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STRATEGIES TO FINISH ORTHODONTIC TREATMENT WITH A CLASS III MOLAR RELATIONSHIP: THREE PATIENT REPORTS

The purpose of this article is to review treatment concepts for patients with congenitally missing teeth in the mandible, for patients in whom teeth in only the mandibular arch were extracted, or for patients with Class III camouflage treatment. The therapy result in these situations is a Class III molar relationship. With this type of intercuspation, esthetic and functional aspects must be observed.
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Key words: *Class III molar relationship, camouflage treatment, intercuspation, uniarch extraction, orthodontic finalization*

The existing concept of normal occlusion in orthodontics calls for the first molars occluding in a Class I relationship, which ensures ideal intercuspation of all posterior teeth. However, nearly 45% of patients who seek orthodontic treatment demonstrate a Class II or III molar relationship.[1] These malocclusions can be of dental or skeletal origin. If they are of skeletal origin and the patient still has some potential for growth, he can be treated with orthopedic appliances, which will influence the development of the basal bones, as well as dentoalveolar remodeling, simultaneously leading to a dental Class I relationship. However, in adult patients, mainly those with Class III occlusions, the involvement of orthodontics and orthognathic surgery is often necessary to accomplish a satisfactory treatment outcome. If, on the other hand, the skeletal deformity is only moderate or the malocclusion is solely of dentoalveolar origin, the possibility of camouflage exists.[2–4]

In a patient with a Class II relationship, extraction of two maxillary teeth, generally the first premolars, is often the therapy of choice because it reduces treatment time and allows for an excellent esthetic and functional finish.[5] When dealing with a Class III occlusion, orthodontists become more cautious: The extraction of two mandibular premolars could lead to a Class III molar relationship at the end of treatment, ie, the mandibular first molar will occlude with two maxillary premolars, leading to a somewhat awkward intercuspation due to the dissimilar cusp configuration. Thus, the involved teeth have to be reshaped by either grinding or restoration.[6]

Camouflaging with extractions in the mandible can be indicated for certain patients with a Class III, but a similar situation will evolve in patients with tooth agenesis in only the mandibular arch. Agenesis of mandibular premolars occurs in about 3% of the population.[7] If a patient with missing mandibular teeth presents with a convex profile, a Class II relationship, excessive incisor protrusion, and increased overjet, the orthodontist may consider extracting two maxillary premolars to compensate for the missing ones in the mandible, thus ending with a Class I relationship. However, if the aforementioned situation is not present, extraction of maxillary premolars is contraindicated and treatment will finish with the molars in a Class III relationship.

Subsequently, three patients are presented in whom the mandibular premolars were extracted or genetically missing, leading at the end of therapy to a Class III molar relationship.

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CLINICAL EXAMPLES

Patient CG

Patient CG was a 13-year-old male who had congenitally missing mandibular second premolars. His facial appearance was very agreeable. He presented with a Class I molar relationship and excellent maxillary incisor inclination (Figs 1 and 2). The patient was treated using a standard edgewise technique, no extraction of maxillary premolars, and space closure in the mandibular arch by moving the mandibular molars mesially.

Treatment with extraction of the first or second maxillary premolars was contraindicated because it would have negatively affected the incisor inclination and the patient's facial profile.

With the aforementioned approach, the patient's facial profile was maintained, even though his chin showed accentuated growth. At the completion of therapy, the patient had an excellent Class I canine and a Class III molar relationship (Fig 3) with parallel roots of all his posterior teeth (Fig 4). Figure 5 shows the patient 13 years posttreatment. The treatment result was stable and all tissue healthy.

Patient MT

Patient MT was a 17-year-old male whose mandibular first premolars were extracted. The patient showed an excessive projection of the lower lip. The molar and canine relationships were Class III with an edge-to-edge incisal relationship (Figs 6 and 7). The treatment plan foresaw the extraction of the mandibular first premolars to retract the mandibular incisors without anchorage loss, thus improving the profile, establishing a correct incisor relationship, and finishing with the canines in a Class I and the molars in a Class III relationship.

An alternative would have been to extract the mandibular second premolars. However, this approach would have certainly resulted in a greater loss of anchorage and therefore in less retraction of the incisors. It would have also been more difficult to establish a correct overjet and overbite, as well as resulting in less reduction of the lower lip projection.

At the end of treatment, the profile was considerably improved due to retraction of the incisors and the subsequent uprighting of the lower lip. The intraoral photographs document an optimal intercuspation with the canines in Class I and the molars in Class III occlusion (Fig 8). The final panoramic radiograph reveals root parallelism, and the lateral cephalogram exhibits the repositioning of the mandibular incisors as a remodeling of the mandibular symphysis (Fig 9).

