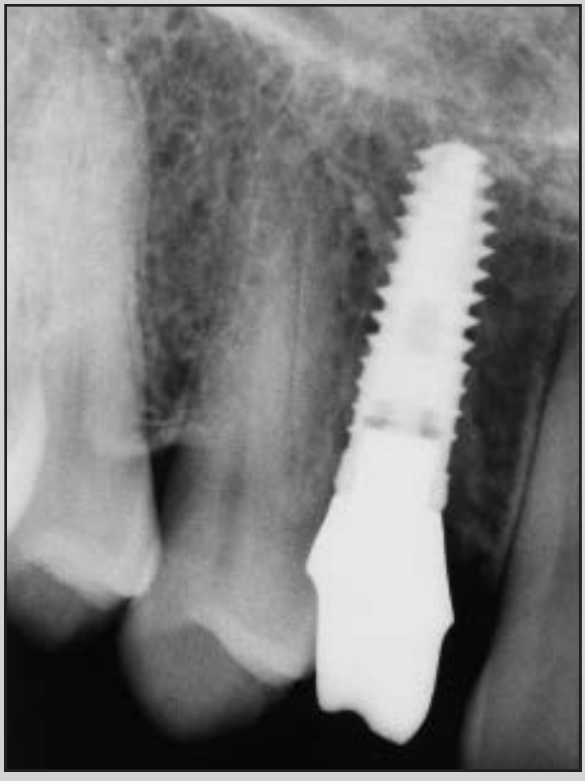

Immediate Postextraction Implantation with Provisionalization of Two Primary Canines and Related Impacted Permanent Canines: A Case Report

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This study presents a case of replacing two maxillary primary canines and related impacted permanent canines with two single implants, in conjunction with grafting lost hard tissue. By using immediate postextraction implant placement and provisionalization protocols, the stability of the implant was ensured while bypassing the bony void created by the removal of the primary canines. In this respect, a minimum healing period of 1 year was originally planned to evaluate the gingival esthetics before the final step was carried out. By the time the final restorations were fitted, the graft and tissues were stable. The time involved not only placed biology on the clinician's side, but also helped the patient to spread the cost over time. In modern esthetic dentistry, harmonious results can be achieved relatively quickly when the prerequisites for esthetic success have already been met, but, as this case demonstrates, human biology often requires more time and patience for augmented hard and soft tissues to heal and mature.
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Over the past decade, there has been a dramatic rise in the esthetic expectations of patients, especially in the case of an impacted tooth, in both conventional and implant prosthodontics.

Impaction of maxillary canines is a frequently encountered clinical problem that usually requires an interdisciplinary approach to treatment. Surgical exposure of the impacted tooth and the complex orthodontic mechanisms used to align the tooth into the arch may lead to varying amounts of damage to supporting structures, along with a long treatment duration and financial burden on the patient. Therefore, it is worthwhile to focus on the means of early diagnosis and interception of this clinical situation.[1]

The management of an impacted canine often leads to an inadequate width of attached gingiva, which can be a risk factor for future gingival recession and associated complications. Uncovering a labially impacted maxillary canine can be performed by gingivectomy, apically positioned flap surgery, or a closed eruption technique. Choosing the right technique is sometimes difficult.[2]

Fig 1 *Preoperative view of two maxillary primary canines restored with two all-ceramic crowns with a poor esthetic appearance.*

