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Inman Aligner

A Project

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Submitted By

Ahmed Ali Mahmood

5th Grade

Supervised By

Professor Dr. Nidhal H. Ghaib

Assitant Dean for Scientific AFF airs

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Firstly and finally, allgreatfulnss and faithfulness thanks and praises to “ALLAH” the gad of world

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1-Introduction:

Removable orthodontic appliances were once widely used to correct a variety of malocclusions. As techniques associated with fixed appliances developed and became the main preference of orthodontists, the role of the removable appliance diminished. However, in recent years the popularity of the removable appliance has returned with a vengeance. It provides patients who would normally opt out of orthodontic procedures on the grounds of lengthy treatment time, compromised aesthetics and cost, a real alternative to ordinary fixed braces ***(*McReynolds et al ,1991*)***.

The Inman Aligner, a versatile removable appliance, is a unique modification of the traditional spring retainer. It uses super elastic open coil springs to create light and constant forces on both the labial and lingual surfaces of the anterior teeth. The appliance is designed to correct crowding, spacing, and rotations of the anterior teeth with force levels that can be adjusted to meet the requirements of each case ***(Atif ,2008).***

For over 30 years, spring aligners were used to correct minor tooth movements. Early designs were developed for minor tooth movements and to treat slight rotations. Previous spring aligners were useful, but several problems always limited the amount of tooth movement achievable ***(Hancher , 2005).***

Figure 1: Mandibular Inman Aligner used with clear acrylic maxillary retainer to recover and maintain orthodontic result (Jacobson et al, 2008).

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. ***(Hancher,2005).***

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 it 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 steadier 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. ***(Dugoni et al, 1995)***.

2-Patient selection: (Henis,1988).

Case selection for the Inman Aligner is critical. Only certain types of movement are possible and some patients will still need conventional orthodontic treatment or indirect restorations. Certain criteria should be met before treatment proceeds: A. Cases should require movement of incisor and/or canine teeth only ,B. Root formation of the teeth to be moved must be complete ,C. Crowding or spacing should be less than or equal to 3mm.Arch evaluation must be performed to determine the amount of space required. Cases with over 3mm of crowding require additional space creation techniques which should only be at tempted with training. It is quite possible to treat cases with 5.5 mm crowding easily and predictably in less than 16 weeks, D. Cases should have fully erupted posterior teeth to facilitate retentive clasps, with a reasonably well-aligned arch form to facilitate the path of insertion of the appliance ,E. Cases should be stable and preferably periodontal disease free , F. Patients must agree to wear the Aligner for about 20 hours a day and be responsible for good appliance and oral hygiene. Should the patient wear the Aligner for 14 hours a day only, treatment will still be successful, G. Sufficient fully-erupted posterior teeth to facilitate retentive clasps, with a reasonably well-aligned arch form to facilitate the path of insertion of the appliance.

Figure 2: patients slelection for inman applaince ***(Henis , 1988)***

3- Model evaluation:

The amount of crowding present is calculated by measuring the sum of the mesial-distal widths of the teeth to be moved. This may be carried out with a calliper. Each width is plotted along a straight line and the total length measured. This distance is called the ‘Required space’ . If incisors only are to be moved, this will be from the mesial surface of one canine to the mesial surface of the other canine. If canines and incisors are to be moved, this distance will be measured from the distal surface of one canine to the distal surface of the other. Using an orthodontic retaining or jewellers chain, the ideal arch form is then measured by hanging the chain from the distal of each canine and letting it align with the most ideal arch form after orthodontic correction. This is described as the ‘Available space’ and it is measured by placing the length of chain against a millimetre ruler. The ‘Available space’ is then subtracted from the ‘Required

space’ and this gives the amount of crowding present or the space required by inter-proximal reduction ***(Haga et al ,2009.)***

- **Laboratory requirements and ‘model surgery:**

Accurate upper and lower impressions are taken, preferably two of the arch being treated. A bite registration and prescription should be completed and sent to a certified Inman Aligner Laboratory.

Figure 3: Laboratory requirements and model surgery *(Haga et al ,2009)*.

Figure 4: Model evaluation with inman appliance. (Blake et al,1998).