Patient RL

Patient RL was a 14-year-old male in whom the mandibular right second premolar was absent. This patient shows a straight profile with pleasant facial features. The molar relation was Class I on the left and Class III on the right side. The canines were Class I on the right and slightly Class II on the left side due to a deviation of the mandibular midline to the left. Besides an agenesis of the mandibular right second premolar, the patient presented with a retention cyst of his mandibular left second premolar (Figs 10 and 11). The patient was again treated with the standard edgewise technique. The cyst of the left second premolar was surgically removed and the tooth aligned within the arch, establishing a Class I molar relationship on this side. The space of the right second premolar was closed by mesial movement of the posterior segment, resulting in a Class III molar relationship.

Nowadays, a viable alternative treatment for this patient would be the placement of an implant. However, this patient was treated about 15 years ago when implant use was still arguable. The final result of this treatment is shown in Fig 12. The panoramic radiograph reveals correct root parallelism (Fig 13). Figure 14 depicts the patient 14 years posttreatment with excellent stability and optimal tissue health.

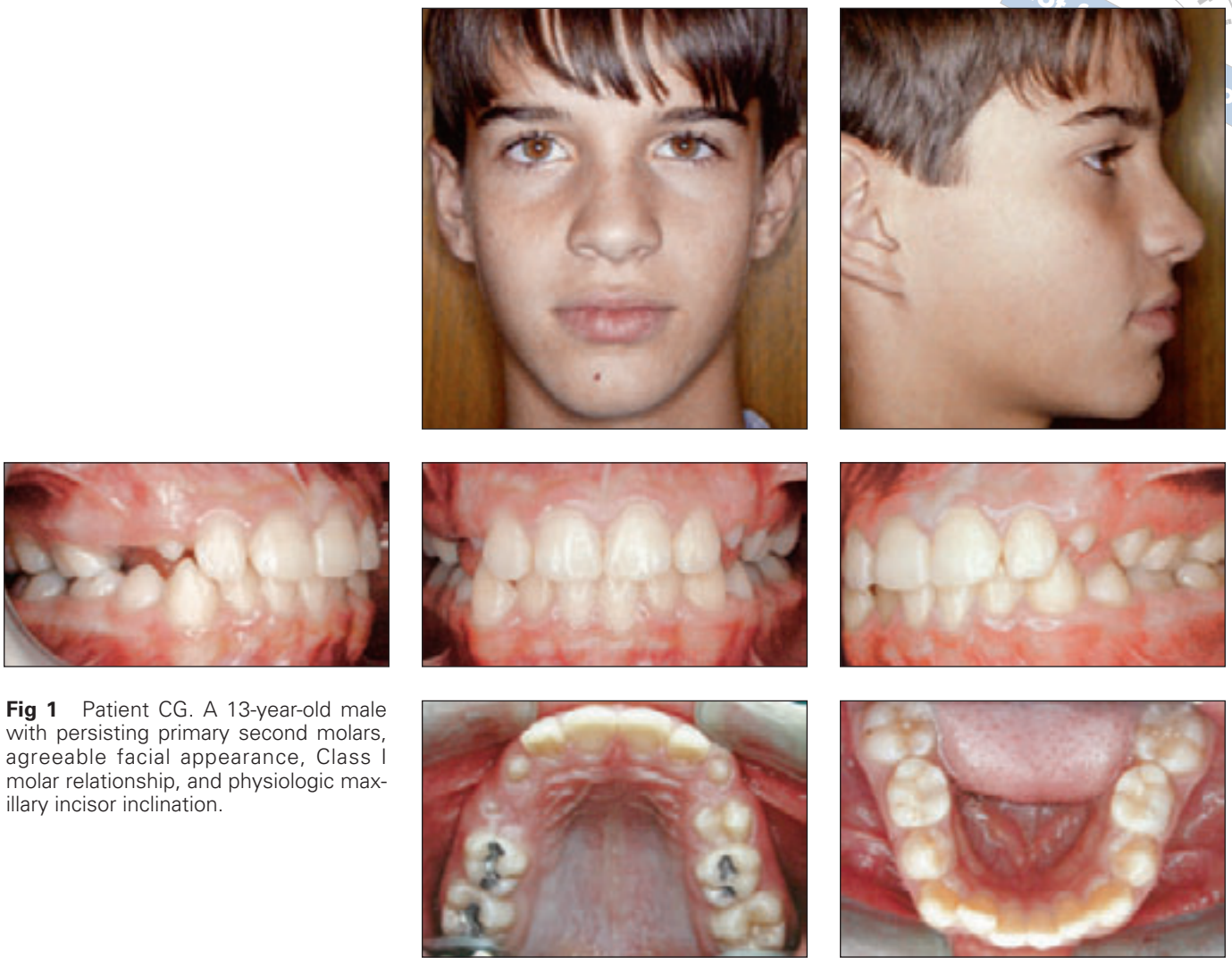

Fig 1 Patient CG. A 13-year-old male with persisting primary second molars, agreeable facial appearance, Class I molar relationship, and physiologic maxillary incisor inclination.

