



Comprehensive Management of Odontoma Cases: Retrospective Analysis

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Abstract _ This article offers a retrospective analysis of odontoma cases treated at Cyprus Health and Social Sciences University Polyclinics, specifically in collaboration between the Oral and Maxillofacial, and Orthodontic Departments. The study aims to evaluate the prevalence, clinical characteristics, and various treatment modalities utilized for odontomas within the university setting to mitigate post-operative complications. Patient demographics, radiographic findings, surgical interventions, and postoperative outcomes will be thoroughly examined. Notably, the research will provide additional insights into the multidisciplinary approach adopted by university polyclinics, shedding light on effective treatment strategies and patient outcomes in managing odontogenic tumors. It is worth mentioning that the study will also explore cases where odontomas were found in proximity to the mental foramen, contributing a nuanced understanding of these incidents within the university's clinical context.

Keywords: Odontomas, Retrospective Analysis, Cyprus Health and Social Sciences University Polyclinics, Oral and Maxillofacial, prevalence, treatment modalities, surgical interventions, complications, demographics, radiographic findings, postoperative outcomes, treatment strategies, mental foramen, incidence.

Introduction

According to the World Health Organization (WHO) classification, odontomas are categorized under odontogenic tumors (OT), distinguished by the concurrent presence of epithelial and odontogenic ectomesenchymal components, with the potential for mineralized dental tissue formation or absence thereof [15].

Early records on odontoma underscore the pivotal roles played by surgeons and pathologists such as Wedl, Salter, Broca, and Bland Sutton in molding the comprehension and categorization of odontomas. This historical exploration, delving into original illustrations from European and American reports dating back to the 19th century, traces the developmental journey of knowledge about odontomas. In contrast to the widely accepted belief attributing the first description of odontoma to Oudet of Paris in 1809 and the subsequent introduction of the term "odontome" by Broca in 1867, recent challenges have emerged. These challenges aim to stress the odontogenic origin of odontomas, with Broca allocating a significant portion of his 1869 work, "Traité des tumeurs" (Treatise on tumors), to the study of odontomas [15,17]. Prior to

Broca's groundbreaking suggestion, phrases such as "exostosedentaire" and "tumeur dentaire" were popular in France, while in Britain, descriptors like "wart tooth" and "supernumerary teeth" were coined to characterize these intriguing dental tumors.

Despite the 19th century witnessed a range of synonyms for odontomas, by 1895, the 9th international meeting of the Anatomical Society officially accepted "odontoma" as a standardized medical term, recognizing its convenience and legitimacy [17].

Odontomas generally appear as small, solitary, or multiple radio-opaque lesions found on routine radiographic examinations as its generally asymptomatic. odontomas have been classified as benign odontogenic tumor (hamartomatous malformation) and are divided into complex and compound odontomas morphologically, as compound odontoma has a tooth-like structure and is arranged in a uniform manner, similar to a normal tooth while complex odontoma has a mixed structure of disorganized tissue mass [10,15,18].



Fig. 1 Panoramic radiograph shows a small tooth-like structure at the lower right middle zone between the mandibular first and second premolars' roots. A radiopaque mass was most commonly surrounded by radiolucent areas.



Fig. 2 Periapical radiography revealed small tooth-like structures between the first and second premolars.

The etiology of odontogenic odontomas, remains uncertain. While the precise cause is unknown, various factors have been proposed by researchers. Some suggest a potential link to trauma during primary dentition, the persistence of Malassez paradental remnants, inflammatory processes, increased odontoblastic activity, and certain hereditary anomalies, including associations with Gardner and Hermann syndromes [20. 21].

Odontomas are detectable at various ages and sites within the oral cavity, yet they are most commonly identified during the second decade of life, with an average age of 14.8 years. This prevalence often correlates with the hindrance of permanent tooth eruption and the persistence of deciduous teeth. With an incidence ranging from 22% to 67% [22], odontomas stand out as the most prevalent among odontogenic tumors. Specifically, compound odontomas exhibit a higher prevalence in the anterior maxilla, whereas complex odontomas tend to be more frequent in the posterior mandible [23].

