A narrow maxilla is a common problem in orthodontics. Approximately 80% of orthodontic patients need some type of arch expansion. The incidence of posterior cross-bite is high and is present in more than 50% of the orthodontic cases, with upper molars being affected in more than 80% of cases, and lower molars affected in more than 19% of those cases. A narrow upper arch can produce undesired transverse growth changes. In order to intercept abnormal development and properly guide the patient's growth into a normal transverse growth, maxillary expansion will properly guide the patient's growth into a normal transverse growth, intercept abnormal development and transverse growth changes.

Maxillary expansion is achieved using a combination of movements such as: buccal tooth version (A), alveolar bone and molar buccal translation combined with molar torque control (B), midpalatal suture opening and buccal molar translation (C), midpalatal suture disrupting (D), and a combination of two or more of those factors (Figure 1). Slow maxillary expansion using the Quad-Helix appliance is a recommended choice, and it is widely accepted and applied by orthodontists. Many practitioners prefer the Quad-Helix as an expansion device because it is a very versatile appliance, with applications such as molar rotation control, and torque and tipping control. It can also produce advancement in the incisor region and create greater anterior expansion, resulting in an improved arch form (taking advantage of the anterior arms that deliver a “sweeping action”). Furthermore, the practitioners don’t need the patient’s or parent’s cooperation to reach the set objectives.

Maxillary expansion procedures can be divided in two major categories according to previous literature. The first, Rapid Maxillary Expansion or RME, is a procedure that is generally accomplished by using an appliance incorporating a screw, for example a Haas or Hyrax. These appliances tend to disrupt the maxillary bone when desired by the practitioner and are pre-activated with a certain amount of forces employed and control molars into vertical lingual tubes. In general, using the Quad-Helix for treatment leads to skeletal changes in maxillary bone when desired by the practitioner and indicated in the treatment objectives. Adjustments are made by simply changing the amount and frequency of the activations. The Quad-Helix can provide a force range from 221 grams to 1149 grams. The Quad-Helix can rotate the supporting molars and it can be adjusted to expand the molars and anterior teeth differentially. It can also be used to control molar torqueing. These features make the Quad-Helix an extremely versatile appliance.

It is observed that when correctly employed, the Quad-Helix can produce similar results to the RMEs and also correct all transverse problems in growing patients. These findings also coincide with what Cotton concluded after his work with monkeys. Additional, Slow expansion is a more physiological reorganization of the maxilla in the three planes of the space, providing more stability and less relapse possibilities than RMEs. We can observe these findings in the works produced by Ohshima and Storey.

The conventional Quad-Helix is typically installed pre-activated with a certain amount of expansion. When the case being treated needs additional activation, the clinicians can normally do it using a three jaw plier inside the mouth. This modality of activation strongly depends on the practitioner’s experience to control the amount of force and movements delivered. Due to this situation, many authors recommend removing the Quad-Helix from the mouth to place new actions, and recommissioning it after these changes. To avoid removing and recommissioning the bands, many practitioners usually construct the Quad-Helix to be inserted on lingual sheaths tubes for horizontal insertion and removing. This type of Quad-Helix is commonly pre-fabricated and available from many ortho manufacturers.

In 1983, Wilson & Wilson presented to the orthodontic community a system of vertically inserted 3D fixed/removable appliances. This method of insertion introduced improved versatility and easier inserting/removing procedures due to an innovative vertical insertion. Using Wilson’s 3D Quad-Helix it is possible to control the molars in all three planes of space during expansion movements. The fitting system is composed of stamped twin posts laser soldered to the Blue Eligoyy .038" Quad-Helix and inserted into vertical lingual tubes (Figures 2 & 3). The 3D Quad-Helix system allows the orthodontists to control the amount of forces employed and control molars in the three planes of space, strongly increasing overall movement control.

Correcting the narrow maxilla fosters an increase in the Mandibular width measurement and releases the mandible to a normal transverse growth. When approaching arch expansion, the practitioner should always consider proper diagnosis and planning procedures in all three planes of space, converting information from the models, comprehensive cephalometrics analysis (lateral and frontal), and divine proportions analysis. The posteroanterior radiograph is a very important tool to be used when analyzing the transverse plane.

Maxillary expansion is related to a more physiological reorganization of the maxilla in the three planes of space, providing more stability and less relapse possibilities than RMEs. We can observe these findings in the works produced by Ohshima and Storey. The conventional Quad-Helix is typically installed pre-activated with a certain amount of expansion. When the case being treated needs additional activation, the clinicians can normally do it using a three jaw plier inside the mouth. This modality of activation strongly depends on the practitioner’s experience to control the amount of force and movements delivered. Due to this situation, many authors recommend removing the Quad-Helix from the mouth to place new actions, and recommissioning it after these changes. To avoid removing and recommissioning the bands, many practitioners usually construct the Quad-Helix to be inserted on lingual sheaths tubes for horizontal insertion and removing. This type of Quad-Helix is commonly pre-fabricated and available from many ortho manufacturers.
CASE 1

- Figure 7: Expansion case 1 sample after 4 months - note molar rotation.
- Figure 8: Superimposition of T1 and T2 tracings on case 1 for checking changes after expansion - note the amount of expansion and molar torque control.

CASE 2

- Figure 9: Pictures taken before treatment on Case 2.
- Figure 10: Occlusal view before treatment on Case 2.

Phases of Treatment

- Figure 16: Beginning of treatment.
- Figure 17: After 2 months.
- Figure 18: After 4 months.
CASE 2 (Continued)

The clinical case 1 (Figures 7 & 8) exemplifies the expansion and 3D molar control using the 3D Quad-Helix. Note how the upper molars were expanded with complete torque control.

On case 2 (Figures 9-22) it is easy to see the features and possibilities of the 3D Quad-Helix during an expansion treatment. Note the severe transverse problem at the beginning and the high amount of expansion obtained after treatment. Figure 20 details 8mm of total molar expansion. The PA tracings showed 2.3mm increasing of J-J beginning and the high amount of expansion and 3D molar control using the expansion and 3D molar control using the 3D Quad-Helix. The full 3D system kit includes a variety of additional appliances the orthodontist can choose according to the needs for each case. The ability to exchange appliances during treatment without removing the molar bands is a significant advantage. Dr. Wilson calls this full kit system the Wilson 3D Tool Box.

I strongly recommend orthodontists use the vertical inserting system developed by Dr. Wilson. The appliances keep expansions and upper molars fully 3D controlled due to the invenerative fitting system, they save precious time cutting off lab steps, and the system is extremely cost effective. No doubt a great time cutting off lab steps, and the system is extremely cost effective.

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REFERENCES