

Surgical and Prosthetic Treatment of a Failed Maxillary Central Incisor (#8)



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The patient presents as a 26-year-old healthy non-smoking male (ASA 1) in November 2014 to our offices (Figs. 1-3). His chief complaint was discomfort apically in the area of #8 (ADA), which had a previous root canal treatment many years prior due to a traumatic event to the face. A full mouth periodontal exam revealed no bleeding upon probing except around #8 with no probing depths greater than 3 mm. He was aware that #8 was hopeless due to a chronic periapical lesion and was interested in permanent tooth replacement without involving his adjacent teeth. He presented with high esthetic expectations, a medium lip-line and gingival biotype and slightly triangular shaped maxillary anterior teeth. (Fig. 4)

The comprehensive team treatment plan that was discussed with the patient was based on clinical, radiographic (including maxillary CT scans) exams and included:

1. Mounted study models with final restorative consultation with Dr. Segel for a maxillary anatomically correct surgical guide and a transitional Essix appliance to replace #8.
2. Surgical Visit: surgical extraction #8 with evaluation for immediate implant placement (Type 1 Placement) with hard & soft tissue reconstruction or ridge preservation with delay of implant placement for 3-4 months (Type 3 Placement). The decision would be made after tooth extraction and 3-dimensional evaluation of the socket after full debridement of the apical lesion as well as insertion torque values. The patient was given Amoxicillin, a NSAID and chlorhexidine gluconate (CHG) rinse to start 1 hour prior to surgery and continue to completion for 1 week, 5 days and 2 weeks, respectively.



Fig. 1 Pre-treatment

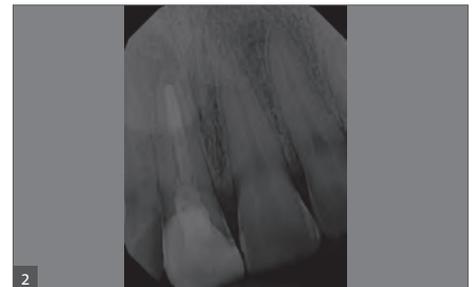


Fig. 2 Pre-treatment

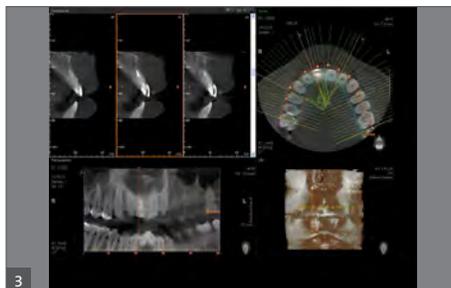


Fig. 3 Pre-treatment CBCT

| Patient: | IMPLANT ESTHETIC RISK PROFILE | | |
|---|--|-------------------------------|--------------------------|
| | Low | Medium | High |
| Medical status | Healthy patient and intact immune system | | Reduced immune system |
| Smoking habit | Non-smoker | Light smoker < 10 Cig/D | Heavy smoker > 10 Cig/D |
| Patient's esthetic expectations | Low | Medium | High |
| Lip line | Low | Medium | High |
| Gingival biotype | Low wellaped Thin | Medium wellaped Thick | High wellaped Thin |
| Shape of tooth crowns | Rectangular | Slightly triangular | Triangular |
| Infection at implant site | None | Chronic | Acute |
| Bone level at adjacent teeth | ≥ 5mm to contact point | 3.5 to 4.5mm to contact point | 2mm to contact point |
| Restoration status of neighboring teeth | None | | Restored |
| Width of alveolar bone | ≥ 3 mm @ 2mm | 1 tooth < 2mm | 2 teeth or more |
| Soft tissue anatomy | None soft tissue | | Soft tissue deficiency |
| Bone anatomy of alveolar crest | No bone deficiency | Horizontal bone deficiency | Vertical bone deficiency |

Fig. 4 ERP

3. Screw-retained provisional #8 to sculpt soft tissues and to act as the “blueprint” for the final restoration. The provisional will be worn for 6-8 weeks and reevaluated by both clinicians for any modifications needed.
4. Commence completion of single crown #8 upon establishing favorable soft tissue scalloping and contours.
5. Periodontal maintenance visits every 6 months with the restorative dentist’s office.

