Enhanced CPD DO C

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Aesthetic challenges associated with congenitally or otherwise missing lateral incisors

Abstract: Jaws are becoming smaller, leaving less space for teeth. To adapt, nature often reduces the frequency of upper lateral incisors and lower second premolars. While this may be logical biologically, it creates major aesthetic challenges.
CPD/Clinical Relevance: xxxxxxxxx

Aesthet Update 2025; 2: xxx–xxx

As part of human evolution, our jaws are becoming smaller, leaving less space for teeth. To adapt, nature often reduces the frequency of upper lateral incisors and lower second premolars {REF}. While this may be logical biologically, it creates major aesthetic challenges: the aesthetics of missing upper laterals clash with conventional views of what represents an acceptable smile {Ref}. No matter how diminutive, or even peg-shaped, the remaining lateral incisors may be, aesthetics do not need to be compromised (Figure 1).

This article addresses the available treatment options involved in replacing missing lateral incisors and features a case treated conservatively through patient choice

Peg laterals are common and usually provide enough bone for orthodontic positioning, with modern composites and veneers allowing excellent aesthetic outcomes (Figure 2).

If the problem of missing lateral incisors is not diagnosed early and corrrective treatment undertaken, the patient can be left with what society regards as an unattractive smile – with the canine teeth often looking 'vampire' like (Figure 3) {Ref?}. Orthodontics in these, and similar cases presenting in adulthood would require extractions to create the initial space, followed by extensive orthodontics to narrow the space mesio-distally where the planned position of the lateral incisors would be and finally, in all probability, the provision of either adhesive bridgework or implants.

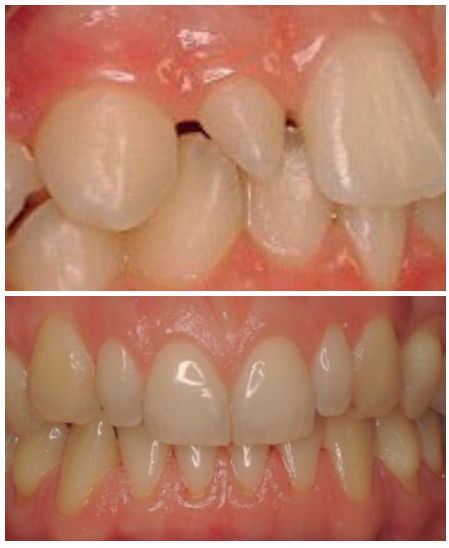

Figure 1. (a) Pre- and **(b)** post-treatment of a diminutive peg lateral incisor.

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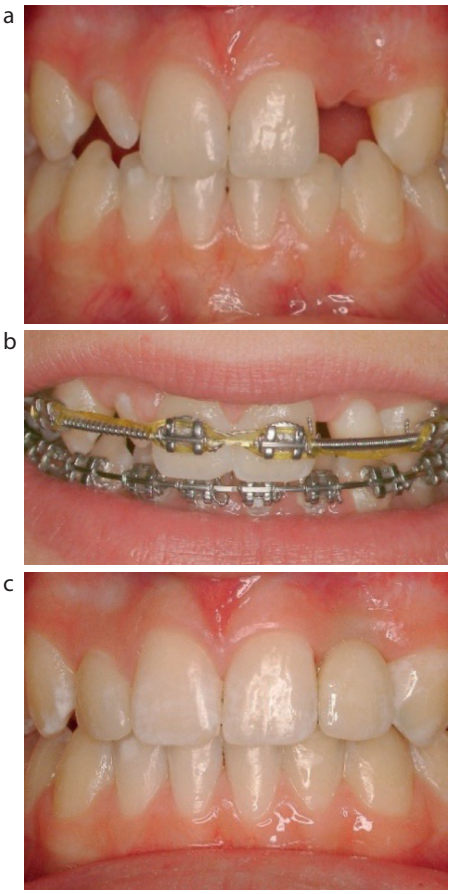


Figure 2. Peg laterals. **(a)** This 14-year-old patient had a missing left lateral and a right peg lateral incisor. **(b)** After orthodontic treatment, **(c)** the missing tooth was restored with an adhesive bridge, which proved to be a very reliable restoration – it has been in place for over 20 years without dislodgement. The peg tooth was restored with a porcelain veneer.

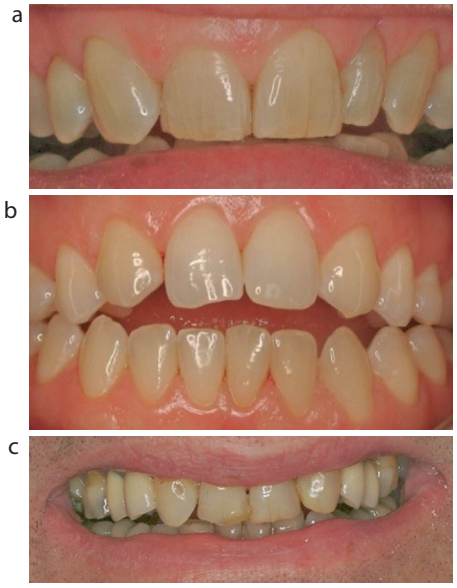


Figure 3. (a–c) In these cases, the problem of missing lateral incisors was neither diagnosed early nor had corrrective treatment undertaken, leaving the patients with a less attractive smile.

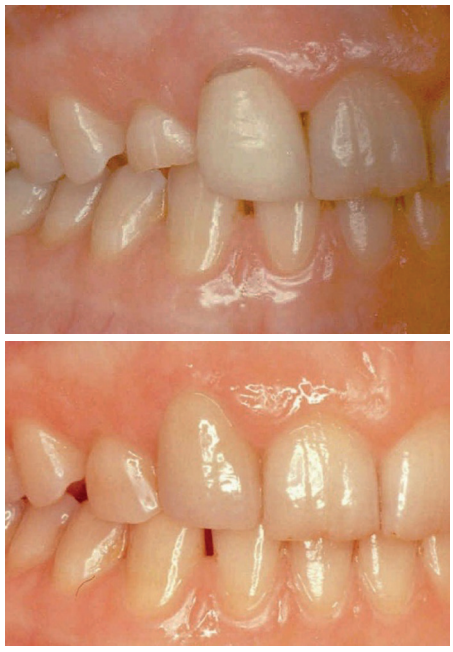


Figure 4. (a,b) The retained deciduous canine was built up in composite.

Even with skilled restoration, canines are bulkier than lateral incisors and have higher zeniths than the adjacent teeth, making disguising the problem less convincing (Figure 4).

The case shown in Figure 5 was one that was impossible to address satisfactorily with a removable denture or orthodontics. It was carried out at Guy's {AQ: full institution name?}, not long after one author's graduation in 1976. Although the restorative protocol would be frowned upon today, fixed bridgework was the only viable option at that time – adhesive dentistry did not exist and neither did implants. Ethically, as three of the teeth that would be involved in the proposed four-unit bridge had already been root treated (Figure 5b), preparing the upper right canine, which already had a restoration present, seemed justified. The patient was delighted with her final appearance (Figure 5c). It was also transformational to her confidence and mental wellbeing.

