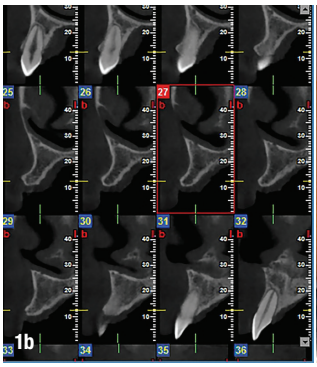
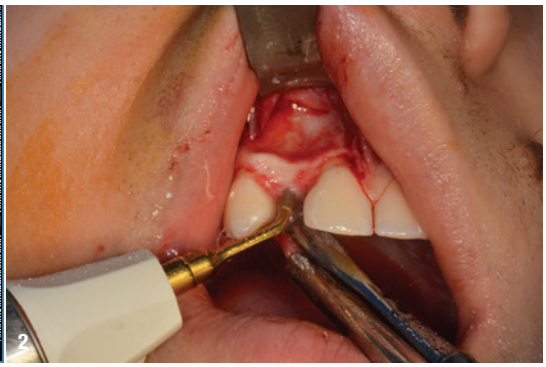
Alveolar deficiency management in maxillary lateral incisor agenesis

Dr Federico Berton, Italy



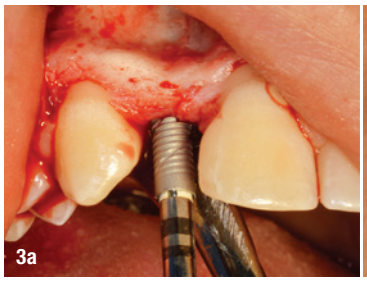


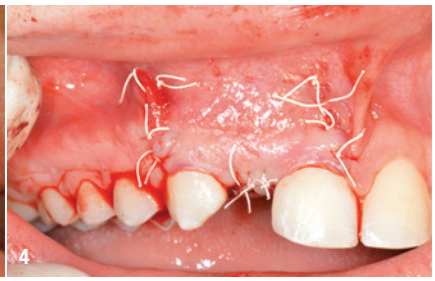
Background

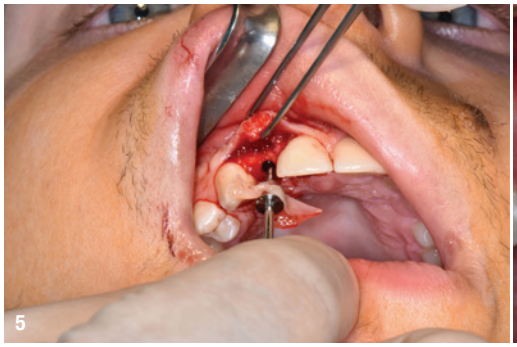
The second most common dental agenesis is that of the maxillary lateral incisors, after agenesis of the mandibular third molars.[1] This common agenesis has important functional and aesthetic impacts for the patient and is challenging to manage for the dental professional. Several approaches to address this condition, both for unilateral and bilateral, have been reported. From least to most invasive, these are (1) the conservative or prosthetic adaptation of the canine to replace the incisor and of the first premolar for canine function (with or without orthodontic assistance); (2) the orthodontically assisted creation of space for the incisor and prosthetic replacement with a fixed prosthesis (employing several approaches); and (3) the orthodontically assisted creation of space for the incisor and implant-supported fixed rehabilitation; removable prosthetic rehabilitation can also be used, but only for provisional necessity when a fixed provisional prosthesis cannot be used.[2] Although implant-supported rehabilitation has many advantages, it also has several disadvantages, such as age constraints, surgical invasiveness, and high hard- and soft-tissue aesthetic demands, given the location of the incisor in the aesthetic zone. Moreover, early implant insertion should anticipate the long-term prognosis of the rehabilitation according to the age of the patient. Finally, incisor agenesis results in a soft- and hard-tissue deficiency that has to be managed to guarantee an opportune aesthetic result and a long-term prognosis for the implant rehabilitation. Therefore, implant replacement of a missing lateral incisor is challenging for the oral surgeon and the prosthodontist.

