12.5 Late Presentation of Peri-implant Mucositis Requiring Soft-Tissue Augmentation and Esthetic Crown Lengthening at Implant Site 11

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Biological or technical complications around implant-supported prostheses place a significant burden on patients as well as the surgical and restorative team. Inflammation of the peri-implant soft tissues is often the first sign that something has gone awry. While there is never a good time for a complication, late presentation of inflammation in the soft tissues around a long-standing prosthesis triggers a period of research and review of the case in order to ascertain the treatment history and its possible contribution to the etiology of the situation. This becomes more complicated in situations where a patient has not received regular maintenance and clinical/radiographical examinations due to personal, financial, or professional reasons. When the complication occurs in the esthetic zone, the complexity of the situation expands exponentially, as the only acceptable outcome in the patient's eyes will be the maintenance of the esthetics of the prosthesis.

A diagnosis of peri-implant mucositis implies that the presenting inflammation is confined to the soft tissues, with evident bleeding on gentle probing, and has not resulted in the loss of supporting bone, as evidenced by the use of periapical, bitewing, or computed tomography radiological studies (Zitzmann and Berglundh 2008). Nevertheless, the resolution of peri-implant soft-tissue inflammation may result in unintended changes to the soft-tissue volume, position, and overall esthetic appearance following "successful" treatment (Renvert et al 2008).

The present case demonstrates the treatment of peri-implant mucositis caused by retained cement on a single-tooth implant-supported crown, followed by periodontal plastic surgery procedures and the provision of a new restoration to recreate the desired esthetic outcome.

Presenting complaint

A 38-year-old healthy Hispanic female patient was referred for evaluation and treatment of her fractured tooth 11, requiring extraction and replacement with an implant. A tissue-level implant (RN TE SLActive, diameter 4.1 mm, length 14 mm, Institut Straumann AG, Basel, Switzerland) was placed at the time of extraction, with simultaneous guided bone regeneration (GBR) consisting of autologous bone chips harvested from the surgical site, followed by demineralized bovine bone mineral (DBBM) and a dual layer of non-crosslinked porcine collagen membranes (Bio-Gide; Geistlich, Wolhusen, Switzerland). A periapical radiograph taken immediately after surgery documented the final implant position (Fig 1).

Following uneventful healing, the restorative process was completed with a customized zirconia abutment and cement-retained metal-ceramic crown (Maxcem, Kerr Dental). The result is pictured 14 months after surgery (Fig 2). A radiograph taken at the 14-month appointment revealed no significant findings, especially no visible retained cement at the crown margins (Fig 3).

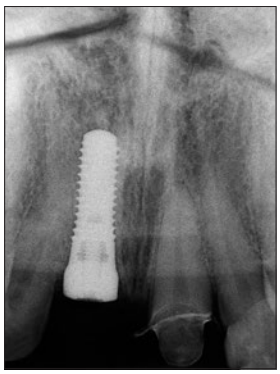
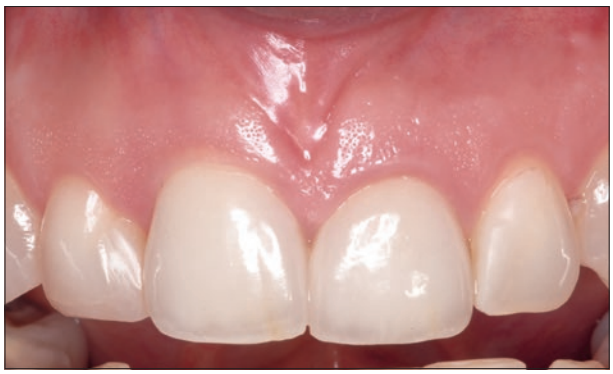
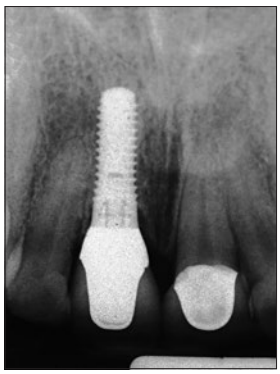
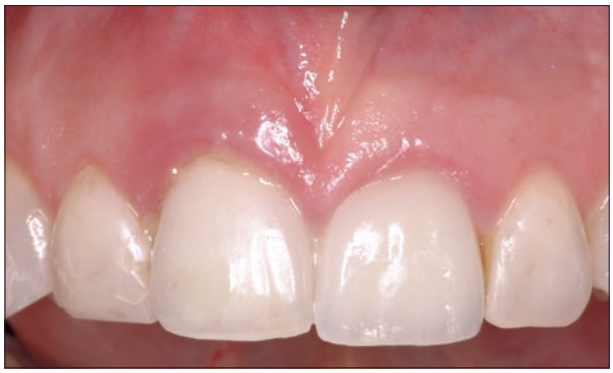