Fig 2 Patient CG. Cephalogram and panoramic radiograph at the beginning of treatment revealing normal maxillary incisor inclination and congenitally missing mandibular second premolars.

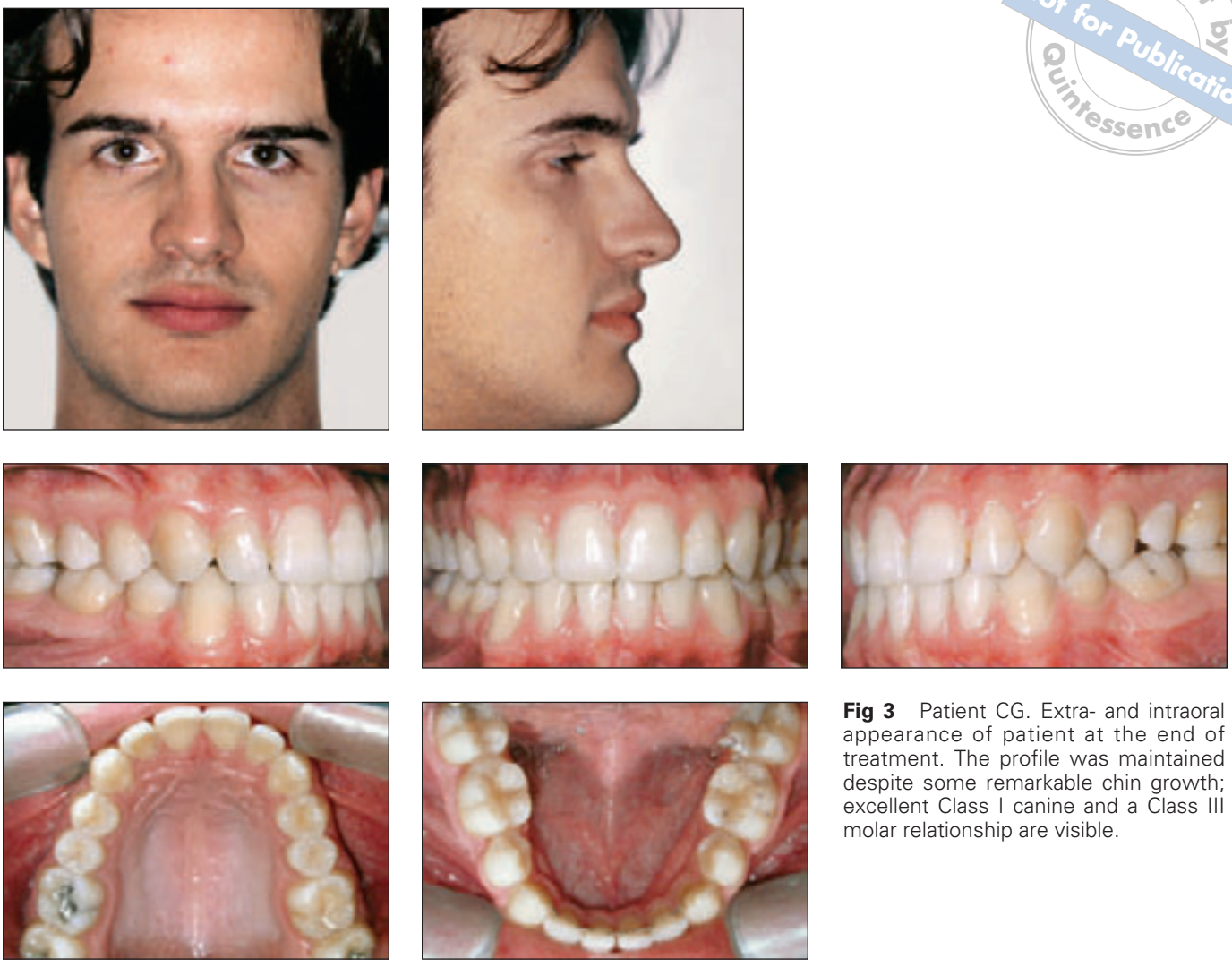

Fig 3 Patient CG. Extra- and intraoral appearance of patient at the end of treatment. The profile was maintained despite some remarkable chin growth; excellent Class I canine and a Class III molar relationship are visible.