The case in Figure 6 is also from the 1990s. Again, fixed bridgework was the only option at that time. However, it could be justified because only one tooth, the upper left canine, which would act as an abutment, was a 'virgin' tooth. The bridge continues to serve the patient well.

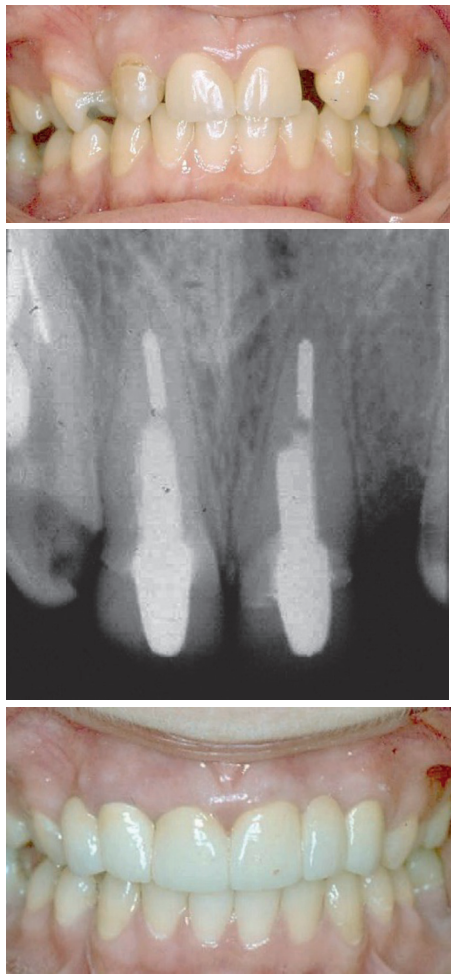


Figure 5. (a) The patient, in their early 20s, hated her appearance. **(b)** Three of the involved teeth had been previously root treated. **(c)** The patient was delighted with the final result, which was still in place some 20 years later – the patient emigrated so further follow up photographs are not available.

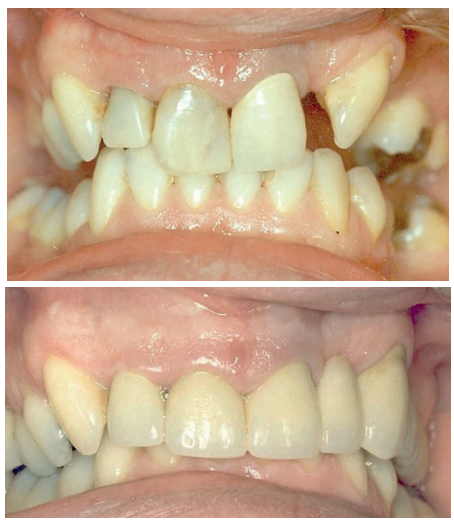


Figure 6. In this case from the 1990s, appearance was paramount to this male patient. Again fixed bridgework was the only option at the time. **(a)** Before and **(b)** after treatment .

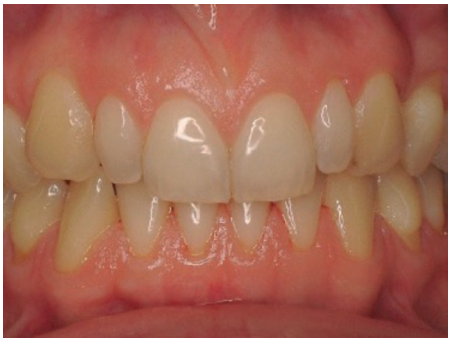


Figure 7. Aesthetic results are achievable even when the zenith points on diminutive lateral incisors are not quite perfectly aligned. {AQ: is visual tension around the rotated UR3?}

Restorative aesthetic issues and missing bone

Figure 7 shows that even if the zenith points on diminutive lateral incisors are not quite perfectly aligned, the aesthetic appearance is still pleasing. Ideally, lateral incisors should be about 1 mm shorter than central incisors, with zeniths slightly lower. However, even small discrepancies can still produce a pleasing smile if proportions are balanced.

Bony clefts are associated with congenitally absent lateral incisors (Figure 8). As a consequence, it is inevitable that, aesthetically, any lateral incisor pontics that are provided will look longer than the adjacent zenith points. Invariably, they are above those of the adjacent teeth, which in turn compromises the final aesthetic result.

The lateral incisor, being diminutive, is also the most commonly lost tooth in an intact dentition (Figure 9a) {REF?}. Around 90% of ridges heal with at least a small defect, but if the extraction is traumatic with bone removal involved, the cleft on healing will be even greater. The once recommended technique of compressing the buccal plate of bone (Figure 9b), in the authors' opinion, should be avoided at all costs {REF?}. The CBCT scan in (Figure 9c) clearly shows that although bone height is normal, bone width has been lost as a result of compression of the buccal plate of bone resulting in a 'large cleft'. In turn, this makes the future restoration difficult to restore aesthetically without grafting techniques.

One other relevant point following extraction of a lateral incisor, or any tooth in the aesthetic zone, is that

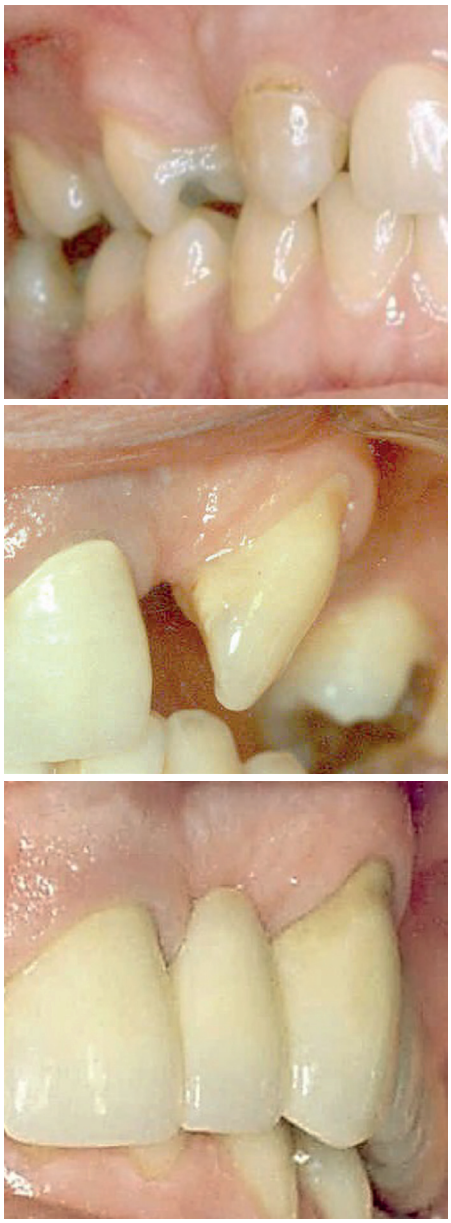


Figure 8. (a–c) Bony clefts are often associater with congenitally absent lateral incisors. The zenith points will be higher than those of adjacent teeth.

in order to preserve bone as much as possible, a simple acrylic tissue-borne 'gum stripper' denture (Figure 10) is contraindicated. This design has been shown to accelerate underlying bone loss thereby increasing the size of the cleft {REF?}. Any form of rudimentary adhesive replacement is recommended during bony healing until the option of the placement of an implant or definitive adhesive bridge is possible (Figures 2 and 11).

