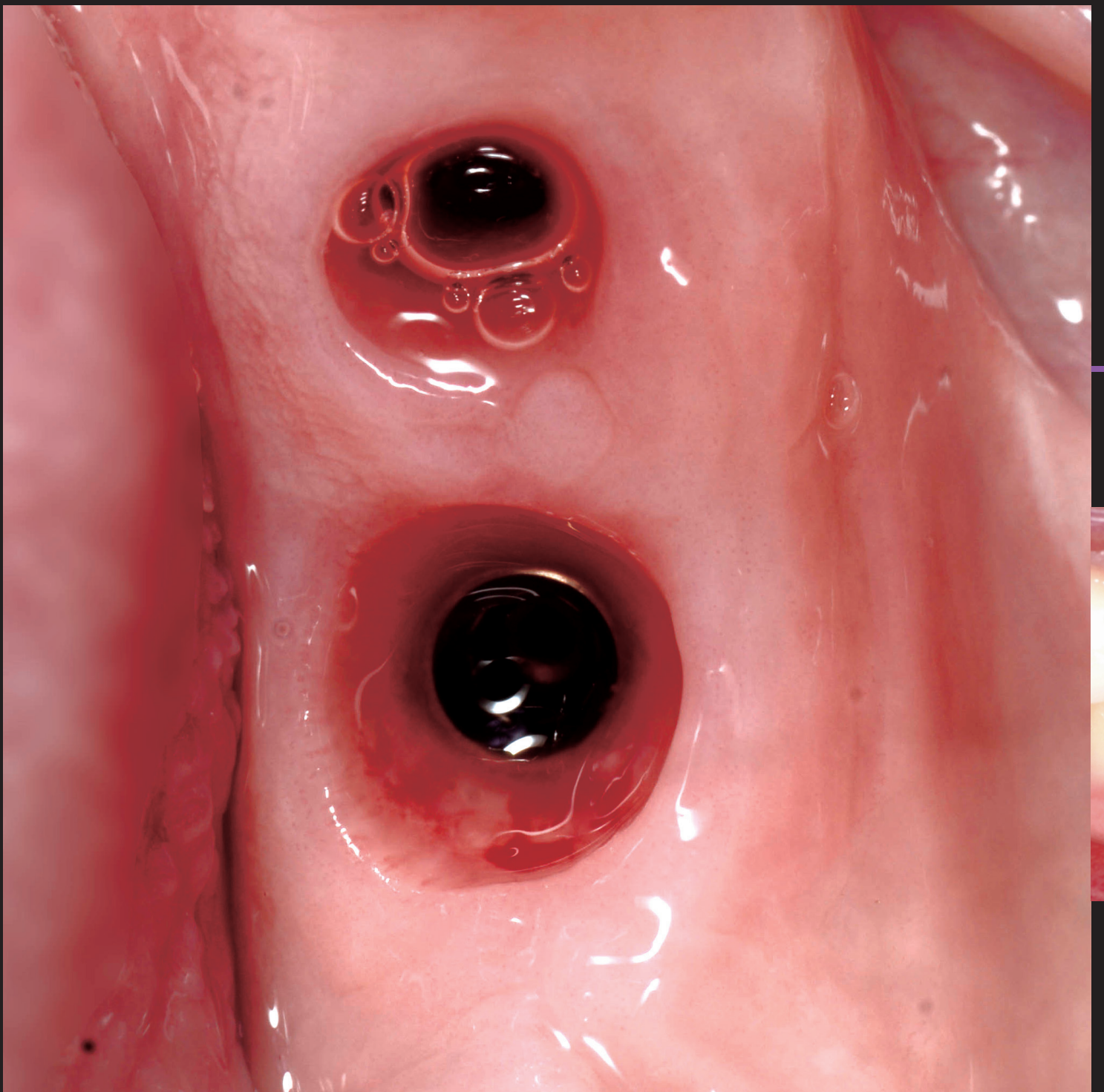


Dentistry in *Ritardando*: Back to Fundamentals

Case review of a staged approach to replace #35,36

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INTRODUCTION

As our world becomes more modernized, the pace of life has changed drastically. Everything moves quicker and faster. Amazon can now deliver products to us the very same day we place an order; McDonalds can cook up a meal within mere minutes; and Netflix can deliver movies to our screens instantaneously. Similarly, implant dentistry is becoming quicker and faster as more talented clinicians find novel approaches to combine multiple procedures in a single surgery - for example, teeth-in-a-day. Novice clinicians, enticed by the “glamor and convenience” of these multifaceted single-visit approaches, often jump right into these procedures - all the while, failing to realize the many pitfalls of such undertakings. They often overlook the myriads of fundamental principles that must be understood, respected, and adhered to. As a result, clinicians often find themselves perplexed and frustrated by their treatment outcomes and regretfully realize how a ‘simple’ surgery can transform into a rather complex one.