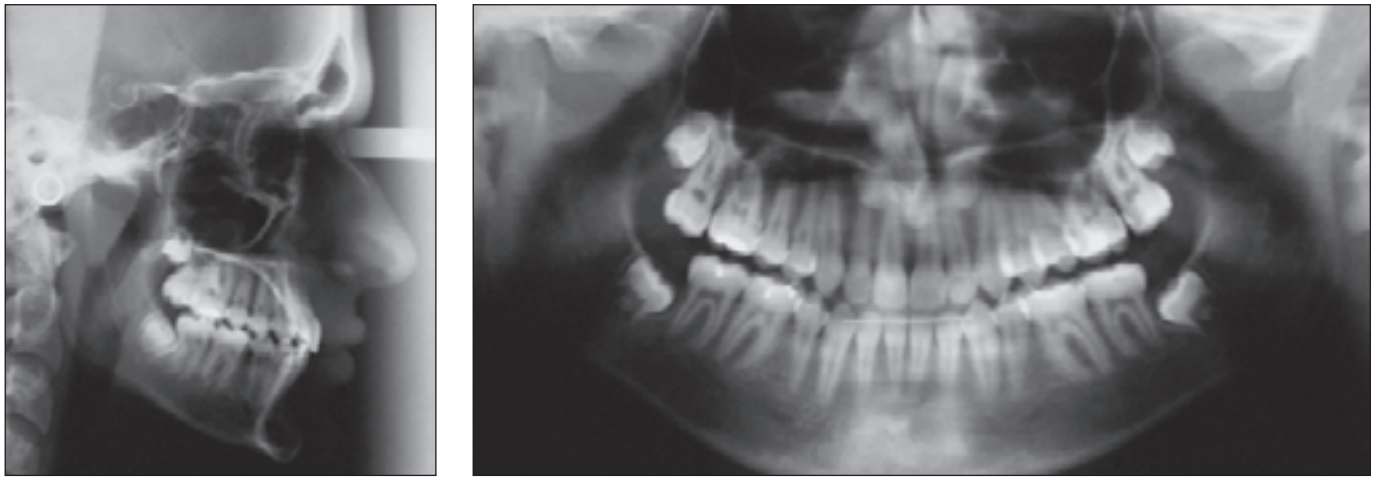

Fig 4 Patient CG. Cephalogram and panoramic radiograph at the end of treatment revealing normal maxillary incisor inclination and good root parallelism of all posterior teeth.

