REALIGN THEN DESIGN:

SMILE CREATION FOR MISALIGNED DENTITION

Tony Knight of Knight Dental Design and Tif Qureshi, President Elect of the BACD, show how combining cutting edge processes of simple orthodontics and ceramic technology have created a paradigm shift in the way cosmetic dentistry can be carried out

If the nineties were the decade of the ultra white Hollywood smile, the noughties seem to have ushered in an era of more refined tastes in smile design. While there is still demand for whiter teeth, many patients are now asking for a more natural look than the dead straight over-bright identikit smiles of the last decade.

In keeping with this more conservative mood patients are also becoming more aware of the good sense of preserving as much of their own tooth structure as possible and are questioning how their restorations will affect the health of their teeth. Can combination therapy with orthodontics and minimal thickness veneers satisfy patients' demands for minimum intervention, natural aesthetics and a rapid result?

RISK OF DEVITALISATION

Smile makeovers with ceramic veneers can certainly achieve patients desire for an instant cosmetic result; for patients with minor misalignment good aesthetic outcomes can be achieved with minimal enamel loss. However, for patients with moderate to severe misalignment, deep preparation into dentine and possible devitalisation may be the result of trying to align by tooth preparation alone.

Frequently adult patients with misalignment have explored and rejected orthodontic options as too slow a route to their aesthetic goal and are willing to risk their pulp to have the perfect smile for their wedding, holiday or new partner. Many of these patients can now be offered a safer way to the ideal smile. The risk has been reduced by two recent developments: rapid adult orthodontics and IPS emax high strength pressed ceramics

FASTER SOLUTIONS

Appliances such as the Inman Aligner have speeded up the alignment process for suitable cases to as little as six weeks for mild misalignment to 16 weeks for moderately misaligned cases, while IPS e.max pressed ceramic has enabled thinner stronger ve-neers with a natural appearance.

For older patients misalignment is often associated with occlusal abnormalities and enamel wear which paradoxically may become more visible after aligning. Misaligned anterior teeth often show irregular incisal edge wear which after aligning becomes more apparent due to the differing lengths of the teeth. While the arch alignment may have been perfected, the crooked incisal line now becomes more apparent. Starkly outlined against the darkness of the oral cavity, the differing incisal outlines of the incisors require further treatment be-fore the ideal smile can be achieved.

Lengthening the incisal edges with composite tips may provide a medium-term solution, particularly on the lower anteriors where the occlusal forces are mostly compressive and less likely to debond the composite from the tooth. In the upper arch, however, incisal tips are subject to more shear stress during function and guidance and in

Figure 1: Lateral view before

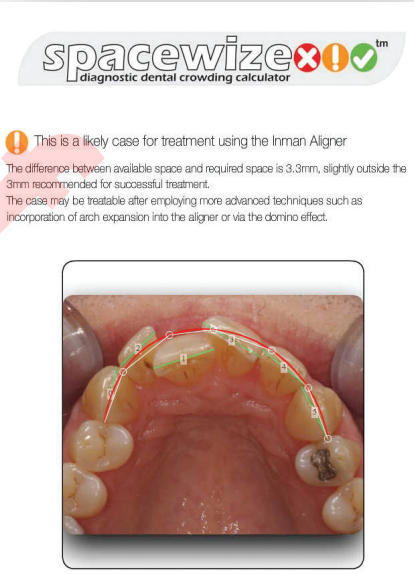

Figure 2: Inman Aligner software showing a difference of 3.3mm

Dr Tif Qureshi BDS is President Elect of the British Academy of Cosmetic Dentistry. He has a special interest in minimally invasive cosmetic dentistry and presents hands-on courses and lectures on the Inman Aligner worldwide. Tony Knight is owner of Knight Dental Design, London, which has been awarded laboratory of the year five times in the last six years, and specialises in cosmetic dentistry.

Figure 3: Pre-op arch form

Figure 4: Pre-op front facing

Figure 5: Inman Aligner with arch expansion

Figure 6: 12 weeks aligning and whitening

Figure 7: Final alignment

Figure 8: Minimal preps

Figure 9: Fixed retainer

Figure 10: Knight IPS emax veneers

this situation composite tips are more likely to chip or debond than a well designed incisal wrap ceramic veneer.

