

Ortho-Perio Interdisciplinary Approach In A 14-Year-Old Patient With Multiple Retained Teeth.

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Abstract

Background. The normal development of the occlusion and craniofacial complex is largely dependent on the normal physiological eruption of teeth. (1) Andreasen and Kurol classified failure of eruption under three clinical conditions: impaction that is the stop of the eruption process due to a physical obstruction radiographically or clinically detectable; primary retention that is a disturbance in the eruption process before the tooth has surfaced in the oral cavity; and secondary retention that is a stop in the eruption process after it has already begun, and the tooth had already penetrated the gingiva in absence of any physical obstruction (3). It is theoretically possible for any tooth to follow an abortive eruptive path and become impacted within the dentoalveolar process or in remote or heterotopic anatomic sites. (4) After detecting a physical obstruction in a delayed tooth eruption, the clinical should perform a complete diagnosis evaluating the tooth position and then, the removal of the physical obstruction and the correspondent orthodontic traction.

Case Report. A 14-year-old male patient presented an impacted superior right premolar, an impacted lower right premolar, a retained lower right permanent second molar, a bilateral class II molar relationship, a left canine class I relationship and right canine class II relationship, both upper and lower second temporary molars were still present, a 1.8mm overbite and a 2mm overjet, proclined lower incisors, the patient presented a vertical growth pattern and a convex profile. An interdisciplinary approach was necessary for the surgical exposure of the retained teeth and its correspondent orthodontic traction.

Discussion. As emphasized by Bjork & Skieller (1972) (1), early orthodontic intervention in growing patients is crucial for addressing both skeletal and dental discrepancies. In this case, we achieved a satisfactory outcome in a relatively short period, thanks to a prompt, well-coordinated interdisciplinary approach and a comprehensive diagnosis.

The success of operculectomy in this case is consistent with a study by Abate et al. (2020) (9), which evaluated the efficacy of operculectomy in a case-control study involving 145 patients. Their results showed a 93.3% rate of spontaneous eruption in the operculectomy group, compared to only 10% in the control group, where no surgical intervention was performed. This high success rate emphasizes the importance of the surgical approach in facilitating the eruption of retained second molars. In our clinical case, following the operculectomy, the lower right second molar erupted successfully into the dental arch, demonstrating the effectiveness of the procedure in promoting tooth eruption.

Results. The objectives achieved thus far in the treatment are as follows: improvement in the patient's smile, successful incorporation of retained teeth into the dental arch, enhancement of the shape of the dental arches, with noticeable expansion of the upper arch, achievement of a Class I molar relationship on both sides, creation of an ideal overbite and overjet, improvement in occlusal function and enhanced periodontal health through regular ortho-perio consultations.

Conclusion. This case highlights the significant role of an interdisciplinary ortho-perio approach in the successful management of a patient with multiple retained teeth. Timely and well-coordinated intervention was essential for achieving optimal results. Maintaining space for the retained teeth, determining the appropriate timing for exposure, and applying continuous traction while respecting biological limits were critical factors for success. We achieved significant improvements in the patient's occlusion, function, and periodontal health.

Keywords: Orthodontics, periodontics, retained teeth, impacted teeth, retained premolars, retained second molars, delayed tooth eruption, delayed exfoliation, forced eruption, operculectomy.

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I. Introduction

The normal development of the occlusion and craniofacial complex is largely dependent on the normal physiological eruption of teeth. (1) Eruption is a procedure characterized by the axial movement of the tooth from its developmental position in the alveolar bone to its functional site in the occlusal plane (2). Andreasen and Kuroi classified failure of eruption under three clinical conditions: impaction that is the stop of the eruption process due to a physical obstruction radiographically or clinically detectable; primary retention that is a disturbance in the eruption process before the tooth has surfaced in the oral cavity; and secondary retention that is a stop in the eruption process after it has already begun, and the tooth had already penetrated the gingiva in absence of any physical obstruction.(3) Emergence, on the other hand, should be reserved for describing the moment of appearance of any part of the cusp or crown through the gingiva. Emergence is synonymous with moment of eruption, which is often used as a clinical marker for eruption. Impacted teeth are those prevented from erupting by some physical barrier in their path. (4) It is theoretically possible for any tooth to follow an abortive eruptive path and become impacted within the dentoalveolar process or in remote or heterotopic anatomic sites it is prudent to perform a thorough clinical examination and obtain adequate radiographs when teeth do not appear according to the usual eruption schedule. The order of frequency of tooth impaction is mandibular and maxillary third molars, maxillary canines, mandibular premolars, mandibular canines, maxillary premolars, maxillary central incisors, maxillary lateral incisors, and mandibular second molars. (5). Retention of premolars occurs in between 0.01% and 0.3% of maxillary premolars and between 0.02% and 0.3% of maxillary premolars. (5,6) By other side, retention of second permanent molars occurs in between 0.03% and 0.58% of mandibular molars and between 0.04% and 0.08% of maxillary molars. (8,9)

