

# Anterior Implant Replacement Therapy

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This case is a 66-year-old patient who needed the space between his anterior teeth restored. The patient was extremely worried about the expected treatment options and the length of the treatment.

I assured him that the best possible treatment modalities would be implemented, however, an elaborate discussion of the expected results and procedures needed to be addressed first.

Usually, a patient with the loss of an anterior central incisor can be divided into indifferent or exacting treatment personality traits according to House classification. The reasons for anterior tooth loss can range from dental trauma to periodontal disease, to gross decay to congenitally missing teeth, all of which render the site a challenge if the prosthodontic factors are not considered in the planning.

For this patient's case, he presented with a failed zirconia crown on #11, which had been treated previously with root canal treatment and developed a secondary carious lesion which compromised the coronal segment and post canal space (Fig 1,2).

Upon the radiographic exam, the results show a carious lesion extending to the internal root canal requiring the use of a ferrule effect principle. All this information was explained to the patient along with the crown-root ratio requirements (Fig 3).

The discussion of the prognosis was also discussed which is poor in this case. At the end of the discussion, the patient was leaning toward the implant treatment option.

I explained to the patient the reality of the expected outcome which I call the "reality check!". I always ensure that the patient is well aware that we are dealing with living biological tissue and expectation is unpredictable. In addition, the black triangle was discussed along with shade matching challenges. It is always imperative to set low / realistic expectations for the patient to make sure the patient and the clinicians are on the same page.

Immediate implant placement was also discussed along with the explanation of the advantages of doing so in this case, in particular.

Gingival phenotype was on our side; thick biotype, and the amount and volume of the buccal plate bone was ideal; 3 mm. A flapless surgery was performed to place the dental implant. The tooth was extracted as atraumatically as possible. The bone thickness was evaluated and compared to the CT-Scan that was taken preoperatively. It is really worth mentioning that flapless surgery can lead to poor results if a thorough understanding of the available bone volume is not well established before the actual procedure is performed (Fig 5,6).



Fig. 1: Anterior view of the dentition exhibiting multiple discoloured Class V composite restorations.



Fig. 2: Maxillary arch view showing the failed post and core on tooth # 11

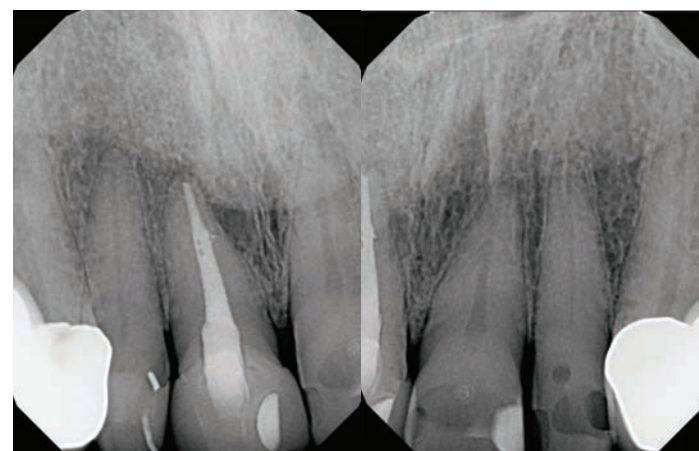


Fig. 3: Pre-operative periapical radiograph taken for the anterior teeth, showing tooth # 11 prior to failure.

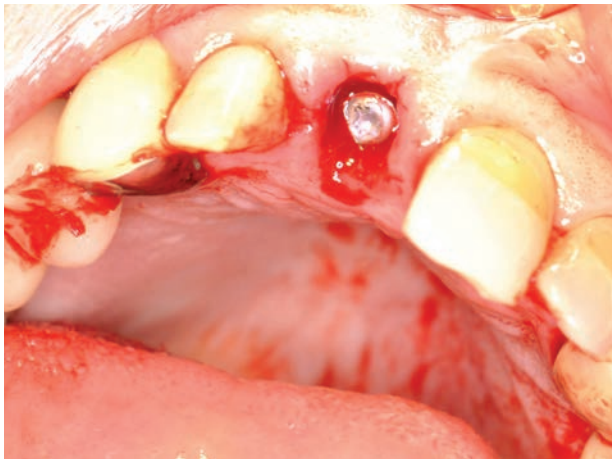


Fig. 4: A flapless procedure was performed, and an implant was placed immediately after the atraumatic extraction.