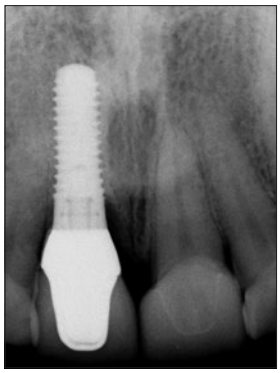
Fig 1 Periapical radiograph. Implant position on the day of the surgery.





Figs 2 and 3 Result at 14 months with corresponding radiograph, showing no retained cement.





Figs 4 and 5 Clinical photograph and periapical radiograph four years later demonstrating peri-implant inflammation and retained film of cement on the distal aspect of implant crown 11.

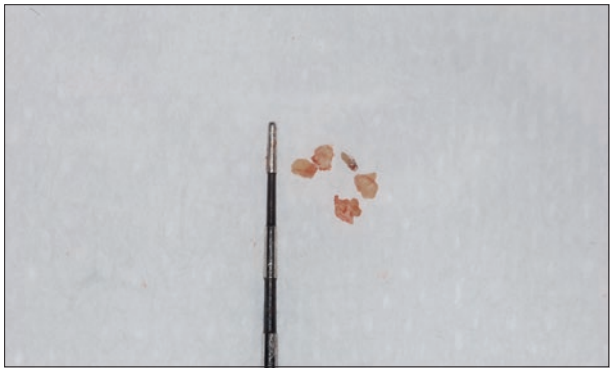


Fig 6 Cement particles removed from implant 11.

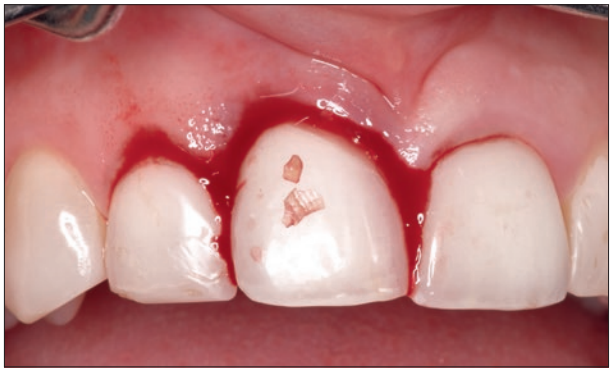


Fig 7 Removal of retained cement particles during the second SRP appointment four weeks later.

Four years later, the patient presented with mucosal swelling, bleeding on probing, suppuration, and discomfort associated with implant crown 11 (Fig 4). A new radiograph was revealed a thin film of a material suggestive of retained submucosal cement, but no apparent loss of supporting bone (Fig 5). Upon inquiry, the patient recalled the crown loosening a couple of years previously and seeing a different dentist to recement the crown. She was unable to recall which dentist recemented the crown, nor the type of cement utilized.

The same day, the area was carefully scaled under local anesthesia, resulting in removal of the particles shown in Figure 6.

