By Dr. Tif Qureshi

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ditionally, cos-

metic 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 been attracted to the restorative approach, for example porcelain veneers, over orthodontic techniques because of 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 crowns, 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 the crown re-
quired. A difficult balance has to be found between overpre-
paring teeth and placing overcontoured restorations. However, owing to the excite-
ment generated 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 be-
cause there has been no altern-
ate that could achieve the patient’s objectives in a suffi-
ciently short period.

Inman Aligners are now offer-
ing a minimally invasive alter-
нативу to patients in Australia. With only one appliance, most Inman cases can be complet-
ed in six to 16 weeks. In an-
terior crowding cases, Inman Aligners have proven to be much more time- and cost-effec-
tive than invisible braces or conventional fixed and short-
term orthodontics. To date, I have treated about 1,000 cases and have found that case ac-
cceptance has been close to 100%, simply because many patients much prefer a remov-
able appliance which fits their life-
style more easily. Treatment can also easily be combined with simultaneous bleaching and final edge-bonding for dramatic, quick and non-inva-
sive results. From this, a new procedure has arisen in cos-
metic dentistry - alignment, bleaching and edge-bonding - which will be covered in the second part of this series. The cases presented in this article will outline some case types that can be treated.

The Inman Aligner

For over 50 years, spring aligners were used to correct minor tooth movements. Early de-
signs were developed for mi-
nor tooth movements to treat slight rotations. Previous spring aligners were useful, 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 spring-
generated force. As a result, traditional re-
moveable 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 tooth roots to ‘rest’ between successive activations. In addition, the direction of force application with traditional springs was much less easy to control, leading to a mousetrap-like force that tended to unseat the appli-
ance. 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 Align-
er, Donal Inman, CDT created a patented design that takes advantage of the gentle, steady and consistent forces gener-
ated by NiTi. The design re-
lies on piston-like components driven by NiTi coil springs. In-
man designed lingual and la-
bial components to function or move in parallel to the occlusal plane, eliminating the mouse-
trap-like unseating forces and allowing actual physiological movement of teeth. Inman Aligners are ideally worn for four hours a day and be responsible for about 14 hours a day, treatment will still be successful.

Model evaluation/arch anal-
ysis with Spacewize

Arch analysis should be per-
formed before any Aligner case is attempted in order to ensure that the case is suitable and, if not, what additional space creation techniques will be needed to allow the Inman Aligner to work. The extent of crowding present is calcu-
lated by measuring the space of the mesial-distal width of the teeth to be moved. This distance is called the required space. If canines and incisors are to be moved, this distance will be measured from the distal surface of one canine to the mesial surface 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 alignment with the ideal arch form following orthodontic correction. Critically, the arch needs to pass through the suggested position of the con-
tact 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 sim-
ple occusal photograph is

The Inman Aligner: An effective tool for minimally invasive cosmetic dentistry - Part 1

4. Cases should have fully erupted permanent teeth to fa-
cilitate retentive clasps, with a reasonably well-aligned arch form to facilitate the path of in-
sertion.

5. Cases should be stable and preferably periodontally disease free.

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

Figure 1. Side smile view before treat-
ment.

Figure 2. Side smile view after nine-
wks with an Inman Aligner.

Figure 3. Occlusal view before treat-
ment.

Figure 4. Occlusal view after treat-
ment.

Figure 5. Occlusal view before treat-
ment.

Figure 6. Occlusal view after 13 wks with an Inman Aligner.

DID YOU KNOW

Almost in 1 in 5 people find stained teeth a turn off. Beverly Hills Formula toothpaste removes over 99% of stains in just one minute.

required, which can be taken chairside. One tooth needs to be bonded to the expansion. A curve can be digitally established and the extent of crowding calculated using such software.

**Laboratory requirements**

Accurate upper and lower impressions are taken, preferably using double arch trays. Simple alginate can be used if cast quickly. A bite registration and prescription should be completed and sent to a certified Inman Aligner Laboratory. The technician should be informed of the amount of crowding calculated. The teeth to be bonded 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 performed in the appointment using abrasive strips or discs. The model analysis will have already established the extent of IPR required. Many authors acknowledge that approximately one half of the interproximal enamel on the mesial and distal of each incisor should be removed. This equates to 0.3mm per contact point, creating 2.5mm of crowding between incisors. In some cases, the distal of the canine and mesial of the premolar should be reduced allowing for a total of 3.5 to 4.5mm. These cases will require more experience in using the system but offer a number of possibilities for clinicians once trained to use the system correctly. Meticulous records of the amount of enamel removed should be kept. An in-surgery fluoride rinse or application of topical fluoride gel should be performed after any enamel reduction procedure. El-Mangoury et al had demonstrated that there is no increased risk of caries after IPR, provided surfaces are smooth correctly. Heins et al and Talib have demonstrated that there is no increased risk of periodontal disease, despite the decreased interproximal space.

