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Multidisciplinary Management of Complex Odontomas in Growing Patients: Two Clinical Case Reports

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ABSTRACT

Odontomas represent the most frequent type of mixed odontogenic lesions and can result in impaction of nearby teeth as well as difficulties in mastication. Management of tooth impaction associated with odontomas depends on the stage of root development and the lesion's position within the alveolar bone. This case report aims to describe a combination of surgical and orthodontic interventions for growing patients with odontomas and to evaluate treatment outcomes. Two pediatric patients were included: an 8-year-old boy and a 17-year-old girl, each presenting with sizable odontomas in the posterior maxilla. The lesions were identified through radiographic imaging, which revealed impaction of the first molars on the affected sides. The therapeutic approach involved surgical excision of the odontomas. In the younger patient, the impacted molar erupted spontaneously approximately 14 months post-surgery. In the older patient, orthodontic traction was applied successfully to facilitate the eruption of the impacted molar. Large odontomas in posterior regions can displace and obstruct adjacent molars, sometimes affecting root morphology. Early detection and removal, before root formation completes, may allow spontaneous eruption; otherwise, orthodontic extrusion becomes necessary. Close collaboration between surgical and orthodontic disciplines is essential for effective management of odontomas in growing patients.

Keywords: Odontoma, Odontogenic tumor, Hamartoma, Impacted tooth, Orthodontic traction, Spontaneous eruption

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Introduction

Odontomas are tumor-like malformations composed of both epithelial and mesenchymal dental tissues, including enamel, dentin, pulp, and cementum. Due to their slow growth and organized structure resembling teeth, odontomas are generally classified as hamartomas rather than true neoplasms [1-5]. Based on histological composition, they are divided into compound odontomas (OCps), which resemble small teeth with pulp tissue, and complex odontomas (OCxs), consisting of disorganized masses of enamel, dentin, and cementum. These lesions are enclosed in a connective tissue capsule and exhibit varying degrees of morphodifferentiation and histodifferentiation [1-4, 6-8].

According to the WHO Classification of Head and Neck Tumors (2017), odontomas are the most common benign odontogenic lesions [5]. However, their prevalence relative to other odontogenic tumors varies by population. For example, Buchner *et al.* reported that odontomas accounted for 75.9% of all odontogenic tumors in an American cohort [3-5, 9-11], whereas a Turkish study by Soluk-Tekkesin *et al.* found them to be the second most frequent tumor after ameloblastomas (odontomas: 27.2%, n = 335; ameloblastomas: 29.7%, n = 366) [12–14]. Differences in reported incidence may stem from the asymptomatic nature of odontomas and incidental detection via radiography [14, 15].

Location and presentation: Compound odontomas are most frequently located in the anterior maxilla (74.6%), whereas complex odontomas are more commonly found in the posterior mandible (68.2%). Typically, they are asymptomatic, discovered during routine radiographic exams in the second decade of life, rarely occur in deciduous dentition, and show no sex predilection [2, 5,13, 15, 16].

Clinically, odontomas can interfere with the eruption of permanent teeth, leading to impaction, malposition, or malformation, which may cause malocclusion and aesthetic issues in anterior regions. Delayed eruption is the most common presenting symptom. Maxillary incisors and canines are the teeth most frequently impacted, while mandibular permanent molars are affected less often. Other manifestations, including facial asymmetry, missing teeth, pain, or inflammation, are less common [2, 3, 13, 17].

Radiographically, compound odontomas appear as well-defined, tooth-like radiopaque lesions, while complex odontomas may resemble other odontogenic tumors depending on their stage of mineralization [13, 18]. Odontomas can also occur in association with calcifying odontogenic cysts (COCs); around 20% of COCs involve odontomas [19]. Histopathological examination is essential for definitive diagnosis [15, 18, 20, 21].

The etiology of odontomas remains unclear but has been linked to factors such as inflammation, genetic syndromes (e.g., Gardner's syndrome) [5, 22], gene mutations affecting tooth development, hyperactive odontoblasts [7,16, 23–26], and trauma to deciduous teeth [11, 17, 27].

