

CLINICAL SECTION

The unerupted maxillary second molar, due to an overlying and malformed upper third molar: treatment and follow-up

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This retrospective study presents the treatment and follow-up of 20 young patients with 23 impacted upper second molars, due to overlying, impacted upper third molars. The third molars were removed surgically under local anaesthesia. After removal of these palatally obstructing teeth, radiographic and clinical follow-up was performed. The purpose of this study was to evaluate the eruption progress of the upper second molars after surgery. Radiological and/or clinical follow-up showed complete eruption of 19 (83%) of the upper second molars. For those cases treated before the age of 12 years and 4 months (the mean eruption age), all the upper second molars erupted completely. For those cases where surgical removal was undertaken after the mean eruption age, four (17%) of the upper second molars did not completely erupt. It was concluded that early treatment of impacted upper second molars, due to overlying third molars, may lead to more rapid eruption. Further prospective research is necessary to develop guidelines for the removal of palatally obstructing third molars to avoid eruption problems.

Key words: Second molars, impaction, eruption

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Introduction

Eruption refers to the continuous process of the axial or occlusal movement of a tooth from its developmental position within the jaw to its functional position in the dental arch.¹ Non-erupting upper second molars are relatively rare.² The aetiology of tooth impaction includes lack of space, rotation, inclination, supernumerary teeth and/or odontomas or other pathological entities.³ An important physical barrier causing impaction of the maxillary second molar is malposition of the developing maxillary third molar.⁴ These malpositioned third molars may be located on the palatal side, with or without malformation of the crown,^{3,5,6} which may be visible radiographically (Figure 1).

Treatment of the impacted permanent upper second molars consists of removal of any possible barrier.^{1,7,8} In this case, removal of the upper third molar is recommended at the age of 11–14 years, because the mean eruption age for males of the upper second molar is 12 years and 5 months (± 1 year and 2 months) and for females 12 years and 4 months (± 1 year and 5 months).^{3,9} After treatment, careful observation of the upper second molars is required to confirm the eruption



Figure 1 Orthopantomogram showing palatally positioned 'beanlike' left upper third molar, preventing eruption of the upper second molar

process.³ However, no series was found in the literature reporting the success rates of the treatment.

In this series 20 young patients are reported with unerupted upper second molars. This was due to palatally positioned overlying third molars, which were removed under local anaesthesia. The purpose of the report was to evaluate the eruption progress of upper second molars after surgical removal of the third molar.

Patients and methods

The outpatient surgical records of the department of Oral and Maxillofacial Surgery of the Leiden University Medical Centre, for the years 1996–2005, were retrospectively searched for patients under 18 years of age, who had been treated by removal of upper third molars.

Twenty patients, with a total of 23 impacted second molars, were found. All had been referred by an orthodontist or dental practitioner for surgical removal of an upper third molar, causing an eruption problem of the upper second molar, either unilaterally or bilaterally (Table 1).

The age of the patients varied from 10 years and 11 months to 15 years and 7 months, with a mean of 13 years and 1 month. Eight patients were male and 12 were female.

Preoperative orthopantomograms (OPTs) were available in all cases and showed superimposition of the upper second molars by malformed upper third molars in each case (Figure 1).

The developing third molars had been removed surgically under local anaesthesia. Examination of the available results showed that all third molars were removed before their root development was fully completed radiographically. None of the relevant second or third molars were visible intra-orally. After local anaesthesia, an incision over the tuberosity was made directly on to the bone or tooth. The periosteum was elevated, with special attention to the palatal side. In all cases, the third molar was located adjacent and palatally and distally to the second molar. Removal was performed using an elevator. The removal in all cases was not difficult to perform. During surgery, all the third molars removed were found to be malformed with

Table 1 Clinical findings of the eruption progress of the upper second molars.

