The Inman Aligner: An effective tool for minimally invasive cosmetic dentistry (part I)

By Dr. Tif Qureshi, United Kingdom

Traditionally, cosmetic dentistry has always been faced with the challenge of treating poorly aligned teeth. Treatment options available for mildly and moderately crowded teeth include orthodontics and restorative dentistry. Many patients have chosen the restorative approach, for example porcelain veneers, over orthodontic techniques because the longer treatment times combined with either unsightly labial wires and brackets or the expense of “invisible” braces.

In cases in which patients choose to have crowded upper and lower anterior teeth treated with veneers, it is extremely challenging to prepare teeth conservatively, owing to their anatomy and the minimum thickness of porcelain required. A difficult balance has to be found between over-preparing the teeth and placing over-contoured restorations. However, owing to the excitement and emotion created by the effect of popular large smile makeovers, aggressive tooth preparations, in which teeth are prepared to stumps, seem to have been accepted as normal practice, simply because there has been no alternative that could achieve the patient’s objectives in a sufficiently short period.

Inman Aligners are now offering a minimally invasive alternative to patients in the U.K. With only one appliance, most Aligner cases can be completed in six to 16 weeks. In anterior crowding cases, Inman Aligners have proven to be much more time and cost effective than invisible braces or conventional fixed and short-term orthodontics.

To date, I have treated about 1,000 cases and to treat slight rotations. Previous aligners were used to correct minor tooth movements. Early designs were developed for minor tooth movements and to treat slight rotations. Previous aligners were used, but several problems always limited the amount of tooth movement achievable. Their active components were made from stainless-steel wire, which is relatively inflexible and lacks any innate springiness.

As a result, traditional removable appliances required periodic reactivation, leading to short-lived force application that limited the speed of tooth movement, owing to the need to allow the bone around the roots of the teeth being moved to ‘rest’ between successive activations. In addition, the direction of force application with traditional springs was less easy to control, leading to a mousetrap-like force that tended to unseat the appliance.

These factors limited the degree of correction that could be accomplished. For larger movements, single appliances were insufficient to complete the movement.

In developing the Inman Aligner, Donal Inman CDT created a patented design that takes advantage of the gentle, steady and consistent forces generated by NiTi. The design relies on piston-like components driven by NiTi coil springs. Inman designed lingual and labial components to function or move in parallel to the occlusal plane, eliminating the mousetrap-like unseating forces and allowing actual physiological movement of teeth. Inman Aligners are ideally worn for 16 to 20 hours a day. Studies have demonstrated that the removal of orthodontic forces for four hours a day massively reduces the risk of root resorption and that risk of root resorption is lower in removable versus fixed appliances.

A standard Inman Aligner as described in the following cases consists of both lingual and labial components. The forces have the effect of squeezing the teeth into alignment. The components can be used in isolation to retract teeth with a more steady force, requiring less adjustment than a standard labial bow retractor. In Case III, a unique approach that incorporates an expander on the Inman Aligner is described.

Patient selection

Case selection for the Inman Aligner is critical. The following criteria should be met before treatment proceeds:

1. Cases should require movement of incisor and/or canine teeth only.
2. Root formation of the teeth to be moved must be complete.
3. Crowding or spacing should be less than or equal to 5 mm. Arch evaluation must be performed to determine the amount of space required. Cases with over 5 mm of crowding require additional space.
AACD credentialing program opens to all dentists, dental laboratory technicians

The American Academy of Cosmetic Dentistry (AACD) offers cosmetic dentistry’s most recognized advanced credentialing program for dentists and dental laboratory technicians. In August, the American Board of Cosmetic Dentistry, the credentialing authority of the AACD, announced that all dentists and dental laboratory technicians are now eligible to pursue AACD Accreditation regardless of their membership status within the AACD.

This visionary and historic change underscores AACD’s dedication to inclusiveness and standards of excellence, thus providing patients greater access to Accredited dental professionals who have demonstrated a very high level of clinical skill and ability in cosmetic dentistry.

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Fig. 5: Occlusal view before treatment.

Fig. 6: Occlusal view after 13 weeks with an Inman Aligner.

Fig. 7: Smile view before treatment.

creation techniques, as pioneered in the U.K., which should only be attempted with training. It is quite possible to treat cases with 3.5 mm crowding easily and predictably in less than 16 weeks.

