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 among 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 complicate 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 path of closure of the teeth, both often complex, lengthy and high cost procedures in their own right and never 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 tooth tissue is sacrosanct and this puts pressure on the ethical practitioner to be as conservative as possible. It is quite possible 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 on the success can be achieved at the straight-forward or more complicated end of the spectrum yet can evolve to encompass more complex restorative work involving the fabrication of a definitive restoration 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 moulders and premolars to re-establish a stable and comfortable VDO. The resulting increase in anterior space was utilized by retracting the spaced, severely worn upper incisors with removable aligners (IAS Inman Aligner and IAS Clear Aligners). This enabled aesthetic restoration without the need for invasive reduction by placing direct labial nano-hybrid composite veneers using a modified (untrimmed, flattened, milled) non-tooth contacting clear ma-
tix technique described by Alצהر. The 3D printed model, fabricated before he was 12 years old, compliant with over its appearance, a pre-evalua-
involving the occlusal scheme was performed later after the establish-
tive temporary in situ. This would take approximately three-four months during which time the patient would be accommodating to the new VDO established in phase 1. This will create the need for invasive reduction of the incisors during the next phase.

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 dentine.
4. To secure retention for life the position of the upper incisors after orthodontic movement.
5. To improve the aesthetics and re-
to the patient’s confidence in the appearance of his smile.
6. To perform the treatment in a sens-
table time frame and as cost effec-
tively as possible.

Treatment plan
Four Phases
1. To re-establish a stable posterior occlusion at an increased VDO us-
ing centric relation and simple direct composites bonded onto the occlusal surfaces as an occlusal depograp-
mence to discourage the anterior slide and allow the mandible to go back.

Upper occlusal at end of treatment

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

2. To recreate the incisal anatomical form using direct nano-hybrid composite labial veneers. Precision in form will be assured by using a full clear silicone stent made over a diag-
notic wax-up, with the use of a pre-
evaluative temporary to assess patient comfort and satisfaction.
3. To retain the teeth in their new positions for life using a palatal wire bonded retainer locked into the com-
pose restorations for added flexural strength.

Treatment Progression
The worn dentine and enamel on the occlusal surfaces of the upper and lower moulders and premolars was covered and restored to original morphology with acid etch bond-
ing and direct placement of nano-
hybrid composite (Venus Pearl – Heraeus Kulzer). Even contacts were established in centric relation (not done definitively as the final adjunc-
tion of the occlusal scheme was performed later after the establish-
ment of the anterior guidance). The increase in the VDO anteriorly was approximately mm. A standard IAS Inman Aligner was

Ac retainer material sucked down over it, was made. As the whole pro-
cedure was additive and as it would make a significant difference to the patient’s appearance, a pre-evalua-
tive temporary in a temp crown and bridge material was made. This was worn for a day and night and proved a functional, aesthetic and phonetic success, giving confidence when it came to the build-ups that the plan was achievable. The thickness of the temporaries was visualised on removal and they were retained for use as a guide to estimating the vol-
ume and distribution of composite to load into the matrix. The compos-
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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, crown- ing would have made reliable acid etch bonding of a retention wire impossible on the palatal side and matrix retention grooves in the palatal ceramic surface would necessitate more aggressive palato-incisal 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.