Management of complications associated with single implants in esthetic zones: a case report

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Abstract: *Problems related to complications associated with dental implants in esthetic zones have become increasingly common in the clinical practice. Among those problems, the most common mistakes include: malposition of the implant, inadequate restoration contour, and lack of adequate treatment planning. The description of the case presented in this article shows a clinical sequence, from surgery to prosthetic procedures, employed to retreat two implants in the anterior maxilla, both of which had been planned and executed incorrectly, causing esthetic and functional discomfort to the patient.* ***Keywords:*** *Dental implants. Esthetic zone. Failures. Complications. Single implant.*

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» Patients displayed in this article previously approved the use of their facial and intraoral photographs.

Introduction

Osseointegration of dental implants no longer represents the absolute success of implant restorations, since patients have increased esthetic and functional demands.[1-4] Currently, the implantodontist serves patients who desire implants to replace missing teeth and also patients who wish to repair functional and/or esthetic failures of previously placed implants.[5] Most complaints concern esthetic failures in anterior dentition that make social interaction difficult and greatly undermine patient's self-esteem.

The desire to create invisible restorations with biomimetic characteristics and a near-natural appearance stimulated researchers and clinicians to establish protocols that favor tissue preservation and peri-implant reconstruction. This is to achieve the ultimate goal of an implant-supported restoration in perfect anatomical and biological integration with the natural hard and soft tissues of the patient.[6]

Since a dental implant is considered the apical extension of a prosthetic restoration, it is clear that the restorative dentist must define the treatment plan and the clinical sequence from the beginning, and surgery should be considered a preprosthetic step. Even after all the recent developments in oral implantology, there are still many clinicians who choose the implant placement technique based mainly on the available bone, which often impairs proper restoration, soft tissue response and biomimetic behavior of the implant and restoration.

The essential steps necessary to achieve a favorable esthetic outcome in Implant Dentistry are the same as those required to solve an esthetic complication. Key elements for invisible implant-supported restorations include: (1) adequate tridimentional position of the implant, which favors correct hard and soft tissue thickness; (2) appropriate peri-implant biological width and the possibility of performing a screwed- or cemented-retained restoration with space for abutment and restorative material; (3) stable prosthetic connection of the implant in order to avoid biomechanical complications and decrease the tendency towards bacterial colonization;[7-12] (4) final prosthetic abutment installed at the time of surgery, and allow the peri-implant tissue to accommodate for at least four months without reconnections;[13-16] (5) use of implants with smaller diameter, whenever possible, to prevent perforation or thinning of the buccal bone,[17,18] keeping a distance of at least 1.5 mm between tooth and implant to maintain the papilla;[19] (6) association of a zirconia abutment with a correctly-designed peri-implant mucosa area, which helps to achieve adequate support for the emergence profile and esthetics.[20]

"The final objective of any rehabilitation with oral implants is a long-lasting, functional and esthetically-pleasing result."

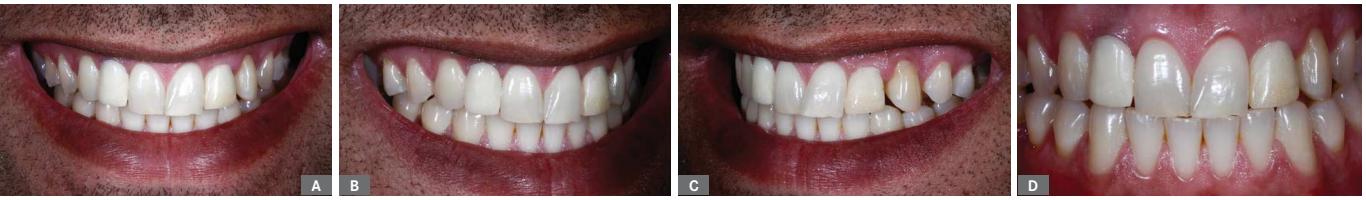


Figure 1: Frontal (**A**) and lateral (**B**, **C**) smile aspects, and intraoral aspect (**D**) of implant-supported provisional restorations on teeth #7 and #10.

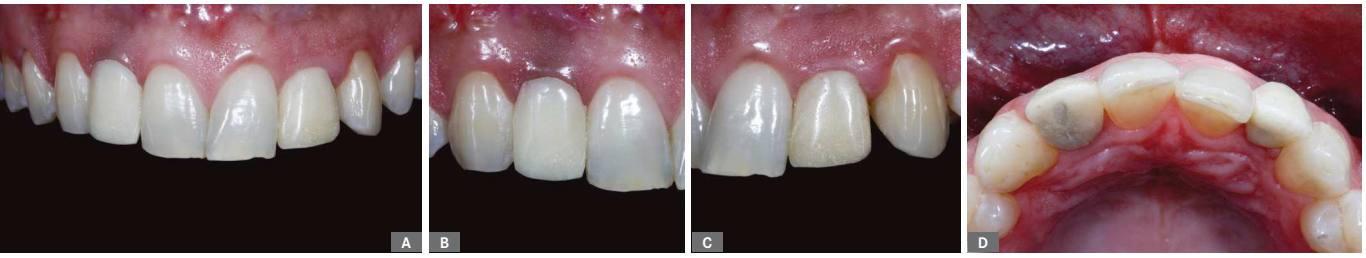


Figure 2: Patient was unsatisfied about the esthetics of the provisional restorations, as well as the grayish color of the gingival margin around tooth #7 (**A**, **B**). It is also possible to see the difference between the mesiodistal distances of teeth #7 and 10 (**C**, **D**).

This case report exemplifies some borderline clinical situations, which can be both treated by maintaining a non-ideal implant restoration from an esthetic point of view, but which can also be solved by remaking the case in a more appropriately manner, considering important key factors for long-term success of natural-looking restorations.

