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Case report

A peculiar case of odontoma and impacted mandibular canine

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Abstract: Odontomas account for a significant proportion of benign odontogenic tumors, often found incidentally due to their asymptomatic nature. This case report details a unique presentation of a mandibular compound odontoma in a 32-year-old male, resulting in the impaction of the mandibular right canine (tooth 4.3) and retention of the primary canine (tooth 8.3). Radiographic evaluation, including cone-beam computed tomography (CBCT), showed a radiopaque mixed lesion near the mandibular canal and the roots of adjacent teeth. Surgical management included the excision of the odontoma and extraction of the retained deciduous canine under local anesthesia, using rotary instruments to preserve adjacent structures. Postoperative healing was uneventful, with histopathological analysis confirming the lesion as a compound odontoma. This case underscores the significance of advanced imaging techniques in diagnosing and managing odontogenic lesions. It emphasizes the necessity for further research into alternative surgical methods and genetic factors influencing odontoma development.

Keywords: odontoma; odontogenic tumors; tooth, impacted; cone-beam computed tomography; surgical procedures, operative; histological techniques

1. Introduction

Jaw lesions, particularly osteolytic and bone neoplasms, are critical clinical entities within maxillofacial pathology. These lesions can present as benign or malignant, and due to the complexities of the maxillofacial region, their detection, diagnosis, and treatment require careful evaluation. One of the most common benign odontogenic tumors is the odontoma, which accounts for 22% of all odontogenic tumors. Odontomas are hamartomas rather than true neoplasms, consisting of enamel, dentin, cementum, and pulpal tissue and mimicking normal tooth development [1,2]. Histologically, odontomas are classified as either compound or complex. Small, tooth-like structures characterize compound odontomas, whereas complex odontomas exhibit a disorganized mass of dental tissue without recognizable tooth-like structures [3,4]. These lesions are typically asymptomatic and are often discovered incidentally during routine radiographic examinations. However, they may be associated with disturbances in tooth eruption, such as delayed eruption or impaction of adjacent teeth [5,6].

Although the pathophysiology of odontomas is not fully understood, they are believed to arise from anomalies in the development of the dental lamina or follicle. Genetic factors may also play a role in their formation, with some studies suggesting a link between odontomas and mutations in genes involved in tooth development, such as MSX1 and PAX9. From a clinical perspective, odontomas are classified into two main types: compound and complex. Compound odontomas occur in the anterior maxilla, while complex odontomas are more commonly found in the posterior mandible [7]. Treatment generally involves surgical excision, as odontomas do not spontaneously regress and may interfere with tooth eruption. The recurrence rate after complete excision is meager. Sometimes, odontomas may be associated with missing teeth or dental anomalies, such as redundant teeth, impactions, or hypodontia. An odontoma can result in the absence of the corresponding permanent tooth, further complicating the patient's clinical management [8–10].

The present case report presents a distinct mandibular compound odontoma in a 32-year-old male. It emphasizes the clinical features, surgical intervention, and histopathological results. This osteolytic lesion is notable because the odontoma has led to the retention of element 8.3, manifesting as an anomalous 4.3. 4.3 was found to be appropriately formed and located next to the mandibular canal beneath the roots of 4.6 and 4.7. It appears that during odontogenesis, only specific fragments reached their intended destination, resulting in the odontoma's formation. Additionally, this case report discussed the current literature on diagnosing and managing similar lesions, particularly exploring alternative surgical methods and preventive measures.

2. Case report

The 32-year-old male patient presented with the absence of the mandibular right canine (tooth 4.3). Radiographic examination, including PANOREX and cone-beam computed tomography (CBCT), revealed the presence of a well-defined [11], radiopaque mixed lesion consistent with a compound odontoma in the area of the missing tooth 4.3 (Figure 1). The patient did not show symptoms of sensibility, pain, or difficulties in chewing.