THE INMAN ALIGNER

TIF QURESHI

The patient in this case study presented com-plaining that he hated his smile (Figure 1). On examination several key problems existed. Firstly his anterior teeth were badly misaligned. They were also dark, following years of staining and this had been compounded by occlusal trauma that had worn the edges of his teeth badly, allowing absorption of stain through the tips (Figure 3). The misalignment and occlusal wear also meant that his teeth were actually quite different lengths.

He wanted a great smile and he wanted it quickly. The patient requested veneers placed as soon as possible, but due to the massively destructive preparations needed to align his teeth this option was discouraged immediately. An occlusal view showing the amount of tooth destruction needed was enough to convince the patient that it was a poor choice (Figure 4). Other options were available and outlined.

- Fixed orthodontics. The patient did not want fixed brackets placed in his mouth even with short term ortho being presented as a compromised alternative to a referral for ideal specialist orthodontics.
- Invisible clear aligner braces. The patient refused this because of the time quoted for treatment, but was keen on the removability. The cost was also an issue because the patient would still need further aesthetic/restorative treatment afterwards.
- Inman Aligner. The patient accepted this because of the short expected treatment time and because he wanted removability.

knightdentaldesign

5x UK DENTAL LABORATORY OF THE YEAR

Smile Design and Occlusal Rehabilitation
All Major Implant Systems
Free Expert Treatment Planning Advice
Cosmetic Imaging
Practice Marketing Support
Great On-Line Case Portfolio
Nationwide collection

A world class laboratory here in the UK

visit **www.knightdentaldesign.co.uk**

Private Dentistry AWARDS 2009
BEST UK DENTAL LABORATORY

THE DENTAL AWARDS 2008 WINNER
UK DENTAL LABORATORY OF THE YEAR 2008

Private Dentistry AWARDS 2007
BEST UK DENTAL LABORATORY

Private Dentistry AWARDS 2005
BEST UK DENTAL LABORATORY

THE DENTAL AWARDS 2004 WINNER
UK DENTAL LABORATORY OF THE YEAR 2004

t. 0208 316 6248 **e.** info@kdduk.net

Our plan was then to perform anterior alignment of the teeth with simultaneous whitening and then to reassess the smile design and occlusal function afterwards to realign, then design.

TREATMENT

A full examination with X-rays and occlusal analysis was carried out. Full BACD style photos were taken. Analysis of the occlusal photo showed that there was 3.3mm crowding (Figure 2). We chose to use an Inman Aligner with combined expander,made by Nimrod Orthodontics (Figure 5). The Aligner was used over 12 weeks by the patient and only worn 16-18 hours a day. The patient turned the midline expander once a week and some progressive, anatomically respectful interproximal reduction (IPR) was carried out.

At week 9 of alignment, bleaching trays were constructed and short acting Day White whitening gel was used to whiten. Because the Inman Aligner can be removed and only needs to be worn a maximum of 20 hours a day, it is very easy for the patient to whiten at the same time. This is excellent for motivation. By week 12 the patient's teeth were whiter and straighter (Figure 6). The patient was then held in retention on a temporary Essix retainer.

However, at this point we needed to reassess, including the patient's perception of the aesthetics (Figure 7). The patient's posterior occlusion was balanced but he had no anterior or canine guidance.

After alignment we offered the patient the option to simply use edge bonding on the upper teeth as we commonly do, but he expressed a wish to still have veneers to give a fuller look. Upper edge bonding was simulated by adding composite in a mock up fashion. He viewed the result but still felt his teeth looked flat and wanted them to appear fuller. So at this point a purely additive wax up was made and a direct preview was placed in the mouth from a silicone stent taken from the wax up. The patient was happy with the new tooth length and dimensions.

At the next appointment, edge bonding was placed from lower premolar to premolar to open the bite and enhance guidance. The Dahl principle was used and no more than 2mm of composite was added anteriorly with most loading on the canines and a long centric on the incisors. (Within two months the posteriors were in full contact again).

One week later the upper teeth were prepared. Minimal preparations could be used because the teeth were in the right position so the preparations could be truly in enamel. Temporaries were placed immediately based on the silicone stent of the wax up.

