Rom J Morphol Embryol 2024, 65(3):517–522 ISSN (print) 1220–0522, ISSN (online) 2066–8279 doi: 10.47162/RJME.65.3.14

CASE REPORT

RJME Romanian Journal of Morphology & Embryology http://www.rjme.ro/

Unusual role in occlusion and mastication of a horizontal positioned erupted mandibular third molar: a rare case

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Abstract

Lower third molars are frequently extracted due to pathologies of the dental follicle, pericoronitis, advanced carious lesions, orthodontic reasons (risk of anterior tooth crowding) or causing periodontal or carious lesions in the distal area of the second molar. The case presented here is of a male patient that came to our Clinic experiencing pain in the distal area of one of his old bridges. The clinical examination revealed a malpositioned, but unusually functional third molar; it is a very rare situation for an initially impacted third molar to erupt in an almost horizontal position and not only to remain on the arch for a very long period of time, but also to contribute to mastication efficiency and occlusion, despite the fact that masticatory forces are distributed at a right angle on its long axis and that mastication takes place on the distal surface of the crown and root, and not on the usually occlusal cusped surface. The horizontal mandibular right third molar contributed to maintaining the vertical dimension of occlusion and the masticatory efficiency for a very long period of time; it also ensured a proper distribution of forces trough the long axis of the second premolar, since the distal contact of the third's molar crown with the second premolar helped it to resist masticatory forces and to remain on the arch, despite the prolonged absence of any mesial contact.

Keywords: lower third molar, malposition, occlusion, mastication.

Introduction

Lower third molars are frequently extracted due to pathologies of the dental follicle, pericoronitis, advanced carious lesions, orthodontic reasons (risk of anterior tooth crowding) or causing periodontal or carious lesions in the distal area of the second molar. Some authors consider that extracting asymptomatic wisdom teeth is controversial, because the extraction is often difficult due to the bone dimension and the relation with the adjacent tooth [1], *versus* others considering it a prophylactic procedure [2]. Most frequently, impaction of the third molar occurs in the lower jaw [3].

The eruption time of lower third molar is around the age of 17 (16 to 24), depending on the masticatory intensity, race and genetic factors. The complete eruption of the lower third molar can be obstructed due to lack of space between the anterior border of the mandibular ramus and the distal part of the mandibular second molar, abnormal development position, size of molar or aberrant eruption path [4, 5]. The mesio-angular position is the most common case of the third molar impaction, independent of the skeletal facial types, the second being the horizontal position [3–6]. Depending on their position and the depth of impaction, the third molar can cause distal caries or periodontal disease to the adjacent second molar or can increase the risk of angle mandibular fracture [4, 7–10]. The mandibular third molar extraction can cause complications, such as lingual and alveolar inferior nerve injury or fracture of mandibular jaw [11].

Aim

The case presented here is of a male patient wearing very old, metal bridges in two of the four quadrants [12]; he came to our Clinic due to the pain in the distal area of one of those fixed restorations. The clinical examination revealed an unusual example of malpositioned, but functional third molar; it is a very rare situation for an initially impacted third molar to erupt in an almost horizontal position and not only to remain on the arch for a very long period of time, but also to contribute to mastication efficiency and occlusion, despite the fact that masticatory forces are distributed at a right angle on its long axis and that mastication takes place on the distal surface of the crown and root, and not on the usually occlusal cusped surface.

Case presentation

The 65-year-old male patient came to our Clinic accusing pain and mobility in the third quadrant, where an old bridge was in service for 36 years (Figure 1A), similar to the one from the first quadrant (Figure 1B). Both bridges were made of a yellow, Romanian invented alloy which is not in use anymore (Gaudent); its use was forbidden in 2003, due to its formula containing copper and its debatable

