

# The Dahl principle in everyday dentistry

Using two clinical case studies, **Dr Tif Qureshi** revisits differential tooth wear, the Inman aligner, the Dahl principle and an alternative to pre-ortho-mental dentistry

My first article on differential tooth wear, the Inman aligner, the Dahl principle and an alternative to pre-ortho-mental dentistry (published in February's *Private Dentistry*) resulted in me receiving quite a few emails. I was aware that the subject matter was a little controversial as the Dahl principle is often viewed as a slightly left field way of treating wear. But why should it be? For some reason, the occlusion industry seems to ignore it.

Certain speakers do bring the topic up, but there just don't seem to be that many case write ups or courses on the subject. I find this pretty amazing because I use it nearly every day in my practice, and often wonder how other dentists can practice without it. Of course, the truth is many manage perfectly well, however, others just don't treat wear because many of the traditional options often have expensive final outcomes, which can be a barrier for the patient.

This struck me more when I was very honoured to speak at the Chicago Midwinter meeting. The majority of the audience was American dentists, however not a single one had even heard of the Dahl principle. The cases I showed, where instead of using ceramic full mouth restorations, we had placed simple composite in the anterior region with no lab fee in a matter of hours, created quite a stir.

Trying to justify one type of approach over another is quite a difficult thing to do because the truth is that there are not that many dentists around who have tried all the techniques extensively. However, I have found that in cases where the combined anterior wear in both arches is 6mm or less, and there is still some enamel coverage on posterior teeth, it is my primary mode of treatment to restore the teeth, restore guidance and still find within a few months that we have our posterior contacts regained. I will usually employ traditional techniques in more severe cases.

Ideally, just showing the kind of cases we often see in practice and what we do to complete them is a great way of letting dentists make their own mind up.

So I am going to present two cases that could have been treated with close to full mouth ceramics – but instead I used the Dahl principle, composite and virtually no tooth preparation.

## The Dahl principle

Modified Lucia jigs have been used as anterior

deprogrammers to help the mandible find centric relation (CR). Direct composites can also be used as an anterior deprogrammer. Resin composites – because of their resilience and ease of manipulation even in small thicknesses – represent an ideal material to restore the palatal surface (Cardoso, Canbaborro, Myers, 2000) and the worn lower anterior incisal and canine edges too.

Dahl (1975) suggested creating space to treat localised anterior tooth wear by separating the posterior teeth using an anterior bite plane for 4-6 months.

A combination of passive eruption of the posterior teeth and intrusion of the anterior teeth, allowed the re-establishment of posterior occlusion while holding the anterior space (Dahl, Krogstad, 1982). Dahl actually used a metal appliance to separate the posterior teeth, but we can now achieve the same result with adhesive anterior direct composites.

By identifying the difference between maximum intercuspal position and CR, using pressure to gently guide the mandible, the position of the direct composite can be set slightly posterior to maximum intercuspal position. This will create anterior contact on the incisal edge build-ups and possibly create premature contacts on the posterior teeth. These premature contacts can be equilibrated to improve the amount of contact, but the residual space will eventually close through passive eruption over a few months.

## Case one

This 48-year-old female presented complaining that her teeth looked short and crooked (Figure 1). She was interested in having porcelain veneers to lengthen and straighten her upper teeth.

On examination it was clear that at least 3mm of enamel had worn from the upper anterior teeth and about 2mm from the lowers. Dentine was exposed on the edge surfaces from first premolar to first premolar upper and lower. She had no canine guidance and this was exacerbating the wear. She complained of TMJ symptoms including clicking and restricted opening. There was also some mild misalignment in the upper arch with in-standing laterals and slightly rotated centrals.

The patient understood that preparations would be very aggressive for veneers so decided to align her teeth first.



Figure 1: Before (worn and misaligned)



Figure 2: After 12 weeks Inman aligner and whitening (incisal edges roughened)



Figure 3: Palatal and dentine build



Figure 4: Enamel composite placed



Figure 5: Both sides complete before polish



Figure 6: After initial polish

## Treatment

Arch evaluation showed the case was suitable (Hancher, 2005) An Inman aligner was used over 12 weeks to align the upper teeth. Standard IPR was performed progressively at appointments every two to three weeks. Performing IPR progressively also means there is far less likelihood to over strip and gouge the teeth. The contacts remain more anatomically correct and less likely to trap plaque.

