

Compound odontoma and impaction of the lower left deciduous canine in a 4-year-old child: diagnosis and treatment



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Abstract

Background Odontomas are the most common odontogenic tumours, often considered hamartomas rather than true neoplasms. These mixed tumours consist of fully differentiated dental tissues, including enamel, dentin, cementum, and pulp. Odontomas can be classified into compound and complex types. While typically asymptomatic, they are often discovered during routine radiographic examinations for delayed tooth eruption. The management of odontomas generally involves surgical removal, which is effective in resolving associated dental impactions.

Case Report We present the case of a healthy 4-year-old child who presented with the absence of the lower left deciduous canine (tooth 7.3) in the dental arch. Radiographic examination revealed multiple radiopaque masses indicative of a compound odontoma associated with the unerupted deciduous canine. Following detailed imaging and surgical planning, the odontoma was successfully enucleated under conscious sedation with nitrous oxide. The surgical procedure was performed without extracting the retained canine. Post-operative follow-up at two weeks showed excellent healing, and at seven months, partial eruption of the canine was observed, confirming the odontoma's role in impeding its eruption.

Conclusion This case underscores the importance of early diagnosis and management of odontomas to prevent potential impaction of associated teeth. The successful surgical removal of the odontoma facilitated the spontaneous eruption of the lower left deciduous canine, highlighting the effectiveness of early intervention. Conscious sedation with nitrous oxide proved to be a valuable tool in managing the young patient, ensuring cooperation and comfort during the procedure. Early identification and treatment of odontomas are crucial for promoting normal dental development and preventing future malocclusions.

Introduction

Odontomas are the most common odontogenic tumours (Table 1); biologically considered hamartomas rather than neoplasms [Shafer et al., 1983]. They are mixed tumours composed of hard tissues of both epithelial and mesenchymal origin [Budnick, 1976; Barnes et al., 2005]. These fully differentiated tissues are a composition of enamel, dentin, cementum, and pulp tissue [Satish et al., 2011]. Thus, they are calcified lesions that can take one of two general configurations:

KEYWORDS Odontoma, Odontogenic tumours, Retained teeth, Delayed primary tooth eruption, Surgical procedure.

they can appear as numerous miniature or rudimentary teeth, in which case they are known as compound odontomas, or they can appear as amorphous conglomerates of hard tissues, in which case they are known as complex odontomas [Sciubba et al., 2001]. The aetiology of odontomas is largely unknown, but it has been suggested that local factors such as trauma, infections, and developmental anomalies may be possible causes [Trejo-Remigio et al., 2019]. Odontomas are typical lesions in children and young adults [Soluk Tekkesin et al., 2012]; most are discovered in the second decade of life [Hidalgo-Sánchez et al., 2008; Owens et al., 1997; Shafer et al., 2006] but are rarely diagnosed in the primary dentition [Owens et al., 1997; Waldron, 1995; Sheeny et al., 2004]. There seems to be no significant gender predilection [Crincoli et al., 2007; da Silva et al., 2009; Daley et al., 1994]. The maxilla is more often affected than the mandible; there is also a tendency for compound odontomas to localise in the anterior maxilla and for complex odontomas to occur in the posterior mandible [Buchner et al., 2006]. Odontomas generally do not produce symptoms and develop slowly [Waldron, 1995; Yadav et al., 2012] but may be associated with clinical signs such as retained or impacted teeth and alveolar swelling [Katz, 1989; Oliveira et al., 1995]. Typically, it is radiographic investigations performed to explain such anomalies that reveal the presence of these lesions [Huber et al., 2008; Tomizawa et al., 2005; Batra et al., 2004].

Radiographically, compound odontomas typically appear as numerous denticles collected in a single cluster. This collection is typically found within the alveolar bone between the roots of dental elements or coronal to an impacted or retained tooth. Complex odontomas are found in the same regions but appear as single, amorphous, opaque masses surrounded by a thin radiolucent border [Tomizawa et al., 2005; Soluk Tekkesin et al., 2012]. Microscopically, enamel matrix, mature tubular dentin, cementum, and pulp tissue with a histological appearance similar to that of a normal tooth can be identified in compound odontomas, while a complex odontoma shows a disorganised arrangement of tubular dentin as the predominant component, although enamel matrix, cementum, and sometimes ghost epithelial cells are also present [Thompson, 2021].

