Interdisciplinary approach for a missing maxillary incisor

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Implant therapy aims to provide patients with a highly predictable treatment outcome, good long-term stability of the treatment results and a low risk of complications during the healing and follow-up phases. The growing demand for functional and aesthetic restoration of missing teeth has become an important challenge. This is especially true in the anterior zone, as various local risk factors can compromise the predictability of the results. Therefore, the clinician must carefully examine the patient's risk profile before establishing the treatment plan.[1]

The International Team for Implantology recommends immediate implant placement (Type 1) in the presence of ideal anatomical conditions. This includes (i) a fully intact facial bone wall with a thick-wall phenotype (> 1 mm) at the extraction site, (ii) a thick gingival biotype, (iii) no acute infection at the extraction site and (iv) a sufficient volume of bone apical and palatal to the socket to allow implant insertion in the correct 3D position with sufficient primary stability. When these ideal conditions are not met, it is suggested to place implants after four to eight weeks of soft-tissue healing (Type 2). If primary stability cannot be


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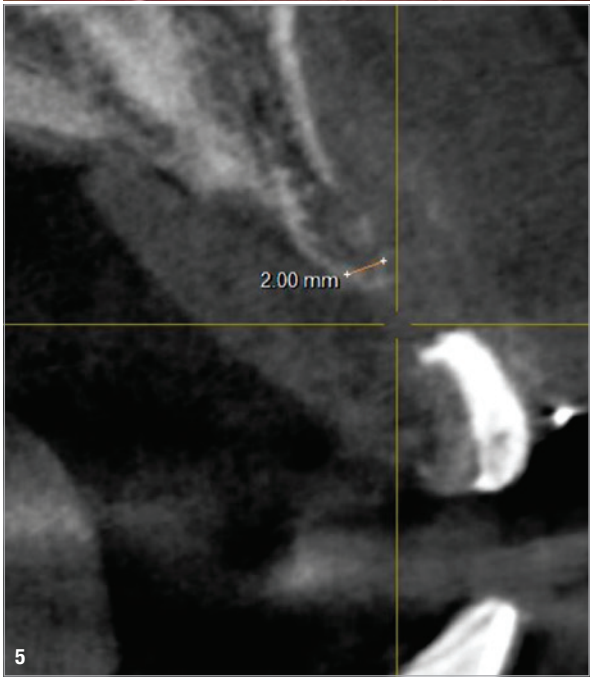

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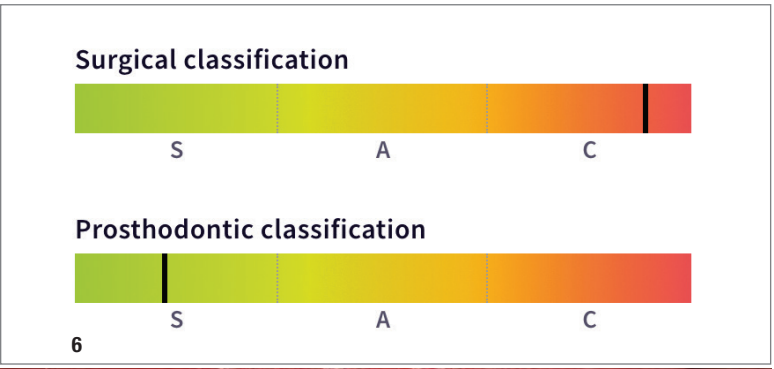