In this case review, I share a staged approach undertaken to replace teeth #35 and 36 (#19, 20). For each stage, I will discuss the fundamental surgical principles necessary to create a successful outcome in each step. This case could have been performed in a single surgery, but the fundamentals cannot be ignored and must be applied regardless.

“Simplicity is the ultimate sophistication”. - DaVinci



Fig. 1&2: Pre-op situation with lower left 1st molar (#36) previously extracted. Note the resorbed ridge both horizontally and vertically.

Pre-Op

A 49-year-old female patient (ASA2) had localized periodontitis around teeth #35 & 36. Due to severe mobility and pain, #36 had previously been extracted. Not long afterwards, #35 became mobile, creating even more problems in her masticatory ability. Replacement of #35 & 36 was deemed necessary to return the patient to a normal masticatory function. A treatment plan of dental implants was developed using a staged approach due to concerns about her history of localized periodontal disease. Periodontitis patients are known to have an increased risk of implant complications.^{1,2} By dividing the treatment into multiple stages, the surgical risks are minimized.

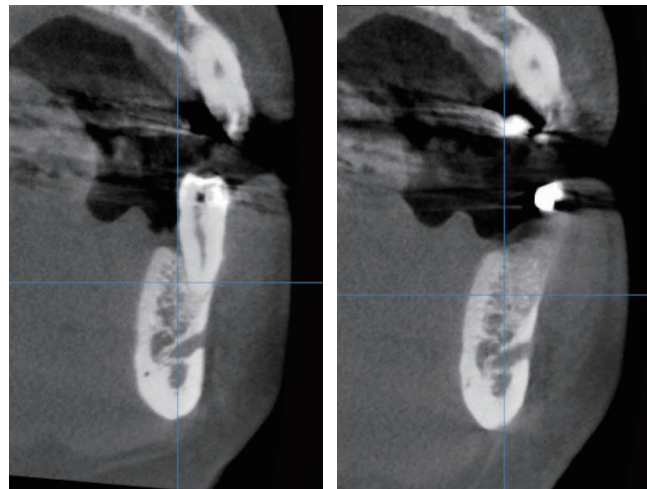


Fig. 3: Pre-operative CBCT scan (sectional slices) of site #35 and 36

Stage 1: Extraction & Guided Bone Regeneration

Due to the prior extraction of #36, the residual ridge had resulted with a less-than-ideal volume. (Figs.1,2,3) Without reconstructing the alveolar ridge, the implants would be lingually positioned, creating an unnecessary cantilever force in the buccal direction. Thus, guided bone regeneration (GBR) was deemed necessary to rebuild the ridge in order to place the implants in prosthetically-ideal positions.

When performing any GBR - whether small or large - the 'PASS' principles, described by Dr. Homlay et al., must be applied.³ PASS is an acronym for four biological principles necessary for predictable bone grafting: Primary closure, Angiogenesis, Space maintenance, and Stability of the graft. All these conditions must be achieved when performing any bone grafting procedures to yield the most optimal outcome.

Once the patient was profoundly anesthetized, #35 was first extracted using forceps. This was achieved effortlessly due to its existing mobility. The socket was then curetted thoroughly to denude any remnant tissue. A full thickness flap was made with a mid-crestal incision, exposing the #35 socket and the resorbed ridge. (Fig. 4) Vertical releasing incisions were then created at mesial line angles of both #34 and 37 to facilitate a tension-free final closure.

Before applying the graft, a periosteal-releasing incision was created at the bottom of the flap when the visibility was unlimited. This release must be sufficient to allow *primary closure* of the surgical site.

