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Therapeutic management for post-traumatic treatment of the anterior dental region: a case report with long-term follow up

CASE REPORT

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Abstract – The treatment plan represents the final step in every diagnostic procedure and is the result of a series of assessments based on information gathered from a detailed clinical history. This clinical case reports the replacement of two central incisors that were lost because of a trauma. The advantages and disadvantages of the two treatment options (i.e. implantology or prosthetic restoration) were carefully evaluated in relation to the case in hand. Patient compliance and aesthetic requirements had been also considered. In this case, a conventional prosthetic restoration was performed using a metal-ceramic bridge, utilising full crowns between the right and left maxillary lateral incisors associated with minimal canine preparation. By this strategy, the treatment plan allows for a future implant restoration, should this become necessary.

The treatment plan represents the final step in every diagnostic procedure and is the result of a series of assessments based on information gathered from a detailed clinical history. There are often a number of treatment options, and the plan should be the best solution for each individual patient bearing in mind the cost in relation to treatment success.

This clinical case reports the replacement of two central incisors that were lost because of trauma. The advantages and disadvantages of the two treatment options (i.e. implantology or prosthetic restoration) were carefully evaluated to provide the best aesthetic result.

It is well established that dental implants are highly successful, although there is a significant difference between those placed in anterior aesthetic regions and those in lateral–posterior segments (1).

To achieve a suitable aesthetic result in the anterior regions, implants should only be used if favourable periodontal (lip line and/or gingival biotype), dental (such as tooth morphology, contact area, distance between contact area and bone ridge) and bone conditions (such as thickness) are present (2–5).

Patient compliance and aesthetic requirements must also be carefully considered.

Case report

At the age of 16, FS, female, was involved in a moped accident resulting in the complicated crown fracture of 31 and 41, the crown-radicular fracture of tooth 12, the avulsion of tooth 11 with delayed re-implantation and the crown fracture of tooth 22 (Fig. 1). An emergency dental splint was placed using a metallic wire splint that was subsequently replaced with a semirigid splint for 3 weeks.

Fig. 1. After a moped accident, teeth 11 and 21 were re-implanted with a metallic splint at a hospital Emergency Unit.

As a result of the crown-radicular fracture, tooth 41 was extracted and a metal-ceramic bridge was positioned between teeth 31 and 42. The right central and the left maxillary incisors were reconstructed directly using composite. A metal-ceramic crown (Fig. 2) was used to restore the right maxillary lateral incisor (tooth 12).

Following the re-implantation and stabilisation, the two maxillary central incisors (teeth 11–21) showed signs of ankylosis within a few weeks. However, the subsequent radicular resorption process, characterised by bone replacement, developed gradually and the remaining clinical crowns remained in place for about 14 years.

Fig. 2. Facial view of the damaged teeth 14 years after trauma.

This positive result was because of the patient's commitment to maintaining a high level of oral hygiene and avoiding any further dental trauma to the damaged crowns, which had almost resorbed.

Fourteen years subsequent to the accident, during clinical examination, complete radicular resorption was clinically observable, whilst radiographic examination revealed that the residual alveolar ridge had been preserved (Fig. 3).

Furthermore, radiographic evaluation showed a periapical endodontic lesion associated with the right maxillary lateral incisor (tooth 12), which had been restored with a radicular alloy post.