The technician should be informed of the amount of crowding calculated. The teeth to be repositioned should be noted clearly. All spring aligners should be constructed on casts on which model surgery has been performed. The anterior teeth to be corrected are sectioned off the model and reset in the ideal arch form in wax on a working cast. The appliance is then fabricated on the corrected cast so that, when worn by the patient, the 'built-in' forces correct the misaligned teeth. **(Blake et al, 1998).**

4- Interproximal reduction:

Interproximal reduction should be started at the fitting appointment. This is performed by using abrasive strips or discs. The total amount of reduction required will already have been calculated during model evaluation. Many authors acknowledge that the reduction of one-half of the interproximal enamel on the mesial and distal of each incisor tooth is a safe technique This equates to 0.5 mm per contact making 2.5 mm of space possible between the canines. In some cases, the distal of the canine and mesial of the premolar can be reproximated, allowing for a total of 3.5 mm. These cases will require more experience using the system. When using abrasive discs or strips, care must be taken to avoid causing any trauma to the interdental papilla. Surfaces should be smoothed with fine polishing strips. Ideally, all interproximal reduction should be performed on the first visit, as more accurate measurement of the amount removed can be assessed using a thickness gauge at this time. However, it is understandable that some clinicians may want to have a staged approach. This can be done if careful records of the amount of stripping are taken. The clinician must be aware of the thickness of the discs and strips being used. An in-surgery fluoride rinse or application of topical fluoride is recommended after any enamel reduction procedure **(Sheridan ,1991).**

Studies by ***(El-Mangoury et al,1991)*** have shown that there is no increased risk of caries after interproximal reduction, provided surfaces are smoothed correctly.

The interproximal enamel is much thicker than labial enamel and is believed to have evolved to protect against the interproximal wear that resulted from abrasive primitive diets. As modern diets are less abrasive, much of this interproximal enamel is considered vestigial. In their study, Radlanksi et al studied teeth after interproximal airrotor stripping using scanning electron micrographs. They stated: Even though plaque accumulation would be expected, the SEM analysis revealed no incidence of caries in the artificially produced furrows. Therefore, interdental stripping can be considered a reasonable therapeutic technique, especially if care is taken to avoid abrasion in more gingivally located enamel. El-Mangoury et al reported that: Posterior interproximal enamel reduction does not appear to expose the enamel to pathological changes that could lead to caries, but to a period of demineralization, followed by remineralization. And, The roughness produced by stripping does not predispose to caries. Also, The results of this study establish a sound biological foundation for Sheridan's air rotor stripping technique. Another Studies by ***(Tal ,1984)*** and ***(Heins , 1988)*** have shown that there is no increased risk of periodontal disease despite the decreased interproximal space. Conversely, they showed it to be beneficial to periodontal health. Tal6 showed that intrabony pockets were less common when the distance between teeth was reduced and more common when the distance increased. He stated 'The correlation between the interproximal distance and the presence of intrabony pockets was positive and statistically significant'. That is, the smaller the distance, the less the tendency for intrabony pockets, and the larger the distance, the greater the tendency for intrabony pockets.

5- Appliance adjustment:

For the labial component, adjustment is fairly simple. An adjustment bead can be incorporated into the appliance during construction. To increase the retracting force, the helices distal to the adjustment bead are wound in a clockwise direction to compress the open coil and tighten the assembly. If no adjustment bead is present, the terminal end of the wire is simply cut and re-bent. To decrease the retracting force, the coil spring is removed and cut so it is flush with the labial component. For the lingual component, the lingual assembly may be removed by gently pulling it out . The NiTi coil may then be removed and replaced with a stronger force NiTi coil or a longer section of open coil to increase the force or a smaller, thinner coil to reduce it. The component is simply replaced by squeezing it and re-inserting it into the metal slots present in the acrylic Fig.5 **(Becker , 1984)**.

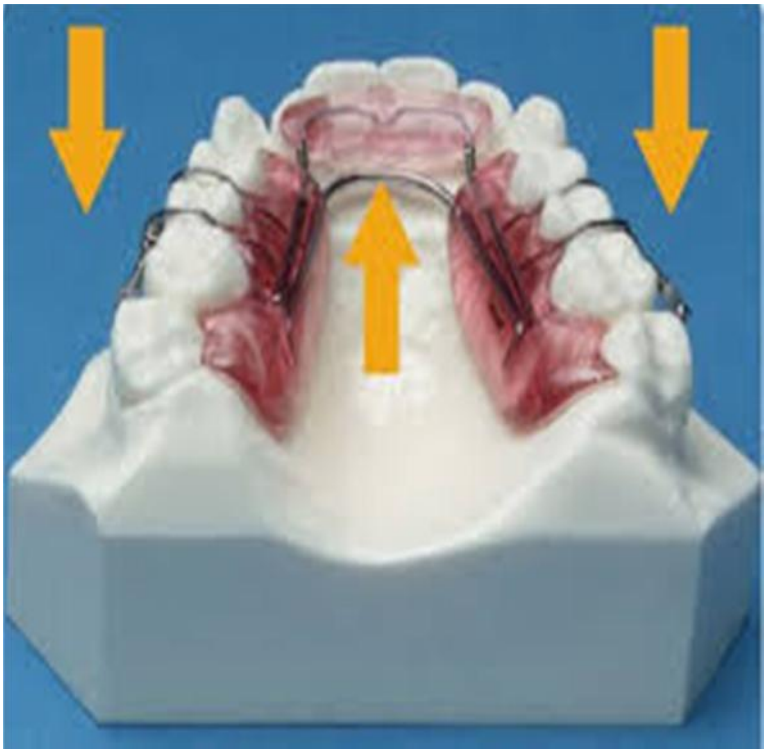

Figure 5: Adjustment of inman appliance. (Becker , 1984)

