Treatment of the worn and spaced dentition—An ultracconservative, multidisciplinary approach

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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, such as treatment of wear involves altering the vertical dimension of occlusion (VDO) and orthodontic treatment alters the plane of occlusion of the teeth, both often complex, lengthy and high cost procedures in their own right and not to be undertaken 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 sacrosanct, and this puts pressure on the ethical practitioner to be as conservative as possible. It is not unusual 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 progressive decompression success can be achieved at the straightforward way of treatment, the VDO spectrum can yet evolve to encompass more complex restorative work involving a degree of preparation 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 centre relation direct composite build-up of worn occlusal surfaces of upper and lower molar and premolars to re-establish an acceptable and comfortable VDO. The resulting increase in anterior space was utilised by retraction the spaced, severely worn upper incisors with removable aligner (IAS Inman Aligner and IAS Clear Aligners). This enabled aesthetic restorative work without the need for invasive reduction by placing direct labial nano-hybrid composite veneers using a modified (untrimmed, full contact wax-up) diagnostic wax-up to allow for a clear matrix technique described by Muzafar. The treatment proved successful when he was 32 years old, complain of unignificantly gaps between his front teeth. There was a relevant family history as he had an identical twin brother who also had a spaced dentition and his occlusion was presented with a reduced lower face height. Intraoral examination showed evidence of moderate occlusal wear through to dentine occlusal wear and premolars. The upper incisors were severely worn and had lost almost half of their clinical crown length. Malocclusion was ruled out, but the presence of distomatomy indicated an interrelationship between the jaw size and the size of the teeth. There was no serious frenum interference. The palatal surfaces of the upper incisors and the edges of the lower incisors were reasonably intact and there was a class I incisor relationship and no deep bite. The labial surfaces of all the teeth were unworn and the dentition unrestored. The upper canines were also worn and tilted slightly labially. It was possible to identify an anterior slide of the mandible, functional contacts on the posterior teeth and an absence of anterior guidance. There were no dietary abnormalities yet neither was he aware of any brush- ing activity, although he admitted a severe nail biting habit. A diagnosis of premature anterior attrition in the presence of unfavourable canine geometry coupled with non-tooth contact parafunctional 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 enamel.
4. To secure retention 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 establish a stable posterior occlusion at an increased VDO using centre relation and simple direct composites bonded onto the occlusal surfaces as an occlusal deprogrammer to discourage the anterior slide and allow the mandible to go back and the premolars and maxillary first bicuspids. The upper incisors were severely worn and had lost almost half of their clinical crown length. Malocclusion was ruled out, but the presence of distomatomy indicated an interrelationship between the jaw size and the size of the teeth. There was no serious frenum interference. The palatal surfaces of the upper incisors and the edges of the lower incisors were reasonably intact and there was a class I incisor relationship and no deep bite. The labial surfaces of all the teeth were unworn and the dentition unrestored. The upper canines were also worn and tilted slightly labially. It was possible to identify an anterior slide of the mandible, functional contacts on the posterior teeth and an absence of anterior guidance. There were no dietary abnormalities yet neither was he aware of any brushing activity, although he admitted a severe nail biting habit. A diagnosis of premature anterior attrition in the presence of unfavourable canine geometry coupled with non-tooth contact parafunctional 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.

This will also create space for the orthodontic phase.

1. To retract the upper anterior teeth with removable aligners by a sufficient amount to enable their subsequent restoration to aesthetically acceptable mesio-distal distances and to create interproximal contact, but not so much as to create a problem with soft tissue closure. This would take approximately three-four months during which time the patient would be accommodating the new VDO established in phase 1. This will create the need for invasive reduction of the incisors during the next phase.

2. To retract the teeth in their new positions for life using a palatal wire bonded to the incisors, A3 Canines) over a small pyramidal build-up of, dentine shade OLC Venus pearl. Adjacent teeth were protected with PTFE tape during placement and the restorations finished on the labial surfaces with a combination of Sof-Lex discs and rubber composite polishing points and wheels. The palatal surface was left unfinished. An Inman retainer was made to hold the teeth in this position for the patient to wear for a week while a lab-fabricated palatal wire splint was made. At the 6th stage, oval undercut cavities were prepared in the composite on the unpolished palatal surface into which flowable composite (Venus Diamond flow – Heraeus Kulzer) was injected. The incisors were worn to a height of 3.5mm, with a scan taken of the arch and the wire was bonded to the long axis of each tooth for the wire to be a large palatal area on each tooth.

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 month recall, there is no evidence of marginal breakdown of the composite and the wire is still bonded and preventing relapse. The occlusion was now established 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-surface 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.

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 incisors 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.