Finally, long-term replacement of missing lateral incisors predictably carries

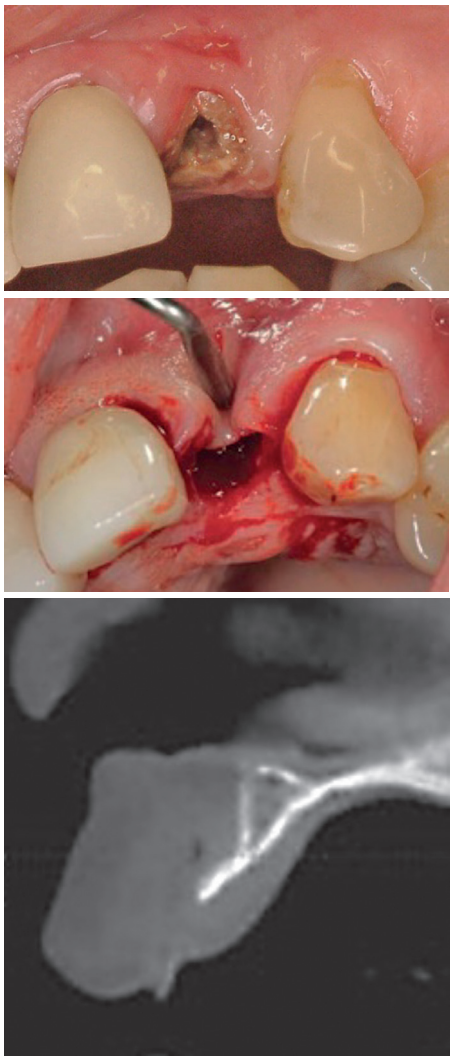


Figure 9. (a) Diminutive lateral incisors are the most commonly lost tooth from an intact dentition. (b,c) Compression of the buccal bone plate is not recommended because bone width can be lost as a reult, creating a large cleft.

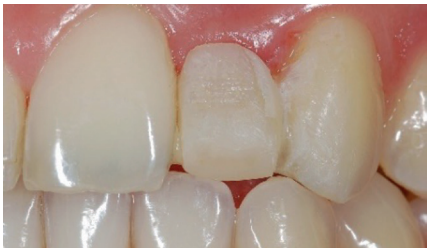
a warning in patients aged up to their early 20s. Skeletal growth usually continues until that time and in many cases the appearance that looked excellent in their early teens begins to look poor (Figure 12). This current appearance is unacceptable to the patient and the treatment provided for its replacement will be dealt with clinically later in this article.

Bone grafts can restore ridge width, which in turn, can give sufficient bone width buccolingually for future implant placement (Figure 13). However, many patients decline invasive surgery, whether the bone is harvested from, as in the example, the ramus.

Alternatives include particulate grafts and the use of membranes, but some

Figure 10. Simple acrylic tissue-borne 'gum stripper' dentures are contraindicated. This design has been shown to accelerate underlying bone loss thereby increasing the size of the cleft.

a



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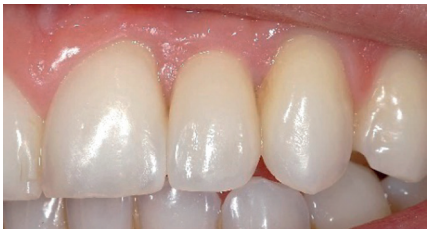


Figure 11. (a) Any form of rudimentary adhesive replacement is recommended during bony healing until **(b)** there is the option for placement of an implant.

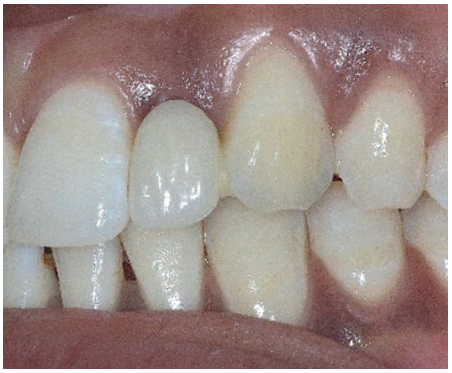
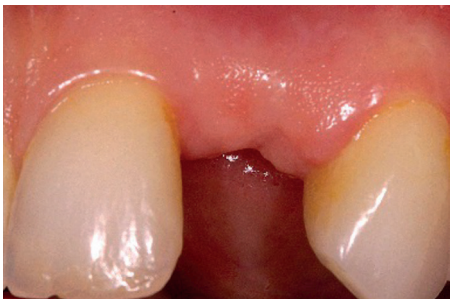


Figure 12. Long-term replacement before the age at which skeletal growth has finished should be avoided.

a



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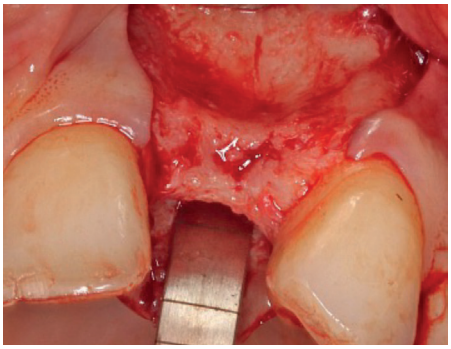

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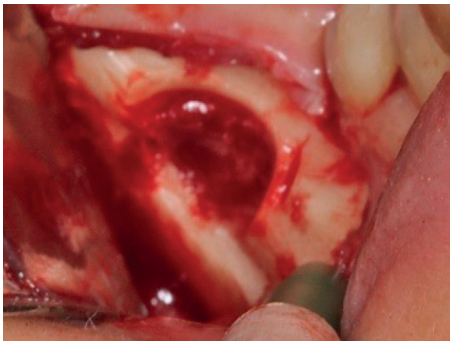

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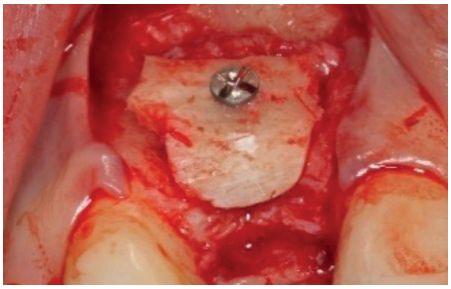

Figure 13. (a–d) A bone graft to restore ridge width with the graft harvested from the ramus. Courtesy of Dr A Dawood.