Inflammation and bleeding on probing persisted four weeks later. so additional scaling and root planing (SRP) was performed under anesthesia, resulting in the removal of additional cement particles (Fig 7).

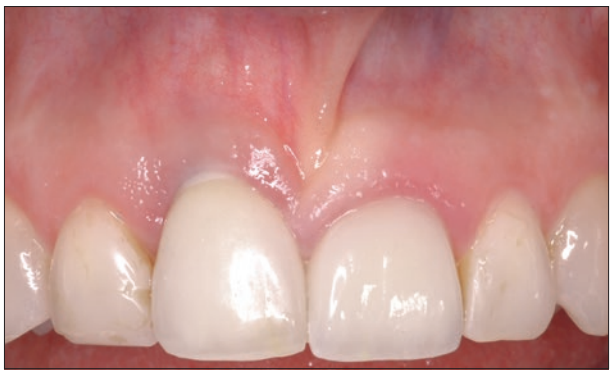


Fig 8 Clinical result following the non-surgical removal of cement fragments. There is 1 mm of exposure of the custom zirconia abutment.

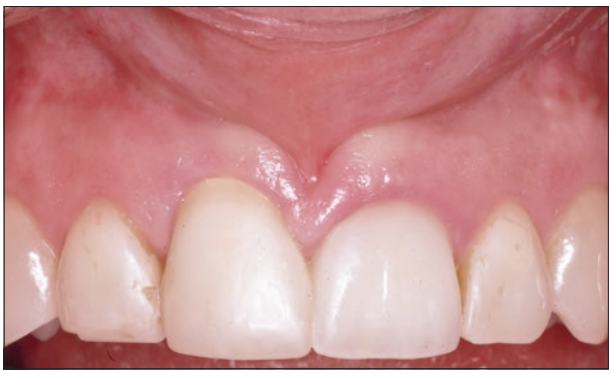


Fig 9 Implant 11 with new acrylic provisional restoration.

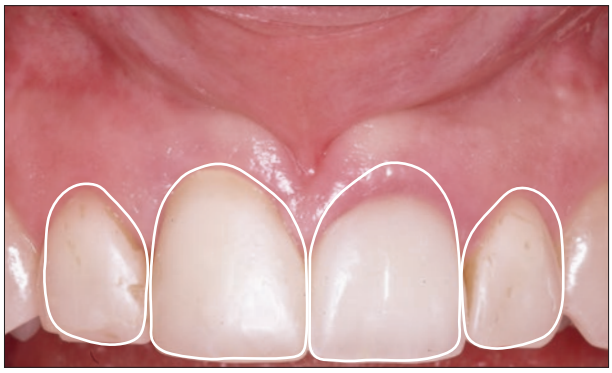


Fig 10 Illustration of proposed surgical and restorative plan.

Re-evaluation four weeks later resulted in resolution of the inflammation and discomfort, but at the same time the mucosal margin had receded, exposing 1 mm of the implant abutment (Fig 8). Although the patient was happy to no longer be in pain, she was not satisfied with the esthetics of the restoration as a result of treatment and requested help in correcting the situation.