As her teeth started to align, we performed simultaneous whitening with sealed trays (Figure 2). These were worn for

45 minutes a day during the rest period of Inman aligner treatments (at least four hours a day). Inman aligners are only worn for 16-20 hours a day maximum.

By week 12, with whiter and straighter teeth, the patient was then able to see her teeth changing and it was clear to her that there was nothing wrong with the facial surfaces of the teeth, so why cut them back to place veneers? She could see that the problem had just become an incisal outline issue. This process of treatment is a far better way of assessing the patient's needs than the traditional approach



Figure 7: Before showing upper and lower wear



Figure 8: After alignment, upper and lower composite build-ups



Figure 9: Right lateral excursion showing canine guidance



Figure 10: Left lateral excursion showing canine guidance

in cosmetic dentistry where smile design is planned from the outset using imaging and wax-ups. Patients do not get the chance to see their teeth changing at various stages, so instead their decision making is short cut by seeing the final outcome immediately on screen, thus assuming that whatever it takes to achieve that, has to be the best result. At this point she switched to a clear retainer.

The patient was offered the possibility of just using edge composite build-ups to regain the correct upper incisal outline with better guidance and deal with her worn occlusion using the Dahl principle on the lower teeth. In one appointment, the upper and lower anterior edges were built (Figure 3). Eight upper anterior teeth were treated. The margins were lightly scuffed and barely bevelled to improve surface area for bonding.

In this case, Empress Direct from Ivoclar was used with two simple shades – B1 dentine and enamel. For me, the new nano-hybrid materials, such as Empress Direct or Venus from Hereaus Kulzer, have very much simplified the anterior aesthetic composite procedures. The dentine materials have a far more natural opacity and help to block out and mask transitions nicely. The matching enamels also blend well and are easy to polish and seem to resist stain well. It is quite possible to use wax-ups and rubber stents to help place the resin, but it is also quite easy in a

case like this to build the tooth to its correct functional length and size free hand.

On the uppers, 3mm of incisal edge (at most) was added. No LA was needed and the total time taken was a little over an hour. The canines and incisors are checked for anterior and canine guidance.

Composite was then placed on the lowers (Figure 8). Adding to the lowers increases the vertical dimension. When doing this with the Dahl principle my aim is to prop the anteriors open mainly loading primarily on the canines, then the first premolars and then a more long centric contact on the anteriors. The upper and lower canines are built to give canine guidance. By just building the teeth back to their original anatomy it is highly unlikely that angles are too steep. The patient would return in two weeks anyway for a final polish and guidance check.

The eight lower teeth were built up again in less than an hour. At the end of this first appointment, she noticed that her front teeth felt high, but evenly loaded on the canines. There was also a noticeable space between the back teeth. She was instructed to eat a little more carefully stick to soft diets for two weeks.

We also cut the incisal edges out of the clear retainer so it would fit and took impressions for a pre-bent wire retainer on a jig.





Figure 11: Before side view



Figure 12: After alignment, whitening and Dahl composite build-ups



Figure 13: Before



Figure 14: After build-ups and final polish

On her review appointment two weeks later, the wire retainer was fitted from canine to canine. She commented that her TMJ symptoms had reduced dramatically. She also felt as if her back teeth were closing up. This was due to the condyles repositioning, but after three months her posterior contacts had fully closed and canine and anterior guidance was still in place. The composites can remain completely stain free by putting the patient on a regime of tooth whitening top-up treatment every three to six months for three to four days at a time.

Ultimately, we have created a natural aesthetic result without any real tooth reduction (Figure 14).

## Case two

This 32-year-old gentleman presented complaining of constantly breaking teeth (Figure 15).

His upper Maryland bridgework was suffering with debonds and breaking porcelain regularly. He had several fractured molar teeth and he also complained that he didn't like his crooked stained lower teeth. On examination, it was clear that the patient had virtually no lateral canine guidance. Even the anterior guidance was drastically reduced, with interferences being close with a little more anterior tooth loss. The lower anterior teeth

were especially worn with 3-4mm of wear evident. The crowding was exacerbating this issue.

