Aesthetic planning and multidisciplinary treatment in cases with macrodontia in the anterior segment: a case report

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Abstract: The presence of macrodontic teeth in the upper anterior segment entails an important imbalance in smile harmony, jeopardizing dental proportions, symmetry and dental disposition due to a difference between the required and the available space. This article aims to describe the treatment planning, sequence and execution to resolve a macrodontic case affecting tooth #11 in a pediatric patient, through a multidisciplinary and conservative approach. **Keywords:** Macrodontia. Aesthetic planning. Aesthetic treatment. Dental composites.

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» Patients displayed in this article previously approved the use of their facial and intraoral photographs.

INTRODUCTION

Currently, composite resins allow us to offer a conservative, minimally invasive, functional and aesthetic treatment, as for the anteroposterior segment. Their versatility in clinical use is due to both their good biofunctional properties and adhesion predictability to dental mineralized structures.[1-3]

Regarding the posterior segment, the most common procedures are direct or indirect restorations for loss of structure due to caries, erosion, abrasion or functionality (friction). In the anterior segment, in turn, the application of composites is especially indicated to solve aesthetic problems, such as diastema closure, reconstruction of incisal edges, anatomical restoration of fractured teeth and changes in shape or size - in microdontic laterals[4] for example.

However, there are cases that tooth size changes are challenging from the point of view of restoration and require a large multidisciplinary planning for aesthetic reconstruction.

Macrodontia is a congenital anomaly in teeth size, where the dimensions are well above average. It is an alteration with 0,03 to 1.9%[5-7] prevalence, most often in men and may occur as true generalized, relative generalized or localised.[8] The cases showing macrodontia in the anterior segment tend to be a big problem concerning aesthetic restorations, since these teeth consume much of the available space in the arch, displacing adjacent teeth, shifting the midline and changing the proportion and harmony with other teeth[9,10] in the arch, which leads to the collapse and aesthetic dysfunction of the anterior segment.

Thus, this article aims to describe the aesthetic planning in a pediatric patient with macrodontia of both maxillary central incisors, although much more striking on the right one. Multidisciplinary treatment with an orthodontist and periodontist helps to prepare appropriate conditions for the anterior segment, distributing the spaces and proportions of the clinical crowns for the subsequent aesthetic restoration with direct composites.

CLINICAL CASE

A 12-year-old male patient with no medical history presented himself at the dental clinic to correct the appearance of his teeth through orthodontic treatment. The reason for the consultation was: "I have prominent canines and huge teeth."

DIAGNOSIS AND TREATMENT PLAN

During intraoral examination and smile analysis, in addition to observing the degree of crowding and the canines' ectopic position, the large size of the maxillary right central incisor clinical crown called attention, even though the left one was also macrodontic. When counting the teeth in the arch and with the aid of the panoramic radiography, dental fusion was excluded. However, the large size of the incisors could still be due to gemination or macrodontia. It was decided to discard gemination, as there was no clear evolution of two dental crowns, reaching the diagnostic of localized macrodontia[8] of #11 and #21 (Fig 1 to 5).

Because of this change in tooth size, there was a clear discrepancy between the available space and the space required for proper tooth alignment. Furthermore, the large size of #11's mesiodistal crown shifted the lateral incisor and the canine to a retrusive position, that if not corrected would result in an Angle Class II canine relationship. Therefore, after a thorough analysis of the case, together with the orthodontist, it was decided to extract the right lateral incisor in or-

der to mesialize the canine #13 to a Class I position and take advantage of the great mesiodistal volume of #11 to shape the anatomy of a central incisor and a lateral one with ideal proportions (Figs 6A, B).

Figure 1: Presurgical smile photos: note a low smile line.

Figure 2: Presurgical intraoral images in intercuspation: frontal and lateral of the anterior segment.

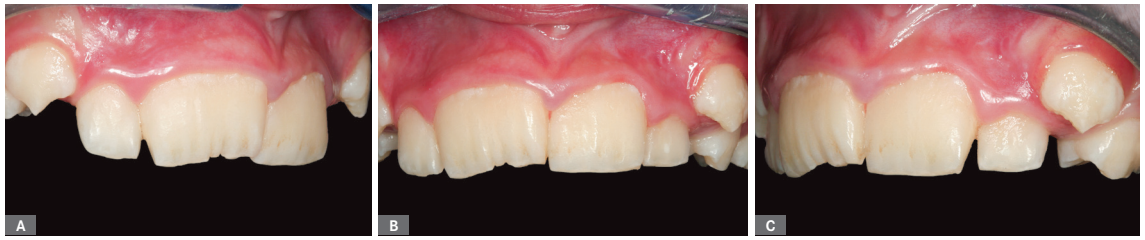

Figure 3: Frontal and lateral views of 3/4 of the anterosuperior segment.