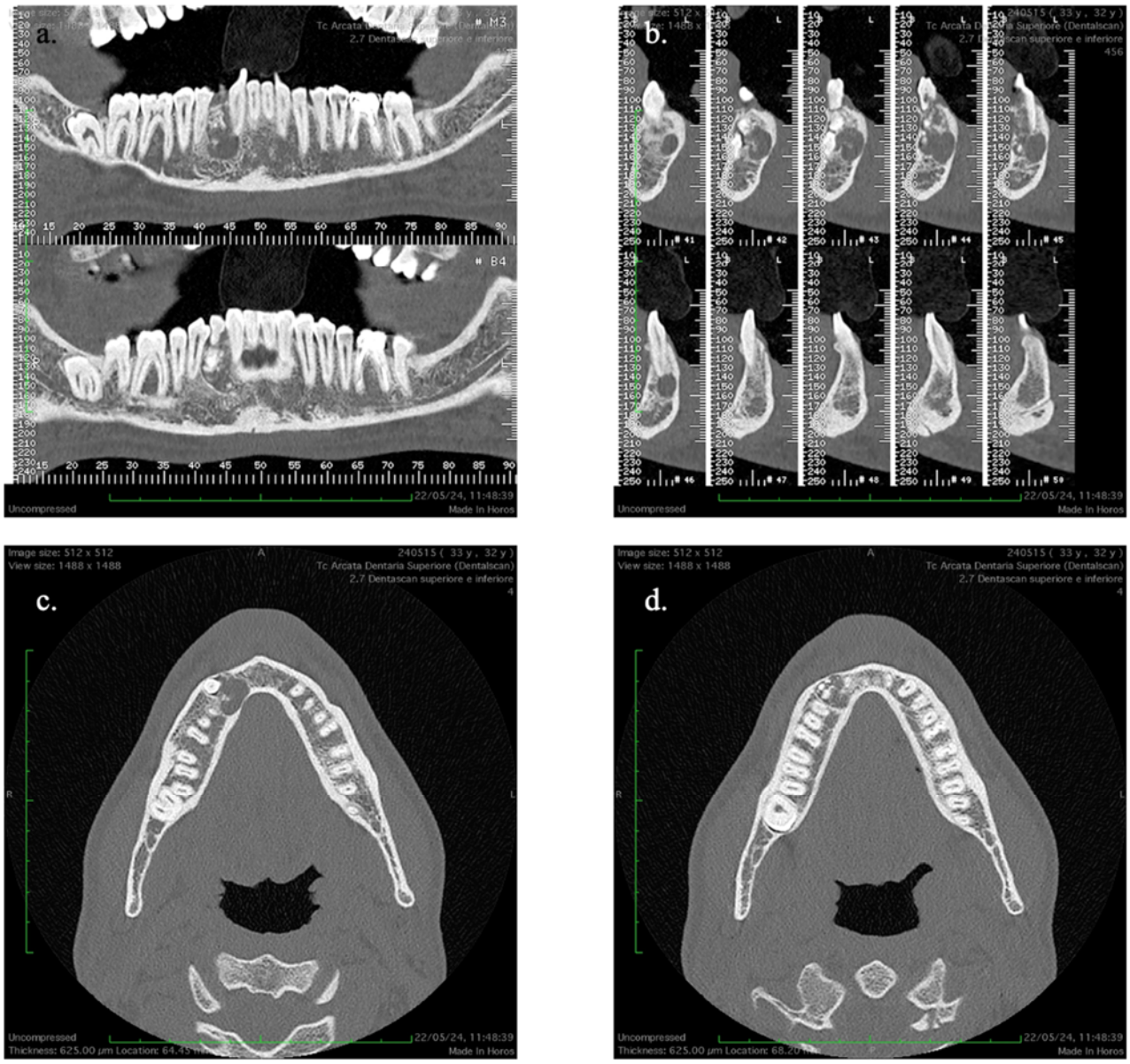

Figure 1. CBCT details of the oral lesion. In Figure 1a, is it possible to see the PANOREX cuts, here, a radiolucent lesion at the top and radiolucent with granular radio-opaque material inside, at the bottom, is highlighted. In Figure b., the lesion mentioned earlier is visible in the paraxial cuts from cut #41 through cut #46. Figure 1c,d illustrate this lesion on the axial view cuts.