I. Case Report

A case involving a compound odontoma located in proximity to the mental foramen is reported. An 18-year-old male of Russian descent was referred to the Department of Oral and Maxillofacial Surgery at Cyprus Health and Social Sciences University and Polyclinics for assessment of a radiopaque area detected on the right side of the mandible. The patient exhibited no systemic issues, and no symptoms were reported in the affected area. Intraoral examination

did not reveal noticeable gingival swelling around the right mandibular region, although the mandibular right second premolar was inclined mesially. Panoramic radiography displayed a radiopaque lesion positioned between the root apices of the right mandibular first premolar and right mandibular second premolar. Further assessment through periapical radiography revealed the presence of small tooth-like structures within the lesion. Based on the radiographic findings, the lesion was located in close proximity to the mental foramen.

Considering the clinical and radiographic findings, a provisional diagnosis of compound odontoma was made. A treatment plan involving surgical removal through enucleation from the buccal side under local anesthesia was initiated to ensure complete excision of the lesion. The surgical removal of the odontoma, positioned in proximity to the mental foramen, was meticulously performed to prevent any potential injury to the nerve.

The resected tumor was found to consist of single small tooth-like structure. Histopathological examination confirmed the diagnosis of a compound odontoma. No complications were observed in the adjacent tooth roots.



Fig. 3 (a) Surgical exposure of odontoma. Intraoral image shows retracted flap and the osteotomy have been done to access the lesion. 4 (b) Enucleated site was thoroughly irrigated, the flap was repositioned and sutured with 3-0 Vicryl.

One-year post-removal, there was no recurrence, and improvements in dentition were anticipated with orthodontic treatment. Notably, no devitalization issues, such as root resorption, tooth discoloration, or mobility related to the mental foramen were observed. The location of the odontoma close to the mental foramen underscores the importance of precise diagnosis and careful treatment planning in such cases.

II. Case Report

I. A 15 year old male student patient, referred to the Department of Oral and Maxillofacial Surgery, Cyprus Health and Social Sciences University, with the chief complaint of presenting radiopaque mass in the left side of mandible during radiographic evaluation in Orthodontic Department. Intraoral examination revealed slight alveolar expansion swelling from lingual side of the alveolar ridge in the region of 34 and 35. The mass was non-tender and hard in consistency on palpation with lingual cortical bone expansion.

Radiographic examination using orthopantomogram revealed a well-demarcated tooth-like radiopaque lesion, with radiodensity as that of a tooth circumscribed by a thin regular radiolucent

halo measuring approximately 2 centimeters distal to the left mandibular first premolar root and mesial to mandibular second premolar root resulting in slight displacement of the left mandibular first premolar root.

In anticipation of surgical excision of the lesion, CBCT images were obtained. The CBCT images revealed hyperdense tooth-like mass in the lingual region of the left mandibular premolars circumscribed by a thin regular radiolucent border. Based on the above finding, an initial diagnosis of compound odontoma was made.



Fig. 4 Extracted odontoma. Denticle was exposed and removed along with the follicle.

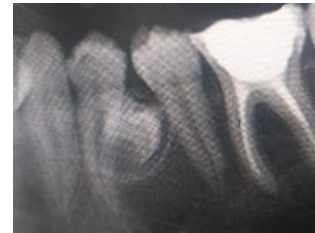


Fig. 5 Intraoral photographs taken at the initial visit. An intraoral examination revealed no obvious gingival swelling around the left mandibular region, though the mandibular left second premolar was inclined in a mesial direction.