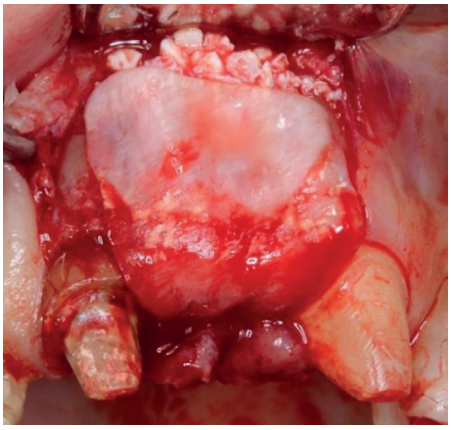

Figure 14. Particulate bone graft and membrane coverage.

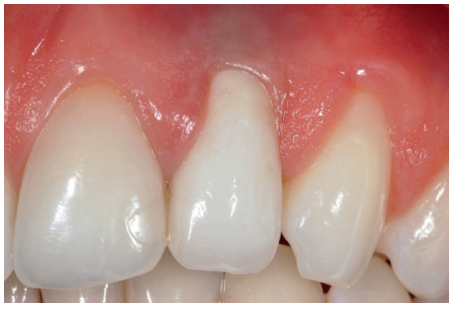

Figure 15. Bone shrinkage resulting in reduced ridge width or height can make implant crowns look unnaturally long. The shadowing seen above the crown is from the titanium implant.

patients will not consider these either (Figure 14).

Finally, there is no guarantee that any form of bone graft will be successful. Bone shrinkage resulting in reduced ridge width or height can make implant crowns look unnaturally long, especially in patients with a high smile line (Figure 15).

Is the 'distalizing' canine technique a possible treatment modality to ensure enough bone exists for future implant placement?

(Frank Speare BACD Cardiff November 2022 ref??)

What does this term mean? As discussed, if one or both upper or lower lateral incisors are known to be missing during the mixed dentition, it is suggested that, working alongside an orthodontist, the erupting canine(s) are moved into the position of the missing lateral incisor(s), with space being left and maintained distally to allow future movement of the canines into their true position. The space is maintained preferably with a non-invasive fixed adhesive restoration rather than a removable denture until skeletal maturation has occurred . By bringing the canines into the lateral position, the bone follows and when the canine is distalized, the bone thickness remains in the edentulous area, eliminating the appearance of a bony cleft and leaving enough bone thickness for future implant placement or other restorative option.{REF}

Age

Before a patient can have dental implants placed, they should have reached skeletal maturity – that is to say their jawbone should be fully developed and will not have any more 'growth spurts.' If implants are placed before puberty has finished and the jaws are still maturing, the restorations can be affected by further bone development {REF?}, compromising

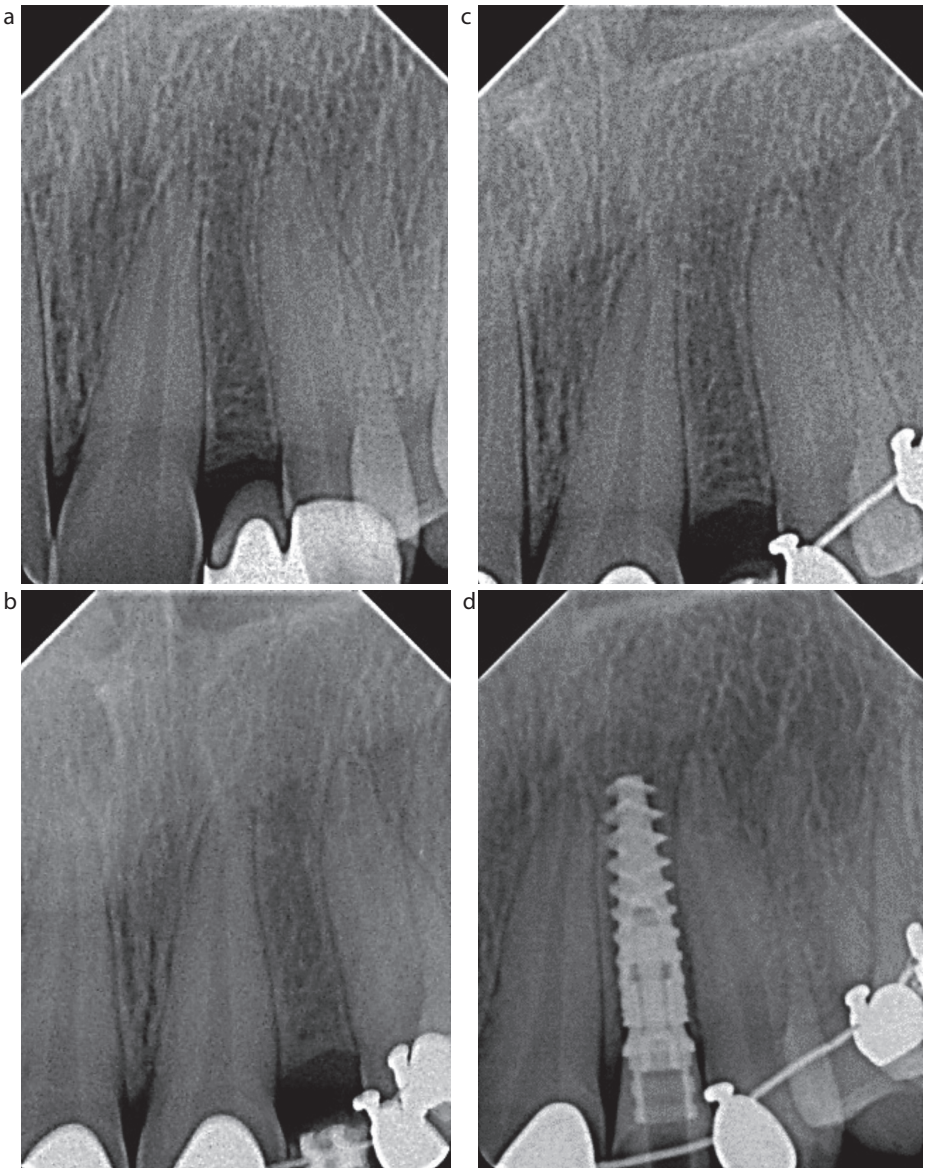

Figure 15. (a) Orthodontic tilting of the tooth left insufficient space for an implant. **(b–d)** A further course of treatment was required to create enough space.