Treatment: Complete surgical excision of the odontoma, including the fibrous capsule, is required. Orthodontic traction may be necessary for impacted teeth. Early removal allows the adjacent tooth to complete root formation and erupt spontaneously. In cases where extraction is challenging or atraumatic removal is not possible, tooth extraction may be considered [28, 29].

Purpose of this report: This case study presents a combined surgical and orthodontic approach for treating growing patients with odontomas and discusses the resulting treatment outcomes.

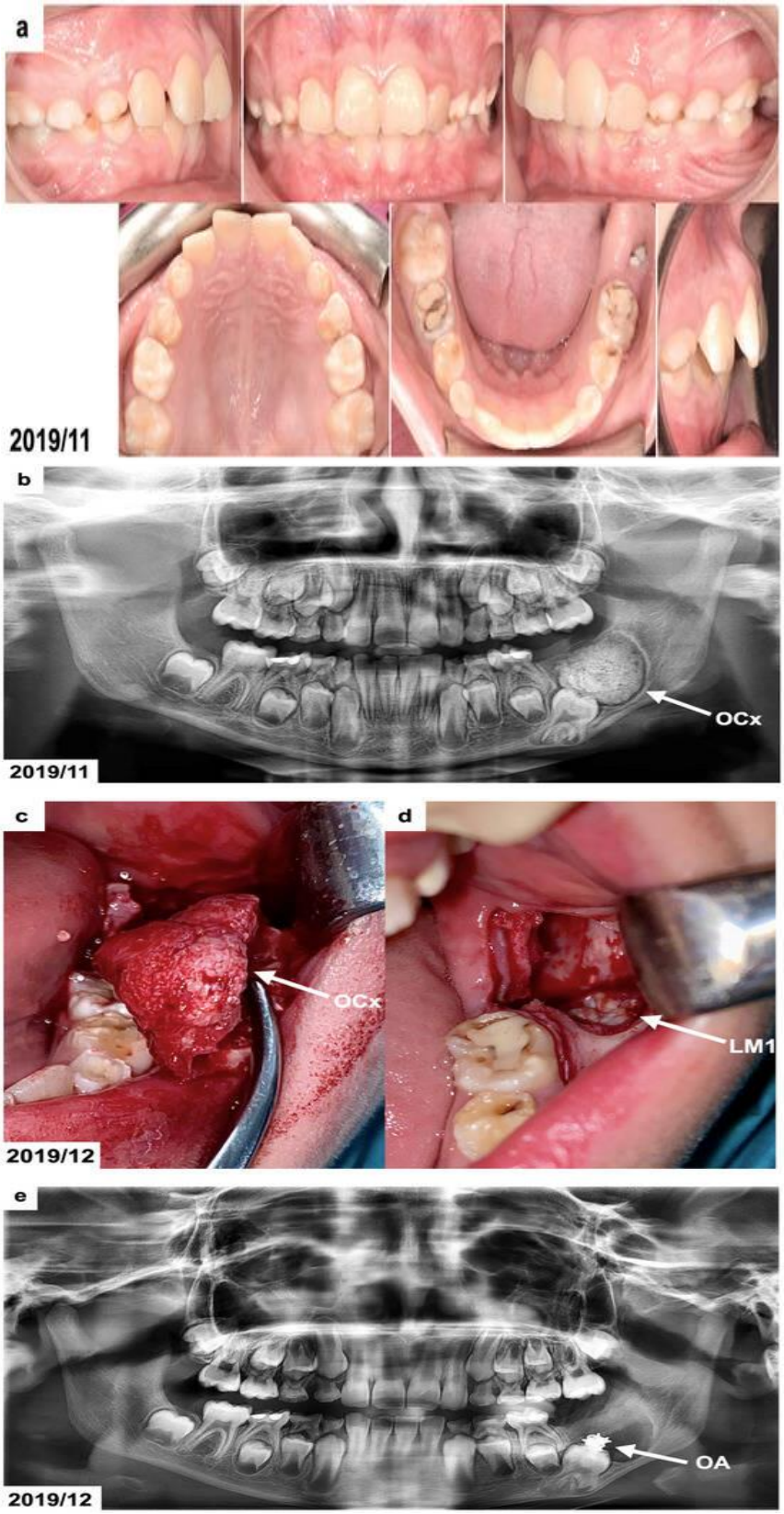
Case Reports

Case report 1

An 8-year-10-month-old boy was referred to the Department of Oral Surgery at the Medical University in Warsaw in November 2019. The family dentist had noticed that his mandibular left first permanent molar had not erupted. The child was healthy, with no previous orthodontic interventions or history of trauma.

