

INTERDISCIPLINARY APPROACH IN THE THERAPY OF IMPACTED SECOND AND THIRD MOLARS

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Abstract

Simultaneous impactions of second and third permanent molars are a very rare clinical situation with different therapeutic approaches. Impaction of mandibular second molar sometimes can be challenging and frustrating for orthodontics and oral surgeons. Treatment depends on degree of tooth inclination and position of the third molars. Early diagnosis and good treatment for mandibular molar impaction is recommended between age 11 and 14, 27, 28, 29 when root formation is not yet complete. Conservative treatments of second mandibular molar impaction are successful in about 50% of cases. The treatment of impacted second molars (maxillary and mandibular) may be extraction of the second molar to permit the third molar to replace it, surgical exposure, orthodontic traction, surgical luxation and orthodontic traction, restoration, transplantation or no treatment.

This paper reports unusual cases of unilateral mandibular and maxillary second and third molar impaction diagnosed radiographically followed by orthodontic treatment.

Key words: impaction, molars, treatment

Introduction

Tooth eruption is defined as "the axial or occlusal movement of a tooth from its developmental position within the jaw towards its functional position at the occlusal plane" [1]. Systemic and local factors can affect this eruptive process. Systemic factors often affect multiple teeth and may be present in patients with syndromes, such as cleidocranial dysplasia [2]. Local factors have influence on the eruptive process and may result with one or few teeth being affected, usually mandibular third molars and maxillary canines. Disturbances to the eruptive process can have various outcomes including ectopic eruption, impaction, primary retention and secondary retention [3].

Impaction of permanent teeth usually concerns the maxillary or mandibular third molars, maxillary canines or central incisors and mandibular second premolars [4]. Eruption disturbances of mandibular second permanent molars are rare. The incidence of second molar impaction revealed by panoramic radiograph studies has been reported as 0.03% to 0.04% of all impacted teeth.

The etiology of impaction is related to some disturbance of physiological mandibular growth and tooth development. The space for second permanent molars is obtained by resorption of the bone at the anterior border of the mandibular ramus and the mesial migration of the first molar into the leeway space. The tooth bud of the second permanent molar develops with some mesial and axial inclination. The ability for natural self-correction manifests as the remodeling changes in their appearance [5].

Disturbance of this natural process may lead to impaction and be associated with an arch length deficiency, [6] because of inadequate mandible growth. Excess space between second molar in development and first molar may also result with impaction, because the crown of the second molar needs the first molar distal root for proper eruption [7]. Sometimes the second molar gets impacted spontaneously, related to the third molar position [8]. Impactions of second molar are mesio-angular in more cases. They occur more unilaterally than bilaterally; the mandibule prevalence is more common than maxillary; they are more prevalent in males than in females [9] and are usually associated with an arch length deficiency [10]. Second molar impaction is usually discovered during orthodontic treatment and it is the reason for the orthodontic referral [11]. Impaction of the second molar can affect patient's masticatory ability and esthetics, increasing the risk of caries, because proper oral hygiene in the area of impacted teeth is difficult, and caries may easily affect unerupted teeth. Undiagnosed second molar impaction may cause resorption of the distal surface of the first molar [9]. Other pathological outcomes have been reported, including formation of a follicular cyst, pericoronitis, tilting of neighboring teeth and malocclusion [12,13].

The best time to treat impacted mandibular second molars is between 11 and 14 years of age, when the second permanent molar root is still incomplete. A multi-disciplinary approach may be required and may involve orthodontic treatment and/or surgery. Various treatment options have been suggested depending on position and degree of tooth inclination. A more severe inclination requires surgical methods or orthodontically-assisted eruption with or without surgical uncovering. Surgical methods include surgical repositioning with or without extraction of the third molar [14-20], or extraction of the impacted second molar to allow eruption of the third molar or transplanting the third molar to the second molar socket [21]. A good treatment option is orthodontically-assisted eruption with or without surgical uncovering. Having in mind the fact that second molars are not vital for mastication [22], all cases need to be assessed on individual basis and all treatment alternatives should be thoroughly discussed with a patient before intervention.