cytotoxicity. Besides the two Gaudent bridges, the only other prosthetic treatment was a total acrylic crown, also very old (16 years), on the tooth 12. It is probable that the bridge in the third quadrant was initially overcontoured, especially in the distal abutment area, and subsequently was inducing a protrusive occlusion, at least until it weared down enough to be hollowed; correspondently, the second left upper molar presented on the palatal cusp a large, abraded attrition surface, while the first molar had an intact morphology (Figure 1C). Also, the mandibular arch was larger than the maxillary arch, and the occlusion was reversed (Figure 1D). Clinical (Figure 2) and panoramic radiological examination (Figure 3A) revealed a completely unusual position of the third right mandibular molar, which was overerupted, in a horizontal position, with the upper half of the distal root exposed on the whole length, touching the occlusal plane with both crown and root and actively participating in mastication, as it was obvious from the accentuated attrition degree. Periapical radiograph revealed bone resorption, more important in the distal than in the mesial area, and also the presence of alveolar bone between the roots (Figure 3B). Despite the malposition, bone resorption, crown and root attrition and masticatory role in the long years of service, the third molar presented no sign of mobility, periodontal disease or pain and the patient was absolutely determined to keep it. He did not remember when he lost the other two molars, or if the first premolar was ever present on the arch, but he remembered that 36 years ago, when the two metal bridges were made, the third molar was in the same place.

Figure 1 – ***Clinical situation at presentation: (A) Lower arch with the all-metallic old bridge, perforated on the lingual side of the distal abutment; (B) Upper metal-acrylic old bridge, making occlusal contact with the right third mandibular molar; (C) Upper arch image showing the normal morphology of the palatal cusp of the first molar and the accentuated attrition of the palatal cusp of the second molar; (D) Disparity between lower and upper arch dimensions and the subsequent reverse occlusion.***

Figure 2 – ***Mirror image of the lower arch showing a high degree of attrition on the upper surface due to its intensive use in mastication.***

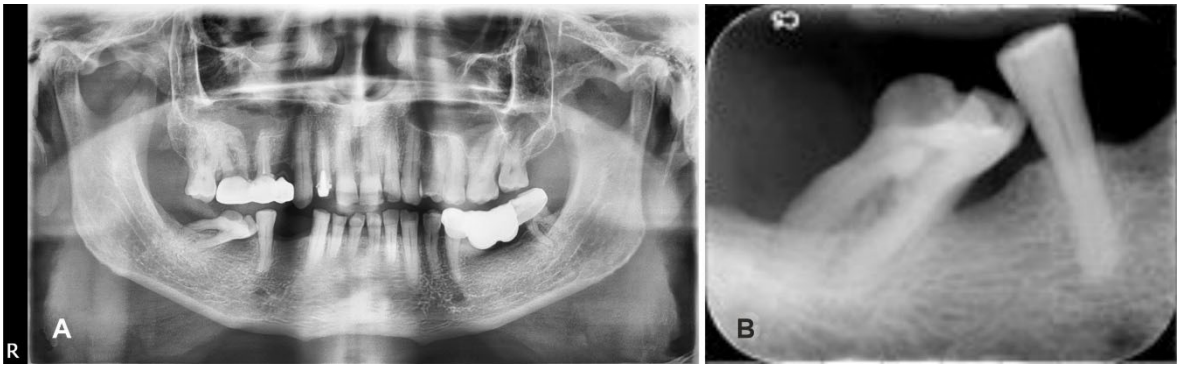

Figure 3 – ***Initial radiological investigation: (A) Panoramic X-ray showing the unusual, overerupted horizontal position of the third right molar, and its mesial contact with the second premolar; (B) Periapical X-ray showing the degree of bone resorption in the distal and mesial areas, and also the presence of alveolar bone between the roots. R: Right.***

Old metallic bridge in the third quadrant was removed; the distal abutment (3.7) was unsalvageable due to pronounced mobility and decay; same situation was found in the first quadrant for the distal abutment of the mesial extension bridge (1.6); both were extracted. The treatment solution was agreed with the patient; for the first quadrant,

a mesial extension metal-ceramic bridge with the second molar (1.7) and the second premolar (1.5) as abutments; for the third quadrant, since there was no distal tooth to be used, two crown-supported implants were made; similarly, for the absence of the first premolar in the fourth quadrant (4.4), an implant-supported crown was realized (Figure 4). In accordance with the patient's wish, absolutely no treatment was attempted for the lateral incisor in the first quadrant, since the acrylic crown was in place, he was not preoccupied with the esthetics, and he experienced no symptomatology.