Case report

A 31-year-old male patient presented to the Dental Clinic of Centro Universitário Senac, in São Paulo, complaining of swelling, pain and esthetic discomfort in two implants (teeth #7 and #10; Fig 1). He had undergone treatment several years previously to solve a problem related to congenitally missing maxillary lateral incisors. During the first appointment, he provided details of the previous treatment. The patient had a medium lip line, revealing the papilla and part of the gingival tissue at smiling (Fig 1A-C). The initial intraoral condition can be seen in Figures 1D and 2. He was a nonsmoker with perfect oral hygiene. With the patient under anesthesia, oral examination carried out with the aid of a periodontal probe revealed swelling, exudate and inflammation around both implants, in addition to a grayish area at the cervical peri-implant tissue of implant #7 (Fig 2B). Radiographic computed tomography (CT scan) examination confirmed that there was insufficient bone volume at the buccal plate of implant #7, although there was sufficient buccal bone volume around implant #10 (Fig 3). After careful analysis of the case, the entire proposed treatment sequence was explained to the patient. The option selected included both implant removal

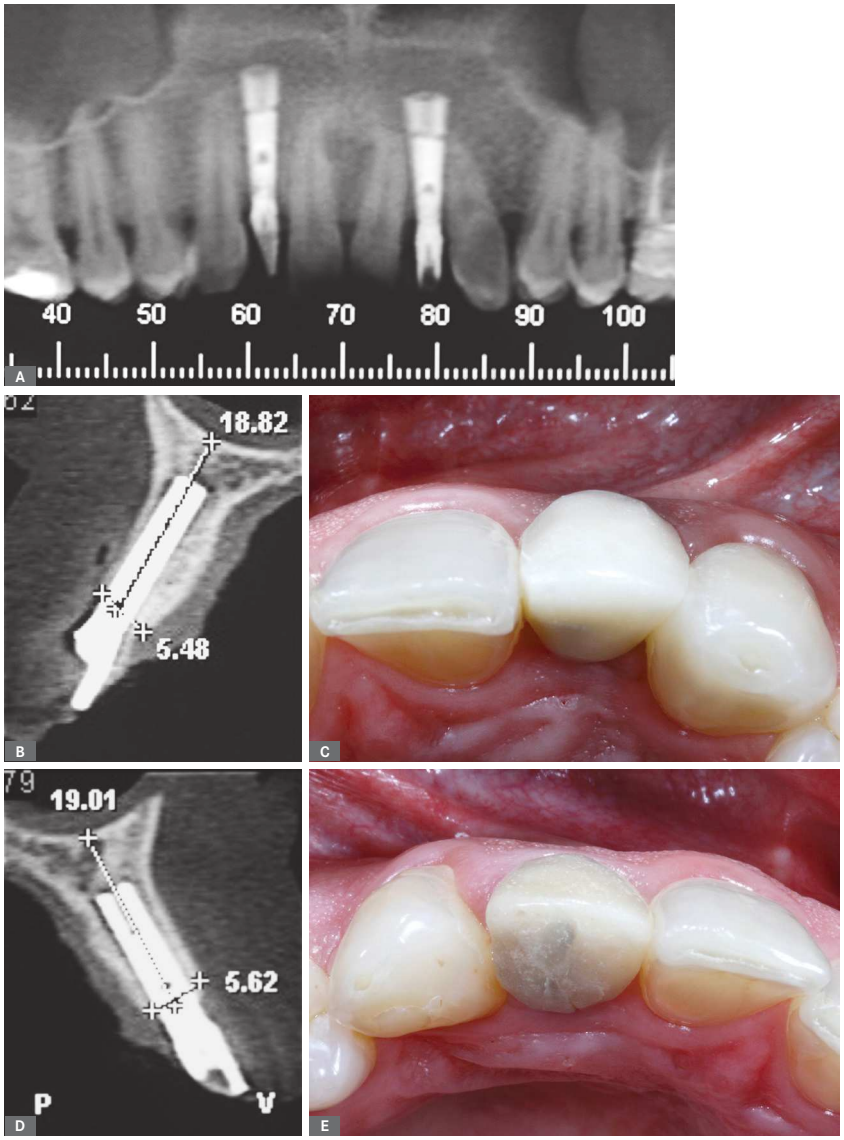


Figure 3: Initial CT examination (**A**) reveals buccal bone deficient volume in the implant that replaces tooth #7 (**B**, **C**). This did not occur in the implant that replaces tooth # 10 (**D**, **E**).

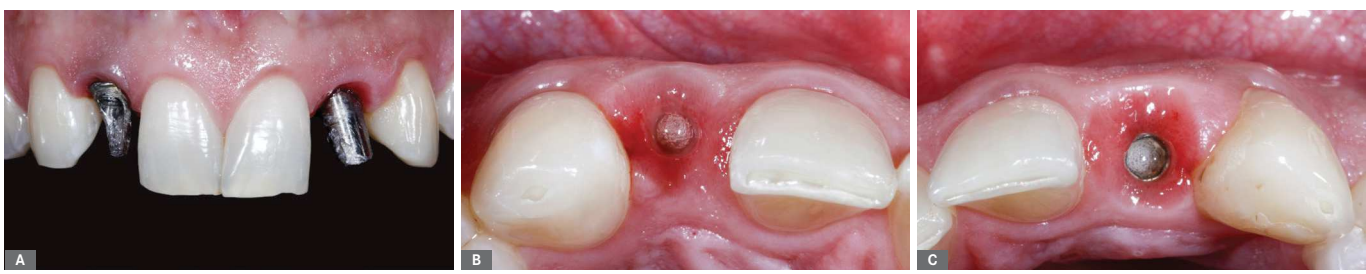


Figure 4: Temporary abutments and HE prosthetic connection of implants (**A**) did not favor peri-implant tissue health (**B**, **C**).