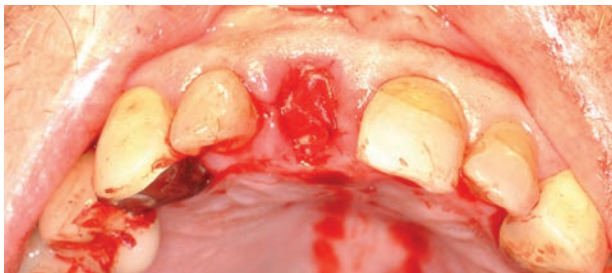


Fig. 7: A resorbable membrane was placed after the bone augmentation was performed. An internal buccal and lingual tunnel was created to pack the membrane properly.



Fig. 8: The site was sutured with silk suture material to secure the membrane and the augmented bone to aid for healing and maturation.

Removal of a fractured root as atraumatic as possible with a flapless approach followed by the immediate placement of an implant to achieve the preservation of buccal bone and to maintain the keratinized gingiva has been studied<sup>1</sup>.

The advantages of flapless surgery are: a. Increase patient acceptance, b. maintaining the blood supply to hard and soft tissue, c. Improve healing time, and d. decreasing postoperative discomfort<sup>1,2,3</sup>.

Implant size 4.1x10 RC BLT was placed, a cover screw was inserted, and hand torqued to 10-15 NCM (Fig 6).

Straumann® AlloGraft granules were placed in the socket



Fig. 5: Periapical radiograph taken for the initial implant site pilot drill to determine the ideal implant location.

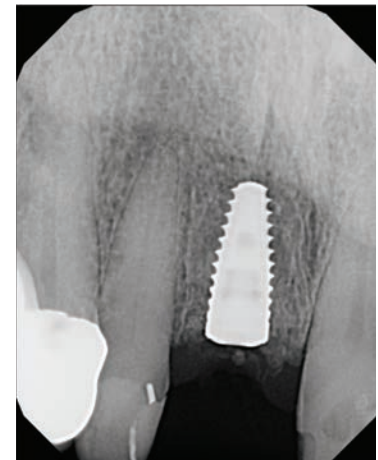



Fig. 6: Periapical radiograph taken after the implant was placed, to verify position and angulation of the implant.

to fill the voids that are created from the size mismatch between the implant diameter and natural tooth root configuration (Fig 4).

A resorbable membrane; Straumann® Membrane Flex was placed over the socket and bone, retained by silk suture (Fig7).

Post operative instructions were discussed with the patient which include:



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**Post Surgical Instructions for Implant placement**

- Please keep gauze on extraction site for 4 hours. We have provided you with extra gauze. Change gauze every 30 minutes. There will be some blood on the gauze, do not be alarmed.
- For the first three days please NO RINSING. You may still brush your teeth with minimal toothpaste, but please spit out gently and avoid rinsing.
- After the first three days (Day 4) start doing warm salt water rinses 2x/day.
- Avoid any food that is too hot (temperature-wise) or spicy. Please try to only drink cold or lukewarm liquids.
- Avoid any food that is sticky, such as caramel.
- Some swelling may occur- use a plastic bag filled with ice on cheek adjacent to extraction site, 5 minutes ON, 5 mins OFF for 24 hrs.
- If we have prescribed an Antibiotic please take this to the end of the Prescription.
- For pain relief you may take extra strength Tylenol, unless we have given you a prescription for something else.
- DO NOT TAKE ASPIRIN for pain management, since aspirin can induce prolonged bleeding.
- Two days post Implant placement if you are still experiencing pain, or if you have any other questions please call the office at: 519-578-5620.

Fig. 9: Post-operative instructions were given to the patient and verbally rehearsed to ensure patient is aware of all the steps mentioned



The patient was seen after 3 weeks for the purpose of suture removal and healing evaluation. Usually with silk sutures, plaque retention is an issue therefore it is recommended to stay within 7-10 days mark. There is a debate about how long the sutures should be kept in situ. The time frame is heavily dependent on the type of suture used <sup>12</sup>. Table 1. Gingival and mucosal tissue were healing nicely. You can appreciate the dent that usually forms above the implant coronal segment (Fig 10). This area will never fully mature as it is not supported by bone or periosteum, hence it will always mark the position of the implant. Speaking of which, there is a device currently on the market that can be used to detect the location of an implant.