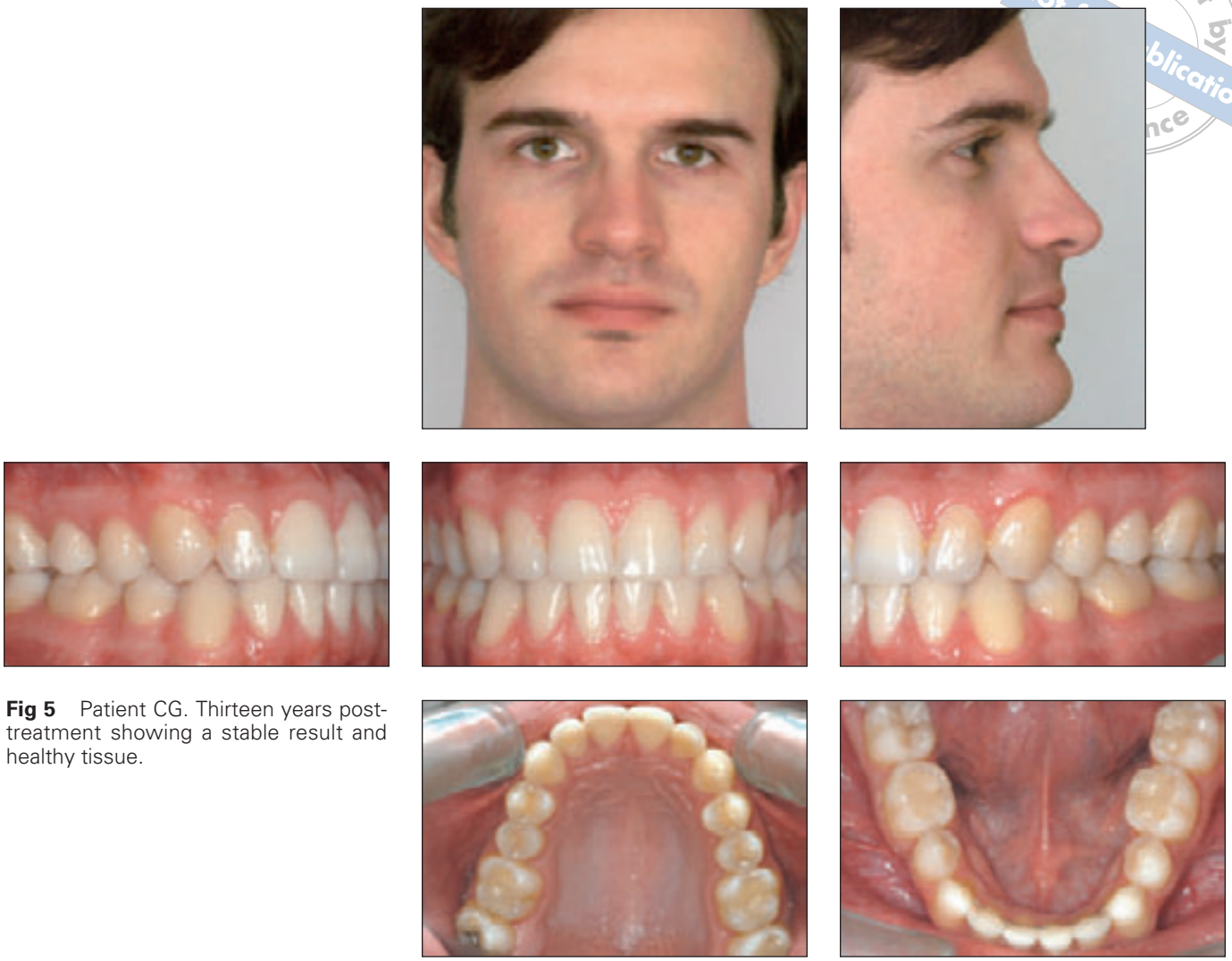

Fig 5 Patient CG. Thirteen years post-treatment showing a stable result and healthy tissue.

DISCUSSION

Angle[8] advocated that all treatments should finish with a Class I molar relationship. Since extractions were introduced in orthodontics, principally by Tweed,[9] the sagittal relationship of the molars has lost importance. Today, professionals emphasize the canine relationship more, which is considered fundamental for function. This gives orthodontists increased therapy options.

In a Class III relationship, the mandibular first molar occludes with both maxillary premolars. The anatomy of these teeth can hamper occlusion, and adjustments with first and third order bends should therefore take place.[6,10] In all three patients, the mandibular first molars were positioned more lingually than usual, ie, without an offset, as when finished in a Class I relationship. In addition, the maxillary premolars and molars received accentuate offsets with no toe-in for the first molar. To further improve the occlusal contacts, special care should be taken vis a vis the inclination of the posterior teeth. The mandibular molars may receive accentuated lingual crown inclination, whereas the palatal inclination of the maxillary molars and premolars can be reduced.

Even then, intercuspation is sometimes compromised and some recontouring is indicated. This includes reducing the palatal cusps of the maxillary premo-