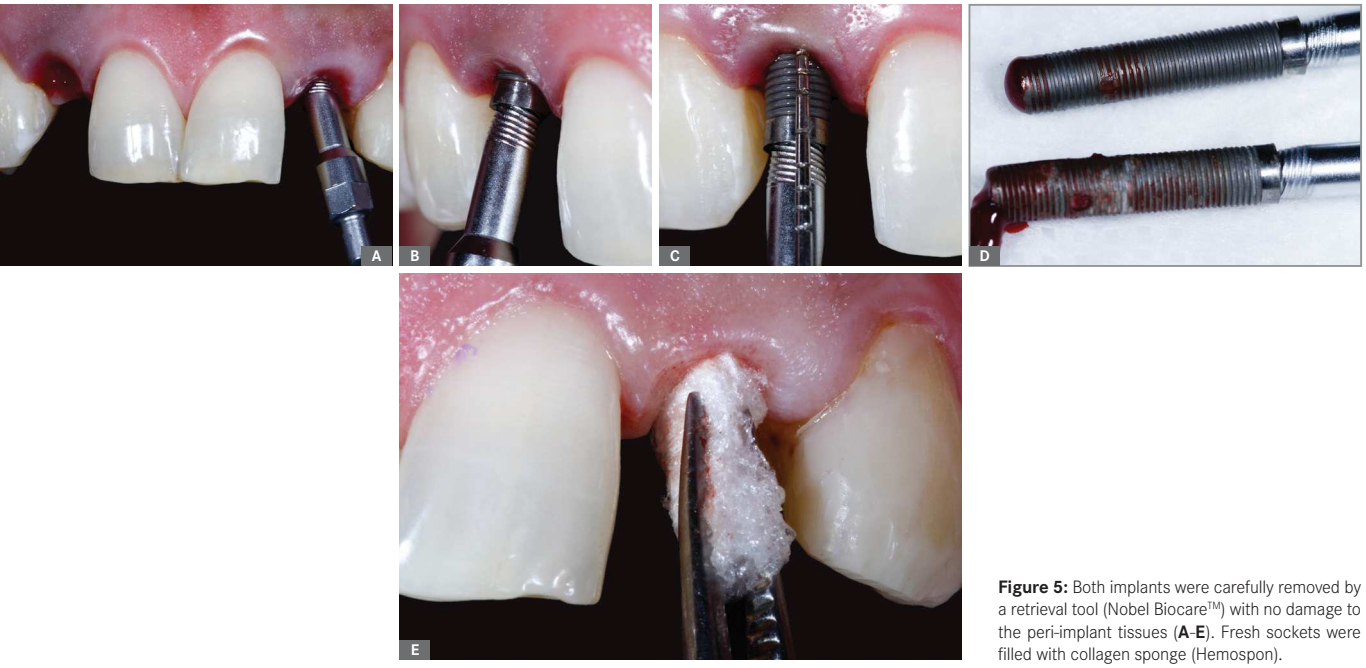


Figure 5: Both implants were carefully removed by a retrieval tool (Nobel Biocare™) with no damage to the peri-implant tissues (**A**-**E**). Fresh sockets were filled with collagen sponge (Hemospon).

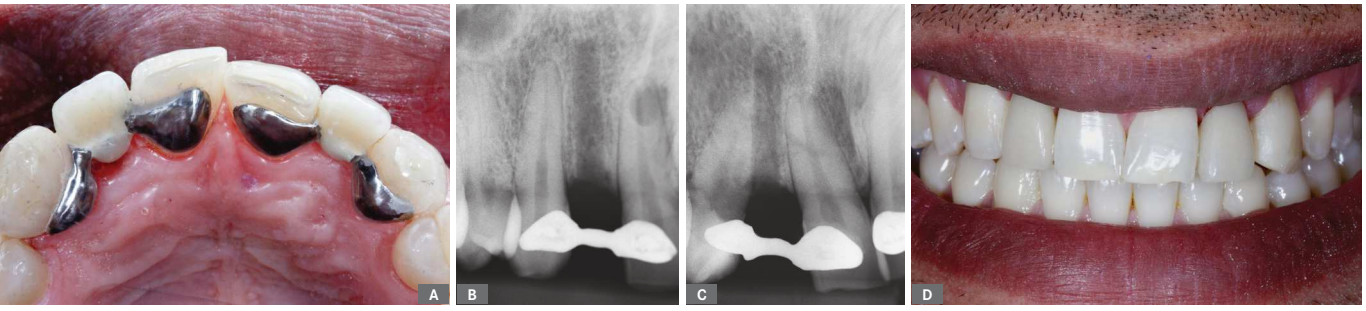


Figure 6: After explantation, temporary restorations were bonded to the adjacent teeth (**A**-**D**).

and soft tissue augmentation followed by implant placement.

Provisional cemented crowns and abutments were removed (Fig 4) and a counter-torque ratchet (Retrieval Tool, Nobel Biocare™, Kloten, Switzerland) was screwed into the failed implant and reverse torqued (Fig 5). The implant site was cleaned with a curette and irrigated with sterile saline solution. Subsequently, a resorbable collagen sponge (Hemospon™) was placed inside the socket

