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Anatomically-Driven Immediate Implant Placement in the Esthetic Zone: Case Report as Proof of Principle

R. Huang DDS, Q. Nyugen DDS MSc., D. Deporter DDS PhD.
Graduate Periodontics Program, University of Toronto, Faculty of Dentistry

Introduction

The replacement of hopeless teeth in the esthetic zone of anterior maxilla with immediate dental implants has become common practice. However, achieving an ideal prosthetically-driven implant position remains a challenge, even for experienced clinicians. Past research has established key steps in achieving and maintaining successful outcomes,[1] considering factors including: i) thick gingival phenotype; ii) preservation of an intact buccal plate; iii) implant positioning along palatal socket wall to enable emergence from cingulum; iv) engagement of 4-5mm of apical bone for adequate primary stability; v) subcrestal placement of implant; vi) placement of suitable bone grafts in peri-implant gaps for long-term stability of soft and hard tissue anatomy;[2] and vii) fabrication of transitional restoration to preserve soft tissue architecture.[3] Each of these pre-requisites comes with challenges – a major one being the initiation of suitably positioned osteotomy. This case report illustrates a novel approach for anterior implant placement using an anatomically-driven technique modified as that described for molar implants.[4]

Clinical Presentation

A 53-year-old male presented to the Graduate Periodontics Clinic at the University of Toronto with a fractured, non-restorable maxillary left lateral incisor. He was a non-smoker with no history of periodontal disease or parafunctional habits.





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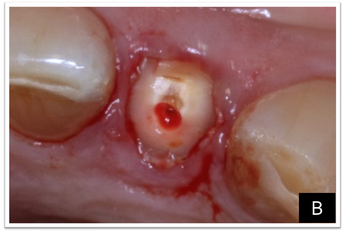
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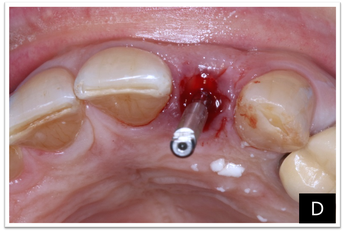
Case Management

1. Pre-operative radiographic assessment of periapical radiograph (PA) and/or CBCT to ensure appropriate case selection. In this case, PA showed favorable periodontal conditions of adjacent teeth and bone sounding with periodontal probe revealed an intact buccal plate. Occlusal relationship was favourable with no crossbite or deep overbite (**Figure A, i**)
2. A matrix impression of the tooth (after build-up with composite resin) was taken prior to extraction to facilitate chairside fabrication of a temporary crown.
3. Atraumatic flapless extraction was performed to minimize soft and hard tissue trauma while preserving the facial plate.
4. The extracted tooth was decoronated extra-orally with a high-speed handpiece at the cementoenamel junction.
5. The root was reinserted back into its socket to act as a guide for the initial osteotomy by drilling through the root at a location of the former tooth cingulum (**Figure B**). A periosteal elevator was used secure the root in place by applying apical pressure from the buccal aspect, while continuing site development with the 2mm twist drill to the planned depth (**Figure C**).



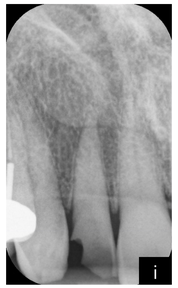




















6. PA was taken with the 2mm twist drill in place, ensuring ideal mesio-distal and bucco-lingual angulations (**Figure D, ii** *shown with drill short of final depth).
7. The root was removed, and osteotomy preparation continued to the desired width and depth (undersize osteotomy to ensure adequate primary stability, if necessary). Final implant position was 2mm apical to the buccal osseous crest and 4mm apical to the existing gingival margin.
8. Implant was placed with adequate primary stability (≥35Ncm). The implant driver was left on top of the implant to seal the opening while "sticky bone",[5] prepared using autologous platelet-rich fibrin glue and allograft, was used to graft all peri-implant gaps (**Figure E, F**).
9. A temporary implant abutment was trimmed and inserted on top of the implant to receive the provisional crown, which was fabricated using temporary crown material and flowable composite resin (**Figure G, H, iii**) .
10. The crown was adjusted to be out of occlusion in maximum intercuspation and in all excursive and protrusive movements. Appropriate contour of the crown helped to support soft tissue profile during healing period (**Figure iv**).







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Results

The patient reported an uneventful healing period. The implant was eventually restored with a permanent crown with excellent retention of soft tissue architecture and aesthetics. PA at 8-month follow-up showed stable crestal bone level (**Figure I, v**).

Conclusions

Immediate implant placement in the esthetic anterior zone requires considerable knowledge and finesse. It is imperative to place the implant in an anatomically-driven position along the palatal socket wall, which can be achieved using the tooth root as an anatomic guide during osteotomy preparation. This not only facilitates proper emergence through the cingulum of former tooth, but also eliminates the concerns of burs drifting buccally into the extraction socket and subsequently, non-ideal implant positioning.

References

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