Sticky bone was created by mixing PRF and 50:50 cortico-cancellous allograft (OraGraft, LifeNet). Although the use of sticky bone is not mandatory, it has been documented to enhance *angiogenesis* within the graft, thereby accelerating the wound healing and minimizing the bone loss. Also, its physical properties provide additional *stability* to the graft due to its coagulatory nature.⁴

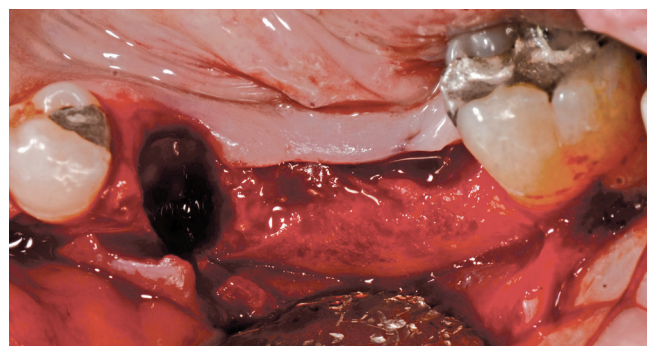


Fig. 4: After extracting #35, a full-thickness flap is reflected revealing the resorbed ridge

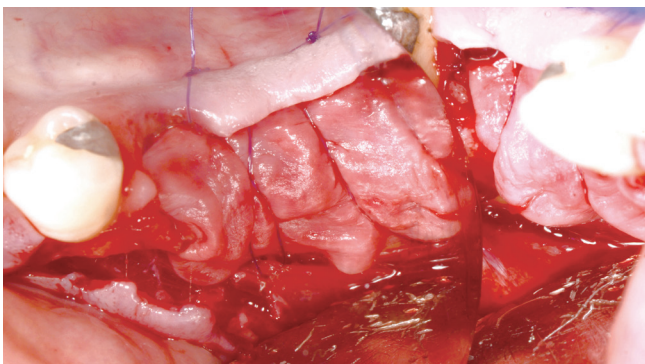


Fig. 5: Collagen membrane is placed and held by membrane-stabilizing sutures.

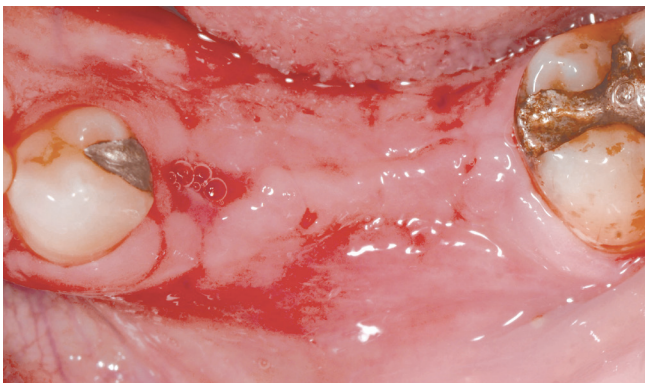
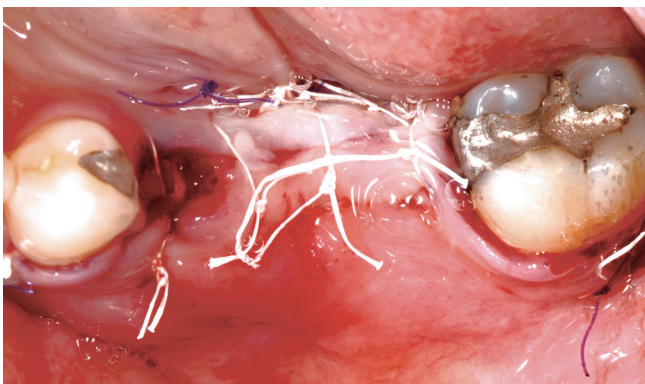


Fig. 6 & 7: Primary closure over graft, allowing fast healing at 2 weeks post-op.