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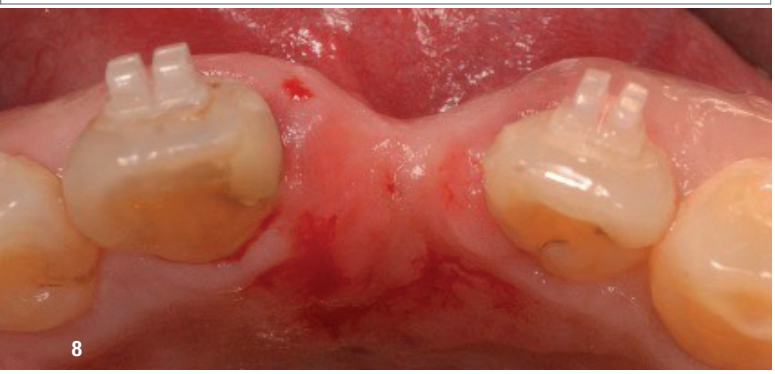
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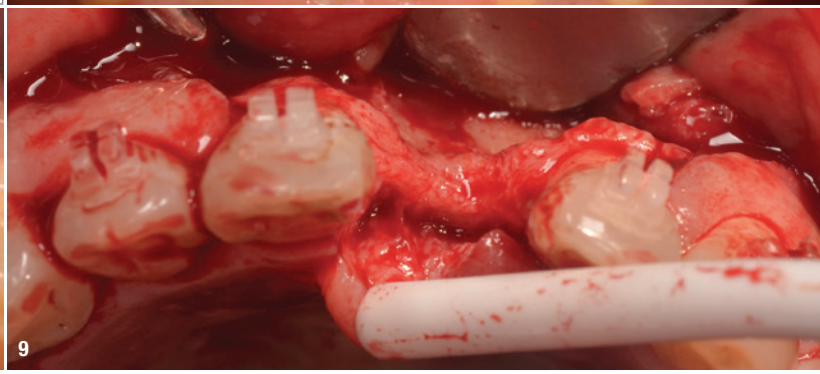
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achieved after four to eight weeks, the post-extraction healing period should be extended to allow for partial bone healing (Type 3).[1] Type 4 is the placement of the implant into a fully healed site.[2]

An adequate amount of bone is needed to be able to place the implant in an ideal prosthetically driven position. If adequate bone volume is not available, guided bone regeneration (GBR) techniques should be used for ridge augmentation before implant placement.[3]

The following case report describes an interdisciplinary treatment that included orthodontic therapy, GBR, implant placement and fixed restorations. A fixed orthodontic appliance with ceramic brackets was used to level and align the teeth and to gain space for implant placement in a central incisor location. Because of the complexity of this clinical case, GBR was first carried out with a non-resorbable membrane and a bovine bone grafting material, and after six months, an implant was placed.

Initial situation

A systemically healthy 48-year-old male patient came to our clinic seeking an aesthetic and functional treatment for a missing anterior tooth. He reported being a non-smoker, taking no medication and having no allergies. His chief complaint was feeling very embarrassed to talk and smile in public because of his missing tooth. He desired a fixed restoration and an attractive smile. His dental history revealed the loss of tooth #21 during an accident over 20 years before. It had been restored with a provisional restoration. Since then, he had noticed that the space left by the central incisor was slowly being closed by the adjacent teeth.

The extra-oral examination revealed a medium smile line with an impaired mesiodistal proportion of the anterior teeth. Owing to the limited mesiodistal space at position #21, the provisional restoration looked small and narrow. Moreover, the anterior teeth were not level, resulting in a reverse smile. For the intra-oral examination, the provisional restoration was removed. The neighbouring teeth were mesially tilted (Fig. 1). Since the residual ridge was atrophic, a severe horizontal ridge defect was apparent, and secondary caries was present in tooth #11 distally (Figs. 2–4). The radiographic assessment (CBCT) revealed a narrow crestal bone width at position #21 and no local infection (Fig. 5).

The SAC classification assessed the potential difficulty, complexity and risk of the implant-related treatment. The case was classified as surgically complex and prosthodontically straightforward (Fig. 6).

After evaluating the patient's wishes and discussing the treatment options, it was decided first to perform orthodontic treatment and then GBR and finally to place a Straumann BLX implant. Straumann BLX implants are made from the material Roxolid and have the SLActive surface. These unique properties enable enhanced control over insertion torque to achieve optimal primary stability, which is a fundamental feature in treating this type of clinical scenario.