On examination, his facial features were balanced and symmetrical. The profile was convex due to a slightly retruded chin, and his lips were competent. No abnormal oral habits were observed. He was in the early mixed dentition stage. All incisors and first permanent molars had erupted except the mandibular left first molar. All primary canines and molars remained in place. Oral hygiene was poor, and several deciduous molars had large restorations. Extraoral evaluation showed a Class II relationship with increased overjet and overbite, as well as a mild crowding in the upper front teeth. Clinically, a small portion of the crown of the unerupted lower left first molar could be seen through the gum tissue **(Figure 1a)**.

Before treatment, comprehensive orthodontic records were collected, including intraoral and extraoral photos, diagnostic models, and a cephalometric radiograph. A small, painless lymph node was noted extraorally. Intraoral assessment revealed poor hygiene, multiple fillings, active decay, and tooth wear. No inflammation of soft tissues was present, and the alveolar ridge dimensions were normal.


a
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LM1
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Figure 1. (a) Intraoral view prior to surgery and orthodontics, age 8 years, 10 months. (b) Panoramic radiograph showing complex odontoma (OCx) in the left mandibular molar area, age 8 years, 10 months.

(c,d) Images during surgery exposing the occlusal surface of the impacted LM1, age 8 years, 11 months. (e) Panoramic radiograph after tumor removal and bonding of orthodontic attachment (OA), age 8 years, 11 months. (f) Panoramic radiograph one year post-surgery showing OA bonded to LM1, age 10 years, 1 month. (g) Intraoral photo of spontaneously erupted LM1 after OA removal, age 10 years, 11 months. (h) Panoramic radiograph 4 years post-treatment, age 12 years, 7 months. (i) Intraoral photo showing LM1 position 4 years after treatment, age 12 years, 7 months.

The panoramic radiograph **(Figure 1b)** revealed a calcified mass with a radiolucent border near the distal portion of the mandibular first molar. The lesion measured roughly 3 cm in diameter and was adjacent to the cortical bone. To clarify the size and exact location, cone-beam CT (CBCT) was performed. CBCT showed a calcified area with density resembling dental hard tissue, surrounded by a thin radiolucent margin. The lesion measured 25 × 20 × 17 mm and was consistent with a complex odontoma extending to the inferior mandibular border. The adjacent first molar was displaced downward and mesially. Root formation was incomplete, at roughly two-thirds of the final length. The upper portion of the lesion was uncovered by alveolar bone over an area of 20 × 6 mm.

Treatment involved surgical removal of the complex odontoma followed by bonding an orthodontic attachment to the occlusal surface of the impacted molar. Extrusion would be carried out with a removable lower appliance. This method was chosen because of the limited biomechanics in the posterior area for a young patient, and the cost was reimbursed by the Polish National Health System.

Surgery was conducted under local anesthesia with 2% lignocaine containing noradrenaline. A triangular incision was made in the retromolar region, and the mucoperiosteal flap was reflected. The covering bone was carefully removed using a round bur under continuous saline irrigation. The tumor was fully excised without harming the unerupted molar **(Figures 1c, 1d)**. The site was irrigated with Metronidazole solution, and the orthodontic attachment was bonded **(Figure 1e)**. The flap was sutured back in place. The excised tissue was sent for histopathology.

Postoperative care included amoxicillin 500 mg with clavulanic acid 125 mg every 12 hours for seven days. The patient returned after one week for suture removal. Healing was uneventful, and no complications were reported.

Case Reports

Case report 1

An 8-year-10-month-old boy was referred by his family dentist to the Department of Oral Surgery at the Medical University in Warsaw in November 2019 because his mandibular left first permanent molar had not erupted. The patient was healthy overall, with no prior orthodontic interventions or history of trauma.