The teeth 4.3 was located near the mandibular canal, near the roots of teeth 4.6 and 4.7 (Figure 2a,b). The patient also presented with a retained right deciduous canine (8.3).

A surgical intervention was planned to remove the compound odontoma and extract tooth 8.3. The approach involved using rotary instruments, including a surgical handpiece and turbine, to access and carefully excise the lesion without damaging the adjacent structures. The procedure was explained to the patient and an informed consent was taken from the patient. The procedure was in line with the institutional protocol of ethics and performed under local anesthesia. After the surgery, a histopathological examination of the excised lesion was programmed.

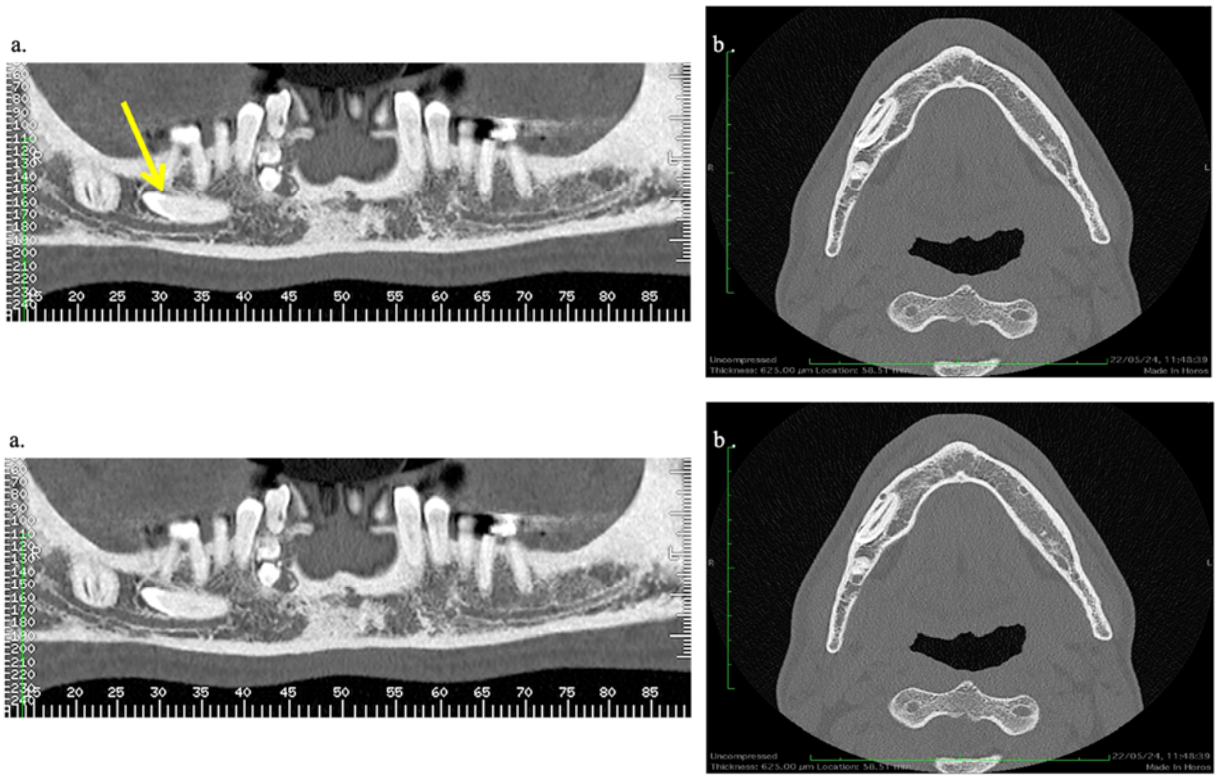

Figure 2. CBCT details of definitive canine (4.3). In Figure 2a, is it possible to highlight the presence of both the radiolucent lesion with radiopaque material inside described in Figure 1 and the presence of a mesio-verse and impacted dental element in correspondence with cuts 30-40#. The presence of the tooth (arrow) and contact with noble nervous structures such as IAN (Inferior Alveolar Nerve) is evident in Figure 2a,b.