Inman Aligner with Expander:

The Inman Aligner with combined midline expander is the most commonly used type of expander used as part of Inman Aligner treatments. A huge benefit is that, as it is part of the Inman Aligner itself, only one appliance is still needed. The Inman Aligner combined with midline expander is particularly useful in 'unlocking' localized crowding such as overlapping centrals or palatally placed laterals. Up to 2mm of space in the incisal region can be created using this type of expansion. Any more than this will distort the aligner bows Fig.6 **(Reprinted , 2003).**

Figure 6 : *Inman Aligner with Expander* . (Reprinted , 2003).

6-How Does It Work:

The Inman Aligner has Nickel-Titanium coil springs that power two opposing aligner bars. These bars exert a squeeze effect which aligns the anterior teeth. This 'squeeze effect' comes from piston like lingual components pushing anterior teeth from the lingual, whilst the labial component pulls on the labial surfaces. These components move in parallel to the occlusal plane allowing some bodily movement of teeth as well as tipping. The forces can be varied by altering the coil size or by compressing the coil to create a stronger force. Most of the time, adjustments are virtually unnecessary. Inman Aligners mainly move incisors, but also cusped to a lesser extent.

Successful cusped rotation is very difficult as it is at the corner of the orthodontic forces of the appliance. Mandibular anterior teeth are easier to correct with Inman Aligners than maxillary teeth. This is because lower incisors are smaller and require less bone remodeling to move.

There has probably never been a better time to practise dentistry. However, dentists and patients are bombarded by image so f the beautiful smile and, for many years, practitioners have been pressure din to believing that porcelain veneers are the only answer. Of course ,there are many situations where veneers are the ideal treatment, and when well placed and properly bonded to enamel they will last for many years **(Magne et al ,2003).**

Layton and Walton in2007. showed a 73 % survival rate at 6 years for veneers bonded to enamel. Unfortunately, in my practice these ideal cases rarely come through the door. Most of the patients coming to the practice for cosmetic dentistry do so for more severe problems. Crowding of the upper and lower teeth is a common condition that adult patients would like improved. Porcelain veneers and 'instant orthodontics' designed to treat this will often lead to excessive enamel removal ,risking pulp vitality and compromising bond strengths ,or over-contoured restorations which can compromise plaque control. Poor root position will also compromise the emergence profile. The patient, who by now has also entered the “restorative cycle “will require the perio dicreplacement of these veneers with more lnvasive restorations.

Kim in 2009. showed the survival rate of veneers in England and Walest be approximately1 0.5 years. Meanwhile, the Inman aligner has proved to be a valuable appliance to help patients with mal-aligned anterior teeth .

7-Applications of Inman aligners: (Miller et al ,1979)

The main applications of the Inman Aligner are:

• It aligns anterior teeth.

• It corrects crowding, protrusion, rotations and crossbites.

• It is ideal for orthodontic relapse.

• It can be used as a stand-alone treatment.

• It can be used to pre-align cosmetic cases.

8-The Inman Aligner Differences: (Morley et al , 2001)

•One simple appliance is required

•Fast - most cases are completed in 6-18 weeks.

•Removable - it only has to be worn for 16-20 hours a day

•Low Cost - in comparison to fixed braces and clear aligners.

•Low Risk/Safe - the low forces and short treatments involved makes it very safe. There are no reported cases of root resorption or devitalization

•Relapse reversal.

•Ideal for Alignment, Bleaching and Bonding, the non-invasive smile makeover.

•Ideal for pre-alignment before veneers

9-Principle movement: (McReynolds , 1991)

A. Labial or lingual tipping:

This is one of the two main movements with an Inman Aligner. Tipping is the principle movement involved in the correction of protrusion and also in the correction of crowding Fig.7

Figure 7: labial or lingual tipping (McReynolds, 1991)

B. Rotation:

This is the other main movement that can be achieved with an Inman Aligner. Most crowding cases will have some degree of correction of rotations Fig.8.