Suture	Indications	Size	Needle	Absorption	Tissue reaction	Notes
Surgical gut	Extraction suture	3-0	Cutting	Completely digested by 70 days. Effective strength for 2-3 days in the oral cavity	Moderate	Used for tissue closure where strength is required for 1-2 days
Chromic catgut	General closure	4-0	Taper	Completely digested by 110 days, but in the oral cavity it has effective strength for up to 5 days	Moderate but less than plain gut	Excellent for oral tissue closure when longer life is required compared with plain gut
Polyglycolic acid Polyglactin	Alveolar mucosa Attached gingiva Large flaps where strength is required but a resorbable suture is desirable	4-0 5-0 3-0 4-0 3-0	Taper Cutting Cutting	Completely absorbed by hydrolysis after 90 days. Faster absorption when exposed to the oral environment. Good strength for least 2 weeks.	Mild	Polyglycolic acid has great advantages for use in the oral cavity in children. It has good strength over 7 days and is resorbable. It is often retained for longer periods however, and has a tendency to accumulate plaque due to its braided nature. Tapering? needles are useful where tissues are friable
Monofilament Nylon	Large flaps where strength is required (i.e. palate)  Skin	3-0 4-0  6-0	Cutting  Cutting	Essentially a non-resorbable material, but degrades at 15-20% per year	Extremely low	Excellent tissue reaction and strength. Monofilament material is extremely clean and allows good wound healing but needs to be removed  Skin closure must be performed with 6-0. Sutures should be removed before 7 days
Surgical silk	General closure of most oral tissues where a non-resorbable suture is required	3-0 4-0	Cutting	Completely degraded by 2 years	Moderate	Traditional suture material, used where strength was required. Its use has diminished with the availability of materials such as polyglycolic acid. A braided material and therefore not as clean as monofilament

Table - 1



Fig. 10: Maxillary view of the healed site # 11 post implant placement. The shadow/Dent of the cover screw can be seen underneath the healed mucosal tissue



Fig. 11: Healing abutment was placed to aid in the initial mucosal tissue healing



Fig. 12: Healing abutment is removed to evaluate the mucosal tissue collar around the implant crest



Fig. 13: Straumann impression coping, closed window technique, was used to capture the final impression.



Fig. 14: The Loxim creating a 40-45-degree angle. Ideally it needs to be either facing buccally or lingually.



Fig. 15: Temporary metal cylinder abutment was placed and used as a base for the temporary implant crown





Fig. 16: ISTC placed on the stone cast was fabricated chair side.



Fig. 17



Fig. 18: Screw retained ISTC - the access opening is sealed using cotton pellet to fill the access canal and macrofilled composite



Fig. 19: Nice mucosal tissue band healing round the ISTC - although a black triangle can be seen in this photograph.



Fig. 20: Anterior photograph view of the ISTC in site # 11.

It uses the principal of metal detection to detect the location of an implant alloy. However, this will not be needed in this case as the position is clearly visible<sup>13</sup>.

Photographs obtained during the implant placement surgery can be highly beneficial as they can be used later as a reference to the position of the implant.

A second stage surgery was done to uncover the implant and a healing abutment diameter: 4.5 mm, H 4 mm was placed to help the gingival and mucosal tissue to heal and mature (Fig 11).

Closed tray technique was used to take the final impression using a custom tray and bone level impression coping. Note that the impression coping needs to be facing either buccally or lingually. In other words, the Loxim - the term Straumann uses - needs to be facing either buccally or lingually as mentioned to facilitate an easier engaging hex system in the case of a single implant crown or even a implant supported fixed partial denture. In this case, however, that was not followed, hence the 40-degree angle that can be seen on the impression coping closed tray system (Fig 14).

The temporary solution was discussed with the patient which includes an implant supported temporary crown to form a nice emergence profile and to establish mature gingival bands around the abutment collar and crown. The patient accepted the temporary solution after discussing the finances and the esthetic advantages that the implant supported temporary crown can provide.

A regular crossfit (RC) Straumann temporary abutment was used as a base for the temporary implant crown and the abutment was modified to fit within the vertical dimension requirements for the patient.

An index of a proposed crown shape was used to form the temporary crown which was done chairside, using (3M ESPE Protemp Plus). Then the crestal segment was filled and formed using the flowable composite material. It is crucial to produce a smooth finish of the temporary, as gingival and mucosal tissue loves the smooth surface, it is proven that non-porous smooth surface produce better result in soft tissue healing and response<sup>10</sup>.