Critically, Inman Aligner treatment uses progressive, anatomically respectful IPR. While the amount of enamel removed is already known, it is never carried out in one treatment. In order to achieve the IPR (0.11mm per visit per contact point) is carried out only in small increments. If the patient is sent away with the Aligner. Owing to the Aligner forces, this prevents any chance of inadequate or no IPR. The patient is sent away with the Aligner. This enables the teeth to be realigned using a specially made jig and fitting interproximal reduction. The end result is a perfectly contoured profile for occlusal contact. The alignment of the teeth is reproducible, allowing for efficient and cost-effective orthodontic treatment.

**Case I**

The 25-year-old female patient complained about the appearance of her lower anterior teeth. She had a history of orthodontics in her orthodontic technique for a period of two years. She had been given a retainer at the time but was told to wear it at night for 3 months only. She had noticed her lower four incisors starting to become crowded. The treatment options discussed were invisible braces, conventional fixed braces or an Inman Aligner. The amount of space required for reduction was calculated at 5.5mm. Interproximal reduction was performed using diamond strips (Brasseler). A reduction of 0.11mm per contact point was achieved at the fitting appointment. This was verified with a thickness gauge. The patient was seen three weeks later and a further 0.11mm reduced at each contact point. The teeth were aligned in just over nine weeks. The patient 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. Simultaneously bleach was applied to the lower incisors. This resulted in 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 upper prosthesis for hygiene.

**Case II**

A female patient presented complaining mainly about her rotated upper right central tooth. She had had her incisors treated previously and was concerned ve neers to redistribute the space over the four front teeth. This would have severe consequences if she would undergo three aggressive, preparatory treatments and one interference treatment. She would suffer from the use of the upper right central tooth. Space gained with model analysis indicated that treatment would be possible with an Inman Aligner. Retainers are available with relatively low cost, the patient selected this option, understanding that the cost would not be able to achieve Golden Proportion, owing to the length and width of her lateral teeth. A mandible screw was incorporated to allow for low amount of space between the canines. This equates to 0.5mm per visit per canine and can be placed additively, for one month to stabilise the appliance. The patient was aware that the reduction of half of the arch would be necessary. This can also be used for the lingual 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.

**Apppliance adjustment**

The forces can be varied by adjusting the spring components or replacing 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 III**

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. Once options had been discussed in detail, the patient proceeded upon an Inman Aligner to align the teeth with veneers following this treatment. It was decided that after alignment, retention would be mandatory. Space was created above the canine with only 0.85mm crowding in deviation from the ideal curve. A space of 0.11mm with combined expander was fabricated and fitted. Minimal IPR was carried out with a 0.11mm reproximation strip to separate the teeth. The patient turned the screw every five days for six weeks, which created nearly 2mm of space. This allowed space for the centrals to advance and de-rotate. At this point, the expander was unwound and a bonded retainer was placed. The teeth were aligned within a few weeks, and a bonded retainer was used to retain the teeth passively for a further four weeks, after which a bonded wire retainer was placed. The patient was very pleased with the alignment and decided that she would not require veneers. Veneers could always be used at a later stage if necessary, after more enamel has eroded at a later stage if necessary, after more enamel has eroded. It is a temporary technique for one month to stabilise the treatment.

**Retention**

Retention for anterior alignment is usually presented for porcelain restorations 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 allows for physiological tooth movement and prevents bond fracture through occlusal forces. Periodontal ligament stability is also achieved with this technique.

**Essix Retainer**

This retainer is a thermoformed, 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 retain a night at night for 18 months and after that for 2 nights a week indefinitely.

**Conclusion**

With the Inman Aligner, patients previously put off by the treatment time and fixed brackets of traditional orthodontic techniques or the expense of more recent invisible braces, could, if their case is suitable, achieve anterior tooth alignment far more quickly with a simpler, single appliance. Inman Aligners offer a visible treatment for these patients previously put off by the time cost of fixed braces and no desire to have appliances adhered to their teeth. Many of these patients were those who would have opted for aggressive preparation of their teeth for veneers, before the Inman Aligner.

**Editorial note**

A complete list of references is available from the publisher.