At this point no retainer was needed because the temporaries were locked together except of course at the gingival embrasures where small interdental brushes could be used to ensure adequate hygiene. Aesthetics, function and phonetics were checked, rechecked and modified over a four week period. Guidance corrections were made in situ on the temporaries and the lower composite edge bondings.

Once the patient was happy and fully comfortable, an accurate silicone rubber impression was given to the technician and he then had an exact copy to follow for the final veneers. The patient visited the lab for a shade match and discussion on tooth characterisation. His input and requirements were noted by the technician.

In the lab, once the veneers were made, an impression was taken of the veneers on a solid model and this was used to produce an immediate temporary retainer. Of course once the temps are removed the teeth will still need retaining so this could be used before a fixed retainer was fitted later. On the fitting appointment, the temporary veneers were removed and the finals tried in. The patient was happy and the veneers were then bonded.

A new impression was taken to make a wire retainer. In the meantime the patient wore the temporary Essix made on the veneer cast. One week later a wire retainer made by the orthodontic lab was bonded to the back of the upper 6 front teeth. Because the preps were minimal (Figure 8) the veneers were only on the facial surface so bonding to the back of the teeth was easy (Figure 9).

Figure 11: The steps towards transformation

The patient was thrilled with his result, not only because he achieved a natural more attractive smile, but also he did it with the minimal amount of invasion needed (Figure 10 and 11).

MINIMAL THICKNESS IPS EMAX VENEERS

TONY KNIGHT

With the trend towards ever more minimal preparations, the ceramist is challenged to produce lifelike restorations in ever thinner slivers of ceramic.

With e.max press ceramic (strength 360 - 400 mpa, 2.5 - 3 times stronger than other glass ceramics) it is now possible to produce high strength veneers as thin as 0.3mm.

To achieve a natural appearance with minimal restorations the technician must rely on creating a surface that closely mimics

Figure 12: Fine surface anatomy carved with fine FG diamonds

Figure 13: Enhancing colour with surface shades

Figure 14: Natural surface morphology and subtle colouring before glazing and polishing

Figure 15: Hand polishing to create the wet enamel feel

Figure 16: Knight IPS emax Veneers

enamel in texture, feel and colour. In order to create a natural morphology and microfine surface texture and in such a delicate structure standard dental laboratory burs are often too course and bulky. Fine diamond dental surgery burs in a low speed electronic contraangle motor are ideal to reproduce the subtle natural morphology microsurface detail of the natural tooth (Figure 12).

However, with so little space to work his magic the ceramist is limited in his use of internal ceramic layering techniques. Subtle surface tints are used to boost the chroma to create an illusion of depth, very subtle washes of almost invisible colour must be applied layer on layer to build up an almost three dimensional effect (Figure 13 and 14).

A final layer of glaze locks in the colour washes and protects the effect. However glazed ceramic does not have the same 'mouth feel' as enamel polished for years by the tongue, cheeks and lips. To achieve the look and feel of mature enamel the ceramic must be hand polished using silicon rubbers, fine pumice and diamond polish (Figure 15).

The difference in feel and appearance between hand polished and glazed ceramic is noticeable and patients often comment on the natural feel of the restorations (Figure 16). Fortunately the high strength and polishability of the lithium disilicate e.max ceramic allows hand finishing of the ultra thin veneers with a low risk of fracture during the process.

CONCLUSION

For the patient with more complex aesthetic or functional/occlusal issues or high aesthetic demands a combination therapy of realignment and minimally invasive ceramic restorations can be the solution that satisfies both the patient's desire for great aesthetics and the clinician's desire to conserve enamel. An added advantage of this approach is that the prealignment of the teeth ensure much less dentine exposure during prep and a greater area for the stronger enamel bonding.

This multidisciplinary case shows what is possible when orthodontics, whitening, and advanced ceramic techniques are combined and sequenced.

With this method the patient is involved in the planning and designing of his new smile at every stage. Risk is reduced and predictability increased to create a natural conservative result.

To ask a question or comment on this article please send an email to: comments@ppdentistry.com

British Academy of Cosmetic Dentistry

www.straight-talks.com
www.inmanaligner.com
www.knightdentaldesign.co.uk
www.bacd.com