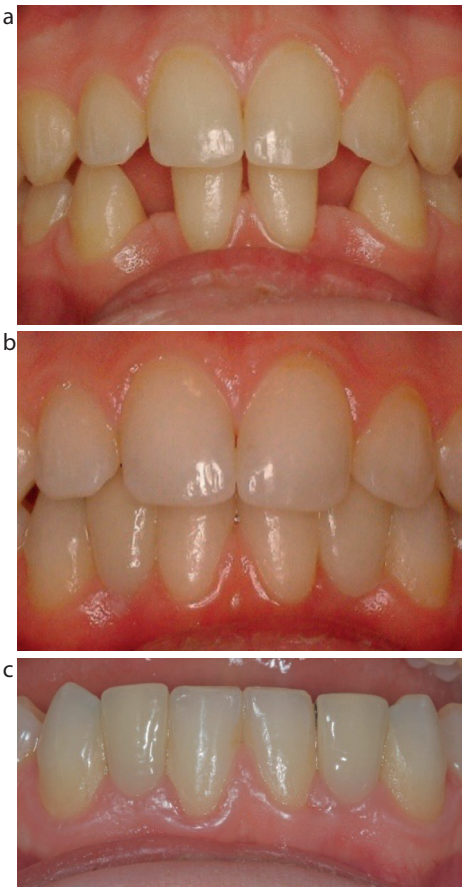

Figure 16. (a.b) Distalization was attempted over a period of 2.5 years but failed to achieve adequate space for an implant. (c) The adhesive bridgework still in place 15 years after treatment.

their longevity and potentially resulting in the following complications:

- Submerging implants;
- Occlusal problems;
- Spaces between the teeth;
- Bone loss around the existing restorations.

Typically, bony growth continues until at least 18 years of age and in many cases, a person is in their early 20s before skeletal maturity is finally complete.{REF?} Implants or bridges placed too early could well appear mismatched as the patient matures.

The 'distalization' treatment option is lengthy, costly, very technique sensitive and not without potential problems, particularly apical space requirements. The narrowest implant (other than one piece) available is 3 mm wide and ideally needs to have 1.5 mm of bone around it.{REF?} This means that the apices of the adjacent teeth need to be 6 mm apart. The orthodontist involved needs to bodily move the canine rather than tilt it because there may be insufficient space at the apical level for implant placement. A further course of orthodontic treatment would then be necessary to provide this apical space prior to implant placement (Figure 15).

Figure 16 shows a case where distalization was attempted over a period of 2.5 years, but still resulted in inadequate apical space with the patient relying on adhesive bridgework for life.

Case presentation

A female patient, in her early 20s, attended regarding aesthetic issues related to the shorter upper left central incisor and the 9-year-old adhesive bridge fitted satisfactorily at the age of 13 to replace her congenitally absent upper left lateral incisor. The initial examination also showed that the upper right second premolar, lower left second molar and all four wisdom teeth were congenitally absent (Figure 17).

For the purposes of this article, only the issue related to the adhesive bridge will be discussed and presented in detail. The causes of the loss of aesthetics of the adhesive bridge during the skeletal growth spurt during her teens were discussed earlier in this article.

The study models (Figure 18) show the residual bony cleft. Clinical examination

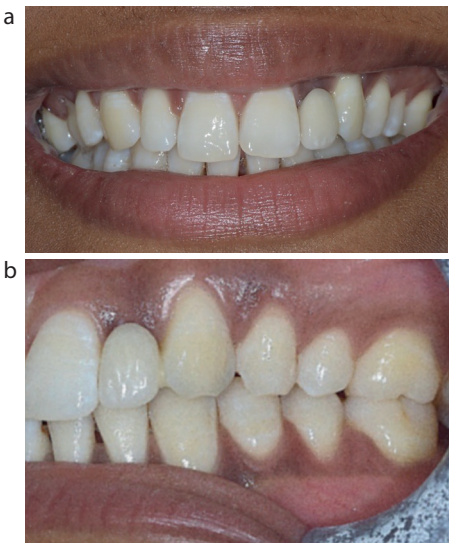

Figure 17. (a,b) The patient at presentation.

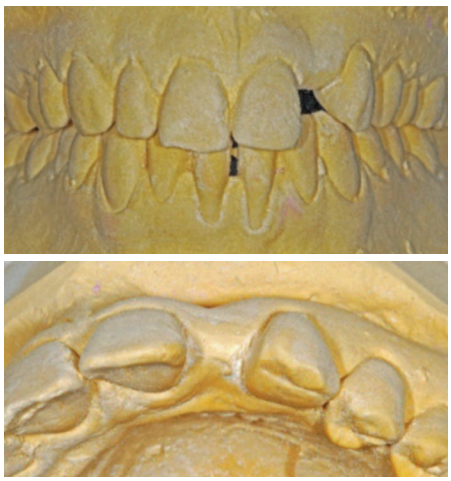

Figure 18. (a,b) Study models.

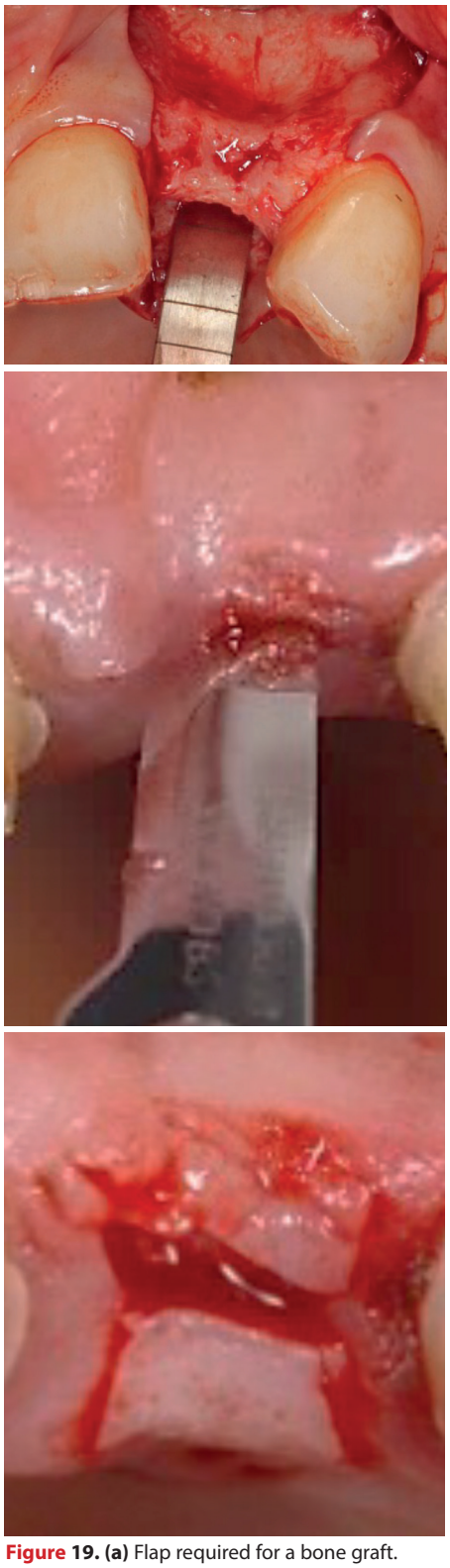

Figure 19. (a) Flap required for a bone graft. **(b,c)** The minimal incisions required to create a buccal 'pouch' into which the fibrous tissue graft is placed

showed it was clinically deeper than it appears in the photo. The treatment options considered were:

- Doing nothing and leaving the bridge as it was;
- Removing the bridge and providing a partial denture;
- The provision of a new adhesive bridge;
- The placement of an implant, a procedure that would require bone grafting.