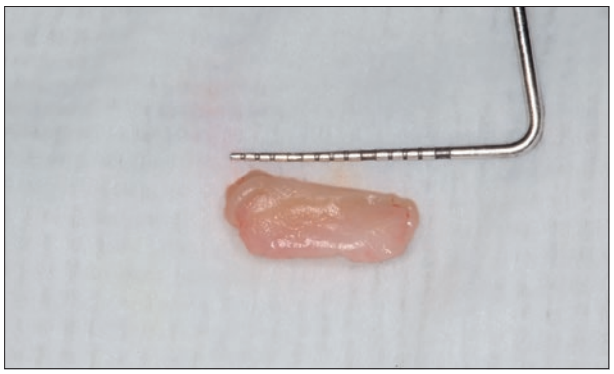
Treatment

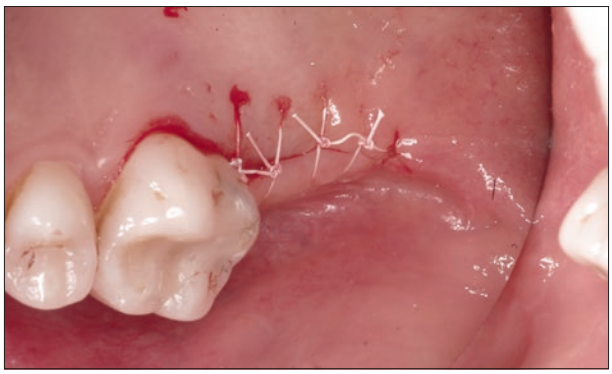
The treating dentist (JG) removed the implant abutment and crown and placed a modified PEEK RN synOcta Temporary Meso abutment (Institut Straumann AG) and a new cement retained bis-GMA provisional (Integrity; Kerr Dental, Brea, CA, USA), secured with Temp Bond (Kerr Dental) that would position the cement line at or near tissue level and allow for simpler removal and recontouring of the crown during later surgical procedures (Fig 9).

The periodontal surgical plan included an autologous connective-tissue graft at site 11 to thicken and coronally reposition the mucosal margin, as well as crown lengthening to apically reposition the tissue at site 21, followed by new restorations at 11 and 21 (Fig 10).

Connective tissue was harvested from the tuberosity region distal to 27 and the donor site was sutured with nPTFE monofilament sutures (Cytoplast, Osteogenics, Lubbock, Texas, USA) (Figs 11 and 12).

This technique has been previously documented and discussed in the *ITI Treatment Guide*, Volume 12, Chapter 6.8. Briefly, the tuberosity region distal to the maxillary second molars is the most common secondary donor site from which to harvest autogenous tissue (Studer and coworkers 1997). At sites such as the one presented here, where only limited amounts of tissue are required, the





Figs 11 and 12 Connective tissue harvested from tuberosity area distal to tooth 27.

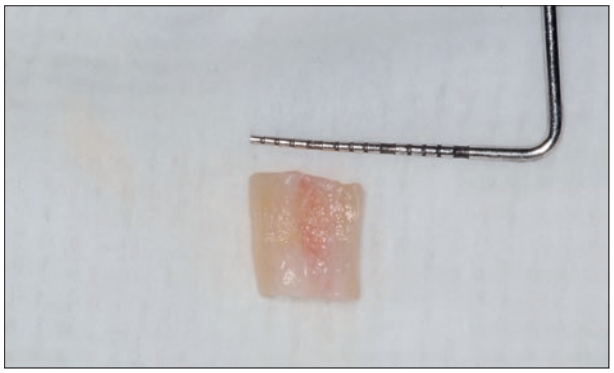


Fig 13 Harvested tissue following "butterfly" modification to obtain the desired dimensions.

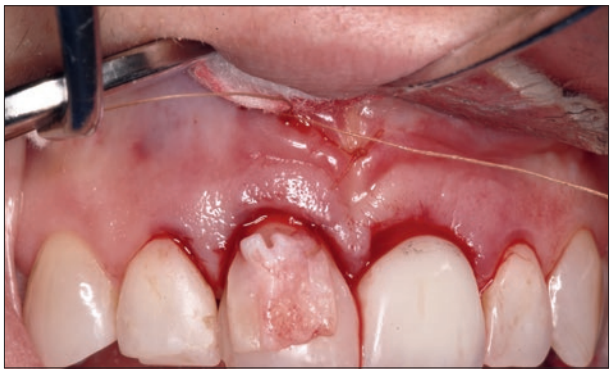


Fig 14 Soft-tissue graft in the prepared soft-tissue pouch at site 11.