TREATMENT OF SITE #8 USING A STRAUMANN® BONE LEVEL TAPERED (BLT) ROXOLID® SLACTIVE® IMPLANT

The involved tooth #8 was extracted using a flapless approach with minimal trauma. The periapical lesion was debrided carefully and removed separately in predominately one large piece which was sent out for oral pathology evaluation (Kornberg School of Dentistry at Temple University, Philadelphia, PA; *Dx.: Periapical Granuloma and Abscess*). The socket was sterilized with the use of the Millenium Dental Laser (ablation setting) after vigorous usage of the PIEZOSURGERY (OT4 insert). (Figs. 5,6)

The goal was to place the implant immediately, if possible. Site preparation was completed with the use of the index finger for tactile sense along the buccal plate of bone to confirm that no buccal vibration or buccal fenestration was evident during site preparation using the Straumann twist drills. All socket walls were intact except the most apical buccal where the abscess was removed resulting in a fenestration without a fistula. A BLT Roxolid SLActive 4.1 mm x 14 mm implant was installed using the rules for 3-dimensional placement (ITI Treatment Guide # 1; 2007; Quintessence Publishing Co., Inc.) with the aid of the anatomically correct surgical guide template of placing along the palatal wall and in an apical position of 4 mm below the mid-facial position of the surgical guide. As the coronal buccal wall was totally intact and soft tissue measured 3 mm mid-buccal, the position of the buccal implant shoulder was 1 mm deeper than the buccal height of bone (Fig. 7).

Insertion torque value of the implant was approximately 10Ncm as it was hand tightened to final seating. A buccal gap of 2 mm was measured (Fig. 8) and packed tightly with anorganic bovine bone (BioOss; Geistlich) previously soaked for 10 minutes in PDGF (Gem-21; Osteo-Health) to aid in both soft and hard tissue healing.



Fig. 5 Extracted tooth #8



Fig. 6 Debriding socket with PIEZOSURGERY



Fig. 7 Palatal placement #8 with aid of surgical guide to allow for a buccal gap of at least 2 mm and a screw-retained restoration



Fig. 8 Flapless placement with along the palatal wall with a 2 mm buccal gap recorded



Fig. 9 Minimal reflection of the buccal flap from line-angle to line-angle with a Buser membrane instrument

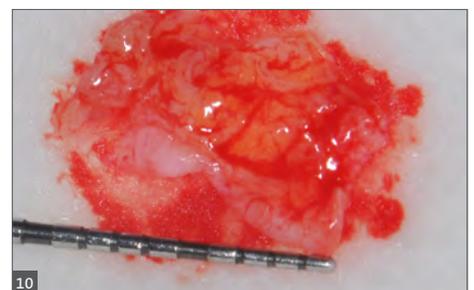


Fig. 10 Palatal connective tissue graft (10x7 mmx2 mm thick)

A palatal soft tissue connective tissue graft (CTG) was harvested from the #4-5 site. The CTG was then placed and sutured under the partially elevated buccal flap from mesiobuccal to distobuccal line angle and apically approximately 10 mm to further aid in long-term soft tissue contours. This was done to mimic the root eminence of the extracted tooth as well as to act as a membrane to aid in guided bone regeneration of the buccal gap. (Figs. 9-11) In addition, the CTG changes the periodontal biotype from a medium to a thick biotype (“biotype conversion”). A 7 mm tapered RC healing cap was placed to lightly support the soft tissue graft. Prior to placing, the healing cap was beveled to the level of the palatal tissues to prevent transmucosal loading by the tongue. (Fig. 12)

The dental laser (Millenium, Cerritos, CA) was then used on the palatal incisions (hemostasis setting) to aid in bleeding control and post-operative comfort for the patient. No periodontal dressing or sutures were necessary. The Essix appliance was relieved so as not to place any pressure on the surgical site. Post-operative plaque control was reviewed with the patient which included normal brushing and flossing in all areas except site #8 where a cotton swab would be used dipped in CHG rinse to locally clean the site along with rinsing with CHG bid till completed along with finishing his other medications as prescribed. A post-surgical CBCT was taken to confirm 3-D placement along with avoidance of the nasopalatine foramen (NPF). The benefits of the BLT implant are readily noted on the post-surgical CBCT as the apical taper avoids the NPF and a buccal perforation due to the anatomical bony buccal undercut. (Fig. 13)

