Treatment of the worn and fractured dentition – An ultracconservative, multidisciplinary approach

By Dr. Andrew Wakefield, UK

Tooth surface loss (TSL) can present in various clinical forms and has a wide range of aetiological factors. Dental erosion, attrition and abrasion are commonly observed by general practitioners, the first two often being seen in younger patients. The superimposition of TSL and malocclusion and/or tooth size and position discrepancies can compound the problem because of the coincident loss of form, function and aesthetics. It can also create difficulties in planning treatment options, with treatment strategies having to be drawn from multiple disciplines and integrated harmoniously to achieve long-term success. There are also other important issues to consider, treatment of tooth wear involves altering the vertical dimension of occlusion (VDO) and orthodontic treatment alters the position of the teeth, both often complex, lengthy, and high cost procedures in their own right, never mind in combination. If the patient is young the cost of ideal treatment can be prohibitive and they will expect longevity from the treatment provided and materials used. These are conflicts which probably will require some form of compromised treatment being embarked upon. It also needs to be borne in mind that the protection of valuable remaining natural tooth tissue is paramount, and this puts pressure on the ethical practitioner to be as conservative as possible. It is also important in these cases to ensure that the patient is fully aware of any compromises chosen, the reasons behind the decisions made and to involve them in the decision making process itself. Fortunately with the advent of modern hybrid nano-composite materials and innovative orthodontic and restorative techniques, treatment can be designed to be progressive in nature, with patients deciding the acceptance and success can be achieved at the straightwayward occlusion and treatment can even evolve to encompass more complex restorative work involving several disciplines if required. All of these factors had to be considered in the case presented here.

Case Study

The case study illustrates a simple multidisciplinary approach through the use of occlusal therapy combining direct occlusal contact, direct composite build-up of worn occlusal surfaces of upper and lower molars and premolars and minimally invasive anterior procedures. Intraoral examination revealed a patient keen on several upper and lower face height. Intraoral examination revealed anterior dentition. Extraorally he had a strong family history as he had an identical case when he was 21 years old, complaining of severe nail biting habit. A diagnosis of premature anterior attrition in the mandible, functional contacts on the anterior teeth and an absence of anterior guidance. There were no dietary abnormalities yet rather was be aware of any bruxist activity, although he admitted a severe nail biting habit. A diagnosis of primary anterior attrition in the presence of unfavourable canine geometry coupled with non-tooth contact parafunction was made. The patient vanished for two years, then returned, eager to commence treatment. Study cast comparison was able to demonstrate that there had not been any appreciable change in the clinical situation during that time, possibly attributable to a decrease in the rate of wear over time as the surface area of the teeth in contact increased.

Aims of treatment

1. To create a mutually protected occlusion where the anterior teeth include the posterior teeth in all excursive movements of the mandible.
2. To avoid any preparation to the teeth whilst providing treatment according to sound biomechanical principles.
3. To prevent further pathologic wear of all teeth and to cover all exposed primary endocement.
4. To secure retain for life the positions of the upper incisors after orthodontic movement.
5. To improve the aesthetics and restore the patient’s confidence in the appearance of his smile.
6. To perform the treatment in a sensible time frame and as cost effectively as possible.

Treatment plan

Four Phases

1. To re-establish a stable posterior occlusion at an increased VDO using centric relation and simple direct composites bonded onto the occlusal surfaces as an occlusal deprogrammation to discourage the anterior slide and allow the mandible to go back.

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This will also create space for the orthodontic phase.
2. To retract the upper anterior teeth with removable aligners by a sufficient amount to enable their subsequent restoration to aesthetically acceptable mesio-distal dimensions and to create interproximal contact, but not so much as to exacerbate a problem with soft tissue tension. This would take approximately three-four months during which time the patient would be accommodated to the new VDO established in phase 1. This will create the need for invasive reduction of the incisors during the next phase.
3. To retrace the incisal anatomical form using direct nano-hybrid composite labial veneers. Precision fitting was assured by using a full clear silicone stent made over a diagnostic wax-up, with the wear of a pre-treatment temporary to assess patient comfort and satisfaction.
4. To retain the teeth in their new positions for life using a palatal wire bonded retainer locked into the composite veneers for added flexural strength.

Treatment Progression

The worn dentine and enamel on the occlusal surfaces of the upper and lower molars and premolars was covered and restored to original morphology with acid etch bonding and direct placement of nano-hybrid composite (Venus Pearl – Heraeus Kulzer). Even contacts were established in centric relation (not done definitively as the final adjustment of the occlusal scheme was performed later after the establishment of the anterior guidance). The increase in the VDO anteriorly was approximately 2mm. A standard IAS Clear Aligners was done definitively as the final adjustment of the occlusal scheme was performed later after the establishment of the anterior guidance. The increase in the VDO anteriorly was approximately 2mm. A standard IAS Clear Aligners was fitted to the upper arch with the aim of retracting the incisors. This occurred over a four-month period with IAS Clear Aligners used for refinement of position at the end. During this time the patient accommodated very well to the new VDO.

Discussion

The treatment proved to be a successful cost-effective choice for the patient, primarily due to accurate planning, realistic expectations, good compliance and avoidance of excessive laboratory fees. At six months recall, there is no evidence of marginal breakdown of the composite and the wire is still bonded and preventing relapse. The treatment was not immediately known and can be copied later if a move to ceramics is ever considered. In this type of additive
case where there is no labial enamel erosion or thinning, ceramics are very much a second choice material since veneering or crowning necessitates enamel preparation to get good margins for the technician to work to in order to avoid over-contouring the restorations. In addition, crowning would have made reliable acid etch bonding of a retention wire impossible on the palatal side and macro-retention grooves in the palatal ceramic surface would necessitate more aggressive palatal occlusal preparation to make sufficient space so as not to weaken the ceramic. Ceramic veneers would fare no better as their palatal margins would be right on the line of the bonded retainer and the bonding footprint for the wire to enamel would be much reduced, both increasing chances of failure.

After posterior occlusal buildup chin-up view
After retraction and alignment of anterior teeth chin-up view

The flexural strength of an incisor comes primarily from the labial and the palatal enamel, which was left intact in this case. High strength composite bonded over both the unprepared labial and palatal enamel surfaces gave an optimal biomechanical result as the flexural strength of the incisor will have been substantially increased. This should reduce the chances of marginal breakdown of the composite in the long term. To further reduce flexural stresses on the upper incisors, the small ledge created by the bonded wire acts as a vertical stop for the lower incisors to occlude against, favourably transmitting forces down the vertical axis of each tooth. The psychological impact of the treatment has been substantial. There was a total transformation of his appearance and smile, with a noticeable effect upon the patient’s self-confidence. The patient’s identical twin has followed his brother’s treatment closely and it is looking like I might need to repeat the process all over again! If not, we have a good control subject for the future in order to observe what might have happened had my patient not had this treatment.

References

The full list of references available from the publisher.

Andrew Wakefield BDS LDS RCS is a general dental practitioner working at Apolline House Dental Practice in Northeast London.