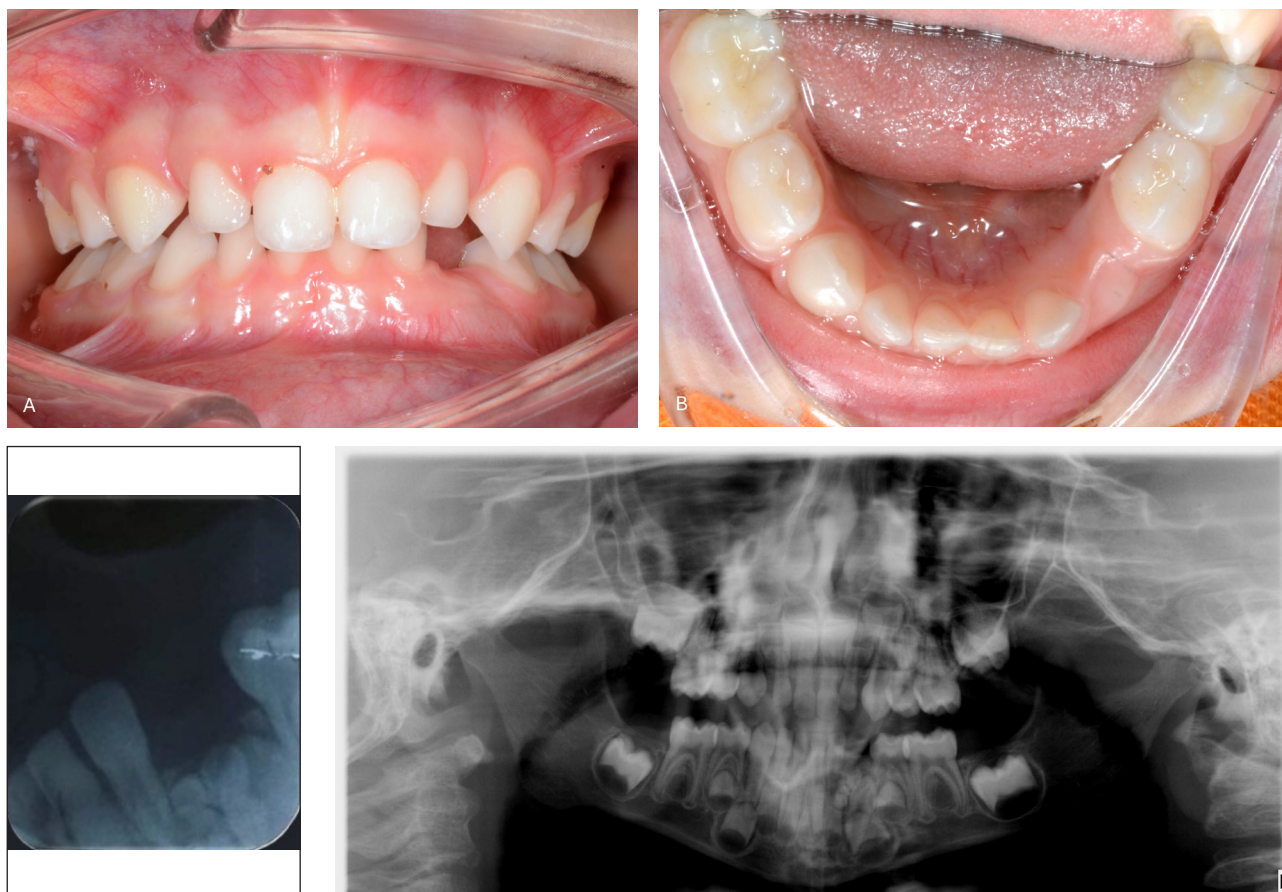


FIG. 1 Pretreatment intraoral view of the anterior mandibular region.

FIG. 2 Periapical intraoral radiograph of the edentulous area showing a radiopaque mass in close relation to the crown of tooth 7.3.

FIG. 3 Panoramic radiograph of the patient showing a radiopaque mass in the anterior left mandibular area.

Conventional surgery is considered the treatment of choice for odontomas [Maltagliati et al., 2020]. Enucleation is curative and recurrence is not an issue [Mazur et al., 2022]. The purpose of this report is to present a rare case of compound odontoma in the primary dentition and to discuss its management and follow-up over a 7-month period.