Fig.6 A) Periapical projection of compoundodontoma. **B)** compound odontoma in the area of lower premolars (orthopantomography). Note the malpositioned first premolar involved in the tumor. Compound odontoma can be observed as radio-opaque mass with regular margin adopting a tooth-like configuration; it presents radiolucent peripheral border. Based on the level of calcification in odontomas, their developmental process can be categorized into three stages: initially, the lesion displays radiolucency due to the absence of dental tissue calcification; in the intermediate stage, partial calcification is evident; and during the last stage, the odontoma becomes radiopaque and is encircled by a radiolucent halo (15).



Fig.7 Computed tomography images showed small tooth-like structure within the lesion located on the lingual side.

Intraoperative appearance after removal of tumor. Under general anesthesia, minimally invasive surgical removal with intraoral approach from the lingual side was performed

Excised surgical specimen showing tumor mass.

A treatment plan was set as the surgical intervention; The lesion was surgically exposed and completely excised under Local anesthesia and a minimally invasive intraoral approach involving the use of an intraoral endoscopy from the lingual aspect without premedication. A Cravicular incision was given extending from the midlingual aspect of 36 to the midlingual aspect of 33 with No.11 scalpel. Once full-thickness mucoperiosteal flap was raised having a benefit of second vertical releasing incision, bony protuberance was observed. The lingual bone plate was thin enough to be penetrated with an electrical motor using a straight surgical handpiece set on 800-1200 rpm. The exposed mass was encapsulated, lobulated and had rough surface with shiny enamel pearls. The whole lesion was excised following completely removal of all the overlying bone and getting an acceptable access to the mass, with a straight elevator without damage to adjacent teeth. The cavity was cleaned using bone file and heavily irrigated with 20 ml of saline.

PRF membrane was applied to enhance bone healing based on the promising statistics revealed improved bone healing and protecting the surgical wound. The flap was approximated and sutured with non-resorbable sutures. Postoperative management included antibiotic, non-steroidal anti-inflammatory drug and mouth rinse to keep good oral hygiene.

Discussion

Odontogenic tumors in the 5th edition of The World Health Organization Classification of Odontogenic lesions are still classified based on the biologic behaviour of the lesion into two categories, malignant and benign. Despite the malignant lesions' classification, benign tumors are classified according to their histogenetic origin into three categories; epithelial, mesenchymal and mixed (1). Odontomas are benign mixed epithelial and mesenchymal tumors that develop in the jaw and consist of dental tissues. Odontogenic Odontomas are often considered developmental anomalies rather than true neoplasms. There are two main types: compound odontomas, which resemble normal teeth, and complex odontomas, which have a disorganized mass of dental tissues (2).

Odontomas vary in gender and location preferences, and number of denticles removed. Although several studies stated a slight gender predilection; Complex odontoma shows a modest

preference for females, but compound odontoma is more prevalent in males (3, 4, 8), the modified 2022 WHO classification of Odontogenic lesions reported no gender predilection (1). Although Odontomas can be diagnosed at any age with high incidence to be discovered before the age of 20 (5,6), the modified classification of WHO of Odontogenic tumors in 2022 stated age predilection in the 2nd and 3rd decades (1). Despite the number of denticles in a single odontoma case is unusual and may indicate a more complex or extensive growth pattern and may be associated with some medical disorders such as Gardner's syndrome of intestinal polyposis and the rare odontoma-dysphagia syndrome (7), the number of denticles removed after enucleation of odontomas ranged from 4 to 37. Equally important, a study revealed that a patient's 232 denticles were removed (4).

Studies claimed racial predilection with the highest incidence of Odontogenic Odontomas in Caucasians 65% of all odontogenic tumors (8) whereas Africans records show the lowest incidence (9). This might be indicative of the tumor's genetic or environmental predisposition, or it could be attributable to inadequate resources to discover asymptomatic instances (11).