A cone-beam computed tomography (CBCT) investigation was recommended in the second stage examination, for the diagnosis and planning of the implants. On the CBCT cross sections, it could be observed in great detail the mesialized position of the third molar, which occupies the second and first molars' place, the horizontal position and orientation of its roots, which excluded a potential root canal treatment and the high degree of attrition of the crown, due to its role in mastication (Figure 5). Due to this position on the arch, the third molar took overall the masticatory effort of the absent two molars. Also, the CBCT three-dimensional (3D) model accurately revealed the pronounced bone resorption around the third molar and second premolar's roots (Figure 6, A and C), and also the loss of the enamel and dentin at the level of third molar's crown facing the occlusal plane (Figure 6B). On the CBCT axial sections, the main axis of the right mandibular third molar (4.8) can be observed; its crown is contacting the distal surface of the adjacent premolar (Figure 7A). The horizontal, mesialized position of the third molar offered a wider, although unusual occlusal area for mastication (Figure 7B); the close contact between the third molar and the second premolar (4.5) is underlining his role in supporting 4.5 during mastication, considering that the first premolar (4.4) was long time missing. Nevertheless, the alveolar bone existing between the roots can explain the lack of mobility, even in the absence of cortical bone at that level (Figure 7C).

Figure 4 – ***Occlusal view of the working cast for the three implant-supported crowns; the abraded area on the third molar's crown and root is also highlighted.***

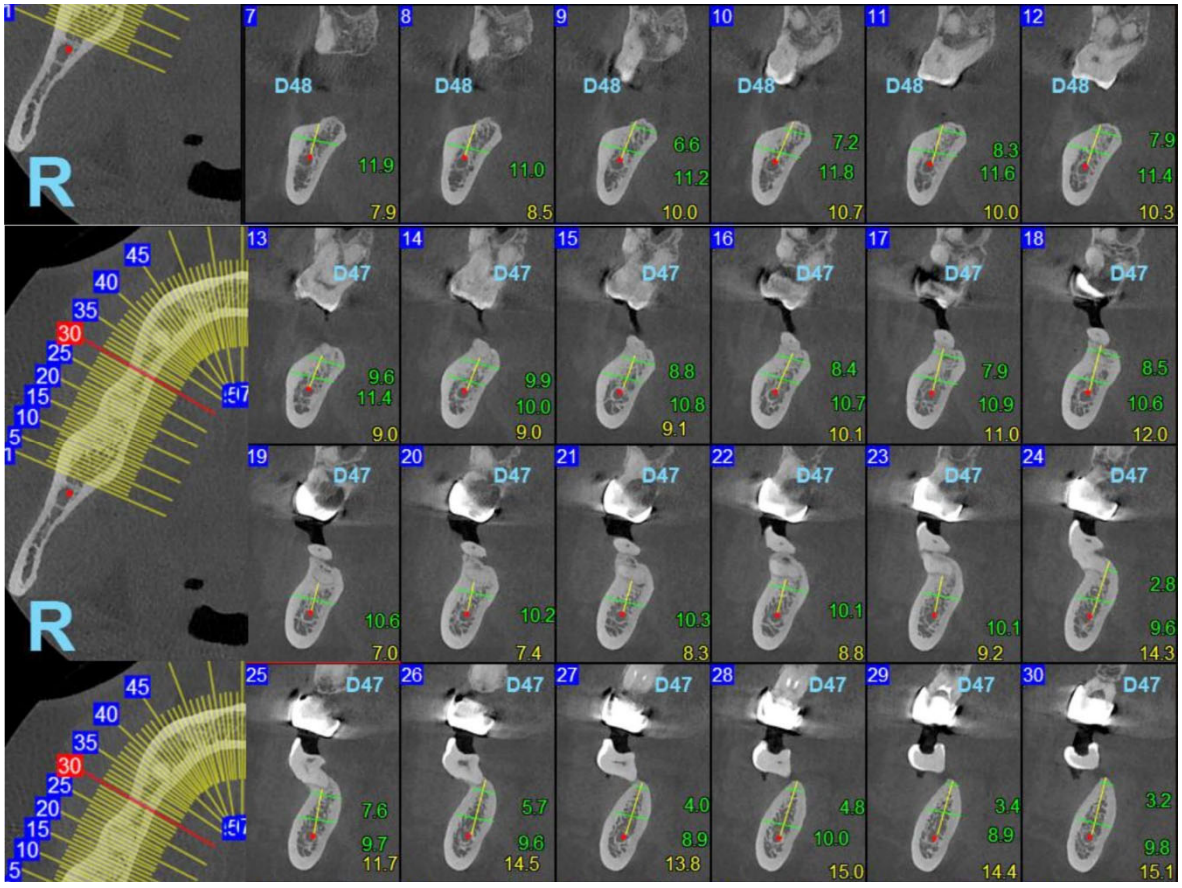

Figure 5 – ***CBCT cross sections, showing the mesialized position of the third molar, in front of the retromolar triangle (slices 1–12), occupying the second and first molars' place (images beginning with slice 13), and the horizontal position of its roots, which exclude a potential root canal treatment. The mesial root, which is the deepest, is situated in the bone, but always above the canal lumen, while the distal root is having contact with the bone only on its lower face; there is no root septum. CBCT: Cone-beam computed tomography; R: Right.***

