Immediate implant placement and bone grafting of a maxillary central incisor: A seven-year follow-up

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Dental implant therapy aims to provide a long-term, successful aesthetic and functional result that meets the patient's expectations and demands. A patient has the best chance of a favourable outcome when there is a sound understanding of his or her chief complaint and a correct diagnosis is made. In addition, clinical decision-making should be based on the patient's condition and needs. Therefore, these must be accurately assessed.

Clinical history and interview, extra-oral and intra-oral examination, additional investigation methods, risk assessment, and referral to or consultation with other specialists are all ways to collect data that could be helpful in diagnosis. In our daily practice, this information helps us establish an effective and practical individual treatment plan for each patient. There are no shortcuts to achieving long-term successful aesthetic effects. The only way clinicians can achieve successful implantation and restorative treatment is to strictly adhere to the treatment plan and discuss with the patient the possible scenarios that may be encountered during the implant treatment journey. Moreover, despite the high success rate for dental implants, complications are still possible. Therefore, maintenance therapy should always be part of treatment, and its goal is to prevent peri-implant disease and, consequently, ensure long-term implant stability.

The following clinical case describes a successful immediate implant placement with bone augmentation in the aesthetic zone of a young patient. The patient showed no clinical or radiographic complications throughout seven years of clinical and radiographic follow-up and maintenance therapy. The outcome met all the patient's expectations.

Initial situation

A 25-year-old, systemically healthy female patient, a non-smoker on no medication and with no allergies, presented to our clinic. Her chief complaint was that the crown of an anterior tooth had been lost a few days before, having been loose for some time. She was eager for a natural-looking replacement but was concerned about damage to the adjacent teeth. In addition, she expressed her desire for a quick and fixed definitive restoration of the maxillary central incisor and to obtain a bright smile with uniform, even teeth and a smoother look. Moreover, she stated that she did not want to be left with a gap in her anterior teeth during the treatment.


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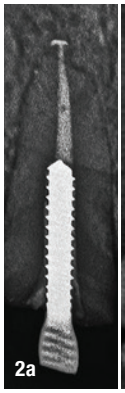
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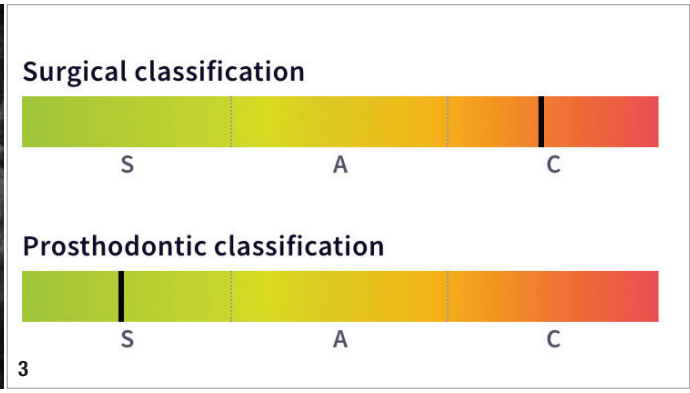