The graft was placed on the ridge and contoured to fit within the graft envelope. It was also packed within the extraction socket of #35. Once the desired bone graft volume was reached, a collagen membrane (Creos, Nobel Biocare) was draped over the graft and the socket. This membrane provided the necessary *stability* and *space maintenance* to protect the graft from being disturbed and infiltrated by unwanted soft tissue cells. Membrane-stabilizing sutures were placed using Glycolon 5-0 resorbable sutures (Resorba), further stabilizing the membrane and the graft.⁵ (Fig. 5)

The previously-released flap was advanced over the graft to achieve *primary closure*. Any tension in the flap can risk premature opening of the incision line. Using a combination of Glycolon 5-0 (Resorba) and PTFE 4-0 (Cytoplast), the buccal and lingual flaps were re-approximated to create an everted flap margin to achieve a highly vascular suture site (periosteum to periosteum union), which results in rapid soft tissue healing.⁶ The vertical incisions were then closed with simple interrupted sutures. (Fig. 6)

A photo taken at a 2-week post-op visit revealed a nicely closed incision line, (Fig. 7) and well-secured bone graft that would mature over the next 4 months.

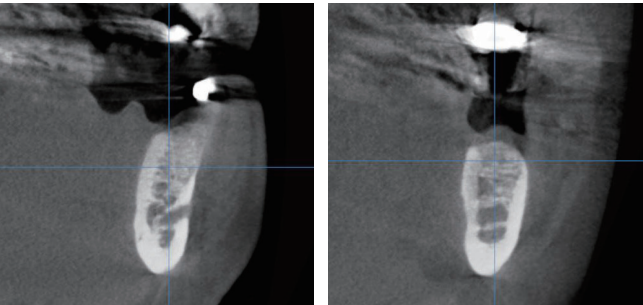


Fig. 8: 4 months post-GBR CBCT

Stage 2: Implant placement and Buccal Veneer Graft

After 4 months of healing, the bone graft was mature, and fixture placement could be planned. But due to the previous GBR surgery, the attached gingiva was positioned coronally.⁶ (Figs. 8,9) Therefore, apical repositioning of the flap was planned to regain an attached gingival cuff of tissue around the implants.

This time, instead of a mid-crestal incision, a lingualized incision was made to enable apical positioning of the keratinized gingiva on the buccal side of the implant fixtures. A full-thickness flap was reflected and revealed a thickened ridge with mature bone. Yet, slight buccal resorption was observed at #35. (Fig. 10)

Two implant fixtures (4.4 x 8.5mm and 4.8 x 8.5mm BlueDiamond, MegaGen) were placed within the healed ridge at #35 and 36, respectively.

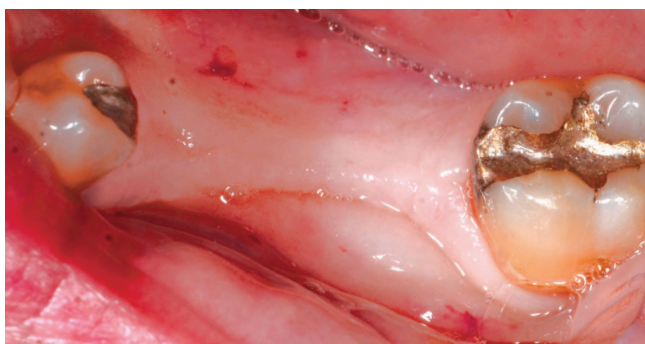


Fig. 9: 4 months post-GBR; note coronal location of attached gingiva.

Both implants achieved 45+NCm of insertion torque without any issue. Plus, an ISQ of 75/78 and 78/78 was recorded for #35 and 36, respectively.

At the time of surgery, it was decided to simultaneously augment the small concavity at #35. Unlike the previous traditional GBR approach, periosteum guided bone regeneration (PGBR) was utilized.⁷

The inner layer of the periosteum is known to contain an abundance of osteoblasts and osteoprogenitor cells. As such, it serves as a potent osteogenic layer. PGBR was developed using this fact, where an intact periosteum serves as nature's membrane. Therefore, when performing PGBR, no collagen membrane is required, as a collagen membrane may impede the osteogenic potential in the periosteum from being fully expressed.⁷

At the buccal concavity of #35, sticky bone with 50:50 cortico-cancellous allograft (Oragraft, LifeNet) was placed and contoured.⁴ (Fig. 11)