Healing of the surgical site was uneventful and the patient was seen at 2 weeks, 5 weeks and at 12 weeks post-surgery. A periapical x-ray was taken at 12 weeks and a reverse torque test at 35Ncm was

completed using the manufacturer’s torque driver and an RC implant carrier device to confirm bone healing. (Figs. 14,15) The patient was scheduled with the restorative dentist for impressions to fabricate a lab-made screw-retained provisional restoration using the indirect method. The patient was seen in our office at 3 weeks after placement of the provisional to evaluate soft tissue healing, tissue support and a periapical x-ray. (Figs. 16-18) Based on clinical healing and gingival margin location being slightly apical for #8 implant vs. #9 natural tooth, further mid-buccal support with acrylic was recommended. The adjacent papillae were healing as expected and the patient was very happy with the results so far. The case went to completion using the custom impression coping technique of duplication of the transitional subgingival zone for the lab. Due to the proximity of the screw-access hole in the provisional being near the palatal incisal edge, a custom abutment (1 mm subgingival margins circumferentially) was fabricated and the final crown was cemented with ZnPO4 cement using the copy abutment teflon-tape technique. This technique was employed to avoid subgingival cement remnants. Final pictures and x-rays were taken of the final case in our office a few weeks after completion. Clinical exam revealed healthy soft tissues and excellent buccal contours mimicking the adjacent natural tooth. (Figs. 19-22) He will continue periodontal maintenance visits twice yearly with his restorative dentist and yearly exams under our care for 5 years to document soft and hard tissue healing with clinical digital photos and x-ray exam of the implant site.



Fig. 11 Donor site post laser hemostasis



Fig. 12 7 mm tapered RC healing cap was placed to lightly support the soft tissue graft

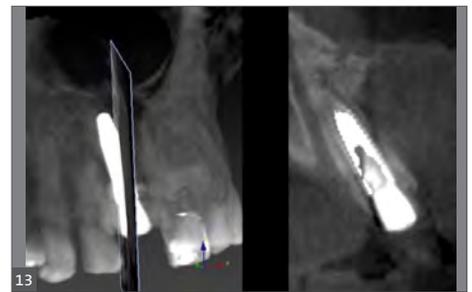


Fig. 13 Post-surgical CBCT of #8; buccal gap bone grafting is noted along with a widened NPF



Fig. 14 Healing at 8 weeks; reverse torque test visit



Fig. 15 Sulcular healing at 8 weeks



Fig. 16 Screw-retained provisional at 3 weeks

CONCLUSION

The treatment of an esthetic zone case was successfully completed using the team approach for maximizing our combined knowledge for the benefit of the patient, which is an ITI doctrine. The use of the Straumann® Bone Level Tapered Roxolid® SLActive® Implant for immediate placement helped in the anatomical management of the central incisor site where the nasopalatine foramen can be an issue along with the normal anatomical buccal undercut. Comprehensive case planning, the use of an anatomically correct surgical guide, evidenced-based materials including the use of connective tissue grafting along with taking the necessary time to sculpt the soft tissues in the provisional phase, are all important factors in achieving a successful outcome. As esthetic zone implant placement, as described in this case report, is a complex SAC procedure, the surgical and literature knowledge of this technique-sensitive area is necessary for the clinician to consistently result in a happy patient as described in this report. (ITI 5th Consensus Conference: IJOMI 2014 (Supplement); Morton D., Chen ST., Martin WC., Levine RA & Buser D. and IJOMI 2014 (Supplement); Levine RA, Huynh-Ba G, Cochran DL)



Fig. 17 Screw-retained provisional #8



Fig. 18 Periapical x-ray of screw-retained provisional



Fig. 19 Final crown 8 (6months post-placement)



Fig. 20 Favorable buccal contours simulating the adjacent natural tooth

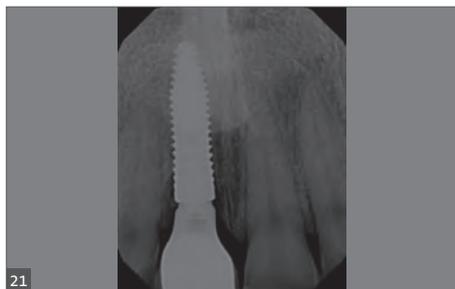


Fig. 21 Final periapical x-ray



Fig. 22 Final smile