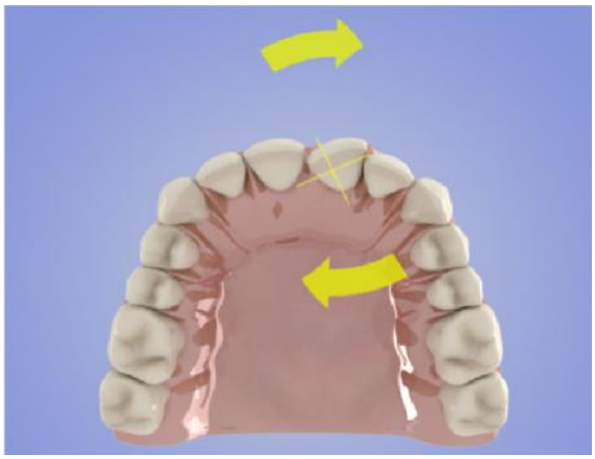

Figure 8 : Rotation movement (McReynolds , 1991)

C. Labial or lingual bodily movement:

This movement cannot be achieved as an isolated effect with an Inman Aligner. However, a degree of labial or lingual bodily movement often takes place in combination with labial or lingual tipping movements Fig.9.

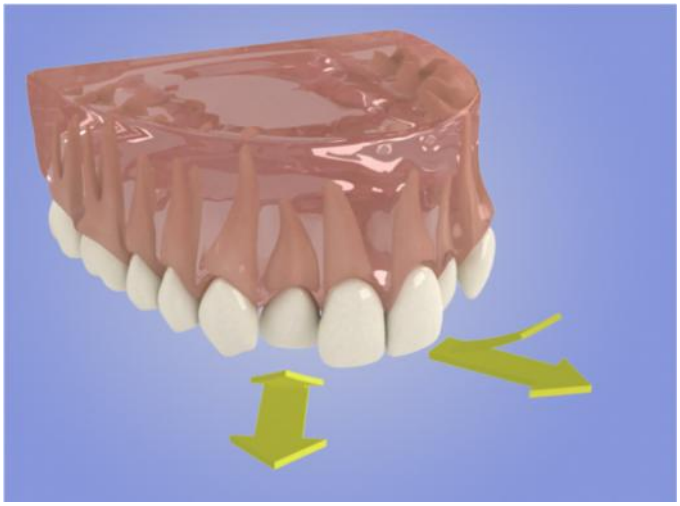

Figure 9: Labial or lingual bodily movement (McReynolds,1991)

10-Other Movements of Inman aligner: (Nance,1947)

a. Domino Effect:

This is when forces on the incisor teeth spread around the arch by a knock-on effect, shifting and tilting teeth distally. this effect can reach as far as the first or even second premolar Fig.10.

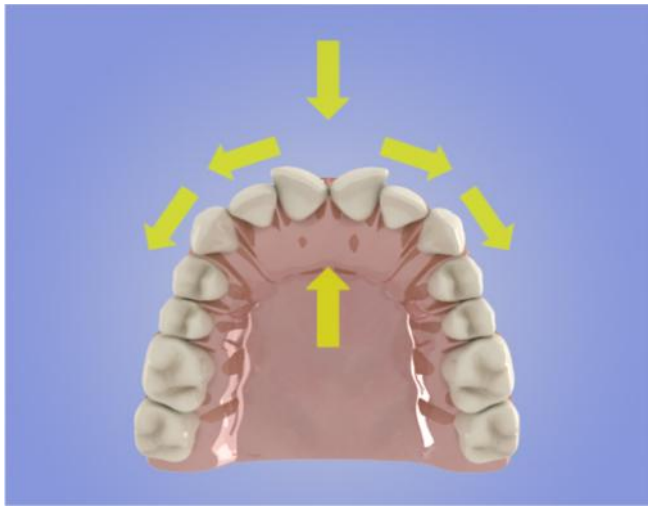

Figure 10 : Domino Effect (Nance ,1947)

b. Arch expansion:

The whole arch can be expanded using an Inman Aligner with a built-in expansion screw. This creates additional space for alignment of the anterior teeth Fig.11.

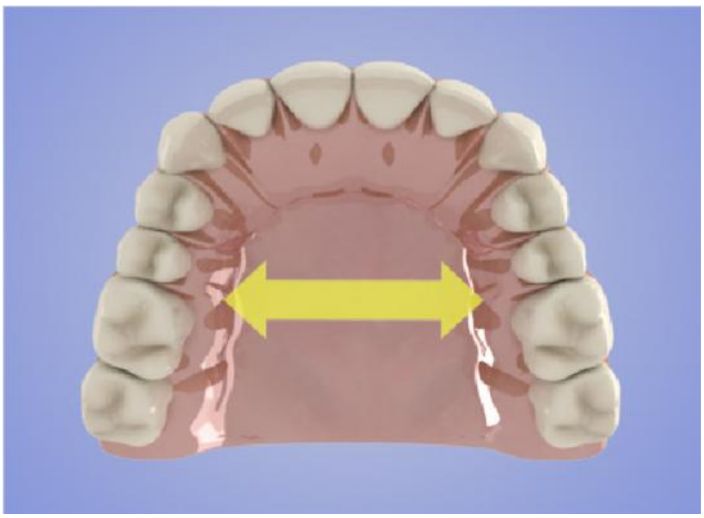

Figure 11 : Arch expansion (Nance ,1947)