Radiographically, odontomas typically present distinct features that aid in their identification. These features may vary depending on the type of odontoma (compound or complex) and the stage of development. Odontoma demonstrates as a disorganized radio-opacity or denticles surrounded by a radiolucency with or without a bony extension (10, 7). Compound odontomas radiographically often leave few entities in the differential diagnosis, with a possible consideration being a supernumerary tooth. On the contrary, complex odontomas may be more extensive in the differential diagnosis due to the varied appearance of the radiodense mass in turn other entities, such as benign tumors or calcified structures, might be considered (13,14). Accurate diagnosis necessitates distinguishing the condition from ameloblastic fibroma, ameloblastic fibroodontoma, and odontoameloblastoma (4,9,10). Additionally, odontomas may present as components of syndromes, including basal cell nevus syndrome, Gardner syndrome, familial colonic adenomatosis, Tangier disease, or Hermann syndrome [18].

Odontogenic Odontomas commonly exhibit a predilection for the anterior maxilla for Compound Odontomas and posterior body of mandible for Complex Odontomas, frequently involving the regions around the canine and third molar. Compound odontomas tend to occur between teeth and tend to be composed of multiple small tooth-like structures, while complex odontomas tend to occur in the posterior jaws and present as a conglomerate mass (12). On the other hand, studies reported manifestation of Odontomas in other locations within the jaws

Odontomas are typically detected through routine dental X-rays or may become evident due to factors such as delayed tooth eruption. They generally exhibit a slow growth pattern and a non-aggressive nature, typically causing no root resorption unless they erupt and develop cavities, potentially leading to the formation of abscesses (7).

Histologically, identifying odontogenic odontomas, whether compound or complex, does not pose a diagnostic challenge. The distinct characteristics indicative of their benign and odontogenic origin; composed of dentin, cementum, pulpal tissue and enamel, contribute to the accurate identification of odontomas during diagnostic assessments. Compound odontomas are defined by morphological and histological differentiation, characterized by the presence of solitary or multiple small tooth-like structures known as denticles, situated within fibrous connective tissue and enclosed by a fibrous capsule. In contrast, complex odontomas manifest only presents histological differentiation as disordered masses comprising all dental tissues, often with a radial pattern and do not resemble the morphology of a tooth. The pulp is intricately branched, creating a sponge-like perforation throughout the mass (10,15,18). Both types

typically contain Loose, myxoid connective tissue with odontogenic epithelial rests may be seen in close association with the lesion, and most often represents normal dental follicular tissue, incorporating dental follicular structures or, less frequently, a dentigerous cyst (12). Odontomas consistently exhibit low cellular atypia and mitotic activity, underscoring their benign nature. Biopsy, a standard histological examination method, plays a crucial role in confirming the diagnosis by unveiling these distinct features, facilitating the differentiation of odontomas from other oral lesions. Treatment involves surgical removal, and the prognosis is usually excellent.

Conclusion

This retrospective analysis conducted at Cyprus Health and Social Sciences University Polyclinics provides a comprehensive understanding of odontoma management within a university setting. The collaborative approach between the Oral and Maxillofacial, and Orthodontic Departments is emphasized, underlining its significance in achieving successful surgical outcomes. The examination of patient demographics, radiographic findings, and postoperative results offers valuable insights into the intricacies of odontogenic tumor management. The discussion delves into odontoma classification, emphasizing their benign nature, and sheds light on gender, age, and racial considerations. The detailed case reports underscore the importance of accurate diagnosis and meticulous treatment planning, showcasing positive outcomes with no complications in adjacent tooth roots. Histologically, odontogenic odontomas exhibit distinctive features facilitating precise identification, with biopsy playing a crucial diagnostic role. The article emphasizes the slow growth and non-aggressive nature of odontomas, contributing to favorable post-surgical prognosis.

In conclusion, this article adds valuable knowledge to the field of odontogenic tumor management within a university setting. The multidisciplinary approach, coupled with detailed case analyses, contributes to the ongoing efforts to refine treatment strategies and enhance patient outcomes in the context of odontomas. The findings presented here will likely inform future research and clinical practices in the field of oral and maxillofacial surgery.

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