The implant supported temporary crown (ISTC) was inserted and torqued to 20 NCM. It is notable that the incisal notch extends from the lingual surface to the labial surface (Fig 16, 17). This represents



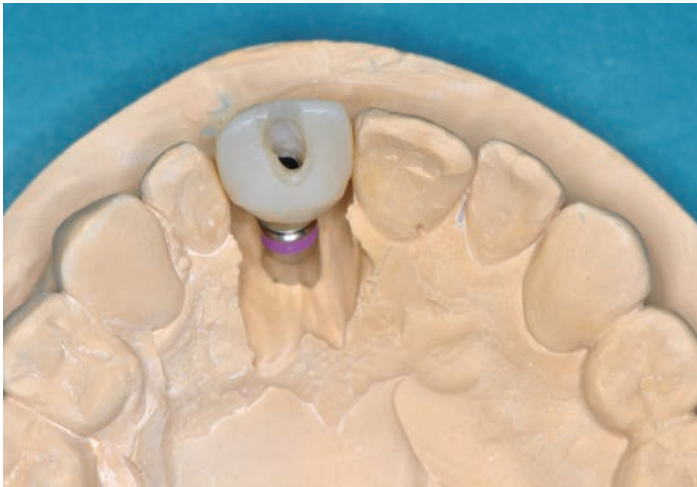


Fig. 21: The patient returned for secondary final impression to capture the desired healed soft tissue surface topography.

the access opening extension. It was later filled with a cotton pellet and macro filled composite material to restore the incisal segment and eliminate the dent (Fig 18, 19).

The patient had the ISTC for 3 months to allow enough time to achieve optimal mucosal and gingival healing and maturation and to achieve the desired emergence profile<sup>4,5,6,7,8,9</sup>.

The ISTC was placed on the primary master cast then a PVS material (Coltene Jet Bite Polyvinylsiloxane) was used to capture the surface topography of the crestal and the apical portion of the temporary crown. Afterwards, the ISTC was removed from the primary master cast and replaced with closed tray impression coping (Fig 23). A flowable composite material (3M Filtek Supreme Flowable Restorative) was used to capture the intaglio soft tissue details from the PVS material rendering the impression coping and the flowable composite addition as one unit (Fig 21, 22).

The “contoured” impression coping was inserted in the patient’s mouth and a final impression, using medium and light flow PVS material (Flexitime light flow and medium flow, was used to take the secondary final impression using a custom tray (Fig 25).

The final impression was poured, and it produced the secondary master cast, out of which, the lab made the final prosthesis; a cement retained zirconia supported implant crown (Fig 28).