The surgical procedure was completed successfully without complications. The compound odontoma was removed entirely using rotary and manual instruments. Tooth 8.3 was also extracted due to its position and association with odontoma.

After locoregional anesthesia, an intrasulcular flap was raised from elements 4.2 to 4.4. After mucoperiosteal detachment, attention must be paid to the noble structures underlying the canine/premolar area. At this point, the surgical dislocation and avulsion of element 8.3 were performed, resulting in the visualization of the osteolytic lesion with the presence of calcified tissue in the apical position: Osteotomy, and avulsion of the fragmentary lesion in all its parts, hemostasis, and suture [12]. Careful attention was paid to preserving the integrity of the mandibular canal, and no damage to adjacent neurovascular structures was noted (Figure 3a,b).

Postoperative healing was uneventful, with no signs of infection or nerve damage. The histopathological analysis confirmed the lesion as a compound odontoma, with no evidence of atypical cellular activity or malignant transformation (Figure 4). Radiographic follow-up three months postoperatively demonstrated complete surgical site healing, with no lesion recurrence or further displacement of the adjacent teeth. The final 4.3 was not scheduled for extraction as the patient refused the surgery.

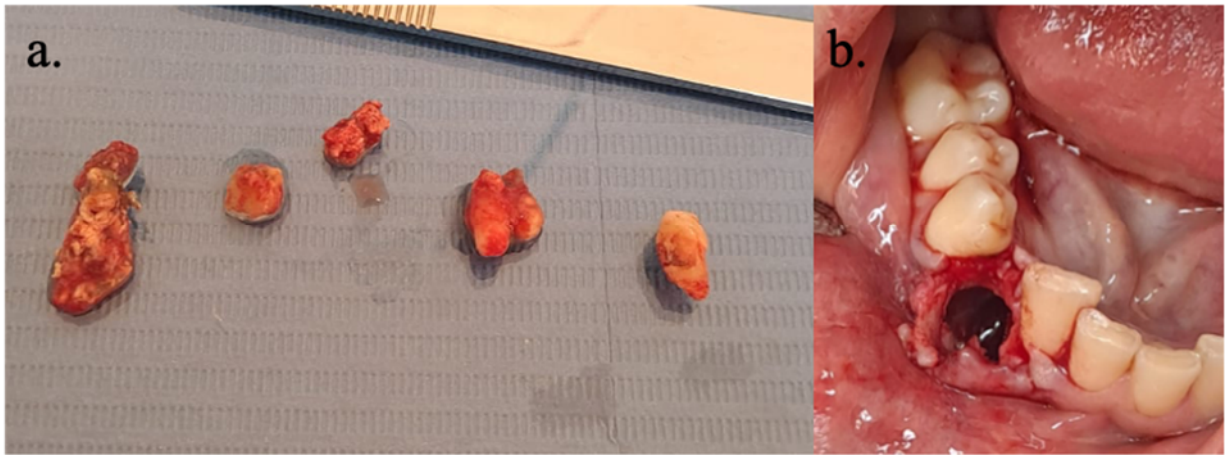

Figure 3. Samples (a) and Post-operative detail (b).