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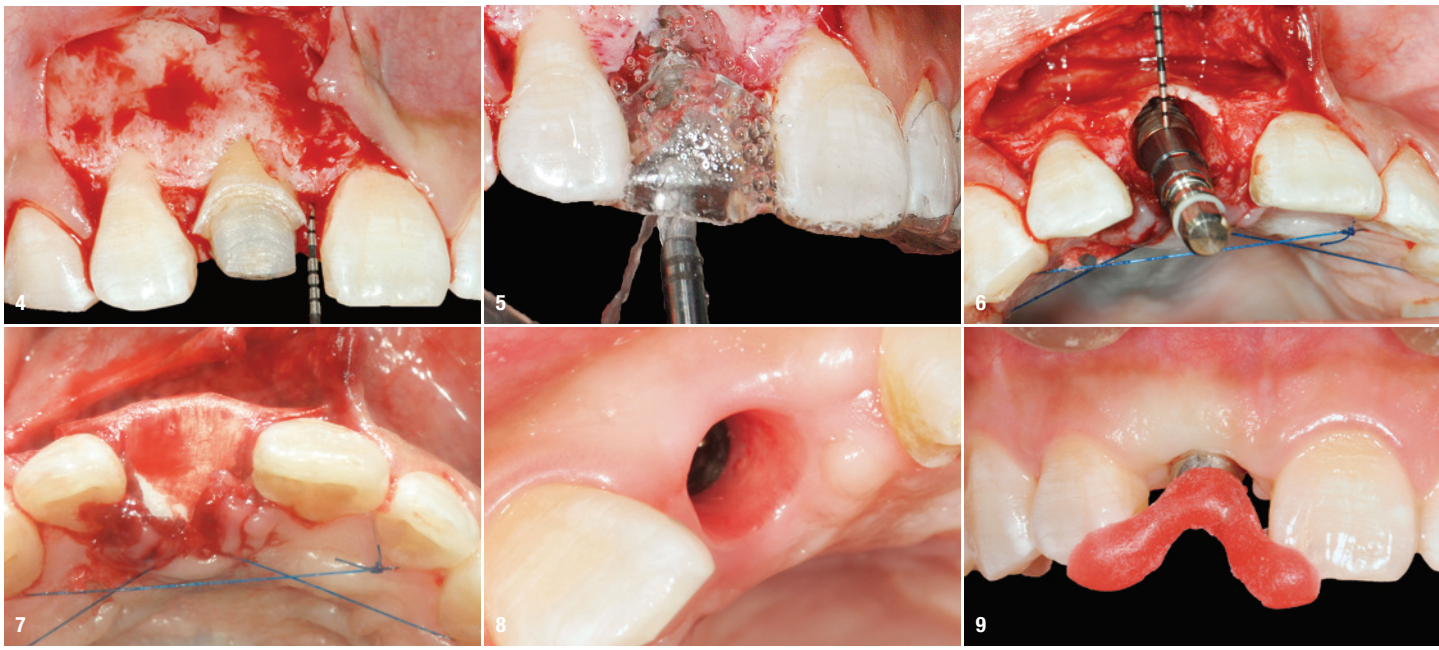

During the extra-oral examination, her smile revealed a medium smile line and showed the cervical margins of the crowns of teeth #14–24. The intra-oral examination revealed mild gingivitis and regular plaque control. After the crown of tooth #11 had been completely removed, a pigmented stump was found, and it was positive for the vertical percussion test (Fig. 1). The radiographic evaluation showed thin facial bone, failed root canal therapy and a post, periodontal ligament widening and root resorption of tooth #11. Otherwise, no local infection was observed (Figs. 2a & b). The SAC Assessment Tool classified this clinical scenario as surgically complex but straightforward in terms of prosthodontics (Fig. 3).

Treatment planning

Immediate implant placement with bone augmentation and delayed loading was decided on after a detailed discussion of the various treatment options with the patient. The main steps of the treatment workflow included:

1. clinical and radiographic assessment;
2. preparation of the surgical guide;
3. extraction of hopeless tooth #11;
4. immediate placement of a Straumann Bone Level implant with flap elevation to ensure facial bone integrity;
5. filling of the gap between the bone and implant with autogenous bone and a xenograft material;
6. placement of a collagen membrane to cover the grafting materials;
7. splinting of the provisional crown to teeth #12 and 21;
8. placement of a healing abutment six months after surgery (second-stage surgery); and
9. delivery of a definitive cement-retained crown two weeks after second-stage surgery.

Surgical procedure

The surgical guide was first tested on the patient's dental arch to ensure a proper fit. The area to be operated on was anaesthetised with local anaesthesia (2% lidocaine with 1:100,000 adrenaline). An open-flap technique for preserving the papilla was performed to gain adequate access to the future implant site (Fig. 4). Tooth #11 was extracted with minimal trauma to the surrounding tissue and the palatal flap fixated with suture (Fig. 5).