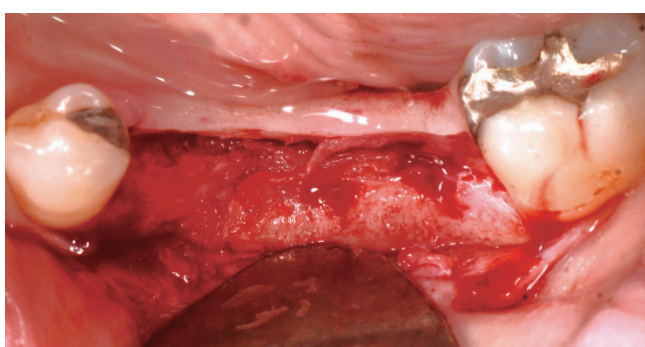


Fig. 10: Mature bone; note small buccal concavity at #35 (add arrow)

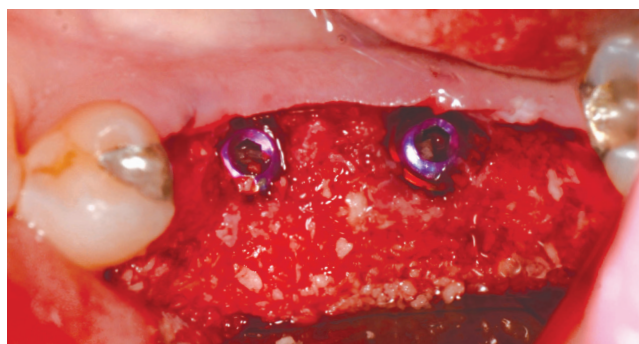
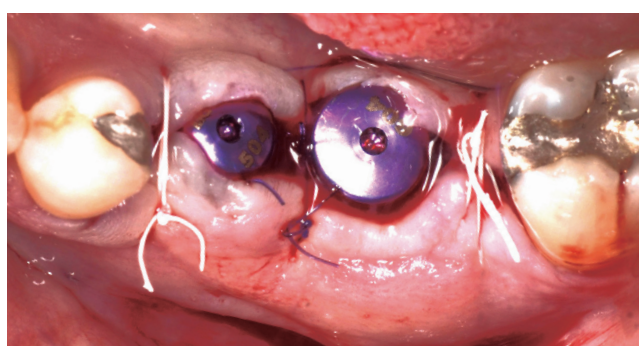


Fig. 11: Fixture placements and PBGR with sticky bone



Figs. 12 & 13: Immediate and 2 weeks post-op showing bucco-apical positioning of keratinized gingiva

The flap was re-approximated over the graft and sutured around the healing abutments (5 x 4mm, 6 x 4mm) using the same combination of Glycolon 5-0 (Resorba) and PTFE 4-0 (Cytoplast) sutures, ensuring bucco-apical positioning of the keratinized gingiva with respect to the fixtures. (Fig. 12)

A follow-up visit was conducted at two-weeks post-op. Despite a slight lack of oral hygiene, the surgical site demonstrated adequate healing. And, more importantly, a sufficient width of attached gingiva was attained around the implants. (Fig. 13)

Stage 3: Final Prosthetic

After another 4 months, the patient was recalled to evaluate the implants prior to the prosthetic phase. When compared to the initial stage, the site had drastically improved. The concavity of the alveolar ridge had disappeared, and a sufficiently thick band of keratinized gingiva was available around the implants. (Fig. 14)

Removal of the healing abutments revealed healthy gingival collars around the implant fixtures. (cover image) ISQ measurements were recorded at 82/82 and 76/80 for #35 and 36, respectively.