Facial assessment revealed symmetry and proportion, with a slightly retruded chin giving a convex profile. Lips were competent, and no abnormal oral habits or dysfunctions were present. The child was in the early mixed dentition stage: all incisors and first permanent molars had erupted except the mandibular left first molar. Deciduous canines and molars were retained, but oral hygiene was poor, and multiple large restorations were present in the primary molars. Extraoral examination identified Class II molar relationships, with increased overjet and overbite, and mild crowding in the upper anterior region. Clinically, a small portion of the mandibular left first molar crown was visible through the gingiva **(Figure 1a)**.

Orthodontic records, including intraoral and extraoral photographs, diagnostic casts, and cephalometric radiographs, were taken before treatment. Extraoral assessment noted a slightly enlarged but painless lymph node, distinguishable from bony swelling due to the lesion. Intraoral inspection confirmed poor oral hygiene, multiple carious lesions, and tooth wear, without soft tissue inflammation. Alveolar ridge dimensions were normal.

Panoramic radiography **(Figure 1b)** showed a calcified lesion with a surrounding radiolucent margin and cortical bone layer, approximately 3 cm in diameter, near the distal area of the mandibular first permanent molar. For precise assessment, cone-beam computed tomography (CBCT) was performed, revealing a 25 × 20 × 17 mm calcified mass resembling hard dental tissues, encased by a thin radiolucent zone. The lesion extended to the lower mandibular border and displaced the developing first permanent molar downward and mesially. Root development of the affected tooth was approximately two-thirds complete. The superior portion of the tumor was partially uncovered by alveolar bone (20 × 6 mm). Radiological features were consistent with a complex odontoma.

The treatment plan involved complete surgical excision of the odontoma and bonding of an orthodontic attachment to the impacted molar for guided eruption using a lower removable appliance. This approach was selected due to

limited biomechanical control in a young patient and because the appliance was reimbursed by Poland's National Health System.

Surgery was performed under local anesthesia (2% lignocaine with noradrenaline). A triangular incision in the retromolar area allowed elevation of a mucoperiosteal flap, exposing the tumor and adjacent bone. A round surgical bur with continuous saline irrigation removed the bony coverage over the lesion. The odontoma was fully extracted without damaging the unerupted molar **(Figures 1c, 1d)**. The cavity was rinsed with Metronidazole solution, and the orthodontic button was bonded to the tooth's occlusal surface **(Figure 1e)**. Flaps were repositioned, sutures placed, and the specimen sent for histopathology. Postoperatively, the patient was prescribed amoxicillin 500 mg/clavulanic acid 125 mg every 12 hours for 7 days. Sutures were removed after 7 days, with healing proceeding without complications.