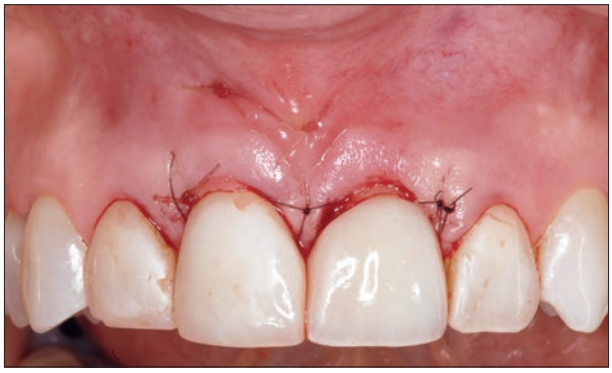


Fig 15 Completed closure of the surgical site.

tuberosity region should be considered as a first option for either teeth or implants, given its advantages over palatal tissue. These advantages include the increased density of the tissue (increased lamina propria vs. submucosa compared to palatal grafts), its remote location away from the tongue, increased stability around implants over palatal grafts, and reported lower morbidity and pain (Rojo and coworkers 2018; Sanz-M and coworkers 2018; Rojo and coworkers 2020; Amin and coworkers 2018; Godat and coworkers 2018).

The harvested tissue was carefully modified to the desired dimensions using a "butterfly" modification where the tissue was carefully split with a fresh #15 blade (Fig 13).

The recipient site 11 was prepared by tunneling under the native tissue, being careful to not sever the interdental papillae. The soft-tissue graft was introduced into the recipient site using 5-0 chromic gut suture (Ethicon, Somerville, NJ, USA) via a horizontal mattress suture technique. Ostectomy and osteoplasty procedures on tooth 21 were performed through the tunneled tissue (Fig 14).

The tissue was further secured with 6-0 nylon monofilament (Ethilon; Ethicon) sling sutures (Fig 15).

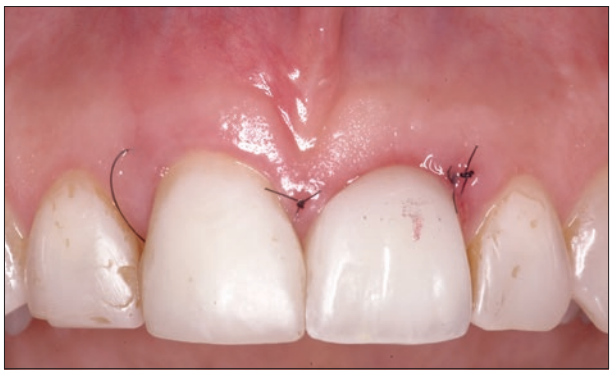


Fig 16 Uneventful healing at two weeks.

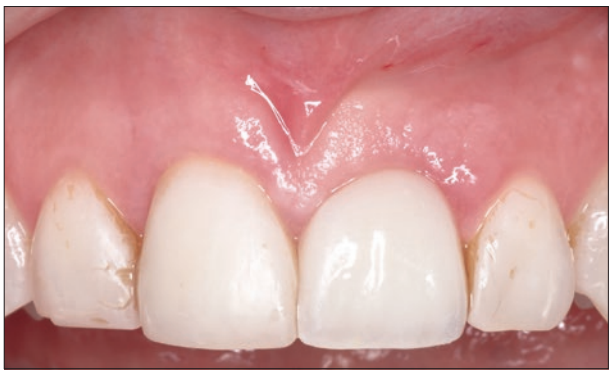


Fig 17 Two-month postoperative tissue regrowth at tooth 21.