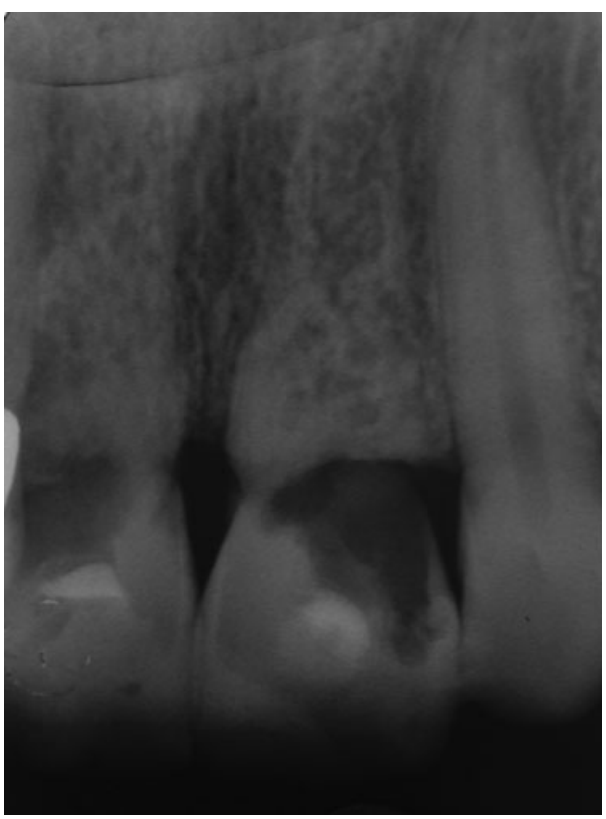

Fig. 3. Radiographic examination showing complete root resorption of teeth 11 and 21.

After crown removal, decay on the palatal surface of the root was observed. For this reason, the gold post was removed and the root was then carefully examined.

In addition, the lateral view showed that the teeth, characterised by a triangular morphology, had a marked crown-root axis inclined towards the palate. The analysis of the alveolar ridge with a CT examination revealed reduced thickness, although the height of the ridge visible from a conventional intraoral radiographic evaluation was well preserved.

Furthermore, the patient had requested a highly aesthetic result, presenting pictures of her before the accident and asking that as far as possible her previous appearance be regained. Prosthetic treatment was provided with the patient's consent.

Following the removal of the remaining clinical crowns of teeth 11 and 21 (which had almost completely resorbed), temporary crowns were provided. Once complete healing of the extraction sites was clinically observed, a crown-lengthening procedure was performed on the palatal surface between teeth 12 and 22, with particular attention being paid to papilla preservation in the vestibular area (Fig. 4). In addition, during the healing period, endodontic re-treatment of tooth 12 was completed and the temporary crown modified (Fig. 5).

On the basis of a diagnostic wax-up, the edentulous saddles were modified through differential compression of the temporary crowns during tissue healing. Once soft tissue modification had finally been achieved, 1 year after the initial surgical intervention, a clinical evaluation determined whether it was required to proceed with the preparation of the canine teeth. A study of the definitive diagnostic wax-up in fact revealed the need to simply modify the morphology of teeth 13 and 23.

To achieve this final prosthetic result, an impression was taken, following the provision of new tooth morphology by means of new temporary crowns and tissue conditioning (Fig. 6).

After a final check of the fit of the metallic superstructure, the restoration was indirectly fabricated and cemented, achieving a satisfactory aesthetic result (Figs 7 and 8). At 7 years of follow-up examination, the prosthetic restoration shows a good aesthetic and functional result (Fig. 9).

Fig. 4. Tissue healing achieved with the initial temporary bridge, after removal of remaining crowns of teeth 11 and 21.

Fig. 5. Facial view of the temporary bridge (teeth 12–22).

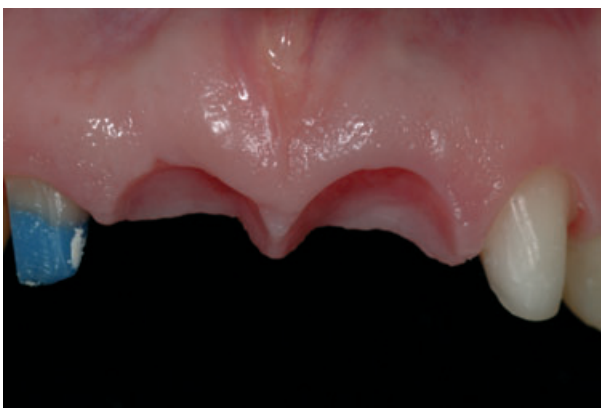

Fig. 6. Final soft tissue contours.