The patient declined the bone grafting option and requested a new adhesive bridge but insisted that, if possible, with her high lip smile, the harmony of the pontic should merge with the adjacent teeth.

With the aid of photographs of cases involving soft tissue grafting to improve the bulk of tissue available for an ovate pontic form, the patient understood that she had little option but to proceed with the recommended treatment. The patient consented for the graft to be taken from her flabby retromolar area on the upper left. Furthermore, she understood that for a period of approximately 8–10 weeks following the procedure, she would have to wear a removable partial denture, which would, in turn, be used to create an ovate pontic form in the grafted tissues and act as an emergency restoration should the proposed adhesive bridge debond.

The soft tissue grafting procedure is not as invasive as the procedure a bone graft. The large flap required for a bone graft (Figure 19a) is completely unnecessary because all that are required are minimal incisions to create a buccal 'pouch' into which the fibrous tissue graft is placed (Figure 19b,c).

Models were taken to fabricate an immediate partial denture to be fitted on the day of grafting. Buccal and palatal local anaesthesia was administered as infiltrations in the area of the lateral incisor, as well as the retromolar area from which the graft would be taken. The existing adhesive bridge was gently tapped off and residual composite micro etched away and then polished.

Incisions were made as shown in (Figure 19c), leaving the papillae untouched. Access was gained through the incision to free up a pouch buccally from the distal half of the central incisor to the mesial half of the canine just short of the muco-epithelial junction. Great care was taken not to puncture the buccal tissues.

Although the photos of a graft from the retromolar area seen in Figure 20 are not related to this case, a similar but much smaller graft was harvested and denuded of the epithelium. It was then further shaped to an even thickness of approximately 4 mm and lozenge shaped, being wider mesio-distally than the defect, and to a height that would allow the buccal and palatal flaps to be brought together. The flaps were sutured and firm pressure was applied in the grafted area for 5 minutes (Figure 21). The immediate denture was trial fitted and adjusted to ensure only very light contact between the grafted site and the underside of the pontic tooth. It is important to ensure that there is no pressure on this edentulous area (Figure 22).

The dramatic increase in the width of the edentulous ridge after 4-week healing period is clearly seen in the before and after images of the area (Figure 23).

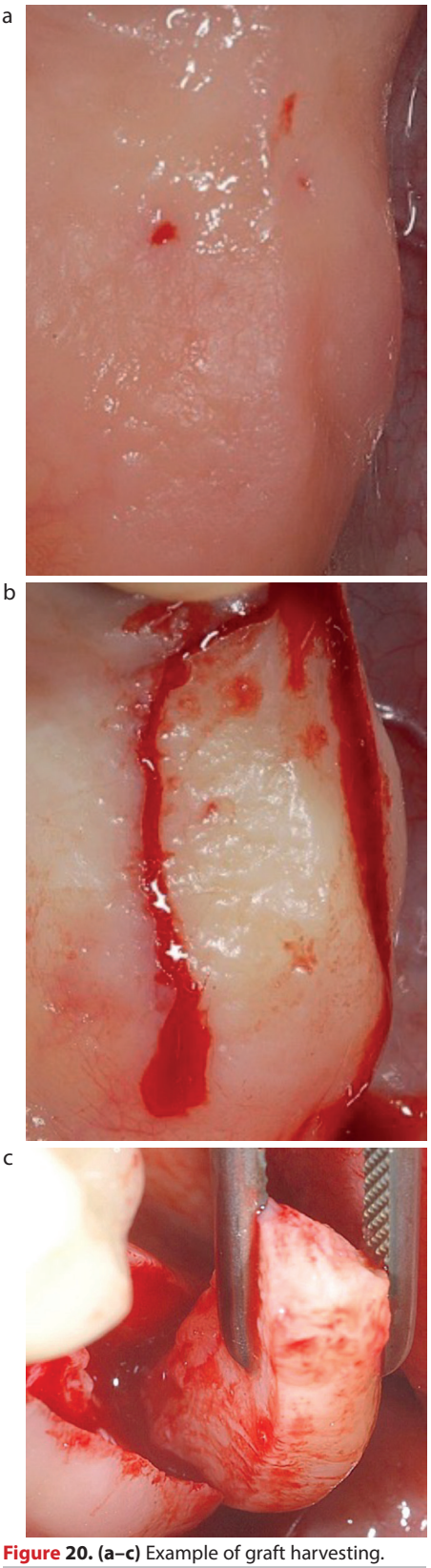

Figure 20. (a–c) Example of graft harvesting.

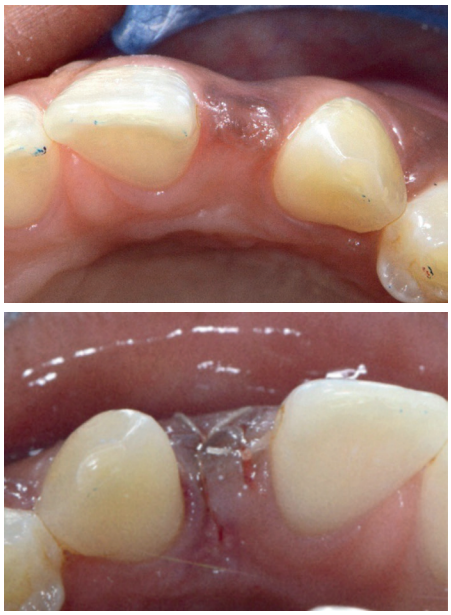

Figure 21. (a) Before grafting and (b) after the graft was sutured in place.

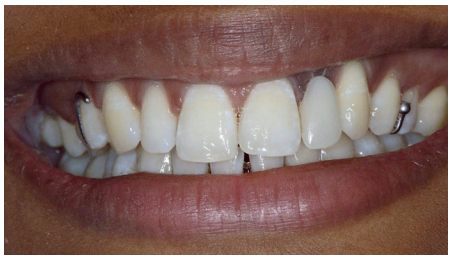

Figure 22. The trial fit of the immediate denture.

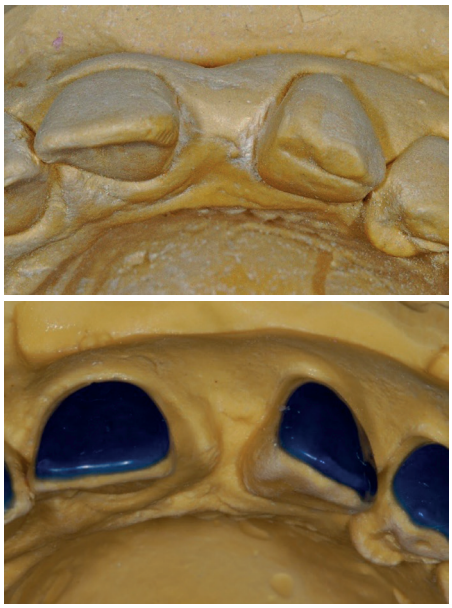

Figure 23. Study models from **(a)** before and **(b)** after tissue grafting showing the much increased width of the edentulous ridge.