11-Treatment planning:

A lull set of clinical photographs were taken (in accordance with American Academy of Cosmetic Dentistry guidelines) and upper and lower alginate impressions were recorded. The exact areas of the patient's smile that caused concern were discussed using the possible with the alignment treatment. Once the models were made from the impressions, we were able to assess the amount of crowding. This is done in a very simple fashion when using an Inman aligner - the maximum width of each incisor and canine tooth is measured using a simple micrometer. Using an interproximal metal strip, the required space of the optimal arch form is then measured from the distal of one canine round to the contra-lateral canine. The difference is equal to the required amount of interproximal reduction. More severe crowding can be addressed with an lnman aligner incorporating a palatal expander. An upper serles of three clear aligners and a lower Inman aligner were prescribed and the patient consented to the treatment as described. The prescribed interproximal reduction carried out on the plaster model, the teeth are removed and then replaced on the model in wax on the ideal arch form. The first upper clear aligner and lower Inman aligner were fitted on the same day Extensive discussion was undertaken with the patient about what to expect over the coming days and weeks. A small amount of interproximal reduction was undertaken using metal interproximal strips on all the interproximal surfaces of the lower teeth, from mesial of the canines round to the contra-lateral canines, and on the upper teeth, as laboratory instructions. IPR is carried out in this fashion to respect the anatomy of the tooth. simply making the teeth more slender. **(latta ,1988).**

The patient was seen every four weeks for the fitting of each of the upper aligners in the series, and to carry out further interproximal reduction on the lower teeth. After three months, the upper alignment was complete and the lower teeth were almost straight. After four months, the alignment of the lower

teeth was complete and impressions were taken for a fixed bonded retainer - a multi-strand stainless steel retainer bonded to the palatal surface of the front six teeth with the aid of a custom placement jig, Due to the type of occlusion, the patient continues to wear an Essix-type retainer on the upper teeth. **(Radlanski et al ,1991).**

The following steps apply purely to the Inman Aligner part of any treatment plan: A. Dental health issues would need to be treated first and any outstanding aesthetic concerns would normally be addressed after alignment ,B. Occlusal Clearance : Is there space between the upper and lower teeth to allow movement or is movement of teeth in the opposing arch also required first to make space? Or is a bite plane required to jump a cross bit **(Nance, 1947).**

12-Movement Potential: (Andrew Wallac,2010)

Is it just the incisors (and canines) that need to be moved and are the movements required achievable with an Inman Aligner

a- Arch Evaluation:

Is there crowding or spacing? What is the degree of crowding? Is this within the range that can be achieved with a standard Inman Aligner or is some additional expansion required? Or is it beyond the scope of treatment with Inman appliances.

b- Expansion:

Arch expansion is another technique to create space and increase the arch length via tipping or bodily moving teeth labially or buccally. Expansion can also be used to reduce or eliminate IPR depending on

the severity of the crowding. Expansion used in conjunction with Inman Aligner treatment **takes 3 forms**:

* Inman Aligner with combined midline expander.

** Fan screw expander.

*** Separate midline expander. In all three forms, the expansion is achieved via incremental activation of a midline screw.

* *Inman Aligner with Expander:*

The Inman Aligner with combined midline expander is the most commonly used type of expander used as part of Inman Aligner treatments. A huge benefit is that, as it is part of the Inman Aligner itself, only one appliance is still needed. The Inman Aligner combined with midline expander is particularly useful in 'unlocking' localized crowding such as overlapping centrals or palatally placed laterals. Up to 2mm of space in the incisal region can be created using this type of expansion. Any more than this will distort the aligner bows.

** *Fan screw Expander:*

In more crowded and complex cases, Fan screw expanders can be used to expand the anterior region only. The Fan screw expander is only designed for use in the upper arch.

The appliance uses a screw in the bicuspid area and a hinge in the posterior. As the screw is turned, it opens the hinge allowing the appliance to 'fan out', but does not allow the posterior to expand. This has the effect of creating up to 5mm of space in the anterior region and improving 'triangular arch forms'. The Fan screw should be activated, a 1/4 turn at a time, every 2-3 days. It must be worn at least 20 hours a day and should be re-inserted with some force onto the palate to ensure full seating otherwise it will not expand effectively Fig.12.