Commonly, when lower anterior teeth crowd, the inter-canine width tends to reduce, causing the lower canines to drift away and mesially from the upper canines, especially if the uppers are still well aligned. It is quite a common situation in many adults. The combination of these two factors often leads to a worsening of occlusal issues. This is why incisor extractions in lower crowding and wear cases must be very carefully considered and avoided, if possible.

In this patient's case, he was keen to correct the lower crowding too, so we had the opportunity to widen his inter-canine width before restoring the guidance.

An Inman aligner was used over 12 weeks to align his lower anterior teeth (Figure 16). Critically, our aim was to align the teeth but also increase the inter-canine width. This was done by performing much of the IPR distally to the canines, but progressively.

As always with Inman aligner treatment, this staged progressive IPR approach is far safer than performing all of it in one go, as often less IPR is needed than expected. It avoids excess space formation and the destruction of contact point anatomy, which is often seen when IPR is all done at once. Anatomically respectful IPR should be performed by anyone creating space to move teeth.



Figure 15: Before



Figure 16: After Inman aligner and composite edges



Figure 17: Before



Figure 18: After Inman aligner (12 weeks) and Dahl composite



Figure 19: After three months in ICP



Figure 20: Right side canine guided excursion

Once his teeth were straightened, we then planned to use the Dahl principle to open his vertical dimension and improve his guidance. This was done with minimal roughening of the teeth, then direct bonding of tetric ceram composite onto the lower edges from premolar to premolar.

A heavily filled composite was preferred because of his previous wear history and because nearly all of the composite being added would be load bearing, 2.5mm was used at most, with the main initial loading being placed on

the canines. Canine guidance was immediately established but the posterior teeth were discluded at this time. The patient returned after two to three months and the posterior teeth were again in contact.

Anterior and canine guidance was still in place and, at this point, the patient decided he wanted to treat the broken upper bridges. He knew implants would be a better long-term measure, but wanted to keep to a budget, so we simply etched and bonded composite to repair them.





Figure 21: Left side canine guided excursion



Figure 22: Posteriors in full contact in ICP after three months



Figure 23: Before



Figure 24: Three months after Dahl build-ups

## Conclusion

Both cases could have been approached very differently using ceramic solutions. The advantage with being able to use direct composite and Inman aligners in this way is that patients can be offered a far more conservative solution to some wear problems.

The fact that a ceramic solution can be avoided also means that many patients who simply don't have the budget can also have wear issues treated and reversed more realistically. This is reflected in the sheer number of times I have used this technique.

I always used the Dahl principle wherever there was some anterior wear just to ensure all my patients had good canine guidance, meaning I have used the technique hundreds of times. In cases where patients require or demand a ceramic solution, I will usually use the composites on the lowers as long-term provisionals and only replace with ceramic once I am happy the occlusion and guidance are stable and any parafunctional activity is either eliminated or under control.

The Dahl principle can offer dentists another way of approaching wear and occlusal issues especially in mild and moderate cases. Combined with alignment and whitening, it is amazing how non-invasive we can be with cases like those shown in this article. [PD](#)

## References

For a full list of references, please contact the editor at [siobhan.lewney@fmc.co.uk](mailto:siobhan.lewney@fmc.co.uk).

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Dr Tif Qureshi BDS qualified from King's College London in 1992. He is the vice president of the British Academy of Cosmetic Dentistry, an organisation that is promoting cosmetic dentistry in the UK and which has embraced orthodontic techniques to help minimise tooth preparations in cosmetic cases. He is a partner at Dental Elegance in Sidcup, Kent, where he practices minimally invasive cosmetic and restorative dentistry.

Tif has a special interest in simple orthodontics using removable appliances and was the first dentist in the UK to pioneer the Inman aligner. He was the first dentist in the world to use the aligner as a major tool for cosmetic dentistry. He has completed nearly 1,000 cases using Inman aligners as a stand-alone treatment and to align teeth before cosmetic dentistry. Tif now lectures nationally and internationally and has had many articles published. The Inman aligner hands-on and online courses are available via [www.straight-talks.com](http://www.straight-talks.com).