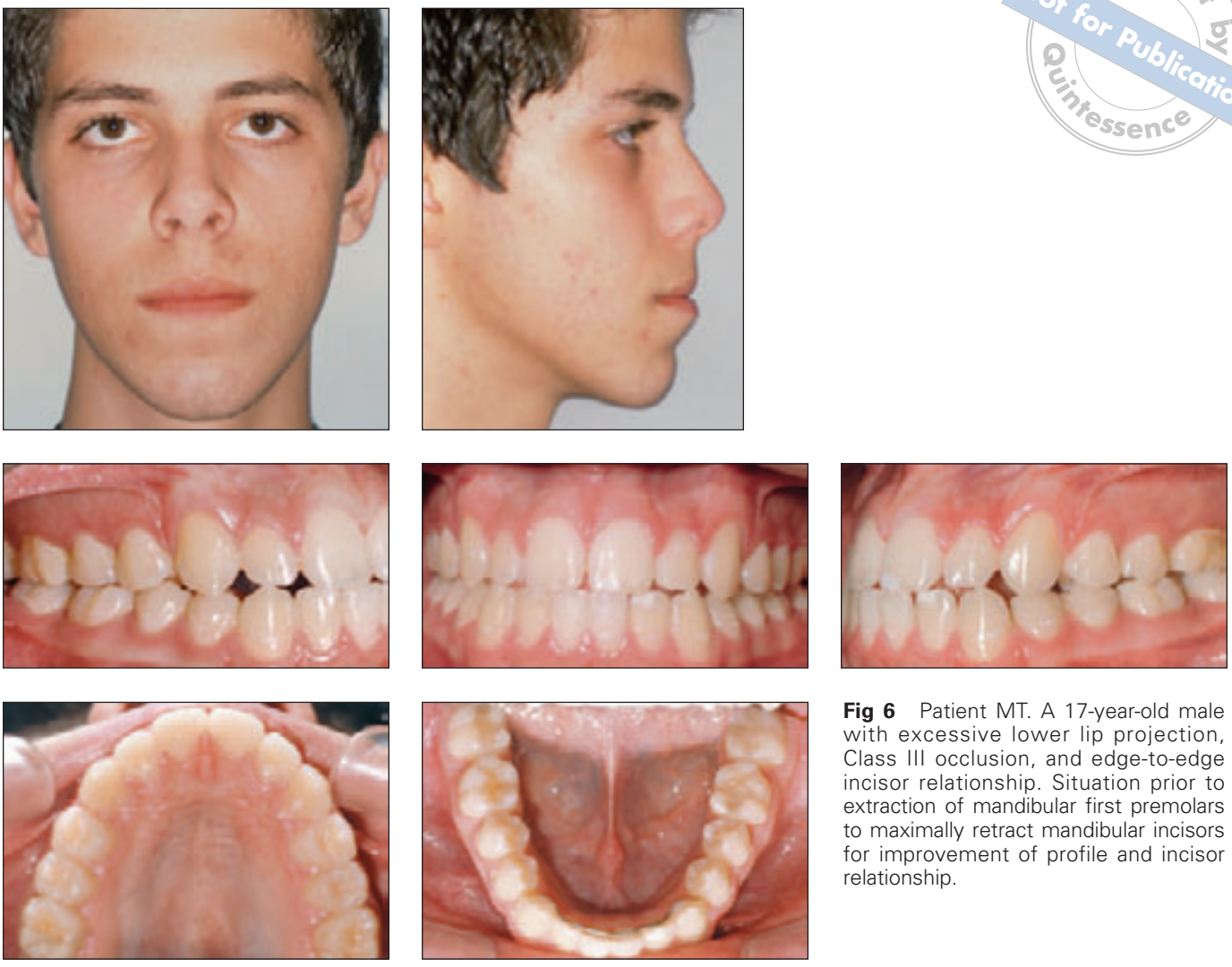

Fig 6 Patient MT. A 17-year-old male with excessive lower lip projection, Class III occlusion, and edge-to-edge incisor relationship. Situation prior to extraction of mandibular first premolars to maximally retract mandibular incisors for improvement of profile and incisor relationship.

Fig 7 Patient MT. Cephalogram and panoramic radiograph at the beginning of treatment revealing bimaxillary protrusion and congenitally missing maxillary third molars.

Fig 8 Patient MT. Extra- and intraoral appearance of patient at the end of treatment. Considerable profile improvement due to incisor retraction and subsequent uprighting of the lower lip. Optimal intercuspation with canines in Class I occlusion and molars in Class III occlusion.

Fig 9 Patient MT. Cephalogram and panoramic radiograph at the end of treatment revealing repositioning of the mandibular incisors, remodeling of the mandibular symphysis, and good root parallelism.