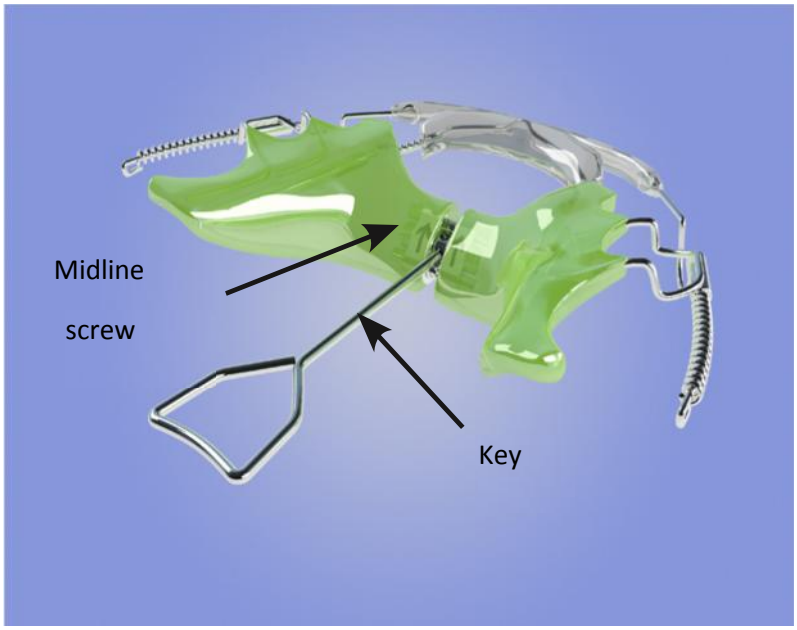

Figure 12 : Fan screw Expander (Mobarakc ,2007)

*** ***Separate Midline Expansion:***

In the most crowded cases, it may be necessary to use midline expansion techniques. In most situations, upper and lower expanders will be needed to avoid occlusal complications. As such, these techniques should only be used by those with a thorough understanding of complex orthodontic techniques. Patient instructions are the same as Inman Aligner with combined expander Fig.13.

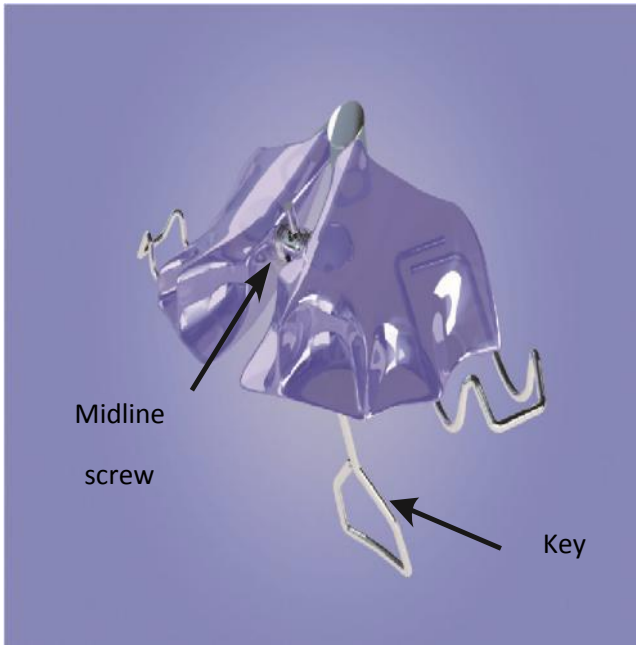

Figure 13: Separate Midline Expansion (Mobarakc ,2007)

13- Inman Aligner Patient Information And Consent form:

The following information is routinely supplied to anyone considering treatment with the Inman Aligner. While recognizing the benefits of a pleasing smile and healthy teeth, you should also be aware that Inman Aligner treatment, like any treatment of the body, has some inherent risks and limitations. These are seldom enough to contra-indicate treatment, but should be considered in making a decision to start treatment

- ***Termination of treatment***:- It is understood that treatment can be terminated for failure to cooperate, missing appointments, not wearing appliances, excessive breakage, failure to keep financial commitments, relocation, personal conflicts or for any other reason the doctor feels necessary. If termination is necessary, the patient will be given ample time to locate another dentist to continue treatment.**(Dugoni,1995)**
- ***Gum tissues, cheeks and tongue***:- The bone-gum relationship around teeth is always dependent upon whether there is enough bone to support the gum tissue properly. Many times when very crowded teeth are straightened there is a lack of bone and supporting gum tissues surrounding the teeth. Therefore, the gum tissue contour (shape) and support may not be adequate and require periodontal intervention. You may experience some irritation to the gums, cheeks and tongue during treatment. We will do our best to make your treatment as comfortable as we can for you, however it can take up to 2 weeks before you get used to the appliance. **(Nance, 1947).**
- ***Oral hygiene***:- Decalcification (permanent markings), decay, or gum disease can occur if patients do not brush their teeth effectively during treatment period. Although this is much less prevalent with removable orthodontics like the Inman Aligner, excellent oral hygiene and plaque removal is a must.**(McReynolds, , 1991).**

- ***A non-vital or dead tooth is a possibility***:- A tooth that has been traumatized from a deep filling or even a minor blow can die over a long period of time with or without orthodontic treatment.

