

Pre aligner treatment with the i-expander™

By Terence Whitty



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When creating space as a precursor to orthodontic treatment with clear aligners, you typically have 3 options:

1. Extraction;
2. Inter proximal Reduction (IPR); and
3. Expansion.

Extraction is the most invasive and hence least favoured option by both patient and clinician; IPR is usually acceptable in small doses in the right circumstances but still requires tooth structure to be removed; and whilst expansion should seem like the ideal pathway, there is a lot of misinformation on the process and its benefits are misunderstood by many clinicians, even though it would be a great asset in many indications.

In addition, because clear aligner therapy has become popular amongst the general dental community, expansion appliances are often overlooked due to unfamiliarity with their operation. General dentists are more comfortable with extractions and IPR than treatment options considered more the realm of specialist orthodontists.

However, if you consider that many orthodontic concerns are caused because sufficient expansion of the jaws did not occur during development, the role of expansion appliances can be viewed in the correct light.

Understanding expansion

Expansion is often used transversely as growth naturally ceases first in the transverse dimension and a constricted maxilla dentally or skeletally always causes issues. Hence, the diagnosis of this problem is an integral part of orthodontic treatment.

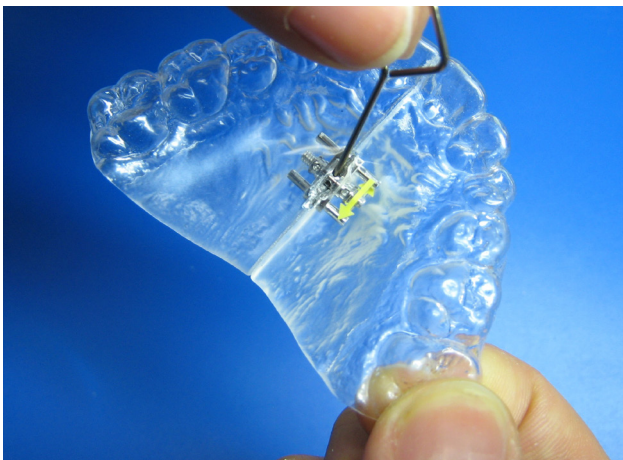
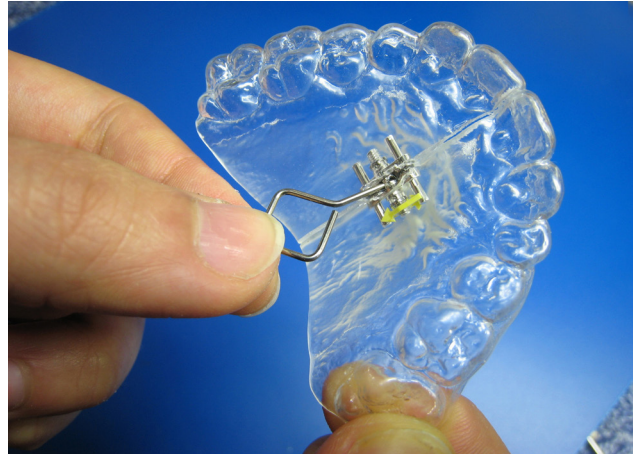
The two most common options available are fixed expansion and removable expansion.

Fixed expansion

Fixed expansion usually requires a screw or spring mechanism attached to orthodontic bands and wound at regular intervals. Often fixed expansion is done rapidly, hence the name Rapid Palatal Expansion. This often results in separation of the mid palatal suture and requires a lengthy holding phase. Many report both alveolar and skeletal development from fixed expansion. Sometimes surgically assisted expansion is applied and the suture is separated surgically and then the appliance is activated.

Removable expansion

Removable expansion makes use of a removable appliance with clasps anchoring the device in place; a screw mechanism is incorporated



i-expander development

and this is wound at regular intervals. The most common types of screws for removable plates will expand 1mm per 360-degree revolution of the screw. Often the screw is adjusted a quarter turn per week, creating one millimetre of expansion per month. Within 3-4 months, a good 3mm of space gain can often be seen. A lot of people believe this is only a dental alveolar change and amounts of tipping. Some disagree and say there is separation of the suture as well as other skeletal changes. Either way, it can be most useful in helping to create space.

There is great debate in the dental community regarding expansion especially with removable appliances, including exactly what is achieved and at what age it can and cannot be used. Suffice to say, it's beyond the scope of this article to enter the debate but it is fair to say many practitioners have reported and published great success with slow removable expansion in adults and children.

The i-expander was developed as a solution to the shortcomings of standard removable expanders, namely:

- 1. Clasp issues.** Usually metal clasps are incorporated to hold the expansion appliance in place. These often need to be adjusted and the constant insertion and removal can cause stresses on the wire and breakages are common. Wire clasps are often not a cosmetic solution and disliked by patients wanting a cosmetic solution.
- 2. Bulky acrylic plate.** The nature of acrylic is that it needs to be a certain thickness to have sufficient strength. Often removable expansion devices are bulky and uncomfortable and can affect the speech, especially in appliance conscious adults.
- 3. Molar tipping.** Most removable expanders will cause some molar tipping and this can be difficult to control. Sometimes covering the occlusal surfaces with "bite platforms" can assist but tends to make the appliance very bulky.

4. Cosmetic issues. Often removable expanders are not suitable for the appliance conscious patient. It does not fit in with the mindset of the patient when they think of "Invisible Orthodontics".

5. Expense. Expanders require a reasonable amount of skill to be constructed well and can be expensive. Often they are lost or damaged and need to be replaced or repaired at high expense to the patient.