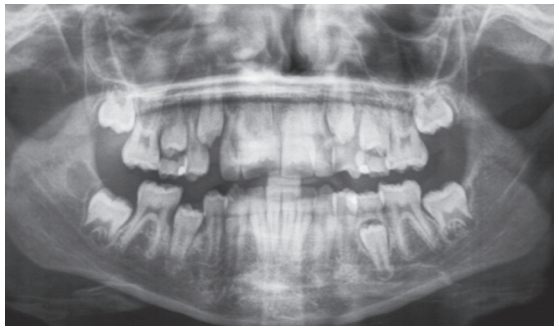

Figure 4: Initial panoramic radiography.

Figure 5: Initial upper intraoral photography.

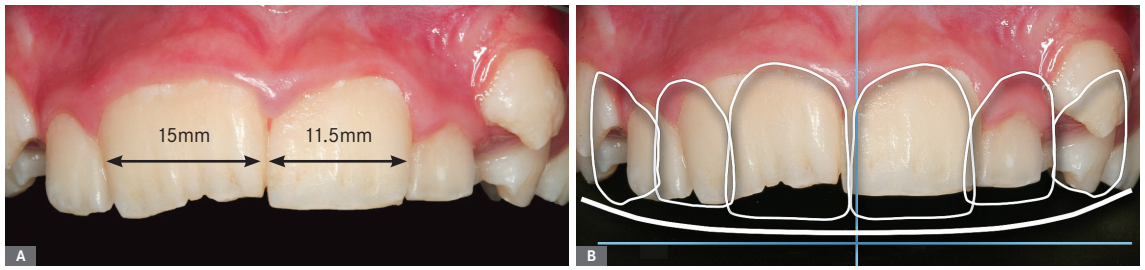

Figure 6: A) Mesiodistal dimensions of the maxillary central incisors: #11 was considerably oversized, but #21 also had above average measures and ideal proportions. **B)** Aesthetic drawing based on the average vertical reference line and the upper lip contour line.

ORTHODONTIC TREATMENT

After performing the planning, the orthodontic treatment started by moving #12 palatally and preserving it because of its aesthetic importance. In this way, it was necessary to redirect the treatment plan to use this tooth. In addition to the alignment and leveling in the first orthodontic phase, the distribution of spaces should be emphasized, starting from a correct midline, leaving similar spaces of 16 mm to the mesial of the canine to the group of the four incisors with ideal proportions (Fig 7A to 7D).

To achieve a proper distribution, there was a slight distal movement of the #12 and an enameloplasty was performed in both #21 proximal surfaces to leave an adequate mesiodistal volume to the central incisor and make room for the correct position of the lateral left incisor in the arcade. The orthodontic treatment lasted sixteen months.