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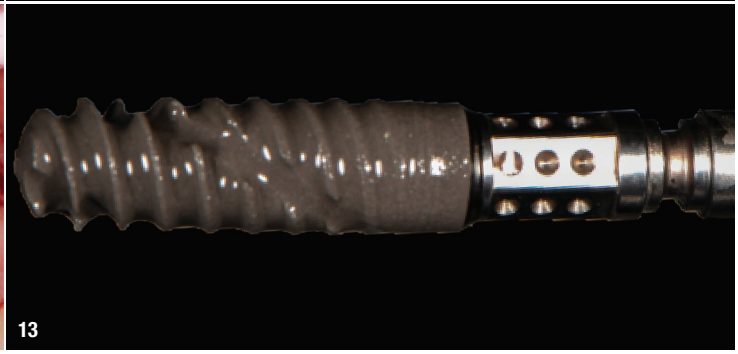
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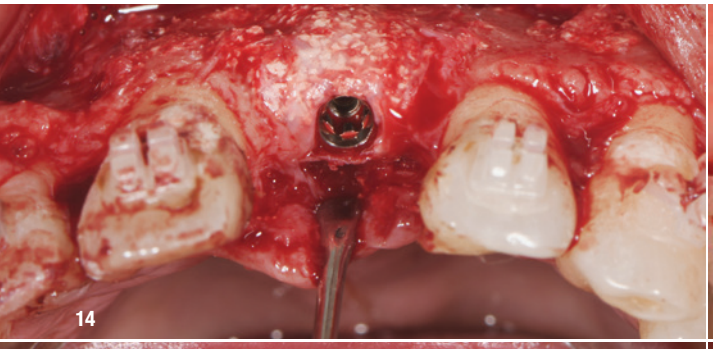
Treatment planning

Treatment would involve the following:

1. provision of oral hygiene instructions and non-surgical periodontal treatment;
2. digital planning of dental space distribution and aesthetics;
3. restoration of the carious teeth and orthodontic treatment to increase the mesiodistal gap at position #21 and to level and align the smile curve (Figs. 7 & 8);
4. GBR using a non-resorbable membrane and bone grafting material;
5. membrane removal after six months and implant insertion in a prosthetically driven position;
6. delivery of a screw-retained temporary crown on implant #21;
7. crown preparation and restoration of tooth #11; and
8. delivery of a screw-retained definitive crown on implant #21.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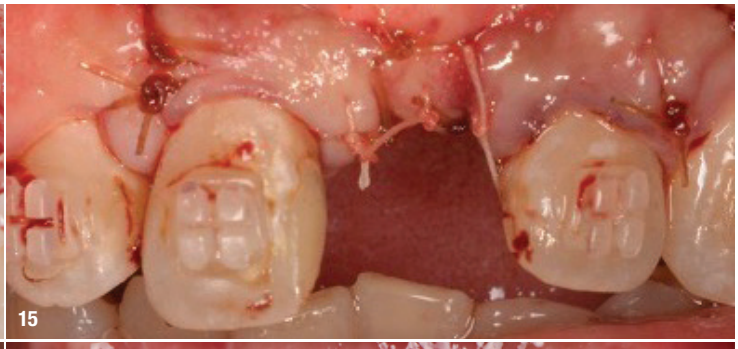
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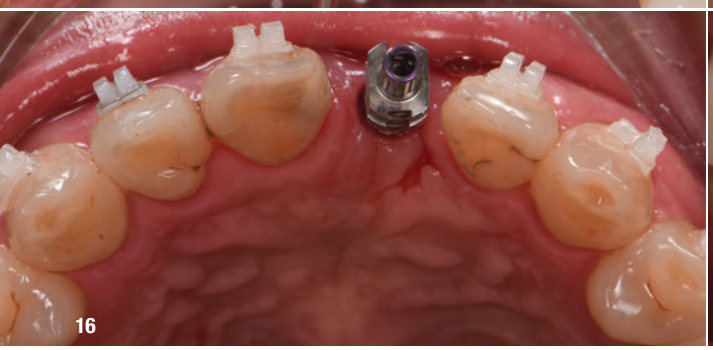
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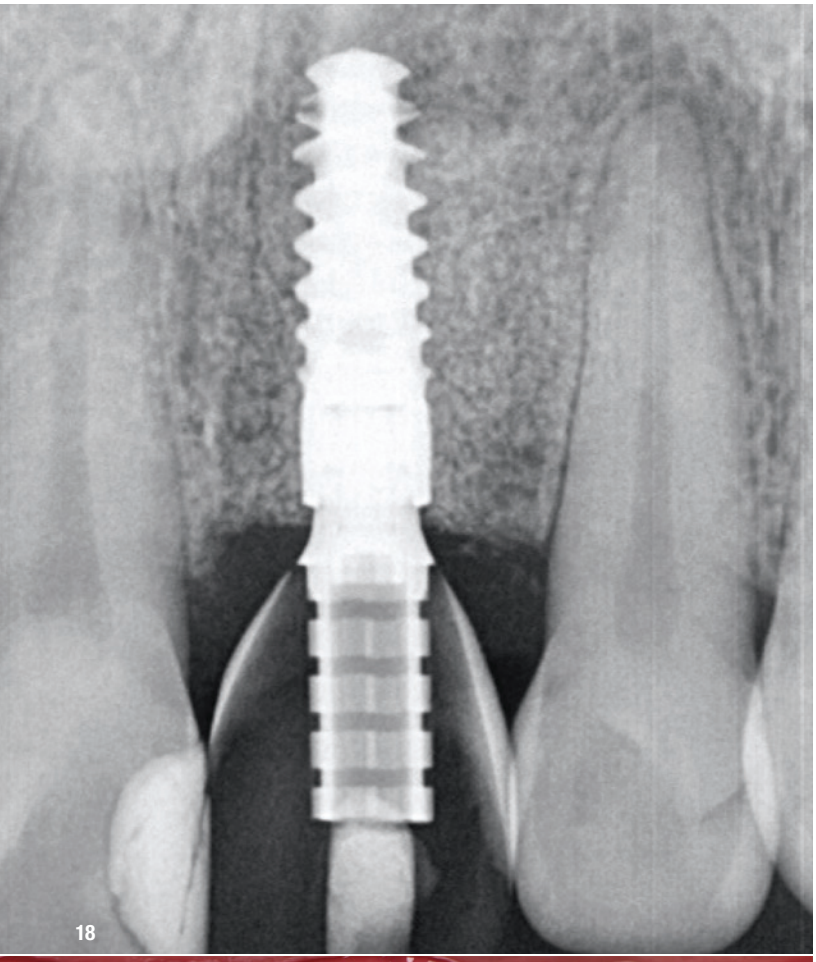
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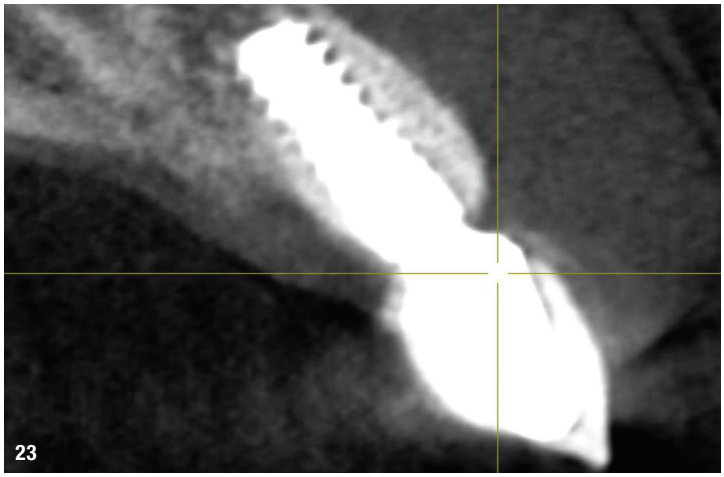
Surgical procedure

Owing to the limited bone availability, the first step of the surgical procedure was GBR using a non-resorbable membrane and bone grafting material. Local anaesthesia was performed with 2% lidocaine and 1:100,000 adrenaline, and a mucoperiosteal flap with a crestal incision was raised. The flap was carefully separated from the bone, and the surgical access confirmed the limited availability of bone (Fig. 9).