Case report

A healthy 3-year-10-month-old boy presented to our clinic in July 2021 due to the absence of tooth 7.3 in the arch. The patient did not report any discomfort or pain, and the area corresponding to the missing tooth showed no signs of swelling or inflammation (Figs. 1A and 1B). A periapical intraoral radiograph of the area was performed as a preliminary investigation, which revealed the presence of several radiopaque masses adjacent to what was initially hypothesised to be the crown of the unerupted deciduous canine (Fig. 2). A panoramic radiograph was then requested for further investigation and diagnostic validation (Fig. 3). The examination revealed a typical cluster appearance of small denticles compatible with the diagnosis of a compound odontoma closely associated with the retained tooth 7.3. The patient's parents reported no previous trauma or associated disturbances in the anterior mandibular region. Additionally, the mother's medical history, including pregnancy and childbirth, was unrelated.

The condition was explained to the parents, and the removal of the lesion was recommended to provide tooth 7.3 with the conditions necessary to erupt spontaneously. Given the child's good preliminary level of cooperation, the procedure was

proposed to be performed in the clinic under conscious sedation with nitrous oxide. The parents, duly informed, agreed to the treatment.

Pre-operative stage

A cone beam computed tomography (CBCT) scan was requested for surgical planning to evaluate the appearance, localisation, and morphology of the odontoma. The examination revealed the presence of a lesion about 8 mm in diameter with a radiolucent border enclosing nodular masses similar to those of teeth located mesially and coronally to the unerupted deciduous canine (Fig. 4). The parents were advised to consult their paediatrician for a suitable antibiotic prophylaxis prescription to begin before the procedure to achieve effective plasma and tissue concentrations at the time of incision and adequate protection in the days following the surgery.

Surgical procedure

The enucleation of the lesion was performed in a single operative session in October 2021. The patient, having fasted for at least two hours, was first subjected to conscious sedation through the inhalation of a nitrous oxide/oxygen mixture delivered by a dedicated machine (Master Flux Plus, Tecno-Gaz, Italy) through a flavoured nasal mask. Initially, 100% oxygen was administered for 1-2 minutes, then nitrous oxide starting at a concentration of 30% was titrated with 5-10% increments until an adequate level of sedation was achieved where the patient was calm and almost immobile but able to understand and

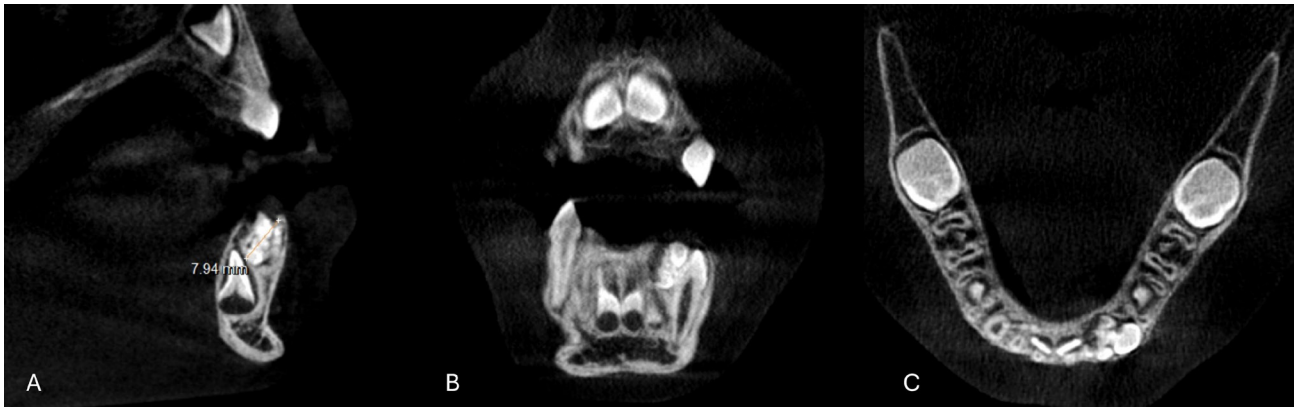


FIG. 4 Pretreatment cone beam computed tomography scan of the odontoma – sagittal view (A), coronal view (B), axial view (C).