Case report 1

14-year-old female presented with impaction of all permanent third molars and unilaterally impaction of the right second mandibular molar. Review of patient's medical, dental and family histories revealed no significant findings. The patient had a significant Class I division with bimaxillary crowding and increased overjet and overbite. A panoramic radiograph (Fig.1) revealed the presence of all permanent teeth except for the third molars and the right second molar with mesial inclination. Right mandibular second molar was impacted under the distal surface of the first molar. The root formation of the impacted lower second molar had reached completion, while the impacted mandibular third molars had immature roots. It is essential to diagnose and treat eruption disturbances as early as possible (ideally during the early mixed dentition period), because treatment at the later stage is usually more complicated. The patient was informed of the potential risks and possible benefits of treatment alternatives before making the final decision. The treatment plan was combined with surgery (Fig. 2) and orthodontic treatment and involved the extraction of both maxillary first molars (with orthodontic consultation). The left first mandibular and right second mandibular molars were pulled out. Upper and lower fixed appliance therapy followed. The orthodontic treatment is still ongoing.



Figure 1. Panoramic radiograph



Figure 2. Surgery

Case report 2

A 16-year-old male presented with impaction of all permanent third molars and unilaterally delayed eruption of the right second maxillary molar. The patient presented a Class $\frac{1}{2}$ II division with bimaxillary crowding and a protrusive profile with rotation of central incisors and canines. After performed x-rays (Fig. 3) the plan for the treatment was made. It included surgical removal of impacted right second maxillary molar. The surgical intervention was without any complications (Fig. 4). Regular check-ups were made on the second and the seventh day after surgery. The orthodontic therapy with fixed appliance followed the surgical treatment to finish the occlusion between jaws. The impacted third molars are planned to be extracted in near future.



Figure 3. X-rays



Figure 4. Photo taken after the surgery

Discussion

This paper presents unilateral impaction of both mandibular and maxillary second and third molars. It is unusual multiple teeth to be affected in a patient with no relevant medical history or syndromes. As already seen in many impacted second molars, they were identified radiographically when the teeth had still not erupted well beyond their normal position. According to Andreasen et al. [23] three main causes have been distinguished with regard to eruption disturbances: ectopic position, obstacles in the eruption path and failures in the mechanism. Failure of tooth eruption is associated with various systemic and local factors [24]. Heredity is also mentioned as an etiological factor. Recently mutation in parathyroid hormone receptor [25,26] in several familial cases has been observed as a problem in eruption of primary dentition. Local factors related to eruption failure including malocclusion, disturbance of deciduous dentition, position of the adjacent teeth, space deficiency in the dental arch, idiopathic factors, supernumerary teeth, odontomas or cysts [27,28,29].

In our two cases, we suggested surgical removal of impacted second molar and orthodontic movement of the third molar mesially to complete the occlusion.

Different treatment options are discussed in the literature. Surgical repositioning and transplantation bring a higher risk of complications, such as pulp necrosis, ankylosis or root resorption and should be applied only when orthodontic treatment is contraindicated [7,14]. If surgical treatment is preferred, it is important to know that surgical repositioning gives a better long-term prognosis than transplantation, because the tooth is not removed from the socket. This helps the apical vessels to remain intact and prevents contamination of roots with saliva [18]. Extraction of the impacted second molar and letting the third molar to erupt also has some disadvantages, because of the long-term interval between the extraction of the second molar (at age 12-14) and eruption of the third molar (at age 17) [7]. As a result, the third molar may become tipped and impacted. Orton-Gibbs et al. [30], in a study of the eruptive path of third molars after second mandibular molar extraction, reported that none of these teeth became impacted and that all achieved the acceptable position, but he suggested that this treatment option required a good case selection. A less risky alternative is orthodontically assisted eruption with or without surgical uncovering; this depends on the degree of impaction. The choice should be based on proper evaluation of impacted molars and developing third molar position. Other factors, such as degree of impaction and desired type of movement, should also be considered when we choose the appliance.

Conclusion

Second molar impaction is a very challenging disturbance. It needs proper clinical, radiological and orthodontical treatments for successful results.

References

1, Ten Cate A.R. Oral Histology, Development, Structure and Function. 3rd ed. Mosby; St Louis, MO, USA; 1989. pp. 275-89.

