A practical and effective method to increase the capacity of screws used for palatal disjunction

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In clinical situations involving accentuated atresia in the maxillary arch, palatal disjunction is called for. This treatment often requires an appliance change to achieve the desired movement. The aim of this article was to demonstrate a simple and effective method to increase the capacity of the expander screw and thus avoid the need to remove and replace it. (Am J Orthod Dentofacial Orthop 2012;141:374-7)

A main objective of orthodontic treatment is to correct any sagittal, vertical, or transversal discrepancy, whether of a dental or a skeletal nature, or a combination of the two. Several studies have demonstrated the effectiveness of rapid maxillary expansion in the treatment of transversal deficiencies.1-4

Rapid maxillary expansion corrects the deficiency in the maxillary arch width by disarticulation of the median palatine suture and by the separation of the maxillary bones and the circummaxillary suture system.5-7

Palatal disjunctor appliances are used to achieve these results. These appliances have screws that are activated to promote separation of the palatine suture. However, patients with a severe maxillary transverse growth deficiency sometimes require expansion beyond the capacity of a conventional expansion screw. For these patients, it is necessary to insert a new appliance or change the screw to complete the opening of the median palatine suture.8 To avoid a second clinical-laboratory procedure, the aim of this article was to describe a simple and effective method of increasing the opening capacity of expander screws.

CASE REPORT

A 15-year-old patient sought orthodontic treatment for crowding. The patient had a Class II dental and skeletal relationship with accentuated maxillary atresia (18 mm) and no space to accommodate the maxillary and mandibular teeth (Fig 1). Rapid maxillary expansion was proposed, followed by tooth extractions, use of an extraoral high-pull headgear, and correction with a fixed orthodontic appliance.

The first stage of treatment began with palatal disjunction with the mixed disjunctor proposed by Pithon.9 When the appliance was made, it was possible only to fit an 11-mm screw, because of the extensive maxillary atresia (Fig 2). After the appliance was fitted, the patient was instructed to activate it 2 times per day for 22 days, creating an opening of 11 mm. However, another 7 mm of opening was still needed. To achieve this, resin composite was applied to the exposed threads of the screw to increase its expansion capacity. Initially, prophylaxis of the threads was performed with a Brush of Robinson (Microdont, São Paulo, Brazil) and pumice stone to eliminate the adhering bacterial plaque, which could compromise adhesion of the composite, followed by isolation of the operative field; then the resin composite (Z100; 3M ESPE, Sumaré, São Paulo, Brazil) was applied with a spatula used for composites and a brush imbied in primer (Fig 3).

After the composite was light-polymerized, the patient was instructed to activate the appliance for 14 more days, totaling 18 mm of screw opening. The patient was instructed to avoid eating chewy or tough foods to prevent fracture of the resin composite.

At the end of the 14-day period, the patient returned to the dental office, where the effectiveness of the technique was noted (Fig 4).

DISCUSSION

In certain clinical situations, the orthodontist is faced with an accentuated maxillary atresia, requiring ample
separation of the median palatine suture. In these cases, it might be necessary to change the disjunctor appliance during the active phase of disjunction, since screws are available with an opening up to 13 mm. To change the appliance, additional clinical and laboratory stages are necessary, and the greatest inconvenience is the recurrence of contraction in this period.\textsuperscript{10}

With the intention of solving this problem, De Mendonça et al\textsuperscript{8} in 2008 described an immediate technique for changing the expander screw. In the same clinical session, the screw that had already opened would be removed and immediately be replaced by a new closed screw. With this technique, they were able, in part, to reduce the above-mentioned inconveniences; however, there would still be the need for an ample clinical session, a risk of contact between the oral tissues and the monomer used for screw fixation, and the difficulty of polishing the acrylic inserted.

\textbf{Fig 1.} Initial intraoral photographs.

\textbf{Fig 2.} Intermediate photographs, after activation of the entire disjunction screw.
Fig 3. A and B, Placing the resin composite in the threads of the screw with a spatula; C and D, finishing with a paint brush; E, light-polymerization of the resin composite; F, final aspect after resin composite placement.

Fig 4. Final photographs after rapid maxillary expansion.
With the intention of eliminating these inconveniences, this article describes a simple and effective method that favors the increase in the opening capacity of the screws used in disjunctor appliances.

As previously described, the technique is based on the accommodation of light-polymerizable resin composite in the threads of the screw. When placing the resin, it is important for the resin to cover the entire thread, thus avoiding points that favor future fractures in the composite. The resin will serve as support so that the thread continues to be activated. The choice of light-polymerizable resin composite was made because it is easy to handle, has good resistance, and does not require polishing. Self-polymerizing acrylic resin would not provide these benefits.

In this clinical case, 18 mm of expansion was required. The screw with the largest opening available on the market was 13 mm; however, because of the accentuated contraction of the maxillary arch, it was possible to use only an 11-mm screw.

The initial activation period was 22 days, with 2 activations daily. After this period, resin was applied on the threads, and the patient was instructed to activate the screw for 14 days more to complete the desired separation.

The positive points of this technique were that it made the laboratory step and the removal of the disjunction appliance unnecessary, since removal could lead to relapse of the expansion achieved. Another point is that this technique could be used for appliances of the Haas and hyrax types as well as for the mixed type.

The negative point is the risk of the resin fracturing, which could result in disarticulation of the right and left extremities of the screw, compromising the entire technique. It is always important to ask the patient to be careful when eating.

**CONCLUSIONS**

This technique enables the capacity of expander screws to be increased, without removing and replacing the disjunction appliance.

**REFERENCES**