Case report 2

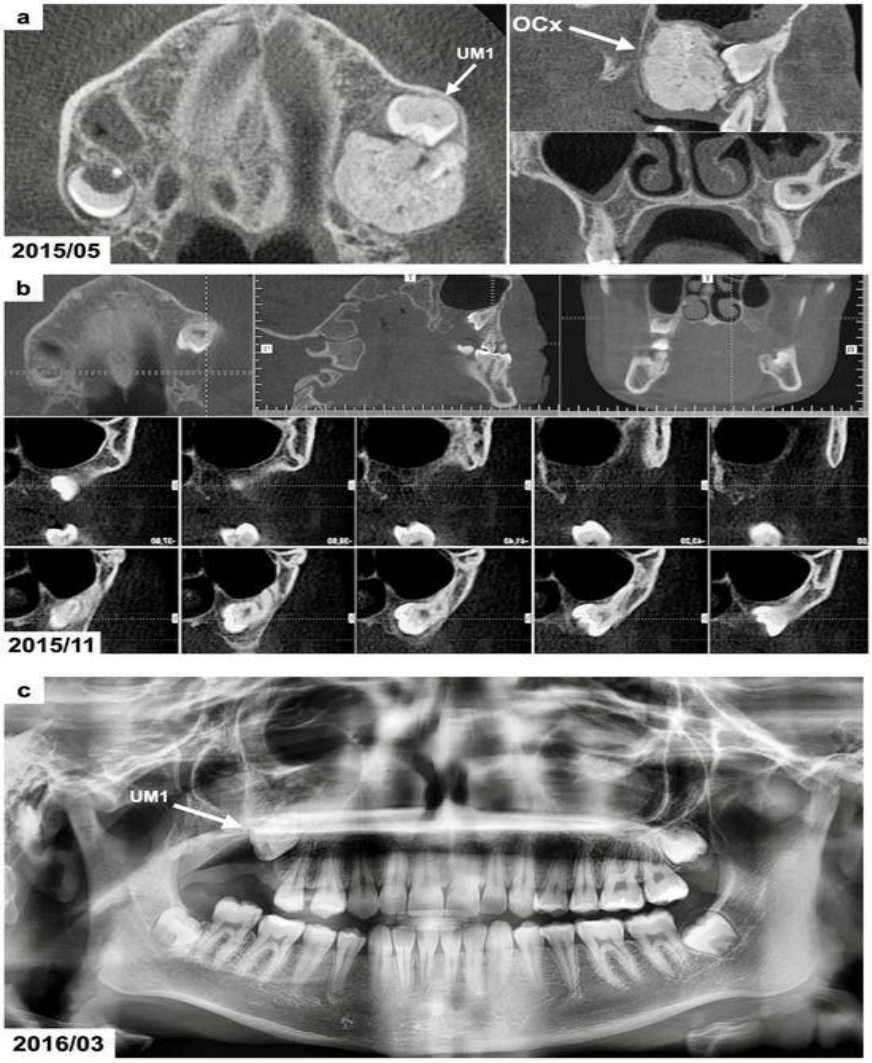
A 15-year-10-month-old girl was referred in May 2015 to the same oral surgery department for evaluation of impacted right maxillary molars and a radiographically detected intraosseous lesion in the posterior maxilla. The lesion had been observed on a panoramic radiograph provided by her dentist.

She was healthy, with no prior orthodontic treatment or dental trauma. She reported no facial pain, TMJ symptoms, or esthetic concerns.

Clinical assessment revealed a symmetric, proportionate face with a straight profile. Intraoral examination showed absence of the right maxillary molars. Lymph nodes were non-palpable. Oral hygiene was good, without caries or extensive restorations. The right posterior alveolar ridge was slightly enlarged but asymptomatic, with no soft tissue inflammation.

The patient had Class I canine and molar relationships and adequate arch spacing. Overjet and overbite were within normal limits. Examination revealed a right posterior crossbite and a minimal lower midline deviation of 1 mm to the left; the upper midline aligned with the facial midline. Hard and soft tissues were normal.