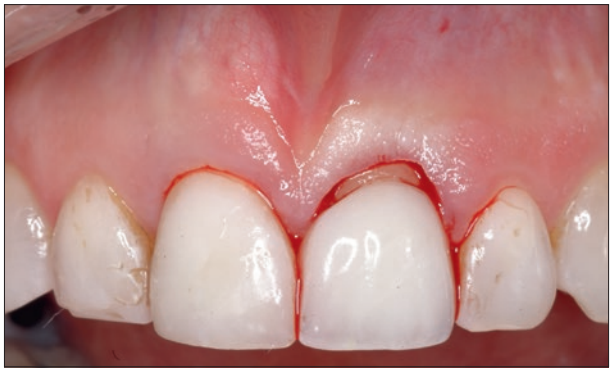


Fig 18 Gingivectomy performed to re-establish ideal contours at site 21.

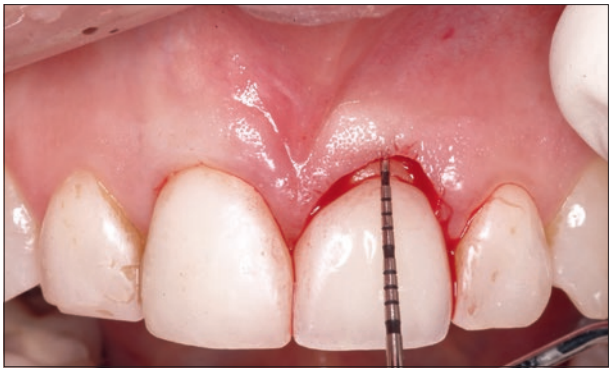


Fig 19 The probe demonstrates proper supracrestal gingival attachment (biologic width).

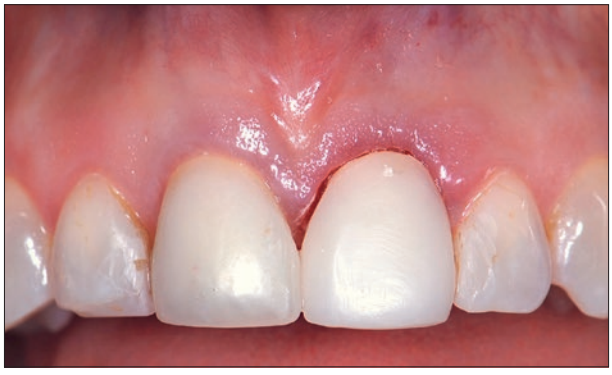


Fig 20 Immediate provisionalization of tooth 21 is complete.

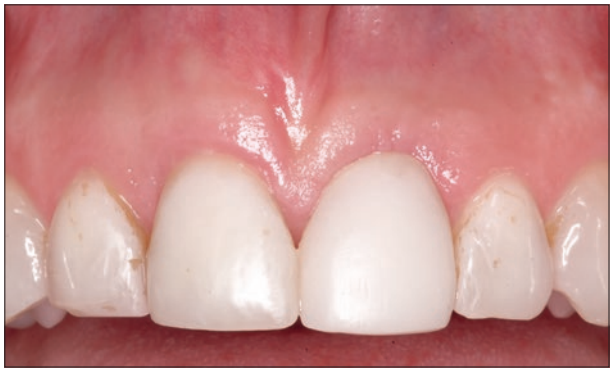


Fig 21 Two weeks after the gingivectomy.

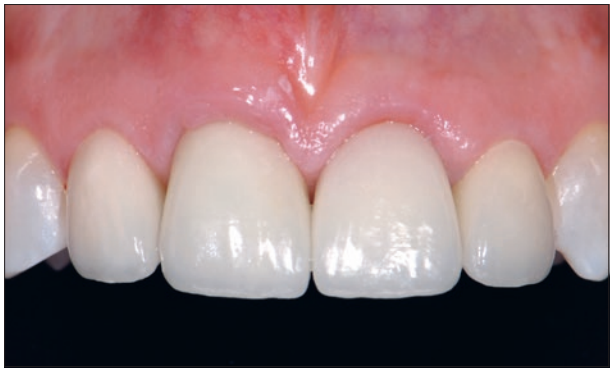
The two-week follow-up photograph showed an uneventful healing response (Fig 16). However, the tissue at tooth 21 had already migrated coronally into the space apical to the crown margin.