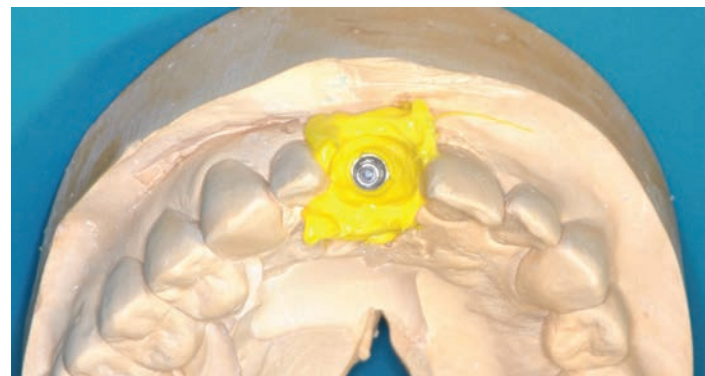
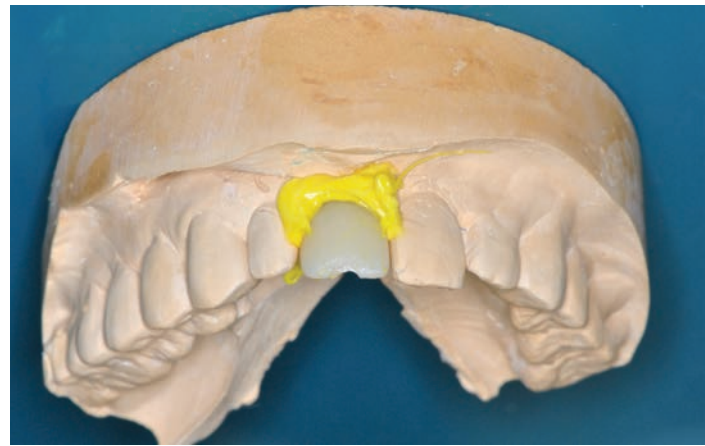
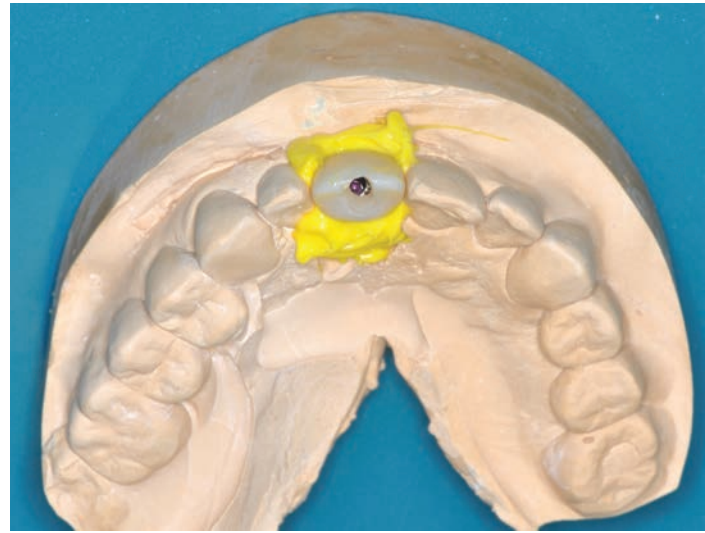


Fig. 22: PVS material was used to capture the intaglio impression that represents the soft tissue surface healed topography



Fig. 23: Impression coping is placed in the secondary master cast prior the addition of flowable composite



Fig. 24: Flowable composite material was added to capture the negative impression of the soft tissue surface topography





Fig. 25: The impression coping along with cured flowable composite as a single unit inserted on site 11 prior the secondary final impression

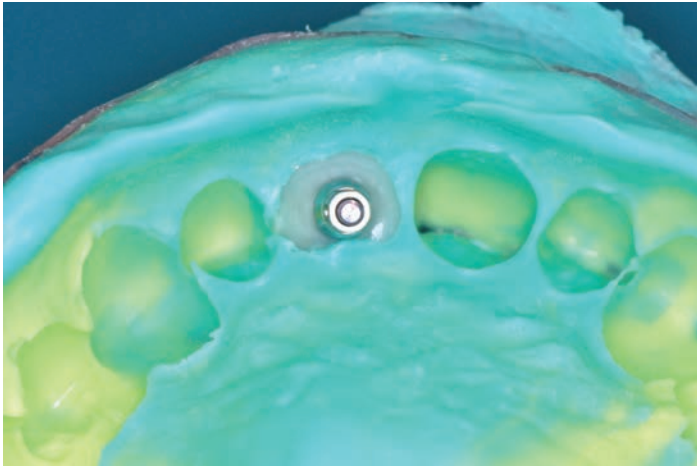


Fig. 26: Secondary final impression was taken using light and medium polyvinylsiloxane impression material



Fig. 27: Insertion Jig with palatal wings in place with black marker indicating the facial orientation



Fig. 28: Implant cement retained crown was cemented in place on site # 11



Fig. 29: Anterior photograph showing the patient smile view



Fig. 30: Final #11 cement retained implant crown insert; black triangle is eliminated. Patient was satisfied with the result.



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Insertion Jig or index was used to guide the zirconia abutment into the implant, then the abutment's access opening was sealed using yellow PVS and finally composite (Fig 27, 28). It is crucial to add that polytetrafluoroethylene (PTFE) tape is sometimes used by the clinician to fill the canal of the access opening 11.

The crown was cemented using Panavia cement system, occlusion was adjusted, and the crown was polished using a Zirconia finishing set. ■

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Dr. Sharkas completed the Prosthodontics Fellowship Program in 2006 at the University of Illinois at Chicago (UIC). He then attended the University of Pittsburgh, School of Dental Medicine and UPMC for the residency program in Prosthodontics. He is Board Certified by the Royal College of Dental Surgeons of Canada and teaches Prosthodontics at Western University.