Figure 6 – ***CBCT three-dimensional model: (A) Lateral right view of bone resorption around the third molar and premolar's roots; (B) Pronounced loss of the enamel and dentin at the level of third molar's crown facing the occlusal plane; (C) Lingual view of bone resorption around the third molar and premolar's roots. CBCT: Cone-beam computed tomography; R: Right; L: Left.***

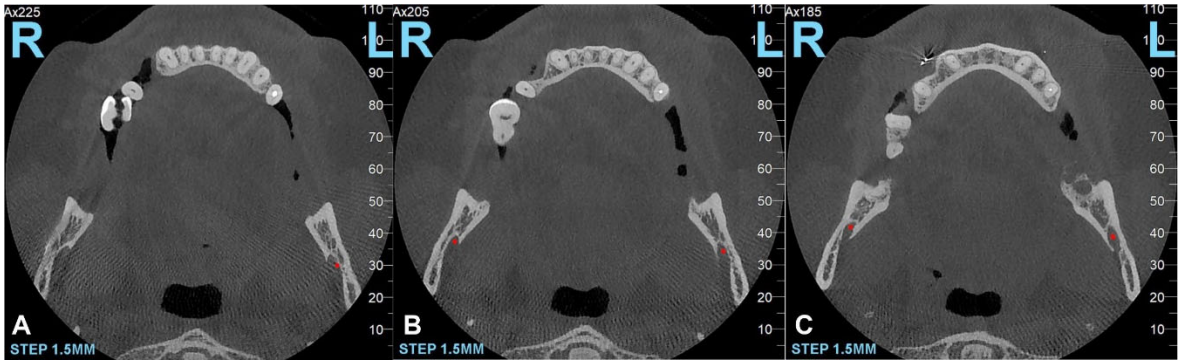

Figure 7 – ***CBCT axial sections parallel to the basilar border showing the main axis of the right mandibular third molar (4.8): (A) Crown of the third molar contacting the distal surface of the adjacent premolar; (B) Horizontal position of the third molar offering a wider, unusual occlusal area for mastication; (C) Alveolar bone separating the roots of 4.8 and the absence of cortical bone at that level. CBCT: Cone-beam computed tomography; R: Right; L: Left.***

Based on these observations, on the absence of any symptomatology, and on patient's desire to keep this molar in place, it was decided to only restore the crown, using a photopolymerizable composite (Figure 8A). The patient was comfortable with the replacement of the bridges, which he considered were no longer functional, with implant-supported crowns; finally, he was satisfied with the masticatory efficiency, the absence of mobility and pain, and also with keeping his third molar in place. Evaluating the risk-benefits factor and the long-term prognosis, the decision of keeping the restored third molar in place was optimal; after six-month evaluation, it was still asymptomatic and functional (Figure 8B).

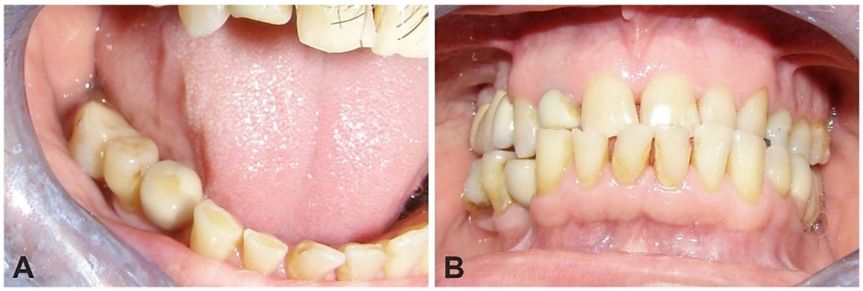

Figure 8 – ***Final oral rehabilitation: (A) Occlusal view of the fourth quadrant showing composite restoration of the third's molar crown; (B) Frontal view in occlusion.***