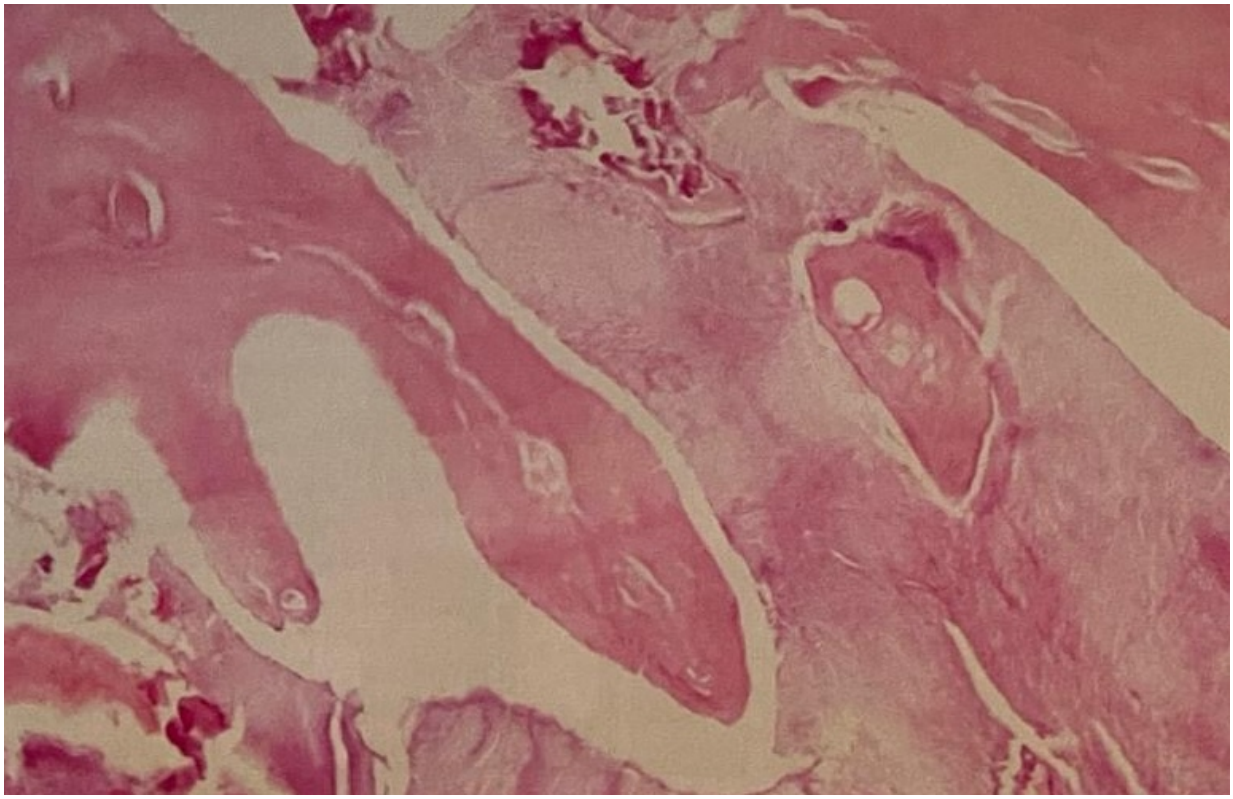

Figure 4. Histological examination detail. Histological reports stated that multiple fragments arrived, some of which are of a hard-soft consistency, the largest being 1 x 0.8 cm. Compound Odontoma free of atypia.

3. Discussion

Managing odontomas, particularly those in the mandible, requires a multidisciplinary approach involving diagnostic imaging and surgical expertise. In this case, 3D imaging modalities such as CBCT were instrumental in determining the exact location and extent of the lesion, allowing for precise surgical planning and execution [13].

The traditional surgical approach for removing odontomas involves using rotary instruments, as was employed in this case. However, alternative methods such as laser surgery or piezoelectric surgery have been proposed as less invasive options that may reduce trauma to the surrounding tissues and minimize postoperative complications. Studies comparing these techniques have shown mixed results, with some suggesting that piezoelectric surgery offers superior precision and preservation of adjacent structures. In contrast, others report no significant difference in outcomes between traditional and newer methods. Piezoelectric surgery boasts precision and minimal soft tissue trauma but often involves longer procedures and higher costs for specialized equipment and training. Laser surgery, while reducing postoperative edema and bleeding, necessitates strict protective measures to avoid thermal damage to nearby neurovascular structures and tooth roots. Moreover, the clinical effectiveness of these techniques varies across studies, emphasizing the need for standardized protocols and robust clinical trials to evaluate their actual benefits and limitations compared to conventional methods [14]. Early detection of odontomas, mainly through routine radiographic screening, may help prevent tooth eruption and displacement complications.

