it means at 1mm below the buccal alveolar crest.

At placement, the primary stability of the implant was achieved at 40 N/cm of torque, and with the Penguin instrument, the frequency was 75 ISQ.

A provisional abutment was positioned and adjusted to obtain enough space for the provisional restoration, and a radiograph was taken to assess the abutment sitting on the implant.

To assure a passive fit without any interference in any position, a lingual access hole was created in the prefabricated temporary restoration. The provisional crown was then re-lined to the abutment using light-cure flowable composite resin (3M ESPE Filtek). To stop the material from entering the screw access chamber of the abutment and obstructing it, teflon tape was applied there. The screw-retained provisional was removed once the material had initially set, and all voids were filled in with the flowable composite. In the facial cervical part of the provisional crown, a concave shape should be done to create space that will be filled by the facial gingival margin, and interproximally, a space should be created between the interproximal provisional crown and the papilla to let the latter rebound over time. The provisional crown was polished with special rubber wheels.

The gap between the implant and the buccal aspect of the socket was filled with xenograft bone particles (Botiss, Cerabone®). The screw-retained provisional was inserted and torqued to 20 N/cm. All occlusal contacts were removed. Teflon tape and flowable composite were used to seal the access hole. A radiographic periapical image was taken to assess the final result (Figure 3).

The patient was asked to use ice-packs for the first three hours at an interval of five minutes after the surgery to prevent edema. To prevent secondary infection of the surgical site, 2 g/day of amoxicillin with clavulanic acid was prescribed for 7 days. In cases of pain, two 500-mg paracetamol tablets every six hours were recommended. From the second post-operative

day for 14 days, the 0.12% CHX mouthwash was prescribed. Healing was uneventful, and no postoperative adverse effects were observed during the regular follow-ups.

The patient was seen at 2 weeks, 6 weeks, and 3 months for evaluation of the healing. The clinical exam revealed a healthy gingival aspect on the implant site #11; the buccal and occlusal views show a scalloped, normal-shaped, orange-peel appearance gingiva on site #11. The periapical follow-up radiograph shows the parallelism between the implant #11 and the adjacent implant #12 and tooth #21 (Figure 4).

After 4 months, the final impression was made using an open tray coping impression. The provisional restoration was removed and a definitive ceramic crown was cemented. A radiograph was taken to ensure that the crown fit perfectly over the abutment (Figure 5).

After 4 years post-loading, the patient was recalled, and the case was re-assessed. The patient expresses satisfaction with the esthetic outcome and claims to have experienced no pain or other discomfort symptoms. The clinical examination showed healthy, firm, pink, scalloped, and orange peel-textured gingiva on implant site #11.

The radiographic periapical image revealed the absence of any bone loss or radiolucency at implant site #11. A CBCT was performed, and the para-axial cuts revealed an intact remaining buccal plate as well as the ideal bucco-palatal placement of implant #11 (Figure 6).

Six years post-loading, the patient was recalled for follow-up. The clinical examination at implant site #11 showed perfect esthetic and periodontal stability. The radiographic periapical image showed the absence of any bone loss (Figure 7). Figure 7, (a) six years post-op full smile photo showing a perfect esthetic stability; (b) six years post-op frontal view photo; (c)(d) six years post-op close up frontal view photos showing the healthy gingiva with orange peel texture on implant site #11; (e) six years post-op close up occlusal view photo showing minor reduced buccal gingival volume on implant site #11 in comparison with tooth #21; (f) six years post-op periapical radiographic image on implant site #11, note the stability of cervical bone level and absence of any radiolucent or abnormal radiographic image.

4. DISCUSSION

The anterior area is a very challenging region, and the timing of implant placement must be studied meticulously in order to avoid any damage to the buccal bone, leading to a bad aesthetic result and a more sophisticated procedure with different aggressive surgeries to solve the problem.

Furthermore, because esthetic concerns are so important in the anterior sector, immediate provisional restoration after tooth extraction is now required for the patient to accept the treatment.

In this case, the patient was highly satisfied not only with the final result, but also declared that she was highly comfortable with the esthetic result of the immediate provisional restoration done just after implant placement.

In an article published in 2014, Hartlev et al. were in agreement with us concerning patient satisfaction and concluded that immediate placement and provisionalization of a single-tooth implant involving a definitive individual abutment and provisional crown followed by later placement of a definitive

crown demonstrated high subjective and professional satisfaction (8).

In an article titled „Immediate implant placement and provisionalization of maxillary anterior single implants,“ Kan et al. stated that many factors influence the final result of immediate implant placement with immediate provisionalization. Good timing of the procedure, flapless surgery, filling the gap between buccal bone and implant with bone substitutes, soft tissue graft in case of thin periodontium, and finally immediate loading seemed to lead to a better esthetic result, according to Kan et al. (9).

All these factors mentioned above were included in our case, except for soft tissue augmentation, which was useless because of the thick periodontium.

In an article published in 2021 by Esquivel et al., it was concluded that ideal 3D positioning of the implant is a fundamental and essential factor for the esthetic final outcome (10).

In this case, the implant positioning was highly respected in its three dimensions: mesio-distal, bucco-palatal, and apico-coronal. Any disrespect of these 3D positions can lead to facial gingival recession (false bucco-palatal axis, with absence of the gap), papilla shrinkage with a black triangle (false mesio-distal axis, with less than 2 mm of space between the implant and the adjacent teeth), and disproportioned crown shape (false apico-coronal position).

5. CONCLUSION

Due to the excellent level of patient satisfaction with esthetic results, IIPV has become popular in implant therapy. The ideal 3D implant position respecting the bucco-palatal, mesio-distal, and apico-coronal positioning is critical for achieving a stable esthetic result. A well-polished provisional restoration with an S-shaped buccal emergence profile respecting the mesial and distal embrasure spaces for papilla maturity, results in a healthy gingival aspect during the final impression, leading to an excellent final restoration result.

Finally, clinician experience and dexterity as well as careful case selection remain the keys to clinical success.

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