Patient number	Sex	Patient age on treatment	Time interval between treatment and second OPT or clinical slide	Eruption progress (category)
1	F	10 years 11 months	1 year 11 months	*
2	F	11 years 5 months	1 year 7 months	*
3	F	11 years 8 months	2 years 0 months	*
4	F	12 years 0 months	1 year 7 months	*
5	M	12 years 0 months	2 years 6 months	*
6	F	12 years 1 month	3 years 0 months	*
7	F	12 years 3 months	2 years 2 months	*
8	M	12 years 3 months	2 years 2 months	*
9	M	12 years 7 months	1 year 8 months	*
10-1 (18)	M	12 years 9 months	4 years 4 months	*
10-2 (28)	M	12 years 9 months	4 years 4 months	*
11	M	13 years 2 months	1 year 7 months	†
12-1 (18)	M	13 years 2 months	1 year 2 months	*
12-2 (28)	M	13 years 2 months	1 year 2 months	*
13	M	13 years 3 months	1 year 0 months	*
14	M	13 years 4 months	3 years 1 month	*
15	F	13 years 4 months	6 years 9 months	*
16	M	13 years 5 months	3 years 11 months	*
17	F	14 years 2 months	0 years 7 months	‡
18	M	14 years 3 months	2 years 1 month	*
19	M	14 years 9 months	0 years 8 months	*
20-1 (18)	M	15 years 7 months	0 years 11 months	†
20-2 (28)	M	15 years 7 months	0 years 11 months	†

*Complete eruption.

†Partial eruption.

‡Minimal eruption.

FDI notation utilized in first column for cases with bilateral impacted second molars (e.g. 18=upper right wisdom tooth).



Figure 2 'Beanlike' upper third molar

a 'beanlike' crown deformation (Figure 2). No perforation of the maxillary sinus occurred. After removal of the tooth and follicle, the incision was closed with Vicryl Rapide 3 × 0 (Ethicon/Johnson & Johnson, Amersfoort, The Netherlands).

Post-operative clinical records were available for all the patients through the referring orthodontist or dentist.

In 13 of the 20 patients, an OPT was available at the end of orthodontic treatment. In the remaining seven patients, no OPT was available but clinical slides could be used to determine the eruption of the second molars (Figure 3a,b). The eruption of the second molar was observed in relation to the eruption of their antimeres and the neighbouring first molar, i.e. the cemento–enamel junction.

The eruption of the upper second molar was classified into three categories:

- (i) complete eruption to the occlusal level of the neighbouring molar (Figure 4a,b);
- (ii) partial eruption, inferior to the cemento–enamel junction of the neighbouring molar;
- (iii) minimal eruption, superior to the cemento–enamel junction of the neighbouring molar (Figure 4c,d).

There were 23 impacted upper second molars, 13 on the left and 10 on the right. The available follow-up records (OPT or clinical slides) ranged from 7 to 81 months post-operatively with a mean of 27 months.

Results

A summary of the eruption progress of the upper second molars, found on OPT or in clinical records, is shown in Table 1. It shows that 19 (83%) impacted upper second molars erupted completely (category 1), three (13%) erupted partially (category 2) and one (4%) erupted slightly (category 3).

For those cases with surgical removal before the mean second molar eruption age of 12 years and 4 months, 100% of the upper second molars had completely erupted (category 1). With surgical removal undertaken after the common eruption age of 12 years and 4 months, 11 (73%) of the upper second molars were completely erupted (category 1), while three (20%) partially erupted (category 2) and one (7%) erupted minimally (category 3).

Discussion

In the literature, treatment of impacted second molars is said to depend on the position of the third molar. When the third molar is malpositioned, removal of the third