Retained primary teeth are indicative of the permanent successor being absent, malposed, impacted, or poorly developed. For example, if the permanent premolars are absent or misdirected, the primary molars root will undergo normal resorption. The etiologies of a delayed tooth eruption are connected to several conditions: mechanical obstructions (hyperdontia, supernumerary teeth, tumors, cysts, fibrous gingival tissue, delayed exfoliation of deciduous teeth, mesial eruption and subsequent impaction into the distal aspect of the adjacent tooth); dentoalveolar discrepancy; a viral infection that somehow affects local innervation and disturbs the physiological eruption process; ectopic eruption; and genetic predisposition. (5,9)

After detecting a physical obstruction in a delayed tooth eruption, the clinical should perform a complete diagnosis evaluating the tooth position and then, the removal of the physical obstruction. This removal could be done removing dental material, bone tissue or, in case of a fibrous gingival tissue, an operculectomy it's the indicated treatment. Operculectomy, that is the surgical removal of a flap of gum tissue over the partially erupted tooth, is useful in the absence of an alteration of tooth position and angulation and in the presence of a radicular system still under development (indication of a residual eruptive potential) (10,11). Most tooth impactions spontaneously solve themselves when hard and/or soft tissue obstacles are removed. If the clinical considerate the retained tooth can't erupt itself, the tooth exposure must be done, with the respective orthodontic traction. This requires an interdisciplinary approach to guarantee the treatment's success. In a case-control study conducted by Andrea Abate et al. (2020), 145 patients were followed to evaluate the efficacy of operculectomy treatment. The study concluded that spontaneous eruption occurred in 93.3% of cases in the operculectomy group (70/75), while only 10% of teeth in the control group erupted spontaneously (7/70). Operculectomy can ease the spontaneous eruption of retained second molars and reduce the chances of inclusion.

In the following case report we perform an interdisciplinary treatment for a 14-year-old patient with multiple retained teeth, and the presence of primary teeth with delayed exfoliation.

II. Material And Methods: Case Report

The following patient is a 14-year-old teen without any medical issues or allergic data, who attended to the Orthodontics program clinic of the Autonomous University of Baja California his mom referred the reason for consultation "his temporary teeth doesn't fell off". The extraoral clinical analysis showed a mesomorph patient, an hyperdivergent growth pattern and a convex profile. The patient presents an obtuse nasolabial angle and competent lips. (Figure 1)



Figure 1. Facial photographs.

Intraoral examination and photographs showed a collapsed upper arch and an asymmetric lower arch, temporary upper right second molar and temporary lower right second molar were still present, the lower right second molar wasn't emerged due to fibrous gingival tissue, we also found mismatched dental midlines, moderate upper and lower dental crowding, bilateral class II molar relationship, a left canine class I relationship and right canine class II relationship, a 1.8mm overbite and a 2mm overjet. (Figure 2)



Figure 2. Initial intraoral photographs.

According to the cephalometric analysis, the patient presented a class II skeletal relationship, a vertical growth pattern, as well as proclined lower incisors and protruded upper incisors. (Table 1, Figure 3).