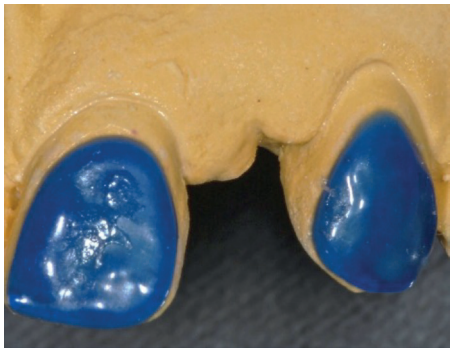

Figure 24. Although there maybe excess gingival tissue in the papillary areas, thick gingival tissue responds very well to directed gentle pressure.

The resultant buccal view (Figure 24) may seem poor aesthetically, with excess gingival tissue in the papillary areas. However, it must be understood that thick gingival tissue responds very well to directed gentle pressure. In this case, the denture pontic tooth will be used to push the tissues mesially and distally to create papillae and eliminate any unaesthetic black triangles.

At this the point, weekly incremental additions of cold cure acrylic can be made to the fit surface of the ridge lap design of the denture tooth to convert it into an ovate pontic form, which in turn places pressure on the tissues to create normal papillae and an emergence profile. Usually no more than four or five additions are required to create the emergence profile (Figure 25). Pressure on the interdental papillary area in particular moves the 'excess' gingival tissue into the interdental space and, with continued additions, will eliminate the 'black' triangles interproximally as seen in Figure 25c.

No special impression technique is required. Simply keep the denture in place until the very last moment to ensure that the tissues do not collapse and distort. Once the model is poured from the impression, it is generally advisable to slightly refine the pontic area on the model before starting the fabrication of the final restoration (Figure 26). The long-term success and stability of the treatment is dependent on ensuring that the ovate pontic form is accurately reproduced to continue to support the tissues.

The final design of the adhesive bridge was discussed with the patient, namely the option of a conventional metal-based adhesive bridge {AQ: please give alloy and porcelain used, thanks}, which has an excellent long-term track record of successful retention, as opposed to providing an all-zirconia design. The patient was made aware that there could be some bluish shine-through buccally

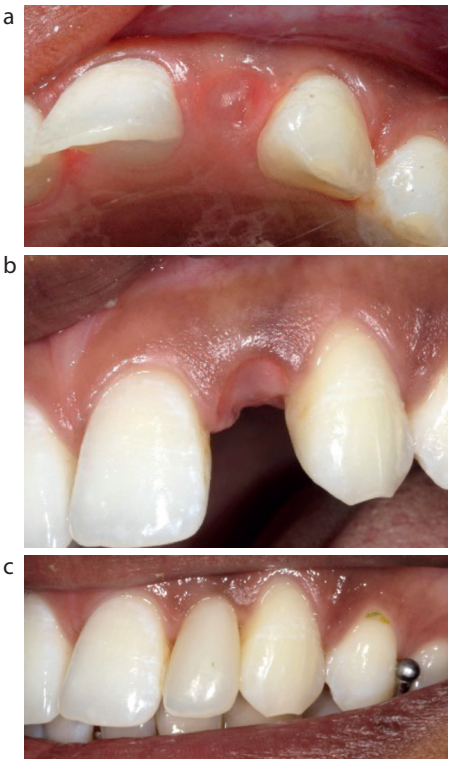

Figure 25. (a–c) Creation of an aesthetic emergence profile using additions to the denture tooth to form an ovate pontic.

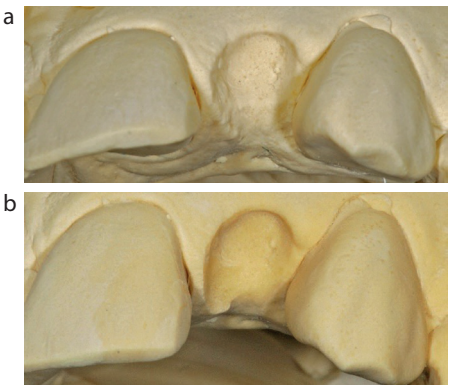

Figure 26. (a) The model poured from the impresson. **(b)** The model after refinement.

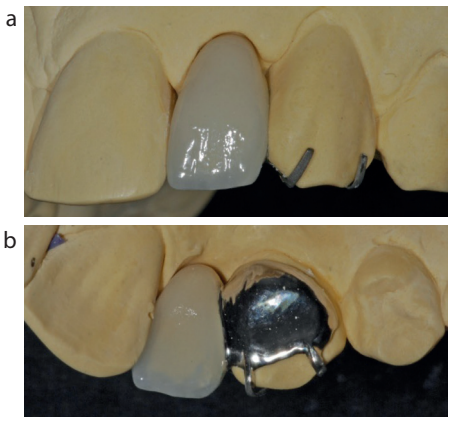

Figure 27. (a) Buccal and **(b)** lingual views of the bridge. Locating hooks are removed once the bridge has been cemented.

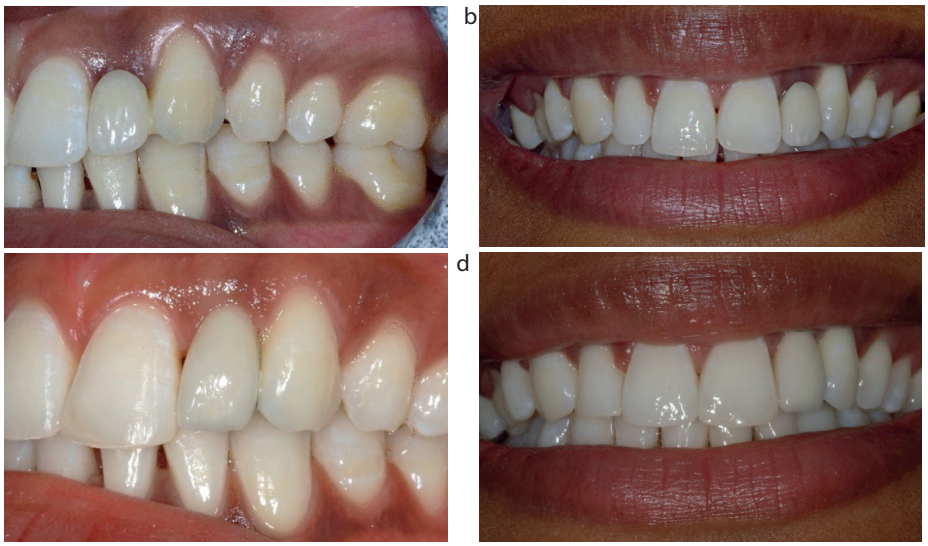

Figure 28. (a,b) The original bridge and **(b,d)** after fitting of the new bridge. Note the much improved aesthetics.