4. Cases should have fully erupted posterior teeth to facilitate reten-
tive clasps, with a reasonably well-aligned arch form to facilitate the path of insertion of the appliance.

5. Cases should be stable and prefer-
ably free from periodontal disease.

6. Patients must agree to wear the Aligner for about 20 hours a day and be responsible for good appli-
ance and oral hygiene. Should the patient wear the Aligner for 14 hours a day only, treatment will still be successful.

Model evaluation/arch analysis with Spacewize

Arch analysis should be performed before any Aligner case is attempted in order to ensure that the case is suit-
able and, if not, what additional space creation techniques will be needed to allow the Inman Aligner to work. The extent of crowding present is calculated by measuring the sum of the mesial-distal widths of the teeth to be moved. This distance is called the required space or the teeth. If canines and incisors are to be moved, this dis-
tance will be measured from the distal surface of one canine to the distal sur-
face of the other canine.

Using an orthodontic retaining or jeweller’s chain or a polishing strip, the ideal arch form is then measured from the distal of each canine in align-
ment with the ideal arch form fol-
lowing orthodontic correction. Criti-
cally, the arch needs to pass through the suggested position of the contact points and not the incisal edges. This is described as the available space or the curve.

It is possible to perform this task more quickly and just as accurately with software such as Spacewize. Just one simple occlusal photograph is required, which can be taken chair-
side. One tooth needs to be measured for calibration. A curve can be digitally established and this is normally easier when observing the patient’s aesthetic requirements and occlusion directly. The extent of crowding is immediately calculated using such software.

Laboratory requirements

Accurate upper and lower impres-
sions are taken, preferably two of the arch being treated. Simple alginate can be used if cast quickly. A bite registration and prescription should be completed and sent to a certi-
fied Inman Aligner Laboratory. The technician should be informed of the amount of crowding calculated. The teeth to be repositioned should be noted clearly. The prescription should provide full details to the technician regarding the teeth to be moved, the area they are to be moved to and the distance they are to be moved. A Spacewize trace of the ideal curve can also be submitted.

Interproximal reduction

Interproximal reduction (IPR) is begun at the fitting appointment using abrasive strips or discs. The model analysis will have already calculated the extent of IPR required.

Many authors acknowledge that the reduction of half of the inter-
proximal enamel on the mesial and distal of each incisor tooth is a safe tech-
ique. This equates to 0.5 mm per contact point, creating 2.5 mm of space between the canines. In some cases, the distal of the canine and mesial of the premolar can be reproxi-
matively allowed for a total of 5.5 to 4.5 mm. These cases will require more experience in using the system but offer a number of possibilities for cli-
nicians once trained to use the system correctly.

Metrical records of the amount of stripping performed should be
What You Don’t Know May Hurt Your Patients
THE OSA-TMD CONNECTION

Hundreds of millions of people of all ages around the world suffer from deadly obstructive sleep apnea; from infants to elderly. Obstructive Sleep Apnea (OSA) has been linked to Cardiovascular Disease, Cerebrovascular Insult, Endocrine Disorders and Obesity and our medical colleagues are asking for our help, NOW! OSA is considered a disease of craniofacial anatomy so the ONUS is on dentists to identify and help manage OSA sufferers.

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kept. An in-surgery fluoride rinse or application of topical fluoride is recommended after any enamel reduction procedure. El-Mangoury et al. and Radlanski have demonstrated that there is no increased risk of caries when enamel surfaces are smoothed correctly. Heins et al. and Tal have demonstrated that there is no increased risk of periodontal disease from the decreased interproximal space.

Critically, Inman Aligner treatment uses progressive, anatomically respectful IPR. While the extent of IPR required is already known, it is never carried out in one treatment. In order to ensure minimal risk, IPR (0.15 mm per contact point) is carried out only in small increments. The patient is sent away with the Aligner. Owing to the Aligner forces, the gap between the incisors will very soon close. Interproximal reduction is performed at each appointment only as needed, using strips or discs, which ensures the stripping is far more anatomically conservative than would be the case using burs. This significantly reduces the risk of excess space formation, gouging or poor contact anatomy.