	Norm	Initial
SNA	82	83.4
SNB	80.9	78.3
ANB	2	5.1
SND	80	75.4
Segment SL	51mm	41.7mm
Segment SE	22mm	17.8mm
ANG Go-Gn/SN	32.9	37.7
Occ Plane/SN	14.4	17.9
Ang 1s/NA	22.8	20.7
Distance 1s/NA	4.3mm	5.2mm
1s/ENA-ENP	113	115
Ang 1s/SN	103.8	104.1
Ang 1i/NB	25.3	32.5
Distance 1i/NB	4mm	9.8mm
1i/Go-Gn	90	98
Interincisal angle	124	12
Overbite	2.8mm	3.1mm
Overjet	2.5mm	3mm



Table 1. Summary of the Initial Lateral Cephalometric Analysis

Figure 3. Initial lateral cephalometric.

The panoramic x ray revealed 28 permanent teeth of which 2 were retained (upper right second premolar and lower right second premolar). The temporary upper right second molar and the temporary lower right second molar were already extracted as planned. The height of both mandibular ramus were symmetrical but with a mildly asymmetric condyle anatomy, and a uniform bone density with a crown root ratio 1:2, and no other apparent pathologies. (Figure 4)



Figure 4. Initial panoramic X-ray.

We confirmed the exact position of the impacted teeth with a tomography, where we observed the upper right second premolar was palatally angulated and had no space to emerge into the dental arch. On other hand, the lower right second premolar was distally angulated, almost contacting the lower right first molar mesial root, in a very low position respect from the occlusal plane. (Figure 5)



Figure 6. CT slice.

Treatment Plan

- Extraction of the temporary upper right second molar and temporary lower right second molar.
- Bonding of fixed appliances (MBT Slot 0.022”)
- Coils to maintain the space of retained premolars.
- Periodontal surgery for exposure of the lower right premolar (periodontics specialty interconsultation).
- Operculectomy for the 47 (periodontics specialty interconsultation).
- Once we get the adequate space for the upper right premolar, perform the periodontal surgery for exposure of the upper right second premolar and button chain placement for the traction.
- Upper right second premolar orthodontic traction.
- Dental alignment and leveling.
- Coordination of dental arches.
- Root torque.
- Retention with upper and lower removable appliances (Hawley retainer).

Treatment Objectives

Smile improvement, include retained teeth in dental arch, conform dental arches, achieve class I molar relationship on both sides, maintain left class I canine relationship, achieve right class I canine relationship, create an ideal overbite and overjet, dental arch coordination, obtain functional occlusion and periodontal health.

Case evolution

We start the treatment indicating the extraction of both temporary upper and lower temporary second molars, then we proceeded with the placement of fixed appliances on the upper and lower dental arch (MBT slot 0.022”) starting with the alignment and leveling which carried out a sequence of NiTi archwires from 0.014”, 0.016”, 0.018” (Figure 6). After that, we scheduled the exposure of the lower right second premolar by the hand of our periodontics specialty department placing a bracket and an elastomeric chain for its traction, a 0.018” stainless steel arch and an open coil to conform and maintain the space for the retained teeth. (Figure 7)

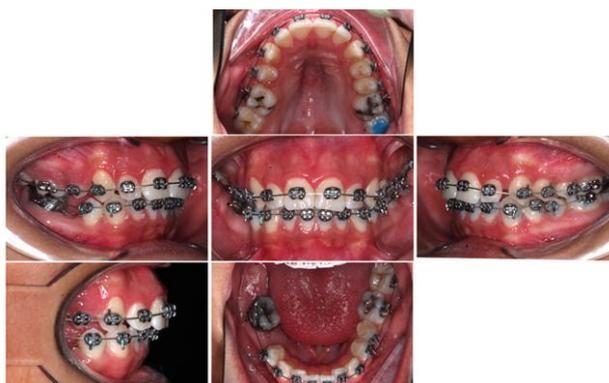


Figure 6.

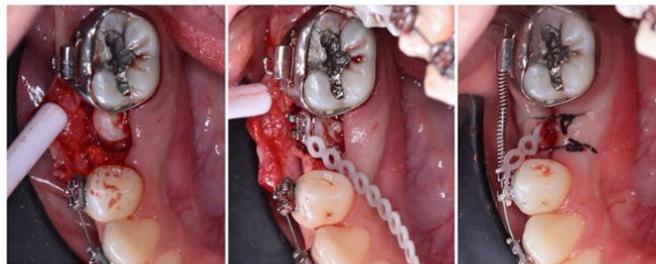


Figure 7.