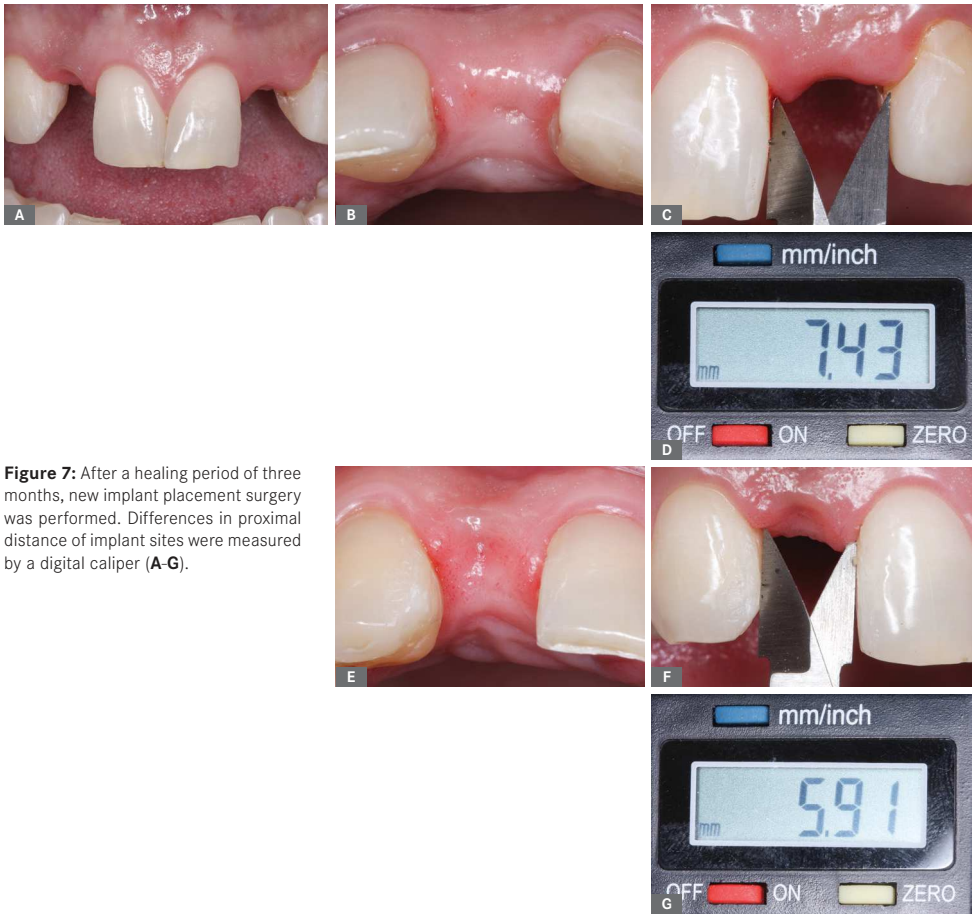


Figure 7: After a healing period of three months, new implant placement surgery was performed. Differences in proximal distance of implant sites were measured by a digital caliper (**A**-**G**).

and stabilized with a suture (Fig 5F). A composite resin acid-etched (Maryland bridge type) metal partial fixed device was bonded to provide patient with comfort (Fig 6A).

After four months, it was determined that there was no need for another CT scan, since no bone augmentation was performed during implant removal. Tissue appeared healed and clinically healthy (Fig 7). In the area of tooth #10, a crestal incision was made and a full-thickness flap was raised. After implant placement (3.5 x 10 mm Replace Groove, Nobel Biocare™, Kloten, Switzerland), patient's buccal plate was carefully inspected to check if there was no thread exposure (Fig 8). A subsequent connective tissue graft was harvested from the palate and positioned in the buccal area of the implant (Fig 8H, I). The area was then sutured for complete wound healing (Fig 8J). In the area of tooth #7, a circumferential incision was made and no flap was raised. The implant was placed by means of a flapless

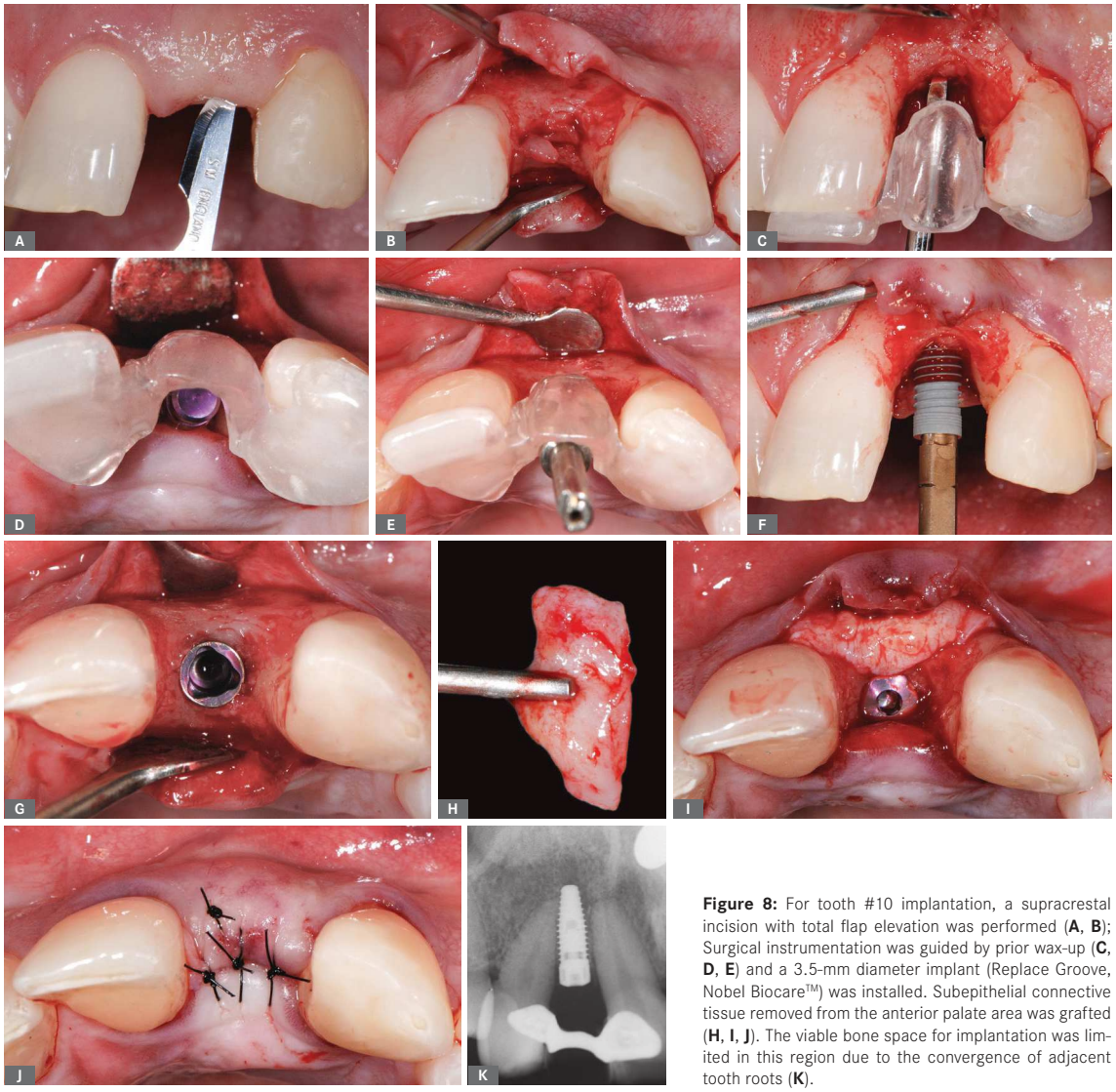


Figure 8: For tooth #10 implantation, a supracrestal incision with total flap elevation was performed (**A**, **B**); Surgical instrumentation was guided by prior wax-up (**C**, **D**, **E**) and a 3.5-mm diameter implant (Replace Groove, Nobel Biocare™) was installed. Subepithelial connective tissue removed from the anterior palate area was grafted (**H**, **I**, **J**). The viable bone space for implantation was limited in this region due to the convergence of adjacent tooth roots (**K**).