Discussions

Among the factors having an important influence on masticatory efficiency, the occlusal surface is considered most important; therefore, the first and second molars are considered equivalent and twice as effective as the premolars [13]. In the case reported here, by occupying the space of those two molars and adapting its whole distal surface (crown and root) for mastication, which is obvious from the wearing facets on the root and from the accentuated loss of hard tissues on the crown, the third right molar ensured an adapted mastication for many years, with no complaints from the patient whatsoever, in an area where the first premolar (4.4) is also missing. The cause of its absence remained unclear, because of the lack of medical data and because the patient did not remember how it was lost; congenital absence of the first mandibular premolar, although rare and less frequent than that of the second one, is encountered [14, 15]; still, its extraction from various reasons cannot be excluded.

Horizontal position of impacted mandibular third molars is variable; some authors found that it is the second most prevalent position in almost all the skeletal facial types [6]; other results suggest also that mandibular impaction of the wisdom teeth occur more frequent in female patients than in male ones [16]. Other authors showed that their impaction in a horizontal position is not usual in case of class III patients [6]; nevertheless, this is the case for our class III patient, having the right third molar in a horizontal position, very close to the occlusal plane. Usually, this position is a risk factor for the inferior alveolar nerve injury, during extraction [17]; however, in our case the third molar is situated well above the canal lumen, due to the long-term absence of the second and first molars. Also, studies showed that horizontal position of the third mandibular molar is associated with a high-risk for distal caries on

the distal face of the second molar [18] and with the probability of cortical bone interruption, results that also depend on the population analyzed [19].

It is obvious that the third molar presented here, at a certain time, had enough space available for eruption, considering the long absence of the two other molars (4.6 and 4.7). We could collect no data in what is concerned those molars' loss, other than that at the moment of inserting the metal bridges they were not on the arch anymore; the same situation was encountered in the case of the first premolar (4.4), and we cannot say if it was missing from the dental lamina, or was lost after the eruption, because the narrow edentulous space existing in the area could be caused either by hypodontia or by a 36 years old extraction. On the other hand, it is presumable that the two molars existed, because of the actual position of 4.8, that finally reached the level of the occlusal plane, but on a horizontal position, never succeeding to reach a vertical axis, which indicates that, for a while at least, it drifted along the distal area of 4.7. From the accentuate mesialization of 4.8, which at the moment is occupying the space of 4.6 and 4.7, we can only suppose that tooth 4.6 was the first that was lost, before 4.7. Studies in literature showed that carries on the distal surface of the mandibular second molars are significantly associated with the 3D position of the third ones, making their prophylactic removal more predictable [4].

The dimension of its roots is similar, indicating that the distal root was not an important factor during eruption. The angle between the axis of 4.8 and the occlusal plane is unfavorable; its position is accentuated mesially inclined, almost horizontal; still, its eruptive phase is long-time finished. Age is an important factor influencing the decision to extract such molars and the age of the patient (59) is not in favor of extraction, while his oral hygiene is rather good.

A rigorous assessment of the quantity of bone that would be removed in case of extraction of 4.8 was made based on the radiological and CBCT investigations that showed the depth of the retained tooth in relation to the canal lumen. From slice number 13 to 24 it can be observed that placing an implant in the area of the second molar after the extraction of 4.8 would be a difficult and possibly not successful procedure; however, replacing the right second molar would still be necessary, since on the opposing first quadrant the right second molar is present, which leaves open only the removable partial denture option, in ordered to avoid the shortened dental arch [20]. The right third molar was not presenting any mobility, even after many years in service, despite the fact that masticatory forces were not transmitted on its long axis and that the bone resorption was pronounced; one possible explanation for this could be that most class III patients make only vertical chewing movements, the anterior movements being blocked [21].

Conclusions

The horizontal mandibular right third molar contributed to maintaining the vertical dimension of occlusion and the masticatory efficiency for a very long period of time; it also ensured a proper distribution of forces trough the long axis of the second premolar, since the distal contact of the third's molar crown with the second premolar helped it to resist masticatory forces and to remain on the arch, despite the prolonged absence of any mesial contact.

Conflict of interests

The authors declare that there is no conflict of interests.

Authors' contribution

Oana Cella Andrei and Gabriela Ciavoi equally contributed to this article.

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Received: January 25, 2024

Accepted: August 3, 2024