2. Jensen B.L., Kreiborg S. Development of the dentition in cleidocranial dysplasia. *J. Oral Pathol. Med.* 1990;19:89-93.
3. Raghoobar G.M., Boering G., Vissink A., Stegenga B. Eruption disturbances of permanent molars: A review. *J. Oral Pathol. Med.* 1991;20: 159-166.
4. Aitasalo, K., R. Lehtinen, E. Oksala. An orthopantomographic study of prevalence of impacted teeth. *Int J oral Surg.* 1972;1:117-20.
5. Majourau, A. L. A. Norton. Uprighting impacted second molars with segmented springs. *Am J Orthod Dentofacial Orthop.* 1995;107:235-8.
6. Varpio, M. Disturbed eruption of the lower second molar: clinical appearance, prevalence and etiology. *J Dent Child.* 1988; 55:114-8.
7. Shapira, Y., G. Borell, O. Nahlieli, M. M. Kuftinec. Uprighting mesially impacted mandibular permanent second molars. *Angle Orthod.* 1998;68:173-8.
8. Kokich, V. G. D. P. Mathews. Surgical and orthodontic management of impacted teeth. *Dent Clin North Am.* 1993;37:198-201.
9. Garcia-Calderon M., Torres-Lagares D., Gonzalez-Martin M., Gutierrez-Perez J. L. Rescue surgery (surgical repositioning of impacted lower second molars. *Med. Oral Patol. Cir. Bucal.* 2005;10:448-53.
10. Johnson J.V., Quirk G. P. Surgical repositioning of impacted mandibular second molar teeth. *Am. J. Orthod. Dentofac. Orthop.* 1987;91:242-51.
11. Evans R. Incidence of lower second permanent molar impaction. *Br. J. Orthod.* 1998;15:199-203.
12. Pindborg J.J. Pathology of the Dental Hard Tissues. Munksgaard; Copenhagen, Denmark: 1970. pp.225-55.
13. Shafer W.G., Hine M.K., Leavy B.M. A Textbook of Oral Pathology. 4th ed. Saunders; Philadelphia, PA, USA: pp.66-69.
14. McAboy, C.P., J.T. Grumet, E.B. Siegel, A.M. Iacopino. Surgical uprighting and repositioning of severely impacted mandibular second molars. *J Am Dent Assoc.* 2003;134:1459-62.
15. Ferrazzini, G. Uprighting of a deeply impacted mandibular second molar. *Am J Orthod Dentofac Orthop.* 1989;96:168-71.
16. Peskin, S. T.M. Graber. Surgical repositioning of teeth. *J Am Dent Assoc* 1970;80:1320-6.
17. Johnson, J.V., G.D. Quirk. Surgical repositioning of impacted second molar teeth. *Am J Orthod Dentofac Orthop.* 1987;91:242-51.
18. Pogrel, M.A. The surgical uprighting of mandibular second molars. *Am J Orthod Dentofacial Orthop.* 1995;108:180-3.
19. Shipper, G, G. Thomadakis. Bone regeneration after surgical repositioning of impacted mandibular second molars: a case report. *Dent Traumatol.* 2003;19:109-14.
20. Fieldhouse, J. C. Shields. Surgical uprighting of an impacted mandibular second molar. *Dent Update.* 1997;24:320-2.
21. Apfel, H. Transplantation of unerupted third molar tooth. *J Oral Surg.* 1956;9:96.
22. Kayser A.F. Shortened dental arches and oral function. *J. Oral Rehabil.* 1981;8:457-62.
23. Andreasen J.O., J.K. Petersen, D.M. Laskin. Textbook and Color Atlas of Tooth Impactions. Copenhagen, Denmark Munksgaard. 1997;199-208.
24. Suri, L., E. Gagari, H. Vastardis. Delayed tooth eruption: pathogenesis, diagnosis, and treatment. A literature review. *Am J Orthod Dentofacial Orthop.* 2004;126:432-45.
25. Frazier-Bowers, S.A. Simmons, K. Koehler, J. Zhou. Genetic analysis of familial non-syndromic primary failure of eruption. *Orthod Craniofac Res.* 2009;12:74-81.
26. Frazier-Bowers, S.A., D. Simmons, J.T. Wright, W.R. Proffit, L. Ackerman. Primary failure of eruption and PTH1r: the importance of a genetic diagnosis for orthodontic treatment planning. *Am J Orthod Dentofacial Orthop.* 2010;137:60.
27. Bondemark, L. J. Tsiopa. Prevalence of ectopic eruption, impaction, retention and agenesis of the permanent second molar. *Angle Orthod* 2007;77:773-8.
28. Kuroi, J. Impacted and ankylosed teeth: why, when, and how to intervene. *Am J Orthod Dentofacial Orthop.* 2006;129:86-90.
29. Magnusson, C. H. Kjellberg. Impaction and retention of second molars: diagnosis, treatment and outcome. *Angle Orthod.* 2009;79:422-7.

30. Orton-Gibbs, S., V. Crow, H. S. Orton. Eruption of third permanent molars after the extraction of second permanent molars. Part 1: Assessment of third molar position and size. *Am J Orthod Dentofac Orthop.* 2001;119:226-38.