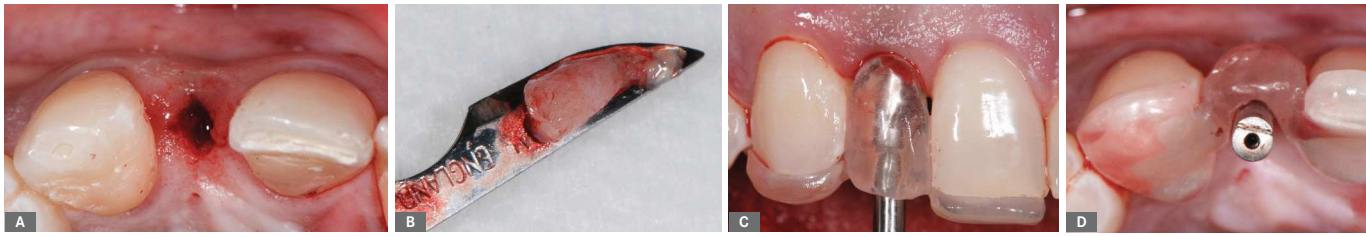
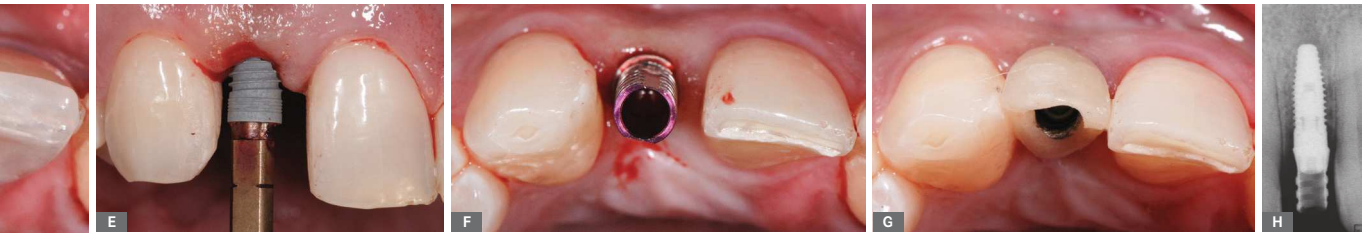


Figure 9: The implantation of tooth #7 was flapless (**A**), carried out by means of a circular gingival incision (**B**). Surgical instrumentation was guided by previous wax-up and a 3.5-mm diameter implant (Replace Groove, Nobel Biocare™) was installed (**C**, **D**, **E**) and immediately restored (**F, G**), Despite a reduced mesiodistal space at this site, adjacent roots were not convergent, which made implant placement easier.

approach, in order to maintain blood supply of implant site (Fig 9). After implant placement (3.5 x 10 mm Replace Groove, Nobel Biocare™), immediate temporary restoration was adapted to a temporary abutment. No hard or soft tissue graft was done at this stage.

After a healing period of four months, conservative uncoverage surgery was performed to access the head of implant #10 (Fig 10). A punch-type flap helped to preserve the interproximal tissue, facilitating papillae regeneration. The provisional abutment was positioned on this implant. After three months, an impression of the implants was made with polyvinyl siloxane (PVS), using the impression posts of the corresponding diameter and design, in order to produce a new set of temporaries in the laboratory. In the laboratory, a working stone cast was poured with a gingival mask to reproduce the original soft tissue condition. In this phase, the dental technician reshaped the gingival resilient material to the desired shape, creating an adequate emergence profile. Two new provisional abutments were modified and adjusted in order to support the desired peri-implant tissues developed by the technician. These screwed provisional restorations were modified, so that the transmucosal concave portion could be properly polished, allowing greater soft tissue thickness at this area. They were inserted with the patient under anesthesia, and a connective tissue graft was harvested from the anterior palate and enveloped at tooth #7 buccal aspect in order to augment the thickness of the peri-implant mucosa, which was perforated at this time.

After soft tissue stabilization for a period of four months with the screw-retained temporary abutments, an impression was taken and sent to the laboratory, and a master cast was manufactured. Resilient silicon-based material was used to copy the cervical and interproximal area. A customized hybrid abutment for each implant was then obtained by means of the CAD-CAM system (Ceramill Motion 2, Amann Girrbach, Voralberg, Austria). The hybrid abutments were manufactured with zirconia-customized copings cemented on titanium provisional abutments customized for the individual case.