In cases where odontomas are associated with missing or unerupted teeth, orthodontic consultation may be necessary to address the resulting malocclusion or spacing issues [15–17]. Odontomas could present many variables, as reported by Erden Sahin et al. [18], who showed a case of a compound odontoma with 177 pieces (denticles), or Mehta et al., who showed a singular case of erupted odontoma [19]. Ribeiro et al. [6] present a case of an extensive ameloblastic fibro-odontoma in the mandible of a 12-year-old male patient characterized by painless swelling and delayed tooth eruption. Radiographic evaluation revealed a well-defined radiolucent lesion with radiopaque foci, leading to surgical excision. Histopathological analysis confirmed the diagnosis, showing both ameloblastic and odontogenic components. The authors emphasize the importance of early detection and appropriate management to prevent potential complications associated with such lesions. While generally benign and often asymptomatic, Odontomas can present radiographic and clinical features that overlap with other odontogenic lesions, necessitating a thorough differential diagnosis. The recent literature underscores the importance of distinguishing odontomas from other mixed odontogenic tumors, such as ameloblastic fibro-odontomas, odontoameloblastomas, and calcifying epithelial odontogenic tumors. These entities may exhibit similar radiopaque characteristics but differ significantly in their biological behavior and treatment approaches. For instance, ameloblastic fibro-odontomas are considered true neoplasms with potential for aggressive growth, unlike odontomas, which are hamartomatous malformations. Accurate differentiation is crucial, as misdiagnosis could lead to either overtreatment or inadequate management. Advanced imaging modalities, such as cone-beam computed tomography (CBCT) and histopathological examination, are essential in establishing a definitive diagnosis and guiding appropriate therapeutic strategies [20].

Despite the success of surgical excision in this case, further research is needed to establish standardized guidelines for the management of odontomas, particularly regarding the use of alternative surgical techniques and preventive measures [21]. Additionally, the role of genetic factors in the development of odontomas warrants further investigation, as this could lead to earlier diagnosis and targeted therapies in the future. Histologic analysis confirmed the diagnosis of a compound odontoma composed of multiple small tooth-like structures. No signs of atypia or malignancy were observed. To prevent issues with adjacent teeth caused by odontomas, dentists should be skilled in their diagnosis to ensure timely surgical removal [22].

4. Conclusions

This case report presents a rare instance of a mandibular compound odontoma associated with the absence of the corresponding canine tooth. Surgical excision was performed using rotary instruments, and the lesion was confirmed benign through histopathological analysis. The case highlights the importance of accurate imaging in diagnosing and managing odontomas and the potential benefits of exploring alternative surgical techniques. Future research should explicitly address the genetic and molecular bases underpinning odontoma development. Investigations on identifying specific genetic mutations, molecular signaling pathways, or biomarkers involved in odontogenesis could significantly advance our understanding of odontoma pathophysiology. Such insights could facilitate the development of novel diagnostic modalities or preventive strategies aimed at early identification and minimally invasive management of odontomas. Additionally, prospective clinical studies comparing the long-term outcomes of traditional surgical techniques versus alternative methods such as piezoelectric or laser surgery could substantiate evidence-based guidelines and enhance surgical decision-making.

Authors' contributions

R.M. conceptualized the study; L.F. and C.D.A. analyzed and interpreted the data; A.M. and Ai.M. wrote and reviewed the manuscript; L.F. supervised the project and contributed to the manuscript preparation. All authors agreed on the final version of the manuscript.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Conflict of interest

Cesare D'Amico, Aida Meto, and Ankita Mathur are editorial board members for *Journal of Dentistry and Multidisciplinary Sciences*, Luca Fiorillo is the editor-in-chief for *Journal of Dentistry and Multidisciplinary Sciences*, and they are not involved in the editorial review or the decision to publish this article. The authors declare no conflict of interest.

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