Lingual/labial anchors
Composite resin just incised placed either incisal or gingival to where the bows contact will help them to function more efficiently. This can also be used for the labial surface, especially in cases in which teeth are being retracted. Strategic placement is vital for success and can be very helpful in the treatment of rotated teeth and the extrusion of teeth.

Appliance adjustment
The forces can be varied by adjusting the spring components or replacing springs for larger, longer springs. Generally, adjustments are not necessary, except in more complex cases, for which training is required to understand the correct spring types and compression rates to use.

Case No. 1
The 25-year-old female patient complained about the appearance of her lower anterior teeth. She gave a history of orthodontic treatment in her teenage years, having a fixed appliance fitted for a period of two years. She had been given a retainer at the time but was told to wear it at night for three months only. She had noticed her lower four incisors starting to become crowded again. Treatment options discussed were invisible braces, conventional fixed brackets or an Inman Aligner.

The amount of space required for reduction was calculated as 3.5 mm. Interproximal reduction was performed using diamond strips (Brasselect). A reduction of 0.15 mm at each contact point was achieved at the fitting appointment. This was verified with a little more space. (Incorporated was seen three weeks later and a further 0.15 mm reduced at each contact point. The teeth were aligned in just over nine weeks. The Aligner was left in for one month to stabilise the tooth positions. Tooth whitening was undertaken for two weeks during the last two weeks of treatment. Simultaneous bleaching is a significant advantage in removable systems and helps patient motivation.

Finally, an orthodontic retention wire was bonded in place on the lingual surfaces, ensuring the patient could still use super floss for hygiene.

Case No. 2
A female patient presented complaining mainly about her rotated upper right central tooth. She was considering veneers to redistribute the space over the four front teeth. This would have meant that she would undergo three aggressive preparations and one invasive preparation with endodontic treatment of the upper right central tooth.

Space calculation with model analysis indicated that treatment would be possible with an Inman Aligner. Because of the relatively low cost, the patient selected this option, understanding that we would not be able to achieve Golden Proportion, owing to the width and length of her lateral teeth.

A midline screw was incorporated to allow for a small amount of operator-controlled expansion to provide space for the expander. Three aggressive preparations and two invasive preparations were carried out to ensure space for the cement.

After alignment, this expansion will just relax. It is a temporary technique to create sufficient space to align the anterior teeth. After alignment, the expander can even be unwound if required.

Treatment took 15 weeks with three sessions of IPR. A total of 5 mm was stripped and 1 mm was gained with the expander. The teeth were retained using orthodontic gold chain bonded from canine to canine. An upper Essix Retainer was also worn nightly as back-up for retention.

Case No. 5
The patient in this case originally presented for porcelain veneers on her upper anterior teeth. The preparations would have required root-canal treatment of two of her incisors in order to achieve adequate emergence profiles.

Essix Retainer
This retainer is a thermo-formed, clear, thin appliance that is easily made and very comfortable for patients. The recommended post-operative regimen for Inman Aligner treatment is to wear the retainer at night for 18 months and after that for two nights a week indefinitely.

Conclusion
With the Inman Aligner, patients previously had noticed her lower four incisors would not need veneers. Veneers could always be used at a later stage if necessary, after more enamel has eroded with age and when veneers can be placed additively, for example. The result was not perfect smile with regard to the criteria defined by Smile Design theory. Yet, that she no longer wanted veneers arguably provides us with a far better and more ethical outcome long term.

Retention
Retention or anterior alignment is essential. Recommended retention types are bonded canine-to-canine fixed retainers commonly fabricated from 0.016- or .0175-inch multi-strand wire. An indirect method can be used to adapt the wire to a working model.

This can then be transferred to the teeth, using a specially made jig and bonded with flowable composite resin to the backs of the aligned teeth. The occlusion must be clear when placing a retainer on the maxillary arch.

Advantages of this method are that the flexibility of the arch wire allows for physiological tooth movement and prevents bond fracture through occlusal forces. Periodontal ligament stability is also achieved with this technique.

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About the author

Dr. Tif Qureshi is vice president of the British Academy of Cosmetic Dentistry. He presents hands-on courses and lectures on the Inman Aligner worldwide.

For information on U.S. course dates and training, please go to www.straight-talks.com or www.inmanaligner.com. Alternatively, contact Caroline Cross on +44 207 253 2559 or at info@straight-talks.com.