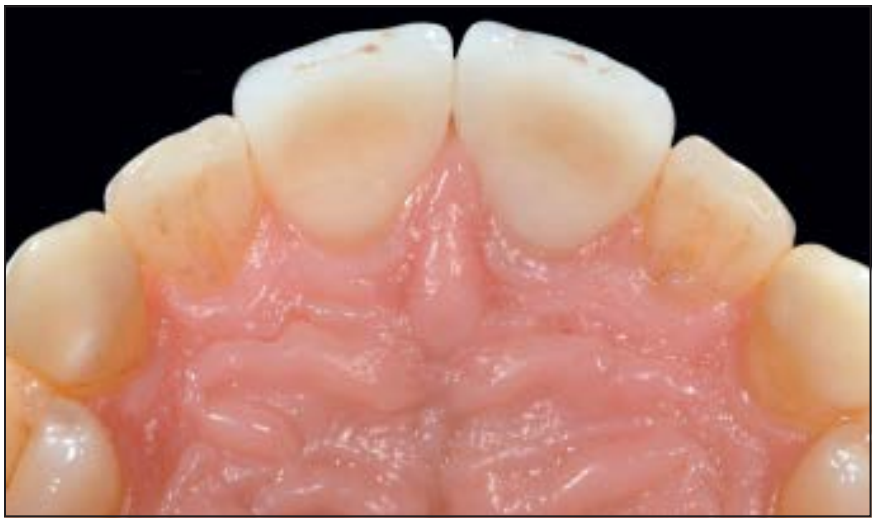

Fig 2 *Occlusal view of the two primary canines.*

Moreover, if the impacted canine is in a palatal position and the patient is older, surgical-orthodontic extrusion is contraindicated. In addition, age influences the treatment success of impacted mandibular canines more than the position and impaction level of the teeth.[3]

The following case presentation details the treatment used in a patient who presented with two maxillary primary canines in need of extraction because of their excess mobility and the presence of two impacted canines that prevented the insertion of two immediate postextraction implants.

Clinical case

A 27-year-old woman presented to the dental office complaining about the esthetic appearance of her two maxillary primary canines. There were no other complaints or health problems (Figs 1 and 2).

The canines had been restored years ago with two all-ceramic crowns, and now their hypermobility and poor esthetic condition called for extraction.

Radiographic examination revealed the presence of normal interproximal bone crests, which are necessary for obtaining a satisfactory papilla in implant therapy (Fig 3). However, the presence of two palatally impacted canines ruled out treatment with two immediate postextraction implants. The volume occupied by the teeth was evaluated using computed tomography. Because the periodontal space was evident, extraction did not appear difficult, and there was enough bone to achieve primary stability in both the coronal and apical directions around the impacted canines.

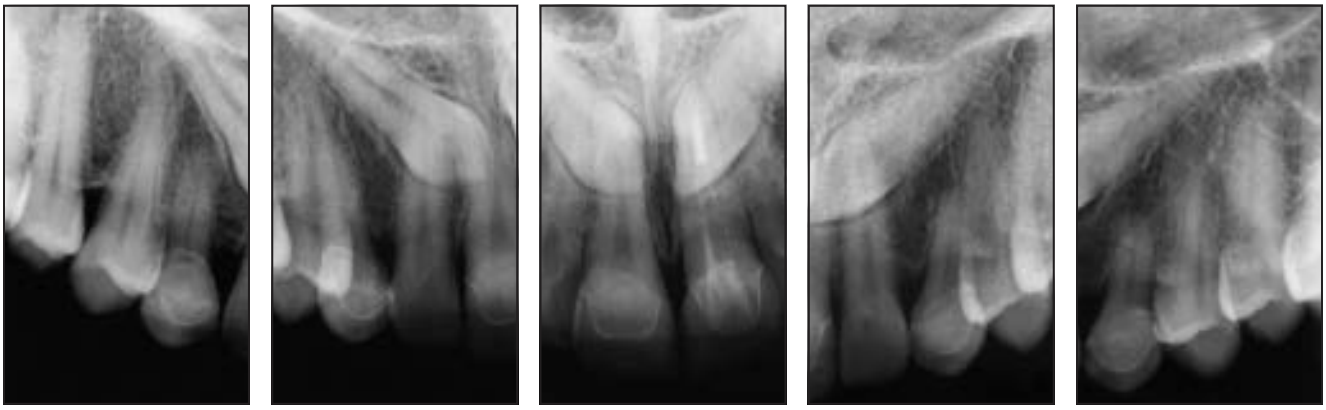

Fig 3 *At the radiographic examination, the presence of correct interproximal bone peaks are evident, along with two impacted canines.*

Fig 4 *With a limited osteotomy, the two impacted canines were visualized.*

Fig 5 *The postextraction sockets immediately after tooth extraction.*

Surgical procedure

Before surgery, a full-mouth professional prophylaxis appointment was scheduled. The patient was premedicated 1 hour before surgery with 2 g penicillin and clavulanic acid (augmentin 1 g, GlaxoSmithKline) to continue with 2 g per day for 6 days.

The first step included the extraction of the two impacted permanent canines. An intrasulcular palatal incision was made, and a full-thickness flap was elevated from the maxillary right first premolar to the left first premolar, without vertical releasing incisions and while preserving the papillae.

A limited osteotomy around the crown of the canines was performed, the follicular tissue was removed by the use of curettes, and the teeth were extracted using only a straight elevator (Figs 4 and 5).