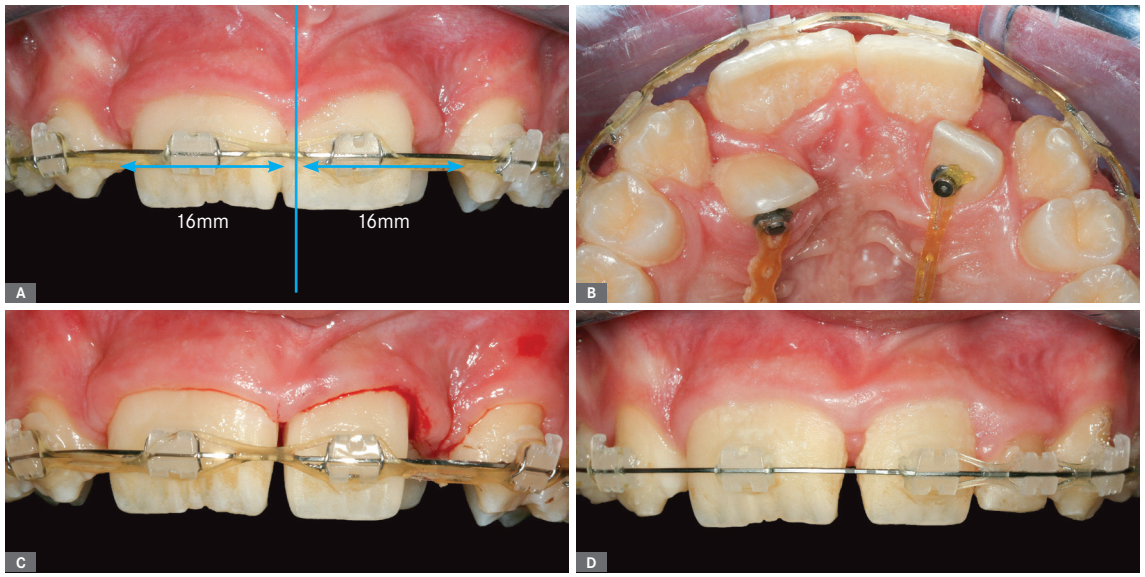

Figure 7: A) Space distribution from the midline and proximal surfaces of the canines. Available space of 16 mm on each side. **B)** Occlusal image in which is observed the #12 palatally moved and the space to the correct position of # 22. **C, D)** Enameloplasty of the proximal faces of #21 and #11 of the light distal movement.

PERIODONTAL TREATMENT

The periodontal treatment prior to orthodontics was performed to reinforce phase I, with emphasis on oral hygiene instructions, to avoid bacterial plaque accumulation. Once phase I was under control, a clinical crown lengthening was carried out through gingivectomy[11,12] in the left maxillary lateral incisor, to improve crown proportions aiming at future restorations with composite[13] (Fig 8A and 8B).