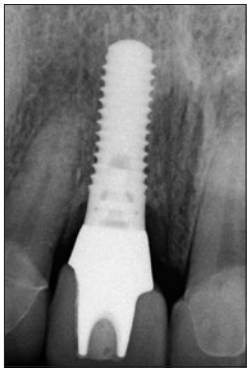
At two months, the tissue margins were still uneven, so it was decided to coordinate a gingivectomy to remove the excess tissue and adjust the provisional crown margin to support the tissues at the desired position (Fig 17).

The gingivectomy was completed with an internally beveled incision and the supracrestal gingival attachment confirmed prior to releasing the patient for immediate provisionalization (Figs 18 and 19)

Tooth 21 was provisionalized to the desired gingival margin position the day of the gingivectomy, providing ideal support to the tissues during the healing phase (Fig 20).

Two weeks after the gingivectomy the desired symmetry of the gingival margin was accomplished (Fig 21).





Figs 22 and 23 Delivery of the final restorations, with periapical radiograph confirming the absence of retained subgingival and submucosal cement.

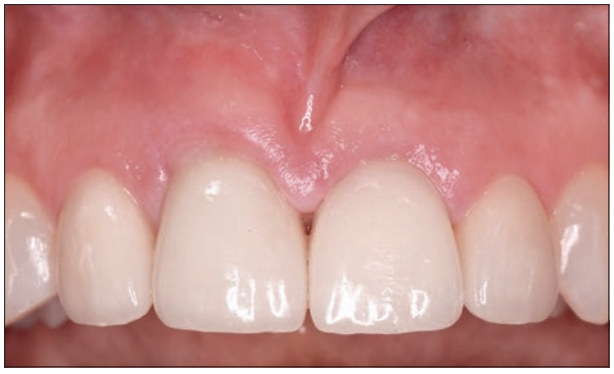


Fig 24 Two months after delivery, the patient was concerned with the space between 11 and 21.

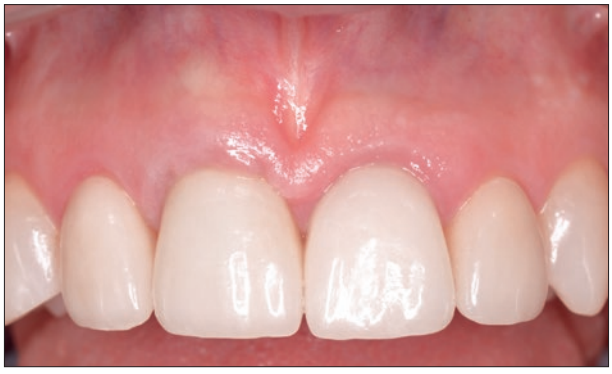


Fig 25 Complete papillary fill-in at one year.

Six months later, the final lithium disilicate restorations (Emax, Amherst, NY, USA) were delivered via careful cementation (Maxcem; Kerr Dental) using a customized zirconia abutment, raising the cement lines to an accessible position. A periapical radiograph was taken to confirm that no residual cement was present subgingivally or submucosally (Figs 22 and 23).

Follow-up

Two months later, the patient returned for a consultation because she was dissatisfied with the blunted interdental papilla between crown 11 and tooth 21 (Fig 24). The patient was reassured that the crown contours and distance between the contact point and the interdental bone were ideal for complete papilla fill (< 5 mm) and that it was only a matter of time before the papilla would fill the space (Tarnow and coworkers 1992).

One year later, the interdental papilla had indeed completely filled the interdental space (Fig 25).