The patient was then referred to the periodontist specialty department to perform an operculectomy, in the meantime, we placed a 0.018" stainless steel arch and an open coil between the upper right first premolar and the upper right first molar, to conform the space for the upper right second premolar. (Figure 8, 9)

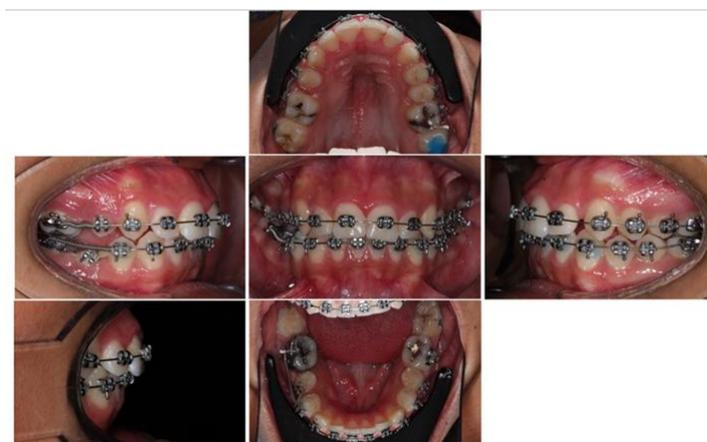


Figure 8.

We continued conforming arches, conforming the space for the upper right second premolar and activating the traction for the lower right second premolar. Once the crown of the lower right second premolar was shown off completely in the dental arch, we decided to incorporate it to the arch wire, placing a 0.014" NiTi, to promote its alignment using light forces.

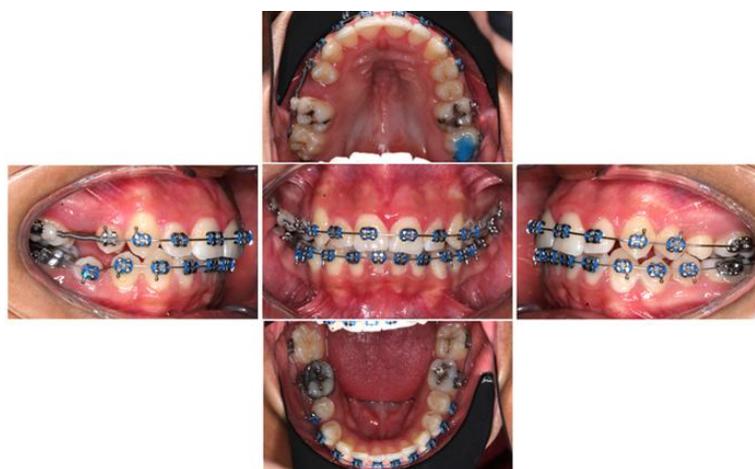


Figure 9.

Once the space for the upper right second premolar was conformed, the patient was referred again to the periodontist specialty department, where the exposure was performed bonding a button chain for the traction of the retained teeth, placing it passively to a 0.016"x0.022" stainless steel arch wire, maintaining the open coil between the upper right first premolar and the upper right first permanent molar.

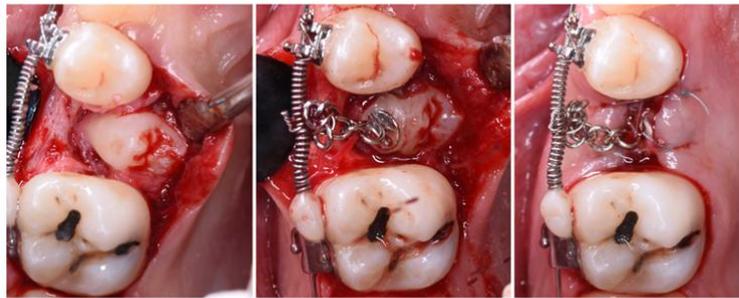


Figure 10.

We continued the traction of the upper right second premolar with 0.010 metallic ligature attached to the arch maintaining the open coil between the upper right first premolar and the upper right first permanent molar. Once the upper right second premolar was in a better position, we placed its bracket and included it into the dental arch with a 0.016 NiTi archwire, we also bonded turbo bites at the 16 and 26, to obtain a disocclusion and permit its free movement. (Figure 11).