Case presentation

An otherwise healthy 21-year-old patient was evaluated for implant insertion after a careful evaluation of treatment alternatives. The patient underwent 12 months of fixed orthodontic therapy for space creation and tooth alignment. Afterwards, the patient wore a removable retainer until musculoskeletal growth was reasonably complete. The CBCT scans showed sufficient mesiodistal space but a width deficiency (Figs. 1a & b). Clinical examination highlighted a generous band of attached gingiva. Therefore, the treatment plan involved an initial surgery for implant insertion and bone regeneration, then the positioning of a healing abutment and soft-tissue augmentation after six months, and finally the definitive prosthetic rehabilitation.



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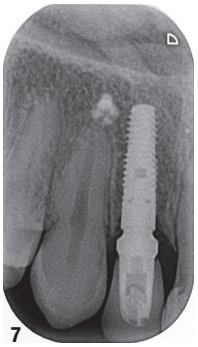
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Amoxicillin (2 g) was given as antibiotic prophylaxis before the surgical intervention. A trapezoidal full-thickness flap was elevated from tooth #11 to tooth #13. After bone exposure, the implant site was prepared with a combined approach (piezoelectric and twist drill; Fig. 2). A tapered implant with a conical connection (3.6 × 12.0 mm; GTB, Advan) was inserted 1.5 mm below the crest in a palatal position (Figs. 3a & b). Afterwards, bone-promoting holes were made in the buccal bone and a cross-linked collagen membrane (Geistlich Bio-Gide, Geistlich Pharma) was secured with a single palatal pin and two buccal pins positioned between the roots of teeth #11 and 13. The gap was filled with deproteinised bovine bone mineral and autologous bone. After accurate periosteal releasing incisions, primary intention closure of the flaps was gained (Fig. 4). The patient was prescribed antibiotic and anti-inflammatory therapy (ibuprofen, every 8 hours; amoxicillin, every 12 hours), together with a 0.2% chlorhexidine mouthwash, and given instructions on postoperative care. Postoperative healing was uneventful, and the sutures were removed after 14 days.

After 6 months, during the uncovering phase, a roll flap technique was employed to augment the soft tissue and a leucocyte- and platelet-rich fibrin (L-PRF) membrane was placed (Fig. 5). After a healing phase of 1 month, impressions were taken and a cemented fixed lithium disilicate crown was delivered (Fig. 6). After one year of healing, besides a physiological remodelling of the peri-implant bone, the soft and hard tissue remained stable and the aesthetic and functional results were good (Fig. 7).

Discussion and conclusion

Prosthetic implant rehabilitation is an effective approach to the treatment of dental agenesis. However, the correct management of tissue deficiencies is a fundamental factor for short- and long-term tissue stability and thus final implant success. L-PRF was chosen in this case to promote soft-tissue healing and for soft-tissue augmentation given the presence of a wide band of attached gingiva.[3,4] Therefore, the more invasive option of a connective tissue graft was not considered. The easy withdrawal of blood and the reduced costs of the procedure make L-PRF the procedure of choice for select cases. The choice of hard-tissue augmentation, within the context of implant insertion, was made owing to the sufficient bone height and width for primary implant stability and to provide the requisite bone width to reduce the risk of facial dehiscence and possible aesthetic impairment and to allow prosthetically driven implant positioning.[5] Also the choice of implant was made according to the state of the art. A position below bone level allows more space for hard and soft tissues, together with prosthetic management of the crown. Therefore, a conical implant connection was chosen. The conical connection is reported to have the least micro-gap with the prosthetic abutment. This seems to protect the peri-implant bone from resorption.[6] Finally, the minimal roughness of the implant surface (OsseoGRIP) was chosen according to the expected prognosis of the implant and its position: a good long-term prognosis may be a benefit of this choice, given the low correlation to peri-implant pathology and the ease of cleaning[7] if exposed to the oral cavity. In conclusion, an accurate treatment plan, together with the most updated scientific findings brought to the clinical setting, facilitates a successful treatment result, for both the patient and the clinician.

about the author

Federico Berton, DDS, MSc, PhD, is a dental consultant at the clinic of maxillofacial surgery and dentistry of the University of Trieste in Italy and an oral surgeon at his family's dental office. He is a lecturer and tutor at the University of Trieste and a national councillor on the board of the Società Polispecialistica Italiana dei Giovani Chirurghi. He is an active member of the International Piezoelectric Surgery Academy. He engages in research in regenerative surgery, implantology and periodontics and has authored more than 30 scientific articles in international journals.

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Literature