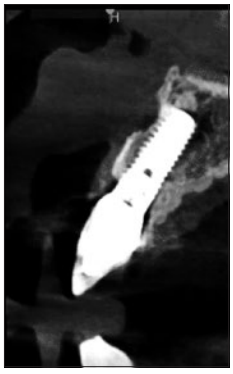


Fig 26 CBCT scan at six years. Long-term stability of the buccal plate.

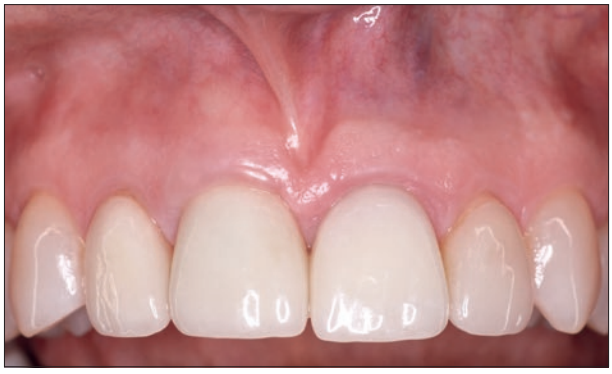


Fig 27 Retracted anterior view at six years (thirteen years after the original implant placement).

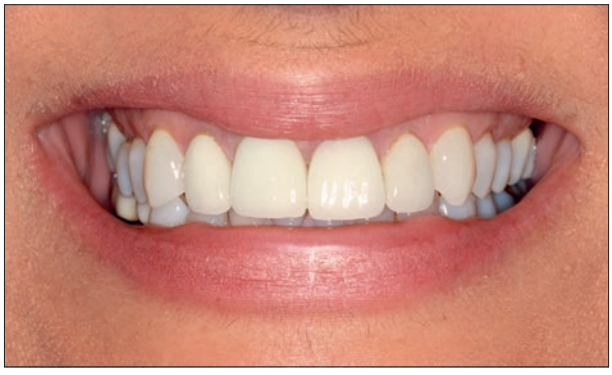


Fig 28 The patient's smile at six years.

Five years later, the patient was referred for implant treatment at site 45, which allowed for long-term re-evaluation of a cone-beam computed tomography scan of implant 11 six years after it was delivered. The scan demonstrated the presence of stable bone levels, including a stable buccal plate (Fig 26).

In addition, clinical photographs were obtained that documented the maturation and stability of the soft tissues and only minor scarring of the soft-tissue graft at site 11. Overall, the tissues had settled into the desired position, validating the long-term result of the reparative soft-tissue and restorative procedures, with the patient's smile displaying a pleasing, esthetic result (Figs 27 and 28).

Discussion

Treatment of peri-implant inflammation in the esthetic zone, whether limited to the soft tissues as in the present case of peri-implant mucositis or involving the supporting bone (peri-implantitis), can result in unintended or unforeseen esthetic compromises. In the present case, the resolution of the inflammation around implant 11 by multiple rounds of non-surgical SRP to remove retained cement particles resulted in the recession and exposure of the custom zirconia abutment. This triggered a new round of treatment planning and perio-restorative collaboration to attain the desired esthetic result.

Retention of cement submucosally is a concern regardless of depth of margin placement, but the incidence and inability to completely remove retained cement increases with increasing submucosal depth of restorative margin (Linkevicius and coworkers 2013). To further complicate such situations, clinical signs and symptoms of residual cement particles may take several years to develop (Wilson 2009). In this case, the patient presented several years following recementation of the crown after it had dislodged.

The most predictable treatment for any complication is to prevent the complication to begin with. The situation described might have been avoided completely if the implant had been positioned further palatally to facilitate a screw-retained restorative approach. Nevertheless, properly executed cement-retained restorations have a well-documented history of success, as the six-year follow-up of this particular case demonstrates (Wittneben and coworkers 2014). The perio-prosthetic restorative team must evaluate all aspects of each case in order to determine the ideal approach for each patient, with an awareness of the benefits and limitations of each approach.