The second step included the extraction of the primary canines, initially with the use of a syndesmotome followed by a very gentle technique to preserve as much of the anatomical site as possible and not crack the alveolar walls.

After extraction, the alveolar bone was explored using a periodontal probe to assess its integrity and to determine which implant diameter to use.

The implants were inserted 2 to 3 mm apical to the free gingival margin, close to the margin of the palatal bone wall, with proper three-dimensional placement.[4] It appeared logical to insert an implant of sufficient length for optimum anchoring (Figs 6 and 7).

Fig 6 *An implant was positioned with an implant carrier in the ideal three-dimensional position.*

Fig 7 *The implant apical bone anchorage is visible bypassing the postextractive void.*

Fig 8 *The two provisional screw-retained restorations at 1-year postsurgery.*

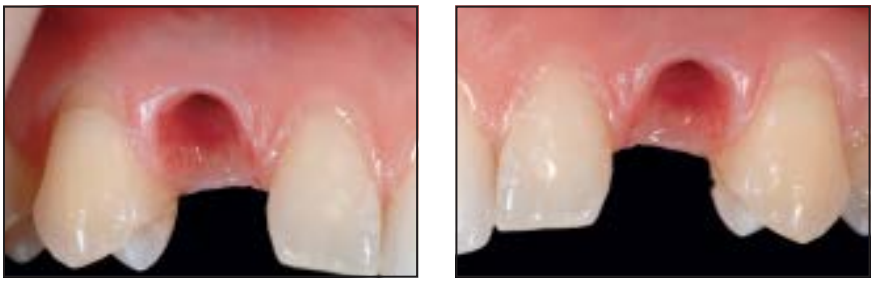

Fig 9 *The transmucosal path created by the correct contour of the provisional restoration.*

The flap was repositioned passively and sutured with multiple single sutures that were removed 10 days after surgery.

It was decided against a soft tissue graft buccally because the deciduous roots had almost the same diameter as the implants and the canine prominence was still in place, precluding the necessity of filling the implant-buccal bone gap with biomaterial.

Prosthetic procedure

An individually screwed provisional crown was relined for each side with acrylic resin (Yates-Motloid) up to the sandblasted provisional base mounting (Dentsply Friadent), which according to the manufacturer can be used as a provisional abutment. After resin polymerization, the provisional crown was removed and some resin was added to fill the gap between the crown and base, and the provisional was finished with the transmucosal part given a concave shape, more pronounced buccally than palatally and interproximally.

The provisional was screwed in by hand, maintaining stability with two fingers so as not to transmit any force to the implant.

Finally, the screw access hole was filled with cotton and covered with composite (Filtek, 3M ESPE). The occlusion was checked and both contacts in centric relation and in protrusive/lateral movements were removed (Fig 8).

The patient was instructed to avoid chewing on the treated area for 3 months and to avoid brushing for the first 2 weeks. A 0.2% chlorhexidine rinse was prescribed for 2 weeks. Thereafter, conventional brushing and flossing were permitted.

The patient kept the provisional for 12 months, then an impression was taken, according to the Hinds method.[5] The use of an abutment capable of faithfully replicating the transmucosal path created by the correct contour of the provisional restoration is a prerequisite for obtaining optimal results (Fig 9). Furthermore, a custom-made abutment allows positioning of the finishing line no deeper than 1.5 mm inside

the sulcus, as in preparing a natural tooth for a crown. This makes it easier to remove the excess cement, which has been associated with signs of peri-implant disease in the majority (81%) of cases.[6]

A zirconium custom-made abutment was fabricated and screwed onto the implant using 24 Ncm of torque; a definitive all-ceramic crown was then cemented (Figs 10 to 12).

Fig 10 *The zirconia abutment in situ. The surrounding tissue did not present any signs of ischemia because the provisional replicated the transmucosal design.*

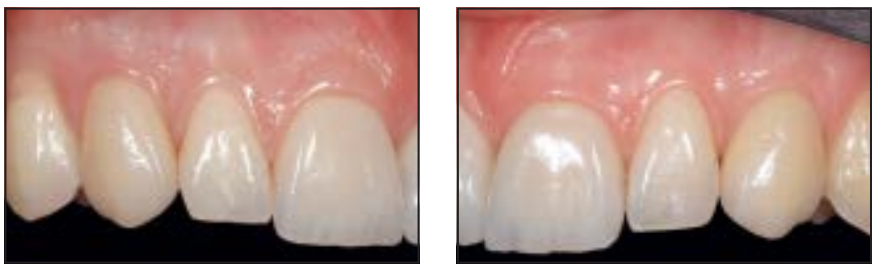

Fig 11 *The 1-year postinsertion view of the final restoration with optimal tissue healing (technician: Mr Giancarlo Cozzolino).*

Discussion

An implant-supported restoration should meet clear-cut esthetic requirements, especially when replacing a single unit in the anterior region.

