When planning orthodontic and restorative treatment, it is of great importance that the collaboration between the dentist and orthodontist is interdisciplinary. This means that the communication between clinicians should start at the treatment planning phase to formulate the agreed treatment goals, with progress relayed throughout the treatment until completion.

The interdisciplinary approach is a team effort comprising the restorative dentist, hygienist, orthodontist and other specialists as required (eg, periodontist, implantologist, endodontist and oral surgeon).

All clinicians involved must agree the detail of the proposed treatment plan and be clear about their individual contribution.

There seems to be a current trend towards dentists themselves providing many of the disciplines required to treat their patients. This only reinforces the need of good treatment planning using a format such as the one in Figure 1. This includes understanding the patient’s chief complaint, performing a thorough assessment with relevant diagnostic analysis, allowing the clinician to formulate a problem list from which treatment goals and solutions can be devised.

When considering different treatment options, the dentist must be able to explain how the malocclusion affects the patient aesthetically, functionally and biologically. Treatments advocating a long-term improvement in the prognosis of teeth and the stomatognathic system will inevitably be more cost effective in the long run.

In this case, the referring dentist had created a well-informed and motivated patient for an orthodontic consultation. Even, if the outcome of this consultation resulted in the patient having no desire for orthodontics, the decision to proceed with a restorative approach would have been done with full disclosure and understanding of the treatment options.

Case report: anamnesis

A fit and healthy 60-year-old man presented with a history of failed composite restorations, occlusal trauma and anterior tooth wear.

Having been unhappy with the appearance of his smile for many years, it was not until he changed his regular dentist that the recommendation to see an orthodontist specialist was made.

Clinical examination

The pre-treatment photos are shown in Figures 2a-2f. The results of the extraoral and intraoral examination are summarised in a problem list (Table 1). Based on this list, the treatment goals and treatment plan were defined and explained to the patient (Table 2).

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Treatment plan
The main aim was to provide and maintain occlusal stability as described by Dawson (2007). The inability to disclude all posterior teeth in protrusive movements and lack of anterior guidance were to be restored by a combination of pre-restorative orthodontics and prosthodontic restorations. Orthodontic treatment was to be performed using fixed appliances on upper and lower arches using a straight wire and segmented arch approach.

Ceramic 3M Clarity brackets were used due to their superior aesthetics. Pre-restorative orthodontics in this case also aimed to reduce the amount of invasive dentistry required to prepare teeth for prosthodontic restorations.

The planned restorations were aimed at restoring the anterior teeth to their original anatomical morphology while providing optimum function. It was for this reason that IPS E.max crowns were prescribed – with particular attention to providing minimal preparation of teeth, optimised translucency, durability and strength.

Treatment progress
The total duration of the orthodontic treatment was 15 months. The treatment was split into phases. Initially the upper arch was bonded with a fixed appliance from UL6 to UR6 and did not include UL1 and UR1 at the start. After initial levelling and alignment, space was created for the UL1 and UR1 using open coil on a stainless steel wire.

Once adequate space was created, an overlay arch system was used to bring the UL1 and UR1 forward. After this point, the lower arch was bonded and the treatment required alignment, torque control and arch coordination. The UL4 crown was thick in the bucco-palatal dimension and required some occlusal adjustment during orthodontic treatment to accommodate for its correct position before replacement.

On completion of the orthodontic treatment, the patient was provided with upper and lower Essix retainers as an interim provision until the restorative work was completed.

Although the planned restorative work was to be completed soon after debond, it is important to be prepared for all eventualities. Hence interim retainers are important for pre-restorative cases such as these.

The post-orthodontic photo shows a dramatic change in aesthetics and correction of the cross bite (Figure 3a). However, Figure 3b shows the problems that still needed to be addressed, which included:

- Discoloured teeth and composites
- Poor margins and aesthetics of porcelain bonded crowns
- Short incisal clinical crowns
- Reverse smile line
- Functional occlusion still compromised.