Figure 11.

Once the upper right second premolar was properly included in the dental arch, we removed the turbo bites and asked for a panoramic x-ray to verify the root parallelism and correct the brackets position if needed (Figure 12, 13).



Figure 12. Panoramic X-ray to assess root parallelism.

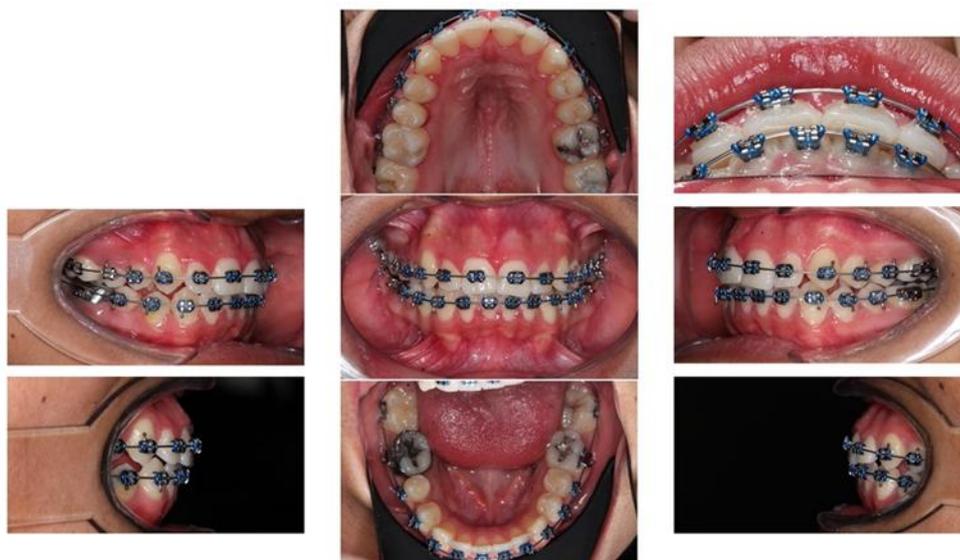


Figure 13. Last intraoral photographs.

Once all the teeth were incorporated into the dental arches, we proceeded with our treatment plan to achieve ideal occlusion. This included the use of box intermaxillary elastics in a Class II vector to improve intercuspitation and canine relationships.

III. Results

The objectives achieved thus far in the treatment are as follows: improvement in the patient's smile, successful incorporation of retained teeth into the dental arch, enhancement of the shape of the dental arches, with noticeable expansion of the upper arch, achievement of a Class I molar relationship on both sides, creation of an ideal overbite and overjet, improvement in occlusal function and enhanced periodontal health through regular ortho-perio consultations.

IV. Discussion

As emphasized by Bjork & Skieller (1972) (1), early orthodontic intervention in growing patients is crucial for addressing both skeletal and dental discrepancies. In this case, we achieved a satisfactory outcome in a relatively short period, thanks to a prompt, well-coordinated interdisciplinary approach and a comprehensive diagnosis.

The success of operculectomy in this case is consistent with a study by Abate et al. (2020) (9), which evaluated the efficacy of operculectomy in a case-control study involving 145 patients. Their results showed a 93.3% rate of spontaneous eruption in the operculectomy group, compared to only 10% in the control group, where no surgical intervention was performed. This high success rate emphasizes the importance of the surgical approach in facilitating the eruption of retained second molars. In our clinical case, following the operculectomy, the lower right second molar erupted successfully into the dental arch, demonstrating the effectiveness of the procedure in promoting tooth eruption.

V. Conclusion

This case highlights the significant role of an interdisciplinary ortho-perio approach in the successful management of a patient with multiple retained teeth. Timely and well-coordinated intervention was essential for achieving optimal results. Maintaining space for the retained teeth, determining the appropriate timing for exposure, and applying continuous traction while respecting biological limits were critical factors for success. We achieved significant improvements in the patient's occlusion, function, and periodontal health.

Although the treatment plan for our clinical case has not yet been finalized, we are satisfied with the results achieved up to this stage and confident that upon its completion, the objectives outlined in the treatment plan will be successfully met.

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