The surgical guide was placed in the mouth to ensure insertion of the implant in the optimal 3D position and to visualise the future soft-tissue margin, which would ideally be located 3 mm coronal to the implant shoulder. The Straumann surgical cassette was used for preparing the implant bed, strictly following the drilling protocol (Fig. 6). The osteotomy was prepared to a diameter of 2.2 mm, which was then widened to 2.8 mm and finally to 3.5 mm. The preparation depth was checked with the 3.5 mm diameter depth gauge. The final implant bed preparation included profile drilling and subsequent tapping. An implant (Straumann Bone Level, SLActive, 4.1 × 10.0 mm) was inserted at a speed of 15 rpm and torqued to 35 Ncm. The implant was placed in its ideal prosthetically driven position with a gap distance of 2 mm between the facial bone and the implant surface (Fig. 7). The gap around the implant shoulder was filled with a mix of autogenous bone and xenograft and covered with a collagen membrane.

The provisional restoration, an ovate pontic, was immediately placed in position #11 and splinted to teeth #12 and 21 to allow for proper healing, to shape the under-


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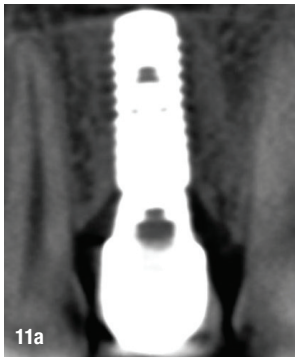
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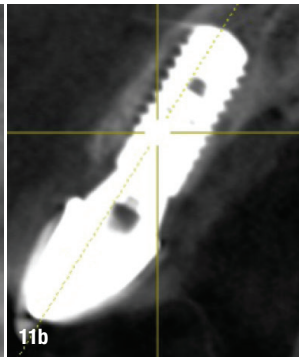
11b

lying peri-implant tissue and to enable assessment of any necessary phonetic or aesthetic adjustments. Instructions on oral hygiene were given, and the occlusion was checked.

After the implant placement, the patient underwent routine check-ups, and no signs of pain or infection were found. After the sutures were removed, the soft- and hard-tissue preservation seemed uneventful.

Prosthetic procedure

Six months after implant placement, the intra-oral examination showed healthy soft tissue around the implant. The implant had osseointegrated. A healing abutment was placed in second-stage surgery.

Two weeks later the healing abutment was removed. The soft-tissue profile showed optimal healing (Fig. 8). The implant site was irrigated with 0.12% chlorhexidine, the impression coping was placed and hand torqued, and a radiograph was taken to verify adequate placement of the impression coping. An alginate impression was taken of the mandibular arch, and a conventional impression with a closed-tray transfer technique using polyvinylsiloxane was taken of the maxillary arch (Fig. 9).

A cement-retained ceramic crown was delivered by the laboratory. A satisfactory aesthetic outcome with a natural bone contour was achieved. Furthermore, the patient's smile revealed a medium smile line with pleasing aesthetics (Fig. 10).

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CoDE Lead

After the final restoration, it was critical that the patient understood the need for regular monitoring and maintenance to ensure long-term implant stability. Scheduled annual follow-up visits included oral hygiene control and, if appropriate, a dental radiograph. At the seven-year control, the patient presented with healthy peri-implant and periodontal tissue, and the CBCT images showed adequate peri-implant bone levels (Figs. 11a & b).

Treatment outcomes

The patient had been afraid of losing her anterior teeth. She assumed that the treatment would be painful and complicated owing to the necessary bone augmentation procedure and the aesthetic location. We treated her with a dental implant seven years ago, and she told us at the most recent consultation that she was still highly pleased with the results.

about the author

Prof. Su Yucheng works at the Peking Union Medical College Hospital and Chinese Academy of Medical Sciences and is the chairman of the Beijing dental implant training college, which has been a Straumann Center of Dental Education since 2022, all in Beijing in China. He is a fellow of the International Team for Implantology and of the International College of Dentists. He is a member of the academic committee of the Chinese Academy of Medical Sciences, a special member of the Chinese association of oral implantology and chairman of the subsociety of oral implantology of the Chinese Stomatological Association.

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