Panoramic radiography **(Figure 2a)** identified a radiodense lesion with a surrounding radiolucent zone in the posterior right maxilla, likely causing impaction of the first permanent molar on that side.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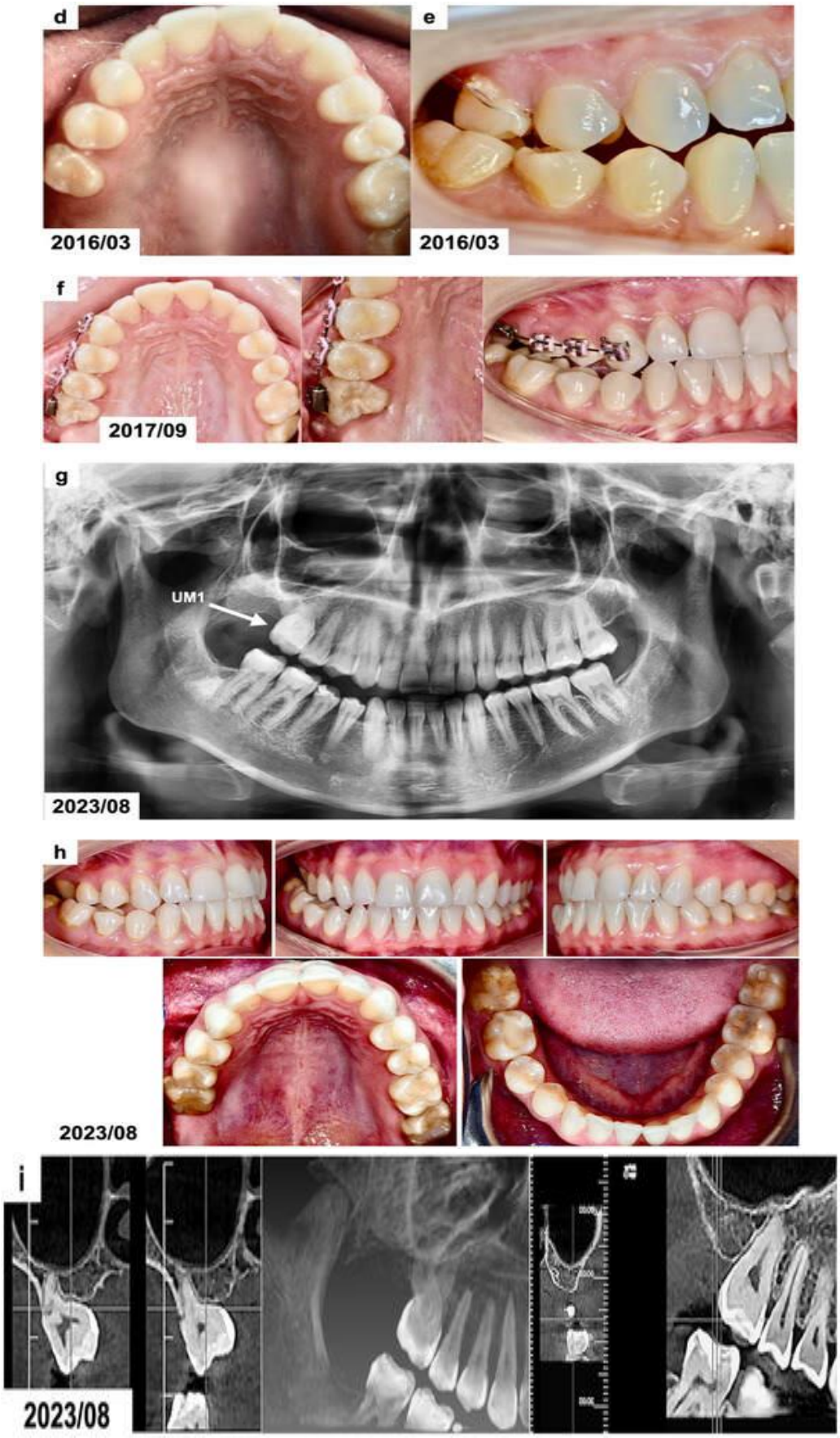

Figure 2. (a) Pre-treatment CBCT imaging illustrating an odontogenic growth in the right upper molar region. The patient was aged 15 years and 10 months. (b) Post-operative CBCT scans following tumor excision, showing displacement of the unerupted permanent upper right first molar. The patient was 16 years

and 4 months old. (c) Panoramic radiograph obtained after surgery revealing the retained maxillary molar; the patient was 16 years and 7 months old. (d,e) Intraoral views captured 10 months after the operation, prior to initiating orthodontic traction using a sectioned fixed system; patient's age: 16 years and 7 months. (f) Intraoral photographs 1 year and 4 months after active traction of the upper right first molar; patient age: 17 years and 10 months. (g) Panoramic image recorded 6 years after completion of surgical and orthodontic therapy; the patient was 24 years and 1 month old. (h) Intraoral views 6 years after treatment showing proper eruption and alignment of the permanent upper right first molar; patient's age: 24 years and 1 month. (i) CBCT scans at the same 6-year follow-up confirming eruption of the molar and loss of alveolar bone in the prior tumor area; patient's age: 24 years and 1 month.

A cone-beam computed tomography (CBCT) study was ordered to define the location and extension of the lesion. Imaging showed a dense spherical opacity with irregularly mineralized dental-like material (dentin and enamel) encased by a thin radiolucent line in the right posterior maxilla **(Figure 2b)**. The lesion measured 16 × 18 × 20 mm. The upper right first molar displayed complete root formation and was lodged distoangularly, its crown contacting the mass. The right second and third molars were missing. These findings pointed to a complex odontoma.