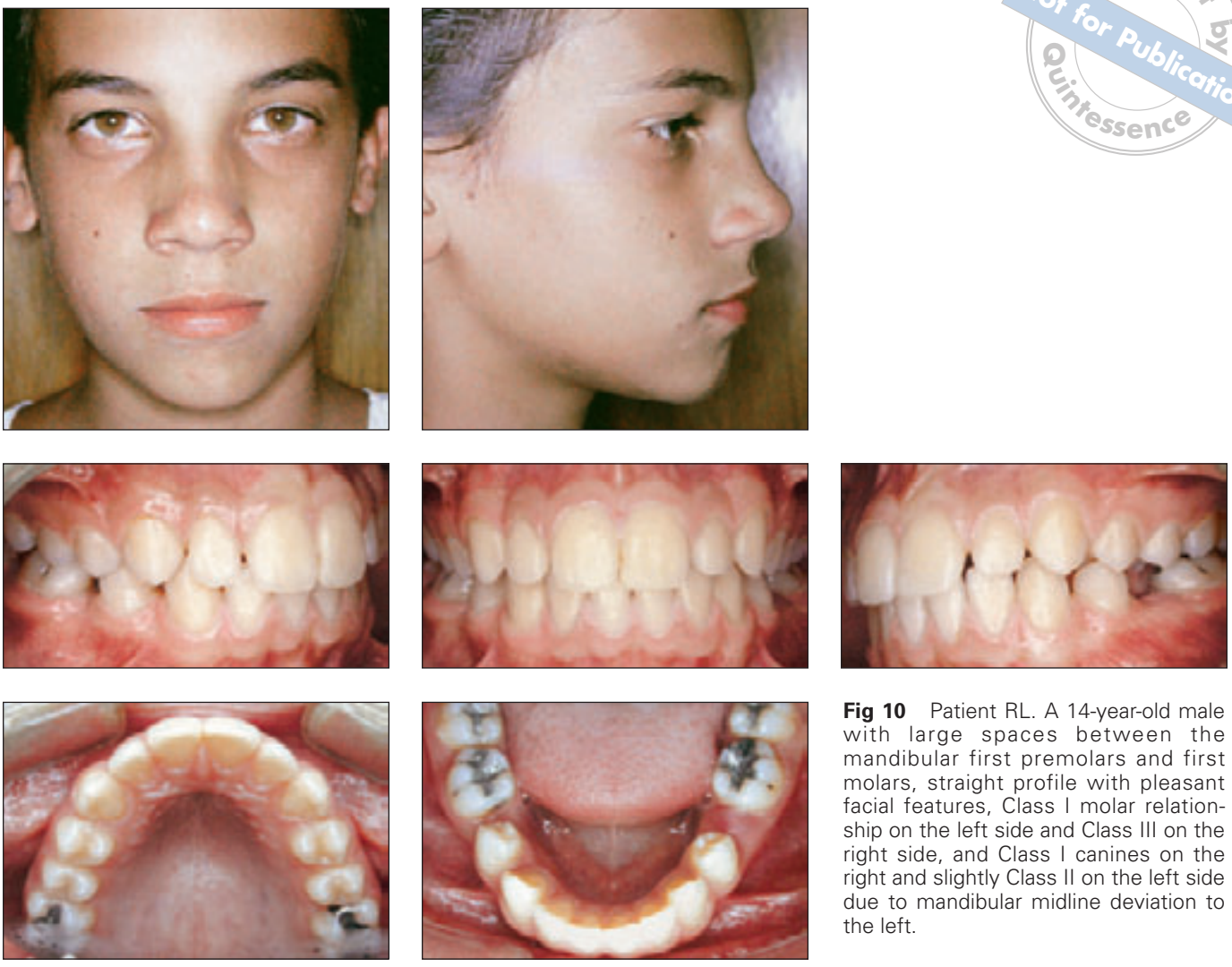

Fig 10 Patient RL. A 14-year-old male with large spaces between the mandibular first premolars and first molars, straight profile with pleasant facial features, Class I molar relationship on the left side and Class III on the right side, and Class I canines on the right and slightly Class II on the left side due to mandibular midline deviation to the left.

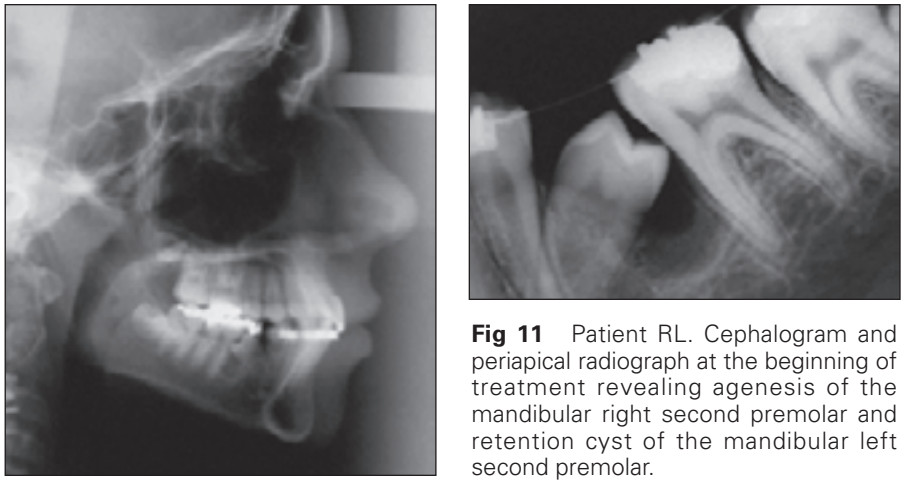

Fig 11 Patient RL. Cephalogram and periapical radiograph at the beginning of treatment revealing agenesis of the mandibular right second premolar and retention cyst of the mandibular left second premolar.