The achievement of stable results is dependent upon many factors, such as the quantity of keratinized mucosa, thickness and height of buccal and interproximal bone, appropriate surgery, implant position, and shape and material of the transmucosal implant prosthetic components.[4,7,8]

The goal of this case report was to extract two impacted canines, creating only palatal access and preserving the buccal and interproximal bone and, consequently, the papillae and soft tissues.

Primary implant stability was achieved because the small root diameter of the two primary canines left a large amount of bone, the residual pseudo postextraction alveolar socket of the two permanent canines was bypassed, and the apical part of the implant was placed in a portion of intact and stable bone. In this manner, the primary stability of the implants was so good that it was possible to immediately provisionalize the patient.

The immediate loading technique has an unquestionable advantage because the interpapillary and gingivoalveolar fibers preserve the interproximal bone peaks when the interdental peri-implant tissues are provided with immediate support from a healing screw or an immediate provisional restoration.[9]

Moreover, the transmucosal portion of the provisional restoration was concave because this design better preserves and maintains tissue stability over time. The tissue

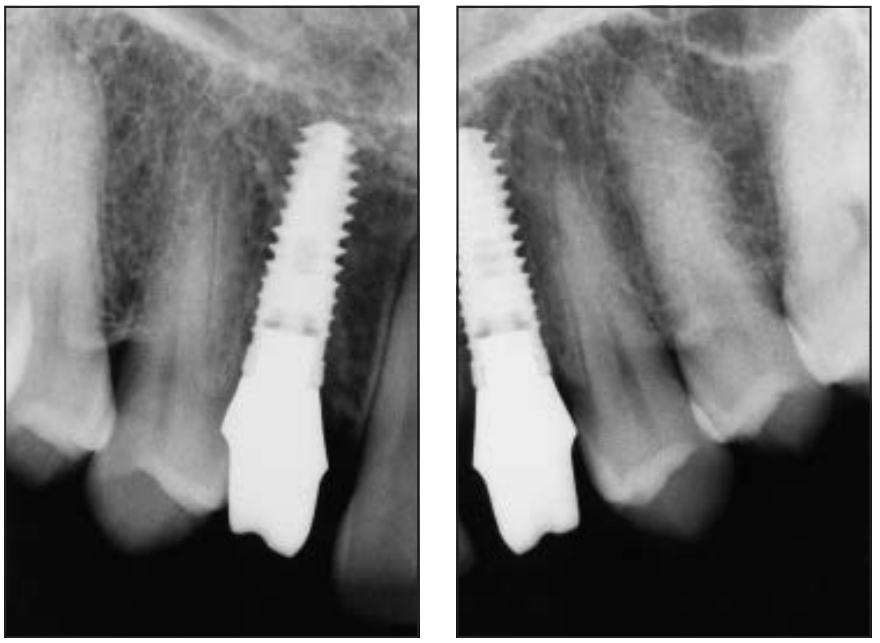

Fig 12 *The final radiograph at 1 year after definitive crown cementation (2 years from implant placement) demonstrated functional implant integration.*

appears healthy, having a clear pink color and sometimes a characteristic orange-peel aspect resembling that around natural teeth.

A concave abutment provides more space for the connective tissue around the abutment, creating a sort of O-ring that functions as a barrier for the bone-implant interface.[8,10,11]

Furthermore, using an abutment made from a highly biocompatible material such as zirconia makes it possible to avoid placing any other metal, including gold alloy, within the transmucosal path or covering the titanium abutment with ceramic. Both procedures have been shown to be incapable of establishing a link with the surrounding mucosal tissue through hemidesmosomes.[12]

Conclusion

The esthetic rehabilitation of patients with functionally compromised dentition frequently involves an unconventional approach. A correct esthetic diagnosis, treatment plan, and material selection are critical factors in a successful restoration. A team approach that includes the clinicians, the laboratory technician, and the patient is essential for achieving the desired result.

Acknowledgments

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