Management involved removing the lesion surgically and assisting eruption of the impacted molar through orthodontic traction. During excision, an orthodontic button with a soft ligature was to be bonded for later movement. Because the patient declined a full corrective plan for her posterior crossbite, a limited fixed system was applied only on the right upper canine and premolars. Traction was planned in the absence of spontaneous eruption, and the patient refused temporary anchorage devices (TADs) altogether.

Local anesthesia (2 % lidocaine with noradrenaline) was administered. A trapezoid-shaped incision exposed the operative field, and the mucoperiosteal flap was elevated. Buccal bone over the lesion was removed with a round bur under constant irrigation. The mass was carefully detached and taken out intact, sparing the first molar. The cavity was cleaned and irrigated with metronidazole solution. An orthodontic attachment was fixed to the molar crown and linked with a wire to the second premolar before closure of the flap and placement of sutures. The excised tissue was sent for microscopic study. Postoperatively, the patient took amoxicillin–clavulanate (0.625 g every 12 h for 7 days). Recovery was smooth, and sutures were removed after one week.

Histopathological assessment (H&E staining) showed mature dentin tubules enclosing small remnants of enamel matrix or immature enamel, with mature enamel lost in decalcification. These clinical, radiographic, and histological findings verified the diagnosis of a complex odontoma. The unerupted molar was monitored for 10 months without eruption **(Figures 2c–2e)**. Consequently, orthodontic traction was initiated using a segmented fixed appliance (slot 0.022 in, *Mini Master*, American Orthodontics). Brackets were bonded to the right canine and premolars. After three months of alignment, a 0.017 × 0.022-in stainless-steel **wire** was installed. Traction was delivered through an elastic power chain attached to the ligature and renewed every 5–6 weeks. After 1 year 4 months, the tooth erupted into the arch **(Figure 2f)**, though some sessions were missed. The patient declined further treatment for crossbite correction, so the appliance was removed without retention.

Five years later, she returned for review. The upper right first molar remained in function with no pathological findings **(Figures 2g, 2h)**. Follow-up CBCT revealed missing alveolar bone in the area where the lesion had been excised, and bone grafting was recommended prior to any implant procedure **(Figure 2i)**.

Discussion

Odontomas constitute the most prevalent form of intraosseous odontogenic neoplasms and are typically identified during the first two decades of life. These lesions often interfere with normal dental development, producing tooth displacement, eruption delay, impaction, or occlusal alterations [18, 28, 30]. In both clinical examples described here, the odontomas appeared in the posterior maxillary or mandibular regions, resulting in missing or unerupted permanent teeth nearby. Since the patients were still in active growth phases, the absence of a single posterior tooth was not easily detected by them or their families. Nonetheless, in Case 2, the lesion might have been diagnosed earlier through routine dental screening. Both tumors remained largely symptom-free, showing only subtle swelling of the alveolar bone in posterior zones. In the first case, discovery occurred via a panoramic X-ray performed for orthodontic assessment, while in the second, a missing upper first molar was noticed during a standard examination. Radiographs confirmed that the impaction of neighboring molars was caused by the

odontoma. In each case, surgical excision was carried out, and orthodontic treatment was subsequently designed to help bring the retained molars into occlusion. Early, cooperative management between dental specialists is crucial for young patients with odontomas. Pediatric dentists often make the initial observation, and orthodontists should be involved immediately after tumor removal to coordinate follow-up care.

Accurate identification of complex odontomas requires distinction from other jaw lesions, including ossifying fibromas (OFs), osteomas, cemento-osseous dysplasias (CODs), ameloblastic fibromas (AFs), ameloblastic fibro-odontomas (AFOs), ameloblastic fibro-dentinomas (AFDs), and calcifying odontogenic cysts (COCs). Radiologic and microscopic evaluations are both essential for a definitive diagnosis [7, 16, 18, 21]. Historically, AFOs and AFDs were considered separate entities due to their hybrid structure: a mineralized matrix resembling hard dental tissue (like that seen in odontomas) and a fibrous stroma similar to ameloblastic fibroma. Morphologically, they occupy an intermediate position between AF and odontoma. Today, they are classified as developing odontomas, although **BRAF p.V600E** mutations—typical for AF—are also observed in these lesions, unlike in odontogenic cysts. Some AFOs/AFDs behave aggressively, implying a neoplastic, rather than hamartomatous, origin. Further genetic and molecular research may clarify whether they represent transitional lesions or a distinct category within odontogenic tumors [5, 13, 15]. In the current report, histological results confirmed the diagnosis of complex odontoma following excision in both cases.