An undetected non-vital tooth may flare up during movement, requiring endodontic (root canal) treatment to maintain it. We shall take x-rays of any teeth that are being moved to assess the vitality before treatment.**(Jacobson et al, 2008)**.

- ***Root resorption***:- In some cases, the root ends of the teeth are shortened during treatment. This is called root resorption. Under healthy circumstances the shortened roots are no disadvantage. However, in the event of gum disease in later life the root resorption may reduce the longevity of the affected teeth. It should be noted that not all root resorption arises from orthodontic treatment. Trauma, cuts, impaction, endocrine disorders, unknown causes can also cause root resorption.**(Morley , 2001)**.
- ***Growth issues***:- Occasionally a person who has grown normally and in average proportions may not continue to do so. If growth becomes disproportionate, the jaw relation can be affected and original treatment objectives may have to be compromised. Skeletal growth disharmony is a biologic process beyond the dentists control. Some patients will require oral surgery to obtain a reasonable treatment result to complete their case. Most patients we can inform ahead of time prior to starting any treatment that this is necessary and you will be referred to an orthodontist for comprehensive orthodontic treatment**.(Miller et al ,1979).**
- ***Speech***:- Your speech will be affected for up to 2 weeks as you get used to the appliance being in the mouth. We advise you to read out aloud for 1 hour a day for the first week, so you get used to speaking with the Inman aligner a lot sooner. **(Haga , 2009).**

- ***Treatment time***:- The total time for treatment can be delayed beyond our estimate. Lack of co-operation, broken appliances and missed appointments are all important factors that could lengthen treatment time and affect the quality of the result.**(little ,1999).**
- ***TMJ***:- There is a risk that problems may occur in the temporo mandibular joints (Jaw joints). Although this is rare, it is a possibility. Tooth alignment or bite correction sometimes can improve tooth related causes of TMJ pain, but this in not in all cases. Tension appears to play a role in the frequency and severity of joint pains, and there are many other causes of TMJ dysfunction **(Latta ,1988).**
- ***Very unusual occurrences***:- Swallowed appliances, chipped teeth, dislodged restorations and allergies to latex or nickel rarely occur but are possible.
- ***Black triangles, uneven edges, IPR and buttons***:- After having moved the teeth or during treatment black triangles can form between teeth. We will aim to reduce the chance of this happening by selective proximal reduction (slenderizing); however the teeth may need further bonding to minimize the black triangles after alignment. The edges of the teeth may also require bonding to make them all even. Small buttons (white filling material) will be added to the teeth to ensure that the Inman aligner is seated properly and moving the teeth as required. In order to make space to move teeth, we will use a technique called interproximal reduction, by where the sides of the teeth are smoothed just enough to make the right amount of space. No teeth will be required to be taken out with the Inman Aligner **(Kumasako,2009)**
- ***Implants***:- If you have implants (teeth that are screwed in to the bone) the Inman Aligner will not move these. Please let your dentist know if you have any of these before treatment is embarked upon.**(Hancher , 2005).**

- ***Expectations***:- All patients can expect improvement with their particular problem, but, in many cases, absolute perfection is impossible due to lack of muscle balance, tooth shapes and sizes and varying degrees of co-operation during treatment, along with heredity aspects that affects everyone's specific treatment results**.(Dugoni ,1995).**
- ***Cost:***- The patient will be kept up to date and be told before the treatment begins the estimated cost of the whole procedure. During any treatment plan, it is always possible to change however, the patient will be kept fully informed and no extra charges will be added without them knowing **(Latta ,1988)**
- ***Relapse***:- Teeth have a tendency to return to their original position after orthodontic treatment. This is called relapse. Very severe problems have a higher tendency to relapse and the most common area for relapse is the lower front teeth. After removal, a wire or retainers are placed to minimize relapse. Full co-operation in wearing these appliances is vital. We will make our correction to the highest standards and in many cases over correct in order to accommodate the rebound tendencies. When retention is discontinued relapse is highly likely therefore, the patient must be very compliant with the retention regime**.(Reprinted, 2003).**

14- Discussion

Using removable orthodontics, such as the Inman Aligner, can be a simple and effective way for GDPs(General Dental Practitiioners) to straighten anterior teeth on the right case types. It also greatly reduces the need for any tooth preparations in aesthetic dentistry. Other comprehensive orthodontic appliances exist and should be used whenever a patient present with more complex or profound problems, such as severe sagittal or transverse discrepancies or the need for posterior correction.