Afterwards, GBR was performed using the bovine material cerabone (botiss biomaterials) for bone grafting. In addition, a non-resorbable membrane to prevent non-osteogenic tissue from interfering with bone regeneration was used (Fig. 10).

The patient was advised to follow a soft diet and use ice packs on the area for the first 48 hours. Moreover, the postoperative prescription included rinsing with an antiseptic solution (0.2% chlorhexidine for 1 minute twice a day for one week), an analgesic (600 mg ibuprofen up to four times a day as required) and an antibiotic (500 mg amoxicillin three times a day for five days).

Two weeks later, at the suture removal appointment, the patient reported no complications with healing. The patient returned six months after surgery for a follow-up evaluation. Healing had continued to progress well, and oral hygiene was good. Furthermore, there was an adequate mesiodistal gap at position #21 for implant placement, thanks to the orthodontic treatment (Fig. 11).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The implant placement was planned. After local infiltration anaesthesia, the area was reopened with a full-thickness flap for membrane removal. The bone morphology and dimensions were assessed and found to be optimal for implant insertion (Fig. 12).

A 3.75 × 12.00 mm Straumann BLX implant was selected (Fig. 13). The surgical bed was prepared, and the implant was placed in a prosthetically driven position following the manufacturer's instructions (Fig. 14). Next, the mucoperiosteal flap was adapted and closed with interrupted sutures, achieving primary closure (Fig. 15).

At the suture removal appointment, since healing had been uneventful, the fixed appliance was removed, and a screw-retained temporary restoration was delivered (Figs. 16 & 17). A periapical radiograph was taken to assess the correct fit of the restoration (Fig. 18).

Prosthetic procedure

Twenty weeks after implant surgery, the papillae were well formed and osseointegration of implant #21 had been achieved. Crown preparation of tooth #11 was performed (Fig. 19). The Straumann regular base Variobase and zirconia coping obtained by a CAD/CAM procedure for the final restoration of the BLX implant were placed (Fig. 20).

The final implant restoration was performed, and a lithium disilicate crown was placed on tooth #11 (Fig. 21). The soft and hard tissue demonstrated a natural contour (Fig. 22). The occlusion was checked, and oral hygiene instructions were reinforced.

The patient was involved in an annual maintenance programme in which soft and hard tissue were evaluated and oral hygiene instructions reinforced. The radiographic control after three years showed good maintenance of the peri-implant bone (Fig. 23).

Treatment outcomes

The outcome met our patient's expectations. In addition, the hard and soft tissue were well maintained over time (Fig. 24). At the three-year follow-up visit, the patient said that the treatment had greatly affected his life, restoring his confidence and self-esteem. Encouraged by his new smile, he had begun smiling far more than he ever had and everyone in his social circle had noticed.

Literature

about the author

Dr Tran Hung Lam graduated in odonto-stomatology from the University of Medicine and Pharmacy at Ho Chi Minh City in Vietnam. He received his PhD and training in fixed prosthodontics and implantology at the dental faculty of Aix-Marseille University in France. He is the founder of Elite Dental Group and the THL Academy.

Dr Tran is vice dean of research and international affairs at the Faculty of Dentistry at Van Lang University in Ho Chi Minh City. He is president of the Ho Chi Minh City Society of Dental Implantology, an International Team for Implantology (ITI) fellow, an ITI study club director, chair of the ITI's Vietnam section and a fellow of the International College of Dentists.

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