The exact cause of odontoma formation is still uncertain. Factors such as trauma, inflammation, and hereditary influence have all been proposed. In the two cases discussed, there was no evidence of prior trauma, dental infection, or familial tendency toward impaction. Neither patient experienced pain or functional issues associated with the lesion. Both were missing second and third molars on the affected side, likely due to local developmental disruption caused by the odontoma [25, 31]. Liu J.K. and colleagues (1997) reported a comparable case involving a 12-year-old boy whose mandibular first molar was impacted by an odontoma, and who also lacked the second and third molars. They proposed that the lesion may have interfered with normal tooth formation [31].

The standard therapeutic approach is conservative surgery to excise the odontoma while maintaining the integrity of the involved tooth, which is usually separated by a thin bony partition [2, 24, 32]. This facilitates spontaneous eruption, particularly when intervention occurs before root growth is complete. The post-operative strategy should consider multiple variables: the impacted tooth's location within the alveolar ridge, its root maturity, form, and available eruption space [11,17,28,30,32]. Treatment often includes surgical exposure and bonding of an orthodontic element for controlled traction. Teeth with incomplete root formation have a higher likelihood of erupting naturally, making early recognition of eruption disturbances essential. In these cases, family dentists were the first to identify eruption anomalies and referred the patients for oral surgical evaluation. Because odontomas are typically bounded by bone, extractions are unnecessary unless tumor removal threatens adjacent dental structures [24, 25, 32].

In **Case 1**, diagnosis occurred during the mixed-dentition phase, before root completion of the affected molar. Removal of the lesion allowed the tooth to erupt spontaneously, eliminating the need for traction. Continuous orthodontic monitoring remained important until the tooth reached functional alignment [3, 4, 8, 10, 12, 29, 30]. Hidalgo-Sánchez O. *et al.* examined **77 cases** of odontoma treatment, finding that surgery alone was sufficient in most, while only **7 cases** required later orthodontic adjustment [2]. By contrast, Isola G. *et al.* observed spontaneous eruption in just **4 teeth**, with **29** requiring combined surgical-orthodontic management during a **15-year** observation period [12]. The chance of spontaneous eruption after tumor removal depends on factors such as root development, the tooth's depth and angle, and spatial relations with neighboring teeth [3,16-18, 24, 28-33].

In **Case 2**, the odontoma was identified once root formation of the upper first molar was already complete. The tooth failed to erupt on its own, necessitating orthodontic traction with a fixed appliance to bring it into the arch. This underscores the importance of early detection, as prompt intervention can avoid complex traction therapy. Orthodontic appliances can produce complications including enamel decalcification, root shortening, mucosal irritation, and hypersensitivity reactions. Moving a terminal molar is especially challenging because of anchorage demands. Nonetheless, in this instance, extrusion was achieved without the use of skeletal anchorage such as temporary anchorage devices (TADs). Placement of TADs after removal of a large intra-alveolar tumor can be difficult, so alternate sites—such as the palate—should be considered if anchorage is required.

Recurrence of odontomas is exceedingly rare, and prognosis is favorable [5, 7-9]. In the work of Hisatomi *et al.*, odontomas not linked to impacted teeth remained unchanged in size or radiographic appearance over several years. Given their minimal growth potential and absence of malignant transformation, recurrence is uncommon.

Conventional surgical excision confirmed histologically, followed by orthodontic alignment when indicated, continues to be the most reliable therapeutic protocol [5, 25, 28-30, 34-37]. No recurrence was detected in either of the two present cases during the observation period.

Conclusion

Odontomas occurring in the posterior jaws frequently cause displacement or impaction of neighboring molars. When detected and removed early—before root maturation—the affected tooth may erupt naturally without further assistance. Surgery should prioritize the preservation of adjacent structures, with orthodontic traction reserved for teeth that fail to erupt. Close collaboration among pediatric dentists, surgeons, and orthodontists is fundamental to ensure accurate diagnosis and integrated treatment in young patients with odontomas.

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