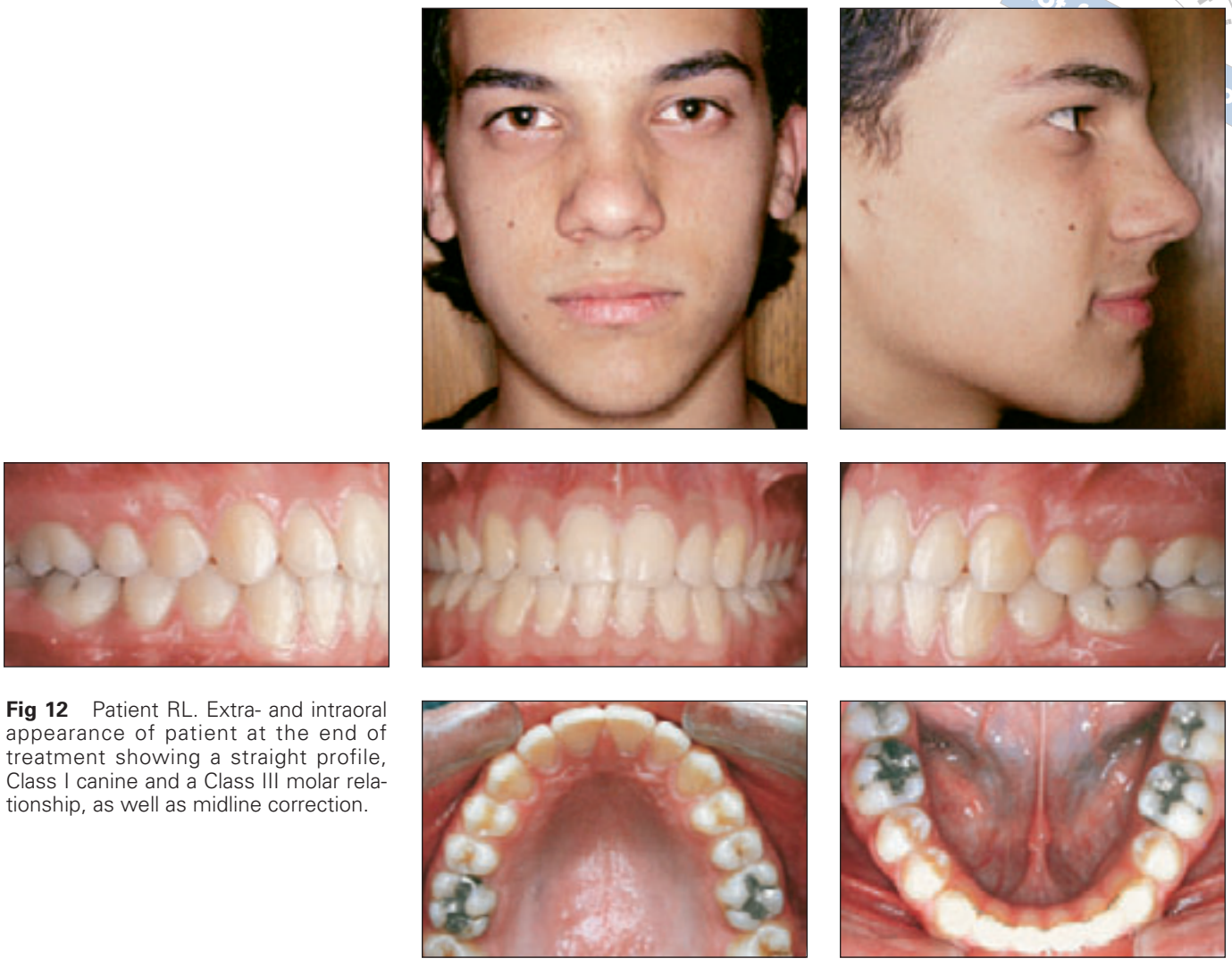

Fig 12 Patient RL. Extra- and intraoral appearance of patient at the end of treatment showing a straight profile, Class I canine and a Class III molar relationship, as well as midline correction.

Fig 13 Patient RL. Panoramic radiograph at the end of treatment revealing good root parallelism of posterior teeth.

Fig 14 Patient RL. Patient 14 years posttreatment with excellent stability of occlusion (third molars have erupted) and optimal tissue health.

lars and molars or the augmentation of the buccal cusps of the mandibular molars with restorative material.[6,10]

According to Hisano and Soma,[11] masticatory efficiency is not severely reduced in a Class III molar relationship. In addition, Bakke[12] ascribes the occlusal force more to the number and quality of occlusal contacts than to the sagittal relationship between the posterior teeth. Therefore, regardless of the molar relationship at the end of treatment, orthodontists should always strive for an excellent intercuspation.

In camouflage therapy of patients with a Class III occlusion, orthodontists can opt for extraction of the mandibular first or the second premolars. Second premolars should be the chosen when:

- They are blocked out and severely lingually tipped
- Anterior crowding is absent or less than moderate
- The patient has a straight or concave profile
- The mandibular incisors are positioned upright or even slightly lingually inclined, ie, when retraction requirements are not preponderant and some anchorage loss is acceptable

The first premolar should be extracted in situations in which greater anchorage is needed, which is when:

- Anterior crowding is severe
- Mandibular incisors are excessively tipped labially

- The sagittal discrepancy between the arches is pronounced
- The facial profile is compromised by a projection of the lower lip, as in patient MT

According to Janson et al,[13] bone remodeling of the symphysis will occur with a controlled retraction of the mandibular incisors, as documented by all patients presented here.

In patients with agenesis or extraction of mandibular premolars, the extraction of maxillary teeth should always be considered. Extraction should especially be taken into account when the patient:

- Shows a convex profile
- Presents with severely inverted lips
- Demonstrates excessive maxillary incisor protrusion
- Suffers from severe crowding and increased overbite[5]

None of the patients presented here fulfilled these characteristics, which is why no maxillary teeth were extracted

Nowadays, replacing missing teeth with implants is often the first choice. In this situation, the orthodontist mainly reestablishes the necessary space for the implant. Because the first and third patient were treated in the early '90s, this treatment alternative was not considered. At that time, space closure was the most viable option. This option should never be overlooked as there are always patients who object to implant placement.

When finishing with a Class III molar relationship, mandibular third molars should have erupted so that the maxillary second molars have an antagonist. Also, any present maxillary third molars should be extracted or splinted to the adjacent teeth to prevent supraeruption.[13,14]

CONCLUSION

Based upon the related literature and the clinical examples presented here, the establishment of a Class III molar relationship to compensate for congenitally missing or extracted mandibular premolars is viable. However, specific details during diagnosis, treatment planning, and execution have to be observed.

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