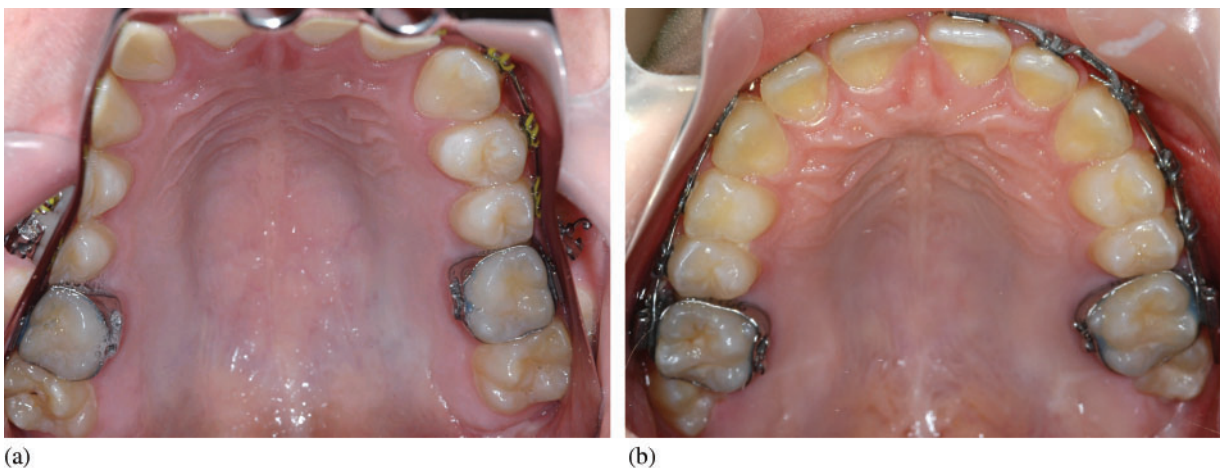


Figure 3 Clinical slides of (a) completely and (b) partially erupted upper second molars, after surgery