Fixed orthodontics offer greater treatment versatility and does not depend to the same extend on patient compliance as removable orthodontics, for some indications, removable orthodontic appliances actually have significant advantages over fixed appliances and usually the treatment time with removable appliances is shorter than with fixed.

Studies in dentistry and other fields of medicine have shown that treatment success is closely linked to the shared responsibility of treatment and aftercare between doctor and patient. Given that the treatment result of the removable appliance is heavily linked to the responsibility and compliance of the patient, it might be interesting to compare patient satisfaction from treatment with fixed versus removable appliances in similar anterior malocclusions.

References

1. Andrew Wallac, Elhical and affordable smile design october2010,Irish Dentist,17
2. Atif Qureshi, The Inman Aligner for Anterior Tooth Alignment, 2008; 35: 377-384
3. Becker A, Goultschin J. The multistrand retainer and splint. Am J Orthod 1984; 85: 470–474.
4. Blake M, Bibby K. Retention and relapse: a review of the literature. Am J Orthod Dentofacial Orthop 1998; 114: 299–306.
5. Dugoni, S, Lee, J, Varela, J, and Dugoni, A. Early mixed dentition treatment: postretention evaluation of stability and relapse. Angle Orthod. 1995; 65: 311– 320
6. El-Mangoury N, Moussa M, Mostafa Y, Girgis A. In vivo remineralization after air-rotor stripping. J Clin Orthod 1991; 25: 75−78.
7. Haga . Kumasako T, Kanoo T, Hayashi H. Effect of 8-hour intermittent orthodontic force on osteoclasts and root resorption. Am J Orthod Dentofacial Orthop 2009; 135: 278. e1–278.e
8. Hancher P. Orthodontics for esthetic dentistry Part 1. J Cosmetic Dent 2005; Winter (20): 4
9. Heins PJ. The relationship of interradicular width and bone loss. J Periodont 1988; 59: 73−79.
10. Jacobson N, Frank CA (2008) The myth of instant orthodontics: an ethical quandary. J Am Dent Assoc I39:424-434
11. Kim J, Chu S, Gurel G, Cisneros G, 2005; Jacobson N, Frank CA, 2008
12. Kumasako, Y., Otsu, E., Utsunomiya, T., Araki, Y., 2009. The efficacy of the transfer of twice frozen–thawed embryos with the vitrification method. Fertil. Steril. 91, 383–386.
13. Latta GH. The midline and its relation to anatomic landmarks in the edentulous patient. J Prosthet Dent 1988; 59: 681– 683.

14. Layton D, Walton T (2007) An up to l6-year prospective study of 304 porcelain veneers. International Journal of Prosthodontics 20 (4) : 389-96.
15. Little, R. Stability and relapse of mandibular anterior alignment. University of Washington studies. Sem Orthod.1999; 5: 191–204
16. Magne P, Belser U. Bonded porcelain restorations in the anterior dentition: A biometric approach. Quintessence Publ. Co. Inc, Chicago 2003.
17. McReynolds, D and Little, R. Mandibular second premolar extraction—postretention evaluation of stability and relapse. Angle Orthod. 1991; 61: 133– 144.
18. Miller EL, Bodden WR, Jamison HC. A study of the relationship of the dental midline to the facial median line. J Prosthet Dent 1979; 41: 657–660.
19. Mobarakc K (2007) Dental health assessed more than l0 years after interProximal enamel reduction of mandibular anterior teeth. American lournal of Orthodontics and D entof aci aI or thoP e dic s r:1(2): r62-L69
20. Morley J, Eubank J. Macroesthetic elements of smile design. J Am Dent Assoc 2001; 132: 39–44.
21. Nance, H. The limitations of orthodontic treatment. II. Diagnosis and treatment in the permanent dentition. Am J Orthod Oral Surg. 1947; 33: 253–301
22. Radlanski R, Jager A, Zimmer B. Morphology of interdentally stripped enamel one year after treatment. J Clin Ortho 1991; 23: 748−750.
23. Reprinted: Case CS. Principles of retention in orthodontia. Am J Orthod Dentofacial Orthop 2003;124 (4): 352– 361.
24. Sheridan J. Air rotor-stripping. J Clin Ortho 1991; 25(2): 75−78
25. Tal H. Relationship between the interproximal distance of roots and the prevalence on intrabony pockets. J Periodont 1984; 55: 604−607.