Fig. 7. Facial view of the final prosthetic restoration (teeth 12–22).

Discussion

The treatment plan of this case was developed considering different variables and in consultation with the patient. In particular, the analysis of the aesthetic risks revealed negative periodontal parameters, such as the thin gingival biotype of the patient and the high lip line that may have compromised the final result of the prosthetic treatment (1). For these reasons, an analysis of the possible treatment options (implant-prosthetic vs prosthetic restoration) was performed.

Fig. 8. Lateral view of the prosthetic restoration showing the emergence profile.

Fig. 9. Facial view of the prosthetic restoration at 7 years of follow up.

From literature, it is well known that the ideal positioning of dental implants on the vestibular-palatal area requires the presence of at least 2 mm of vestibular alveolar bone to avoid bone resorption after implant loading with consequent vestibular gingival recession. This risk increases for thin gingival biotypes (6–8).

In this case, the decision to avoid the use of dental implants was because of the analysis of different factors:

1 The reduced thickness of the residual alveolar ridge combined with the fact that surgical correction of bone and/or mucosal thickness, even if possible, may produce other anaesthetic risks.

2 The hypothetical palatal position of the implant may negatively impact upon the gingival contour of teeth that were already characterised by a particular inclination of the crown-radicular axis.

3 The insertion of two contiguous implants was not advisable because of the difficulty of maintaining the inter-incisal papilla (9).

In addition, the positioning of a single implant to replace the left maxillary central incisor (tooth 21) associated with a cantilever crown was also considered. However, the uncertain prognosis of tooth 12 would have required a subsequent surgical operation to insert an implant bridge between teeth 12 and 21 with significant aesthetic risks. To avoid this eventuality, the elective extraction of right maxillary lateral incisor (tooth 12) should have been performed, but even in this case,

the potentially longer crown would have dictated the prosthetic restoration of tooth 22 to obtain a successful aesthetic result. In addition, the patient's occlusion was not ideal, and implant placement may have potentially created problems for subsequent orthodontic therapy.

In light of the aforementioned factors, a conventional prosthetic restoration was provided using a metal-ceramic bridge (teeth 13–23), characterised by full crowns between the right and left maxillary lateral incisors associated with minimal preparation of the canine. The only 'biological' disadvantage of this prosthetic solution was the full crown preparation of the left maxillary lateral incisor (although tooth vitality was preserved). However, a good aesthetic result was achieved, postponing potential implant therapy, should the right maxillary lateral incisor be subsequently lost.

As discussed, the decision not to prepare the canines for a prosthetic restoration was taken after the temporary bridge had been maintained in place for 1 year without evidence of any abutment mobility.

To achieve a precise marginal seal of the restorations, a metal-ceramic bridge was selected using inclined preparations to obtain an efficacious teeth abutment wiring (particularly for right lateral maxillary incisor).

The combination of extremely good patient compliance together with the close collaboration with the dental laboratory in the production of a prosthesis carefully duplicating the patient's study tooth morphology has both contributed to an excellent result.

Conclusion

Implant placement in aesthetic areas should be carefully evaluated, especially, if favourable periodontal, dental and bone conditions are not present. A conservative approach, as determined by prosthetic rehabilitation, may provide a more predictable aesthetic result and must be considered, especially, in young patients.

In this case, the decision to provide a prosthetic restoration rather than implant treatment was based on several factors previously reported. In addition, a satisfactory aesthetic result (of key importance to the patient) may be a more probable outcome. By this strategy, a treatment plan may allow for a future implant restoration, should this become necessary (e.g. because of the failure of right lateral maxillary incisor tooth 12). However, after 7 years, neither aesthetic nor functional complications have been observed.

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