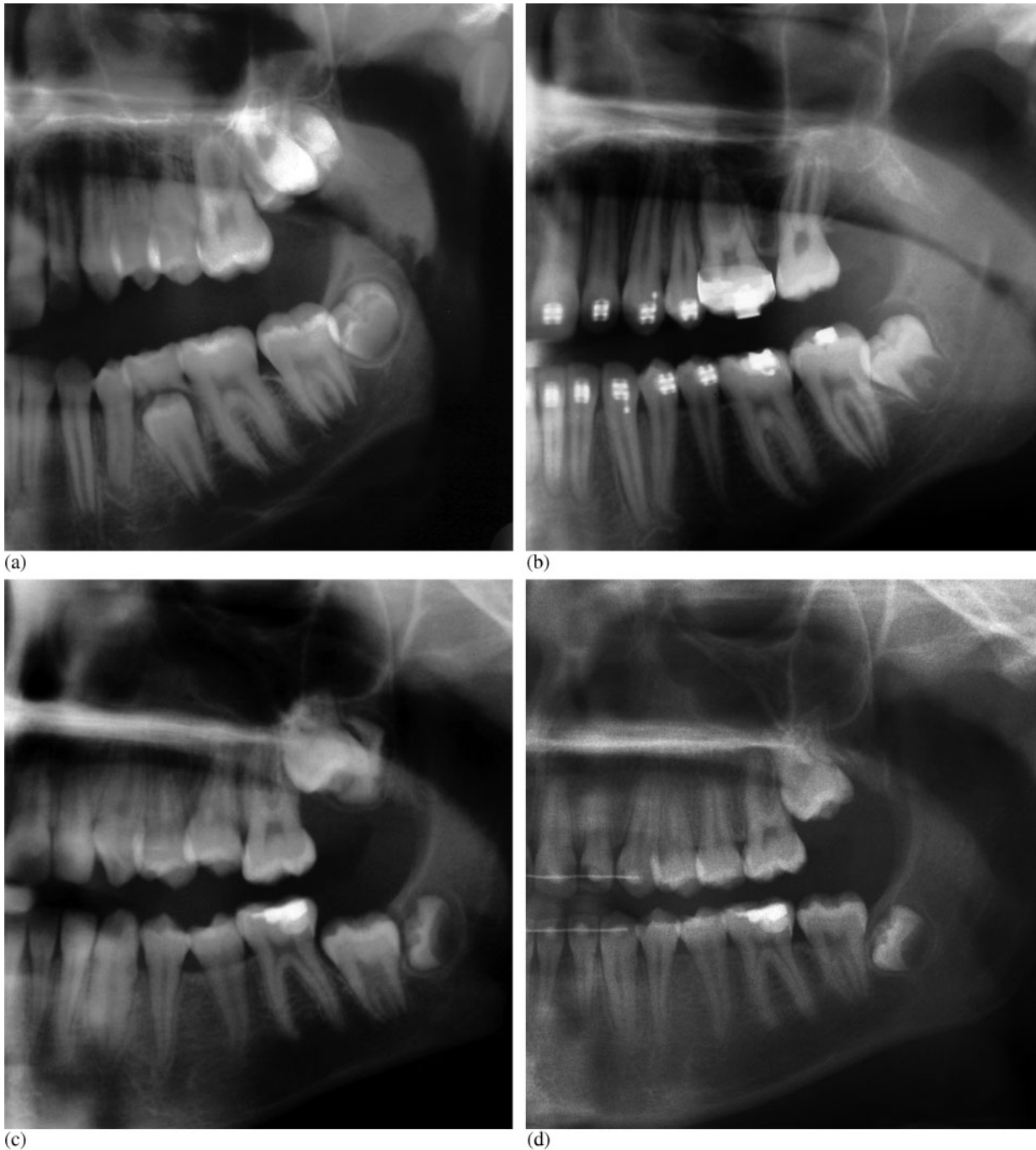


Figure 4 Orthopantomogram of an impacted left upper second molar, before and after surgery: (a,b) category 1 and (c,d) category 3

molar is the treatment of choice. No reasons for impaction were observed.

In our series, all impacted second molars were due to malpositioned and malformed third molars, which were consequently removed. It is believed that when this condition is left untreated, the second molar will not erupt. Furthermore the impacted second and third

molar can be a focus of inflammation (caries, periodontal), root resorption or cysts.¹⁰ So in a case of less eruption of the second molar it is also useful.

A beanlike morphology (Figure 2) as shown in our series has not been clearly reported before. It occurs possibly due to the palatal position, together with a lack of space in the maxilla during development. As the

follicles positioned in a more cranial plane (in association with its aberrant position), follicle pressure may be exerted by the second molar, possibly causing it to bend around the second molar. Levy *et al.* found a distinct concavity in each third molar which corresponded to the distal surface of the crowns of the impacted second molar.⁴ Baart and Bosgra mentioned a possible follicle collision of two developing germs in an underdeveloped maxilla.⁵ These factors may contribute to preventing late crown and early root development of the third molar, thus resulting in the 'beanlike' form.

Not all the second molars erupted completely after removal of the obstruction causing the impaction. The aetiology of this secondary retention or ankylosis is unknown. However, it has been suggested that trauma, infection, disturbed local metabolism and genetic factors may be causative factors.⁷ In our cases a disturbed local metabolism might be contributory, perhaps by more progressive root formation, before the barrier was removed. In the presented series, all patients treated before the age of 12 years and 4 months (the mean eruption age of the second molar), showed complete eruption of the upper second molar. For patients treated after this age, three patients showed incomplete eruption. Second molar eruption might take a little longer for older cases. Therefore, since follow-up in this series was relatively short, further eruption cannot be ruled out.

There are some weaknesses associated with this study. For example, due to the retrospective collection of records, it is possible that some records were missed. For the same reason, timing and type of records could not be standardized. Furthermore, since the follow-up was determined by collection of post-treatment records through the referring specialists, there was considerable variation in follow-up time, and it was impossible to determine exact eruption dates.

Conclusion

The upper third molars preventing eruption of the second molars reported in this study were positioned

palatally in the maxilla and showed a beanlike morphology. After removal, most of the upper second molars (83%) had erupted completely. More rapid resolution may be obtained when treatment is performed before the mean eruption age of the upper second molar. Our advice therefore is to remove third molars in these circumstances, and ideally before the mean eruption age of the upper second molar. However, further prospective research is necessary to develop better guidelines for the treatment of impacted upper second molars with third molars.

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