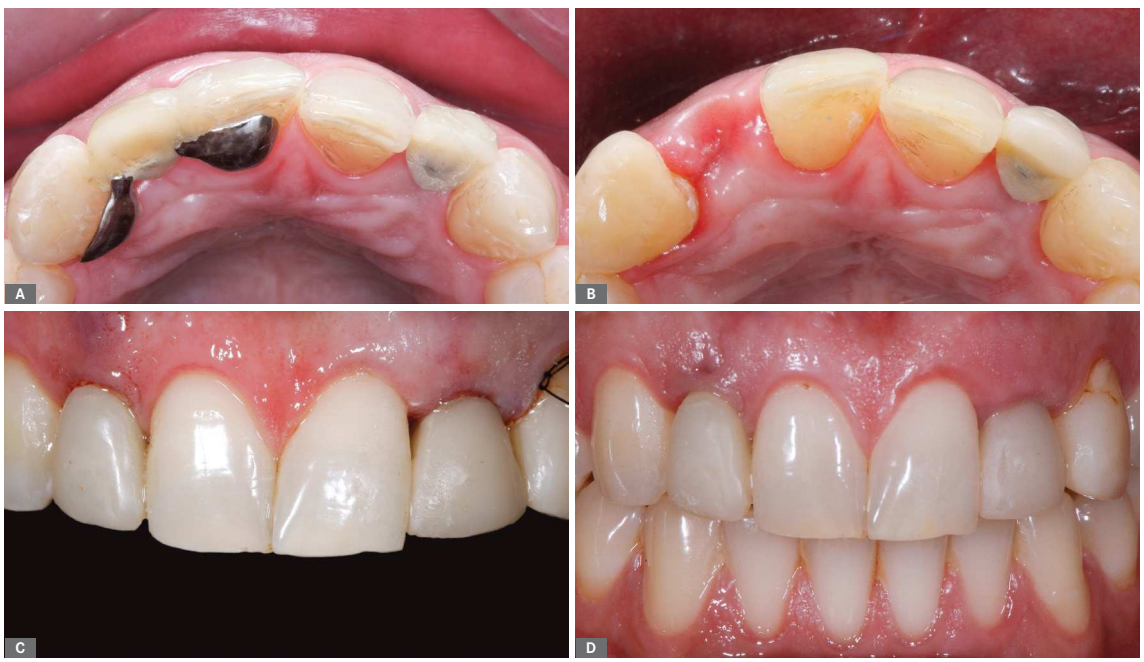


Figure 10: After a 90-day healing period, the correct gingival volume area in tooth #10 site (previously grafted) can be observed, as well as the insufficient gingival volume at tooth #7 site, which did not receive connective tissue graft at the time of implantation (**A**, **B**). Implant #10 was reentered, and temporary restoration was performed (**C**). 30-day post-operative aspect (**D**).

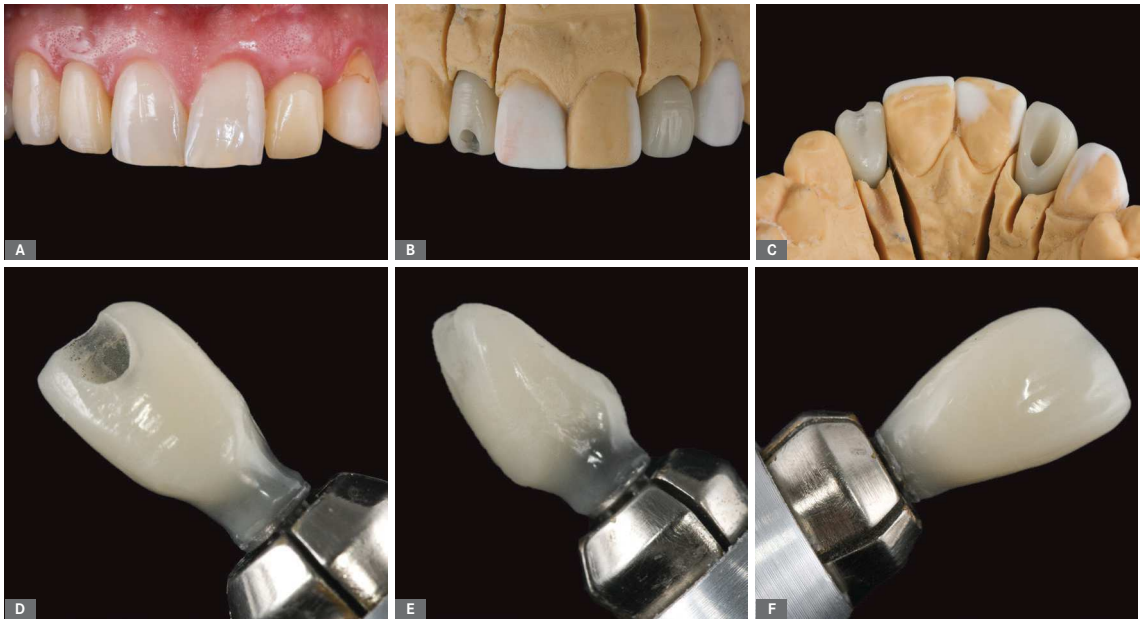


Figure 11: Screwed provisional restorations were made (**A**, **B**) and modified, so that the transmucosal concave portion was properly polished, allowing greater soft tissue thickness at this area (**C**, **D**, **E**).

Abutments were clinically tried, subjected to radiograph to have internal and external fit checked, and final impressions were made with the aid of customized impression copings. Shade selection was performed by digital photography, and all the information was sent to the laboratory.

The final ceramic crowns of the cemented restorations were obtained with a lithium disilicate core (IPS e.max press, Ivoclar Vivadent™) veneered with a compatible glass ceramic. The zirconia copings were luted to the metal abutment with phosphate monomer modified dual-cure resin cement (Panavia F 2.0, Kuraray, Osaka, Japan).

Because of the care taken in handling the gingival tissue over the four months taken for the impression procedures, the tissue was stable and ready to receive the final implant-supported restorations. All parameters, such as interproximal contacts, occlusal adjustments and tissue stability were checked before final insertion of abutments and crowns. The final hybrid abutments were disinfected in a 2% glutaraldehyde solution for 10 minutes before final placement. Meanwhile, screw-retained temporary abutments were removed, and the sulcus irrigated with sterile saline solution. The abutments were inserted, and two periapical radiographs were taken to confirm their satisfactory fitting, which were