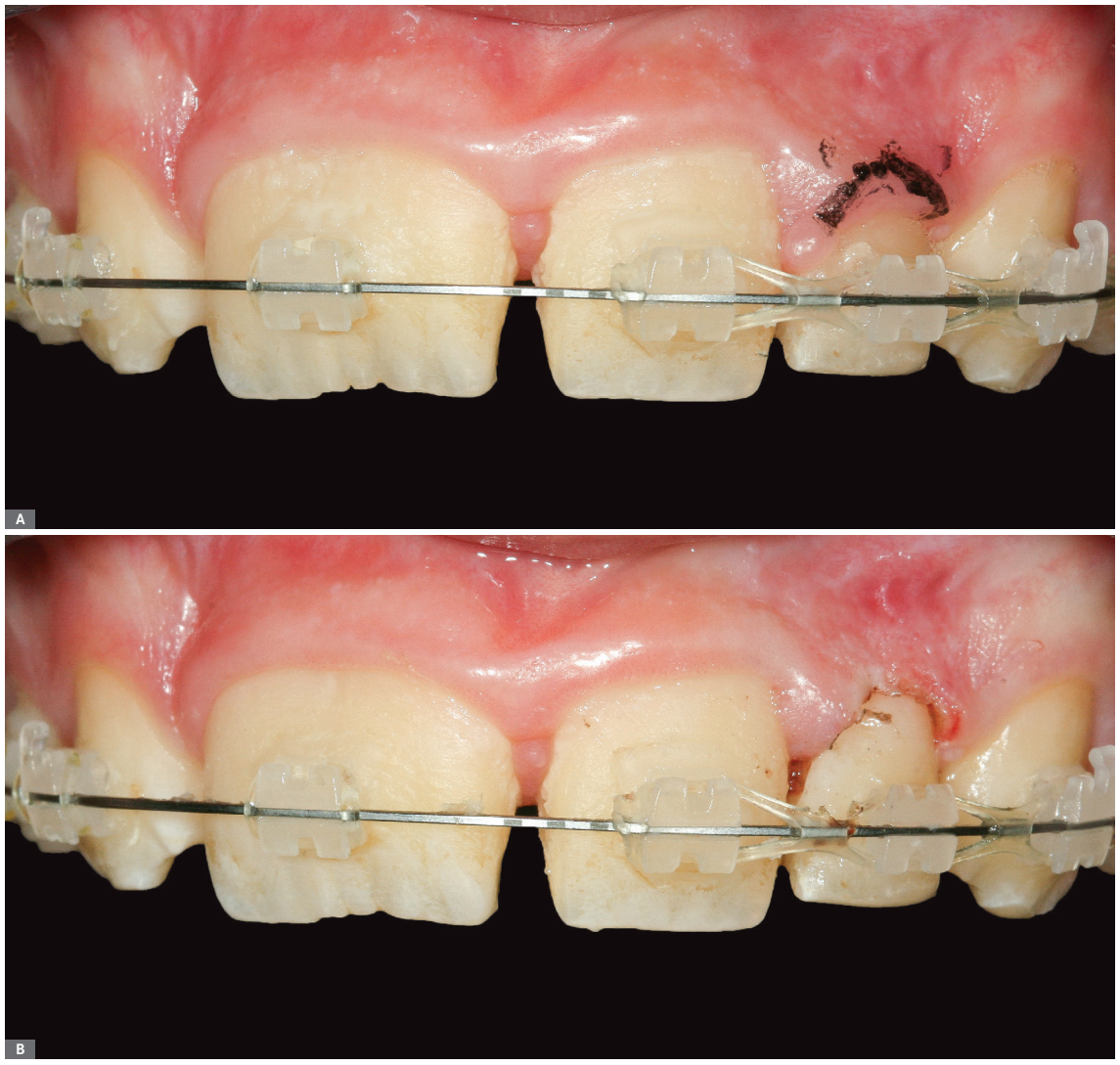

Figure 8: A) Gingivectomy planning required for proper proportion of # 22, before the removal of orthodontic appliances. **B)** Photograph after completion of periodontal phase I and the crown lengthening already performed.

RESTORATIVE TREATMENT

Once distribution and adequate proportions of the anterior segment were achieved, the four maxillary incisors were completely restored by means of composites. With regard to the primary anatomy of the crowns, the biggest challenge was to sculpt a central incisor and lateral from the macrodontic #11.

For this, a permanent marker was used to define and create an aesthetic proportion between the incisal edges of the central and lateral incisors. The application of the pink composite was performed to create a gingival papilla in the cervical transition area between both restorations. A color sample was made with Vita shade guide (Vita Classical - VITA Zahnfabrik) (Fig 9A to 9G).

Figure 9: A) Drawing necessary wear. **B)** Wear. **C)** Enamel etching. **D)** Adhesive application. **E)** Reanatomization of # 11 and # 12 from macrodontic # 11, and creation of gingival papilla with pink composite. **F)** Reanatomization the #21 and #22, for symmetry strengthening. **G)** Aspect after finishing and polishing.

First, an ultra-conservative dental preparation was performed, reducing the further region of the incisal edge of #11 with a light drill marking of the future interproximal space between the central and lateral, which would be the area occupied by the pink composite that simulates the papilla. The coronal enamel preparation was completed by blasting with oxide of silica (CoJet Sand®, 3M) to obtain a more predictable adhesion. After the isolation of both canines' mesial surfaces with Teflon tape, etching was carried out with 35% phosphoric acid for thirty seconds (Vococid®, Voco). It was irrigated until the gel agents were completely removed and air was applied until humidity was removed from the enamel surface. After drying, two adhesive layers (iBOND Total Etch®, Heraeus Kulzer) were applied and light-cured for 20 seconds using an LED lamp (2 Translux Wave, Heraeus Kulzer).[14,15]

A dentin composite (WTO Venus Pearl® Mitsui- Heraeus) was used for the primary anatomy of the four incisors. First, the central and lateral incisors were developed from #11, occupying part of the diastema between the centrals, in order to center the midline and give a more proportional mesiodistal dimension to the central incisor, giving it highlight over the lateral. Once the first quadrant incisors anatomy was reached, a pink composite (Renamel® Gingafill, Cosmedent, Inc.) was used to create an interdental papilla and improve the cervical transition between both restorations[16] (Fig 10A to 10I).

Figure 10: A, B, C) Photographs of postoperative smile. **D, E, F)** Intraoral photographs in postoperative intercuspation: frontal and lateral of the anterior segment. **G, H, I)** Frontal and lateral views 3/4 of the anterior segment restored.

The choice of this particular material is justified because it is a microparticle composite, which ensures a better procedure and less plaque retention and therefore better gingival health prognosis in the highest risk area.

Once the base layers were finalized, a makeup of the incisal area was carried out with a gray shade (Gray Color Creative Tint®, Cosmedent) and white coloring (White® Opaquer Creative Color, Cosmedent) to simulate a certain degree of translucency. Finally, to emulate the enamel layer, an A2 shade composite (Renamel® Microfill A2 Cosmedent) coat was given. In the contralateral teeth restoration, the anatomy was copied to achieve greater symmetry.

Finishing was performed using diamond burs, abrasive rubbers and discs emphasizing the secondary anatomy and transition lines. Polishing was performed with a microabrasive aluminum oxide polish (Enamelize, Cosmedent) using goat-shair discs[17,18] and plush.

CONCLUSION

Changes in anterior tooth size involve a number of aesthetic challenges, due to the lack of space required for functional, aesthetic and symmetrical alignment. Many times, a satisfactory result is achieved with orthodontic treatment in order to distribute spaces. The composites can always help to solve final details, offering greater symmetry and anatomy and for a more satisfactory result, being a minimally invasive and predictable technique thanks to adhesion.

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