respond to verbal commands. After an 8-minute induction period, the surgical procedure was initiated, continuously monitoring heart rate, oxygen saturation, and blood pressure throughout the treatment. Local anaesthesia with 4% articaine and 1:200,000 epinephrine was administered, followed by the incision (Fig. 5A) and dissection of a trapezoidal mucoperiosteal flap to access the underlying bone plane. The bone cortex was partially eroded by the neoformation, which appeared immediately below the elevated flap (Fig. 5B). To improve access to the lesion, a small portion of the surrounding bone was removed using a bone bur under copious saline irrigation. The removal of the odontoma fragments began with the visible fragments, followed by multiple irrigations and the use of an alveolar spoon and haemostatic forceps to remove the remaining denticles and the connective tissue capsule surrounding them (Fig. 5C). The lesion was removed without extracting the deciduous canine. After cleaning the remaining surgical cavity and irrigating with saline solution, the flap was repositioned and closed with interrupted 4/0 polyglactin 910 sutures (Vicryl Rapide, Ethicon Inc, Somerville, NJ, USA). At the end of the surgical procedure, conscious sedation with nitrous oxide was discontinued by administering 100% oxygen for 3-5 minutes to prevent diffusion hypoxia.

Post-operative stage

The patient's parents were instructed to use a gel tray to apply 0.2% chlorhexidine gel to the treated area for 5 minutes twice a day for 10 days. A follow-up appointment was scheduled for the patient to check the surgical wound healing after 15 days.

The excised tissue, consisting of 10 calcified fragments and connective tissue, was fixed in a 10% buffered formalin solution and sent for histopathological examination to confirm the diagnosis.

Follow-up

The two-week follow-up showed excellent tissue healing with no post-operative complications (Fig. 6). The histological report confirmed the diagnosis of compound odontoma. The 7-month follow-up showed no recurrence and partial eruption of the lower left deciduous canine (Fig. 7), confirming the role of the odontoma as an obstacle to its physiological eruptive process.

Discussion

This case described the occurrence of a compound odontoma in the primary dentition with the concomitant failure of a

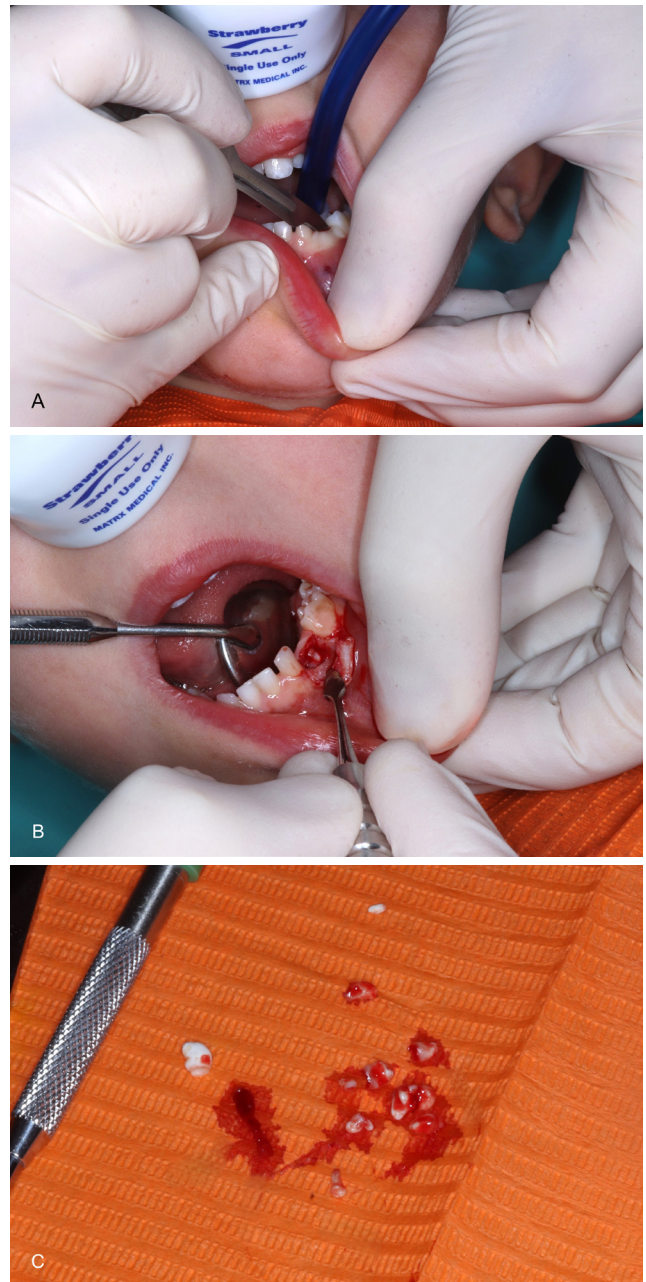


FIG. 5 Surgical procedures.