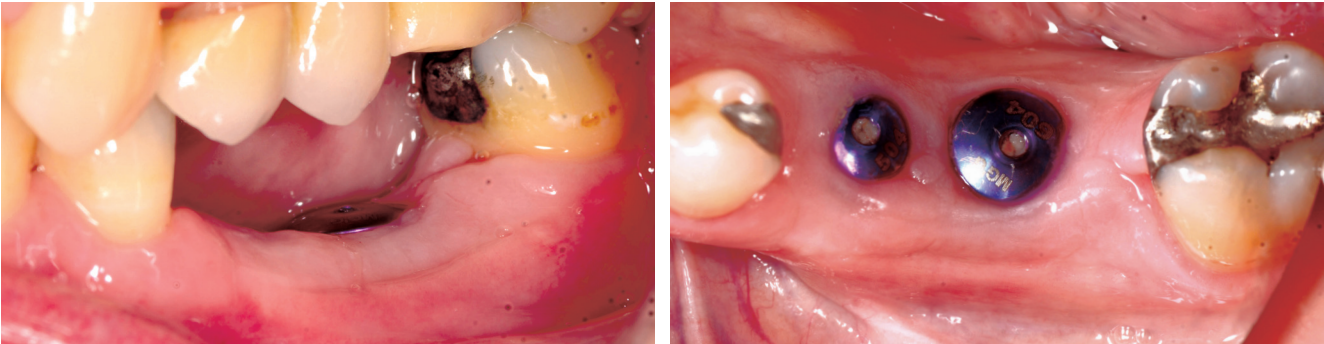


Fig. 14: 4 months post-op reveals healthy gingival cuff around healing abutments and improvements in ridge topography

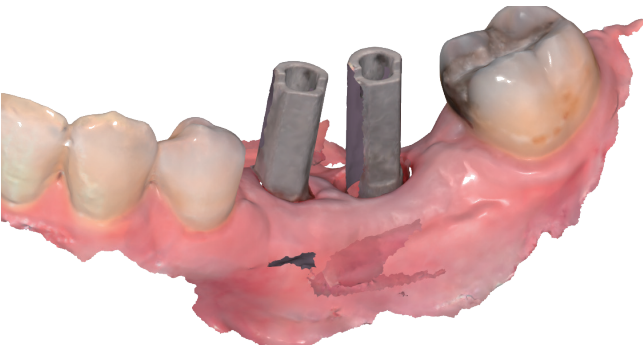


Fig. 15: Intraoral scanning of implant scan bodies using Medit i500



Fig. 17: Final prosthesis delivery



Fig. 16: Zirconia crowns cemented on anodized titanium custom abutments

A digital intraoral scan was completed (Fig. 15) and sent to a dental lab where the definitive prostheses were fabricated using zirconia crowns and anodized titanium custom abutments. (Fig. 16) These screw-retained crowns were inserted at 35Ncm as per the manufacturer's recommendation. This restored the patient's masticatory function and her primary concern. (Figs. 17,18)

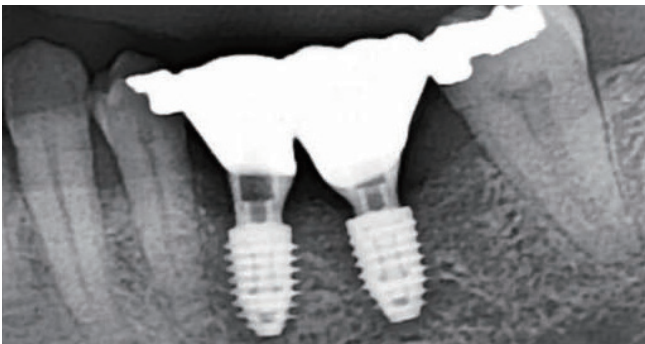


Fig. 18: Panoramic x-ray of final prosthesis

CONCLUSION

It took a total of 10 months to complete the treatment - from the initial consultation to the delivery of the final prostheses. In this modern world of haste, it certainly feels like an eternity to wait 10 months for a final result to be delivered. Despite the long wait, I firmly believe that outstanding results (Fig. 19) were achieved because the correct surgical principles were applied at each stage of the treatment.

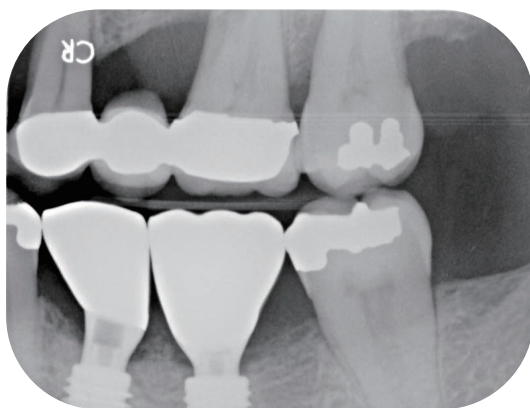


Fig. 19: 1 year post-insertion BW reveals well maintained bone level around the implants

It is possible that a talented surgeon could perform this same case in a single surgery. But the fundamental principles described in this article do not change whether the surgical steps are performed in stages or all-at-once.

As shown in this case review, I firmly believe that implantologists should never take short-cuts for the sake of saving time, but follow the necessary principles in order to achieve exceptional outcomes for our patients.

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