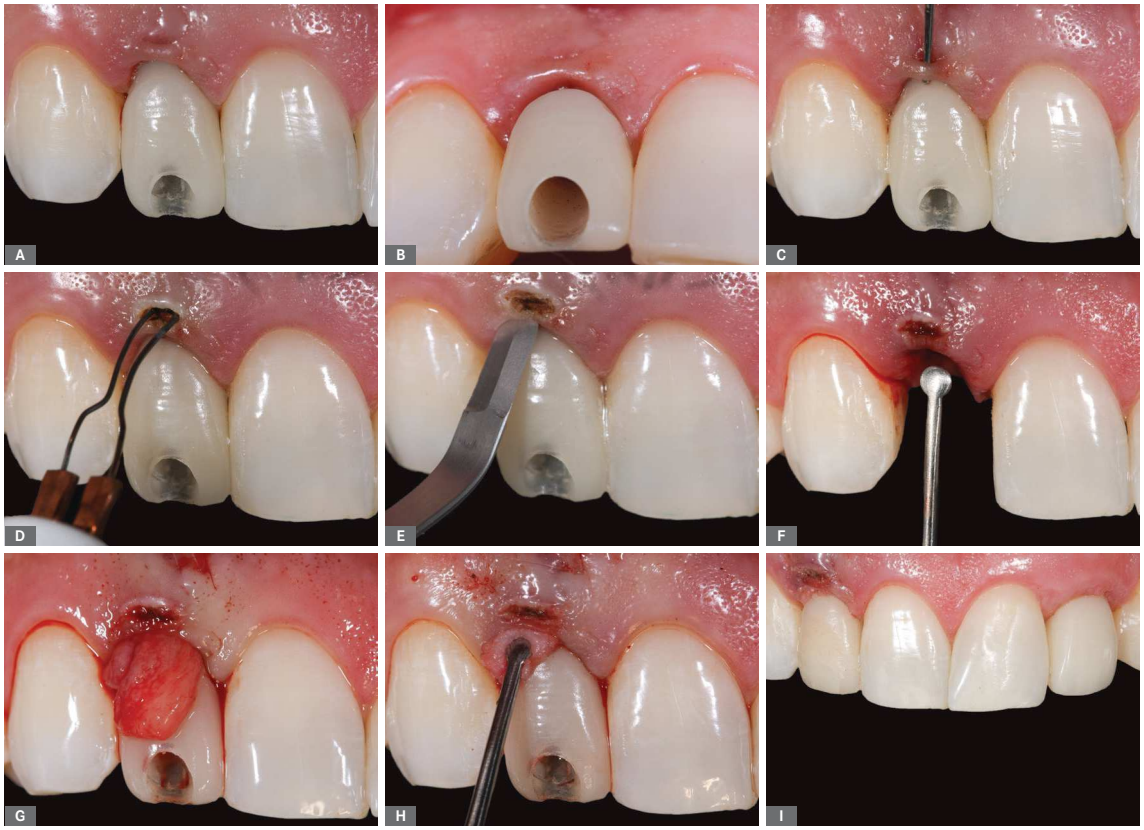


Figure 12: Tooth #7 temporary restoration left adequate space for subepithelial connective tissue graft (**A**, **B**). Peri-implant tissue perforation could be inspected with a probe (**C**) and cauterized (**D**). This site was prepared with a microblade (**E**) and tunnelers (**F**) in order to envelope the connective tissue graft (**G**, **H**). Immediate postoperative aspect of the grafted area (tooth #7), and new provisionals (**I**).

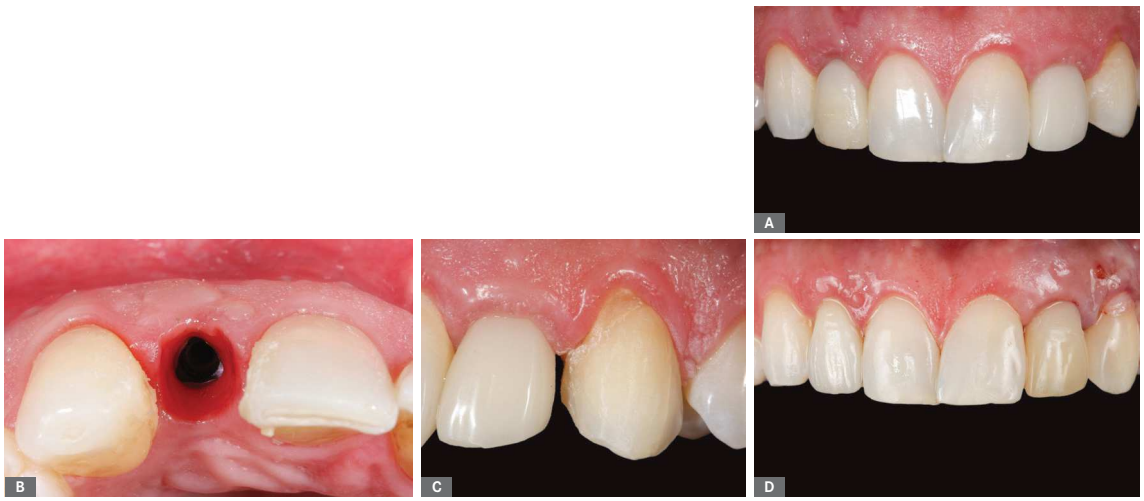


Figure 13: 60-day postoperative of tooth #7 (**A**, **B**). Another connective tissue graft was performed for root coverage of tooth #11 (**C**, **D**).