In response to these traditional shortcomings, the i-expander boasts the following advantages over the standard removable expander:

- 1. Claspless design.** There are no metal clasps incorporated into the design of the i-expander. The appliance is anchored to the posterior teeth using a thermoformed polycarbonate shell and gives excellent retention and comfort. This also makes the retention component very durable and resistant to failure, as well as cosmetically pleasing for the patient.

2. High strength polycarbonate shell.

The baseplate is reinforced with a polycarbonate shell and this allows the appliance to be made thinner than a traditional acrylic expander with greater strength and crack resistance.

3. Anti molar tipping. The polycarbonate shell covers the occlusal surfaces of the molars and acts as an anti tipping mechanism. As the appliance is activated, the posterior teeth are held and are less likely to undergo undesirable tipping.

4. Cosmetically pleasing. The i-expander is the most cosmetic expansion device available. It is comfortable for the patient, very difficult to be detected and is in keeping with complimentary appliances such as invisible aligners.

5. Economical. The i-expander is approximately half the cost of a traditional acrylic expander with similar features.

6. Quality screw mechanism. i-expander uses a German surgical stainless steel screw with a precision mechanism. This is a stable dual pin expansion screw with auto locking function for built-in safety. A titanium screw is optional.

Treatment indications

Expander use should be considered as a precursor to aligner therapy (as well as traditional orthodontics) as a way to more efficiently create space. Generally, where space is needed, especially in the anterior region where crowding is excessive, an expander can be very useful.

The first step is to calculate the gross amount of space needed to align the anterior teeth and if it's between 2 and 3 mm, then an expander should be considered.

An i-expander will typically create more space in a shorter time than aligners, making it a more time efficient treatment option. For example, six months wear of aligners may yield 1.5mm of space gain; an i-expander will often double this with comparable wear time. As an added advantage, when an i-expander is used, the osteoclastic and osteoblastic activity is well-developed so when aligners are finally placed, they will be very efficient.

Ordering an expander

Taking good impressions is a very important first step in creating an order for an i-expander. It is important to capture as much anatomy as possible, particularly where the i-expander will seat. On the

upper arch, this includes the palate, all the tooth surfaces and the buccal tissue from the canines back. On the lower arch, all the lingual surfaces and frenum, tooth surfaces and buccal tissue from the canines back should be captured. Use good quality dental stone and avoid any voids; alternatively you can send PVS impressions and the lab will pour models.

Clinical use

When the i-expander is received, check the fit of the appliance. It should gently "click" into place and fit snugly. Instruct the patient on the insertion and removal of the appliance, check and ease any areas of pressure. If necessary, guide the patient with the use of a removal tool. An aligner removal tool such as an "outie" works well.

Typically, the appliance will feel slightly tight in the mouth. This is normal. If the appliance is slightly loose, then rotate the expansion screw in the direction of the arrow to "tighten" it until it fits snugly.

The appliance should be worn for a week before the expansion phase is started. This lets the appliance settle in and gives the patient time to get used to wearing it.

The usual recommended adjustment for the i-expander is one quarter turn per week. This equates to one full revolution of the expansion screw every 4 weeks. Length of treatment is typically 3-4 months. During this time, definite space gain/expansion should be obvious in the anterior segment of the arch.

It is important to emphasise that complete patient compliance is mandatory for satisfactory results to be achieved. This means the appliance must be worn full time - at least 22 hours per day - every day.

Troubleshooting

1. Non compliance - This is usually very easy to analyse. At check-up appointments, the i-expander will not have expanded to the correct amount in relation to the time worn (1mm per month). Indicative signs are often that the patient has difficulty inserting and removing the appliance as well as adjusting it.

2. Winding back - Quality expansion screw mechanisms do not spontaneously wind back in situ; nor are they designed to be wound back and forth manually. If the patient winds the mechanism back so that the appliance fits after a period

of non-wear, it causes stress. If this becomes habitual, the constant winding forward/winding back will end up damaging the screw and making it loose. It is then unlikely any expansion will occur. Usually you find this situation at a check-up and of course, instantly the appliance is blamed. However, it's unlikely the appliance is at fault.

3. Winding too quickly - Patients sometimes feel that the appliance is not progressing fast enough and will try and wind extra turns into the screw. This is to be avoided at all costs as it will only lead to an appliance that will either not fit because it has been wound out too far or be damaged due to incorrect stresses on the appliance because of ill-fitting due to overwinding.

4. Bruxism - If the patient is a bruxer, a heavy duty i-expander is available.

Conclusion

The i-expander was originally devised as a method to gain space prior to aligner treatment and can be used on either the upper arch, lower arch or both. When the amount of expansion has been achieved, new impressions or intra oral scans are taken and sent to the lab for aligner construction. It is most important that the expander is not activated further but is worn full time until the aligners are delivered to the patient. The i-expander is a very simple and well-designed appliance and when used correctly, can yield great results. It is available exclusively from Fabdent.

About the author

Terry Whitty lectures nationally and internationally on a variety of dental technology and material science subjects and runs a busy laboratory in Sydney's Eastern Suburbs, specialising in high tech dental manufacturing. Using the latest advances in intra- and extraoral scanning, CAD/CAM and 3D printing technologies, most specialties are covered including fixed and removable prosthetics, orthodontics and computer implant planning and guidance. He also specialises in the latest injection systems for traditional and CAD designed removable prosthetics and various associated dental appliances. His articles appear in various international journals.

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