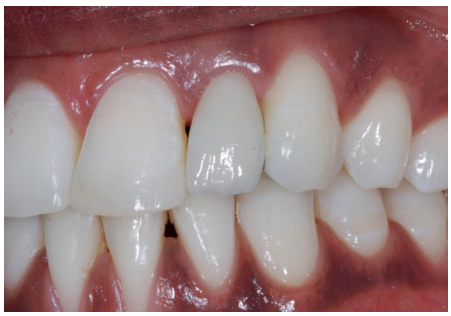

Figure 29. The pontic at 3 years.

with the metal design. With an all-zirconia bridge, this shine through would be eliminated; however, being fabricated from a newer material, this design does not have the same retentive long-term track record. In addition, it was pointed out that there have been instances of reported fracture of the cantilever pontic off the retaining framework.

The constructed bridge is shown in Figure 27. It is the present writers' preference to have locating hooks to ensure a positive stable location during cementation. Once the resin cement has cured, the hooks are simply cut off.

Figure 28 shows views of the original bridge and the aesthetics achieved after fitting of the new bridge. The excellent aesthetics were achieved with the formation of an emergence profile for the adhesive bridge, further supplemented by the incisal build-up of the adjacent central incisor with composite to match the length of the contralateral central incisor. The very stable 3 year follow up is shown in Figure 29.

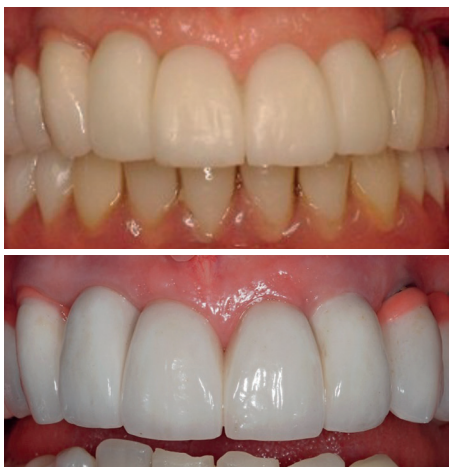

Figure 30. (a,b) Stable gingival form 11 years after fit of a cemented implant-supported bridge. Immaculate oral hygiene seems to be a key factor involved in stability.

Conclusion

The technique described has successfully addressed the patient's aesthetic expectations, if not exceeded them. The overriding question is the long-term stability of the procedure. The patient was at the age where skull growth had stopped so bony further bony changes were unlikely. One of the present authors has been using the ovate pontic technique described for some 17 years with both conventional and implant-supported bridgework, and has found almost no cases of relapse of the soft tissue in that time. The ovate pontic form, if correctly designed, seems to offer long-term stability (Figure 30).

Finally, this technique is not restricted to absent lateral incisors. It can be used

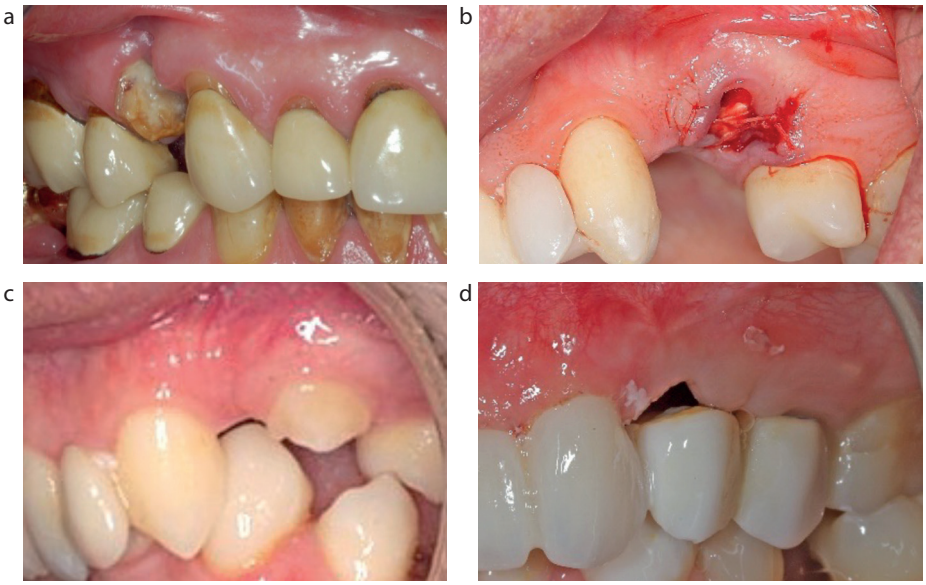

Figure 31. (a) A defect after an extraction for which this technique could be used. **(b–d)** Defects for which this technique would not be suitable and where a large soft tissue, if not a bone graft as well, would be required.

around any single tooth aesthetic defects in the anterior region if a defect exists after extraction (Figure 31a). However, larger soft tissue defects, such as will appear when the deciduous first molar is extracted cannot be re-shaped with this technique (Figure 31). A large soft tissue, if not a bone graft as well, would be required to eliminate this type of defect.

Practical learning tips

- Delay implant placement until skeletal maturity is confirmed.
- Avoid acrylic 'gum-stripper' dentures in the aesthetic zone.
- Use provisional adhesive bridges during healing instead.
- The ovate pontic technique provides stable long-term results.
- It can be applied to both conventional and implant-supported restorations.
- Success depends on careful tissue management and patient compliance with hygiene.

{Please could some concluding sentences be added?}

Compliance with ethical standards

Conflict of Interest: The authors declare that they have no conflict of interest.

Informed Consent: Informed consent was obtained from all individual participants included in the article.

References

1. To adapt, nature often reduces the frequency of upper lateral incisors and lower second premolars
2. conventional views of what represents an acceptable smile
3. can be left with what society regards as an unattractive smile
4. The lateral incisor, being diminutive, is also the most commonly lost tooth in an intact dentition
5. compressing the buccal plate of bone should be avoided at all costs.
6. This design has been shown to accelerate underlying bone loss thereby increasing the size of the cleft
7. (Frank Speare BACD Cardiff November 2022 ref??)
8. By bringing the canines into the lateral position, the bone follows and when the canine is distalized, the bone thickness remains in the edentulous area, eliminating the appearance of a bony cleft and leaving enough bone thickness for future implant placement or other restorative option
9. If implants are placed before puberty has finished and the jaws are still maturing, the restorations can be affected by further bone development
10. bony growth continues until at least 18 years of age and in many cases, a person is in their early 20s before skeletal maturity is finally complete
11. The narrowest implant (other than one piece) available is 3 mm wide and ideally needs to have 1.5 mm of bone around it