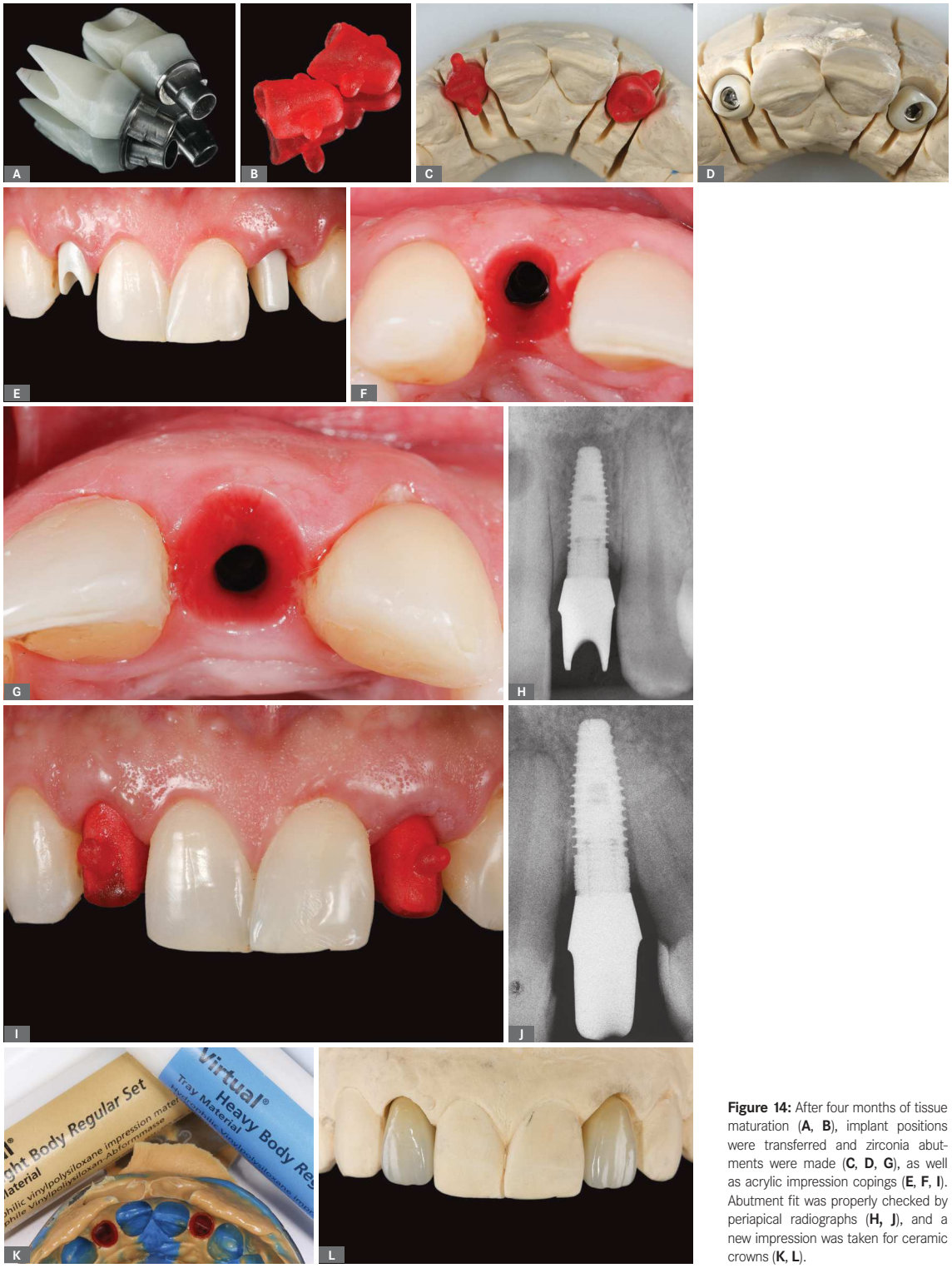


Figure 14: After four months of tissue maturation (**A**, **B**), implant positions were transferred and zirconia abutments were made (**C**, **D**, **G**), as well as acrylic impression copings (**E**, **F**, **I**). Abutment fit was properly checked by periapical radiographs (**H**, **J**), and a new impression was taken for ceramic crowns (**K**, **L**).

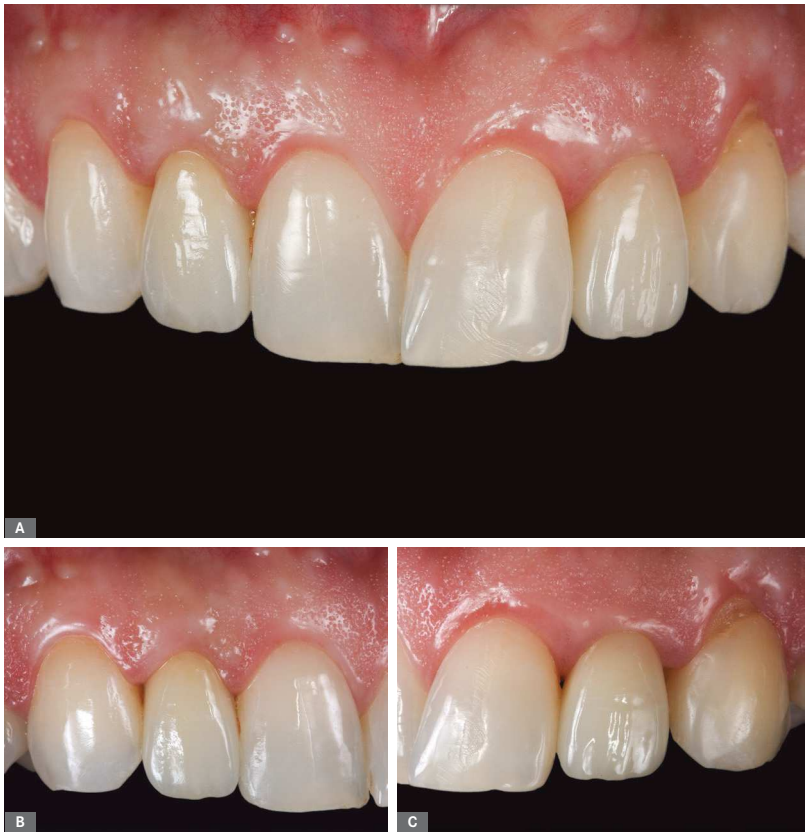


Figure 15: After teeth #7 and #10 cementation, perfect integration between implant-supported restorations and adjacent teeth can be observed. It is interesting to note that these ceramic restorations were so invisible that other minor problems became evident: polishing deficiency of composite resin restoration at distal aspect of the tooth #9 (**A**), and residual gingival recession of tooth #11 (**C**).

then immediately torqued. Final cementation was performed with resin cement (Variolink Veneer, Ivoclar Vivadent™). The final result after two weeks is shown in Figure 15. A follow-up one-year evaluation post-operatively revealed stable conditions of the soft tissue as well as shade maintenance, correct function and a perfect esthetic outcome.

Conclusions

The current concepts in esthetic implant restorations imply the use of minimally invasive procedures even in cases in which an implant cannot be saved. As discussed, the final objective of any rehabilitation with oral implants is a long-lasting, functional and esthetically-pleasing result. However, complications and problems may occur, and the clinician must be familiar with all the possibilities, techniques and material available to treat a patient with the best approaches.

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