Odontoma Characteristics Overview
The most common odontogenic tumor
Considered a hamartoma rather than a neoplasm
Children and young adults
Asymptomatic Discovered during routine radiographic examination or when it blocks the eruption of a tooth
Compound type Composed of multiple miniature teeth Most commonly found in the anterior maxilla
Complex type Conglomerate mass of enamel and dentin Most commonly found in the posterior mandible
Treated with enucleation; does not recur

TABLE 1 Key aspects of odontomas, including epidemiology, classification, diagnosis, and treatment.

deciduous canine to erupt and the surgical approach for removing the lesion without extracting the retained tooth, which successfully erupted after a few months. Odontomas are relatively infrequent in the primary dentition, as highlighted in the literature [Isola et al., 2017; An et al., 2012]. Additionally, most cases of odontoma are diagnosed following the failure of permanent teeth to erupt or due to the persistence of a deciduous tooth beyond the normal shedding period; in these cases, treatment would involve a combined surgical approach for the odontoma and orthodontic recovery of the impacted tooth [Veis et al., 2000; Khan et al., 2014; Tripodi et al., 2012; Kamakura et al., 2002; Dinoi et al., 2016]. However, there is no common agreement on the best management approach for impacted teeth associated with odontomas. Although about 75% of impacted teeth associated with odontomas erupt spontaneously after the lesion is removed, in many cases, impacted teeth are still extracted during the enucleation phase of the odontoma [Morning, 1980; Litonjua et al., 2004]. In this case, the odontoma was diagnosed in the primary dentition well before the mixed dentition phase began. Prompt surgical removal of the lesion allowed the spontaneous eruption of the deciduous canine, eliminating the potential risk of further impaction of the corresponding permanent canine, which would have required orthodontic treatment to be recovered [Aiello et al., 2022]. This underscores the importance of early diagnosis and intervention in order to reduce the risks of worsening a malocclusion condition [Grippaudo et al., 2020]. Additionally, the reduced trauma during the surgical procedure and the choice to preserve the deciduous canine not only decreased the risk of disrupting the natural development course of the subsequent permanent tooth but also avoided potential scarring of the surrounding hard tissues that could have later complicated its eruptive process [Biagi et al., 2011; Mason et al., 2000]. In the presented case, the eruption of the deciduous canine occurred within about 7 months following the removal of the odontoma, although at the time of follow-up, it had not yet completely reached the occlusal level. Becker argues that impacted teeth can take up to three years to reach the occlusal level [Becker, 2002]. Additionally, the level of root development can influence the eruptive process; it is known that permanent teeth with closed apices erupt less rapidly than teeth with open apices [Mason et al., 2000; Ashkenazi et al., 2007]. In our case, the young age of the patient could be considered a favourable



FIG. 6 Intraoral view at two weeks post-operatively showing uneventful healing.



FIG. 7 At the seven-month follow-up, there was no sign of recurrence, and the lower left deciduous canine had partially erupted.

factor for achieving rapid results, although it is likely that the trouble-free eruption of the deciduous canine was mainly due to an open apex and the removal of the physical barrier that prevented its eruption. It is also interesting to highlight the advantage brought by conscious sedation with nitrous oxide in simplifying the management of the surgical procedure. The use of nitrous oxide is often crucial in paediatric patients where cooperation can be compromised by anxiety or fear; in this context, nitrous oxide undoubtedly facilitates the management of the procedures to be performed [Foley, 2005; Ferrazzano et al., 2020]. Data in the literature clearly indicate that nitrous oxide allows for rapid induction and recovery from sedation while maintaining a good safety profile [Gupta et al., 2022]. However, it is always essential to consider the contraindications and limitations in the use of nitrous oxide as well as the need for careful patient evaluation and close supervision during sedation [Galeotti et al., 2016].

Conclusion

Odontomas are often associated with eruption problems, frequently causing impaction of adjacent teeth. Although variations in normal tooth eruption are common, significant deviations from established norms should prompt further investigation into the patient's dental health and development. Clinical experience and dental literature suggest that an individualised radiographic examination is justified for any

paediatric patient showing clinical signs of delayed eruption, regardless of the presence of previous dental trauma or other disturbances. The use of conscious sedation with nitrous oxide can facilitate the management of young patients during surgical procedures, ensuring cooperation and comfort. Early diagnosis is therefore crucial as it allows for timely initiation of appropriate treatments that promote dental eruption according to physiological criteria, preventing future malocclusions and improving overall oral health outcomes.

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Patient privacy and ethical compliance

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