When deciding the final restorative treatment plan, it was imperative to revisit the patient’s original subjective complaint and understand the patient’s needs.

Many patients are satisfied after alignment, whitening and additive bonding; the progressive smile concept aids in the provision of minimally invasive dentistry. This approach was considered, however the patient’s main concerns were associated with the constantly failing composite restorations and tooth wear. A more definitive and reliable solution was required to restore function. The dislike of the colour of the teeth would also be addressed.

It was decided that minimal preparation IPS E.max crowns would be used. The patient was made aware of the amount of tooth structure that would need to be removed and the long-term impact of the treatment.

The clinical crown length of the anterior teeth would be restored to the correct size and morphology. Determining the correct length of worn incisors is challenging – it can only be estimated from known references and data (Magne et al, 2003). This length will be assessed during the provisional phase. It is very important to determine the correct position of the incisal edge as it can affect phonetics, interfere with the envelope of function and interact with the lower lip (Cranham, 2006). The correct length of the central incisors will determine the proportions and symmetry of the adjacent anterior teeth and would also allow the correction of the reverse smile line. This should be achieved with no compromise of phonetics while optimising function and aesthetics.

A diagnostic wax-up was required once the study models were mounted with a facebow transfer on a semi-adjustable articulator. Diagnostic pictures and guidelines regarding the shape, texture and desirable size of the restorations were discussed with the patient and then sent to the technician.

Diagnostic mock-temporisation was performed using a silicon matrix of the
guidance with no occlusal imbalances. The patient was left to adjust to the new temporary crowns to make sure he felt comfortable and everyone was happy with the shape of the restorations.

The patient returned two weeks later to evaluate the aesthetics, phonetics and function and tissue adaptation of the provisional restorations. There was positive feedback on aesthetics and good adaptation to the new incisal positions without any problem at all. Final impressions were taken at this stage with pictures of temporaries and crown preparations along with guidelines for the technician.

Once returned, the restorations were inspected on the models for marginal accuracy, fit and contacts (Figure 3e). The final restorations were tried in with try-in paste and, after final approval from the patient, they were cemented (Figures 4a and 4b). Once all restorative work was complete, a fixed lower retainer was placed LL3 to LR3. Upper and lower Hawley retainers were given to the patient to be worn at night.

Evaluation

The patient’s appearance has improved significantly (Figures 3a-3e). The buccal intercuspation was maintained with a stable and corrected positive overjet. The flattened upper arch was restored and coordinated to the lower arch. All planned rotations and tipps were corrected. Occlusal function was restored and stable with two-year follow-ups to date. The lower anterior teeth have not worn excessively since the treatment and will continue to be kept under review.

The alternative treatment option for this case that was discussed with the patient was a completely restorative approach. However, this would have required the extraction of UL1 and UR1 and the prosthetic replacements to be placed in the corrected position.

The provision of implants for the UL1 and UR1 would be challenging and susceptible to failure due to the implant inclination, loading position and load direction (Wattanabe, 2003).

The consideration of anterior bridges to correct the anterior crossbite at the expense of extractions also seemed to be an invasive option with compromised aesthetic results.

The other important discussion was the choice of restorations after the orthodontic treatment. The consideration of an ‘align, bleach, bond’ approach could have been a solution. However, the placements of composite restorations on teeth involved in anterior tooth wear have a short to medium survival. (Redman, 2003).

The constant monitoring and replacement of such restorations would be necessary to ensure stability of the occlusion. A more definitive approach using indirect restorations would provide a more durable and predictable prognosis for all the dentition in this case.

Conclusion

The need for orthodontics as a pre-restorative speciality has increased over the last 10 years. This is due to many factors, including patients having increased expectations of their smile, a shift to less invasive restorative dentistry and an improvement in aesthetically pleasing as well as patient friendly and dentist friendly orthodontic appliances.

The GDP is the key player in orchestrating interdisciplinary dentistry cases. Systematic treatment planning will be an important skill to perfect for modern aesthetic dentistry.

References

For the list of references that accompany this article, please email pd@fmc.co.uk.