Journal of International Dental Sciences
Uluslararası Diş Hekimliği Bilimleri Dergisi

Research Araştırma

# Evaluation of Unerupted Odontomas With Cone Beam Computed Tomography (CBCT)

## Sürmemiş Odontomaların Konik Işınlı Bilgisayarlı Tomografi (CBCT) İle İncelenmesi

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**ABSTRACT**

**Aim:** The objective of this study was to evaluate the clinical and radiographic features of unerupted odontomas of the jaws.

**Material and Method:** A total of 23 odontomas detected in 21 patients were included in our study. The lesions diagnosed on panoramic radiographs were further evaluated with cone beam computed tomography (CBCT). Patients' age, gender, clinical symptoms, localization, type, presence of supernumerary tooth with odontoma, position (buccal, palatinal, between teeth), distance to crown/root, distance to cortical plate, any complications due to odotoma or treatment method were evaluated.

**Results:** Twenty-three odontomas were evaluated using CBCT. Fifteen lesions located in the maxilla whereas 8 lesions located in the mandible. The closest distance of the odontoma to the neighbouring crown/root varied between 0 to 4.5 mm with a mean of 1.3 mm. The closest distance of the odontoma to the buccal/palatal/lingual cortical layer varied between 0 to 4.6 mm with a mean of 1.8 mm. Associated impacted permanent teeth were left to erupt spontaneously or orthodontic traction was started at the same time or at a later stage. Seven of the impacted teeth were orthodontically tracked during surgery and 1 tooth was orthodontically tracked at a later stage. 2 teeth were extracted during surgery and 2 teeth were left to erupt spontaneously.

**Conclusion:** Odontomas mostly located close to adjacent cortex; therefore, practitioners will not have difficulty in exploring the lesion. However; close proximity to associated tooth may result in tooth or root damage during surgical removal. We recommend CBCT evaluation for accurate surgical planning before removal of odontomas.

**Key words:** Odontoma, CBCT, Odontogenic tumor.

**ÖZ**

**Amaç:** Bu çalışmanın amacı çenelerde lokalize sürmemiş odontomaların klinik ve radyolojik özelliklerini değerlendirmektir.

**Gereç ve Yöntem:** Çalışmamıza 21 hastada görülen toplam 23 odontoma dahil edildi. Panoramik radyografilerde teşhis edilen lezyonlar, daha sonra konik ışınlı bilgisayarlı tomografi (CBCT) ile detaylı olarak değerlendirildi. Hastanın yaşı, cinsiyeti, klinik belirtileri, lokalizasyon, lezyonun tipi, süpernümere diş bulunması, pozisyonu (bukkal, palatinal, dişlerin arasında), kron/köke olan uzaklığı, kortikal kemiğe olan uzaklığı, odontoma varlığına veya tedavi metoduna bağlı gelişen komplikasyonlar değerlendirildi.

Received / *Geliş tarihi*: 29.06.2016
Accepted / *Kabul tarihi*: 30.11.2016
DOI: 10.21306/jids.2016.1.20

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**Bulgular:** CBCT ile 23 odontoma değerlendirildi. On beş lezyonun maksillada, 8 lezyonun mandibulada lokalize olduğu tespit edildi. Odontomanın en yakın komşu kron/ köke olan uzaklığı 0-4.5mm arası ve ortalama 1.3mm olarak ölçüldü. Odontomanın en yakın bukkal/palatinal/lingual kortikal tabakaya uzaklığı 0-4.6mm ve ortalama 1.8mm olarak ölçüldü. İlişkili gömülü daimi diş spontan sürmeye bırakıldı veya operasyon sırasında ya da daha sonra ortodontik olarak sürdürüldü. Yedi gömülü diş cerrahi sırasında ve 1 diş daha sonra ortodontik olarak sürdürüldü. İki gömülü diş cerrahi sırasında çekildi ve 2 gömülü diş spontan olarak sürmeye bırakıldı.

**Sonuç:** Odontomalar çoğunlukla kemiğin korteksine yakın yer alırlar ve böylece hekimler lezyona ulaşmada zorluk yaşamazlar. Ancak komşu dişe yakın olmaları cerrahi olarak çıkartılmaları sırasında diş veya kök hasarına yol açabilir. Doğru cerrahi planlama için odontomalar çıkarılmadan CBCT ile değerlendirme yapılmasını tavsiye ederiz.

**Anahtar sözcükler:** Odontoma, CBCT, Odontojenik tümör.

## INTRODUCTION

Odontomas are the most common odontogenic tumours of the jaws. These tumours are generally considered as hamartomas of dental tissues. They represent 22% of all odontogenic tumours. Although their aetiology is unclear, trauma and infection are suggested being causative factors (1,2,3). There are two types of odontomas: complex and compound odontoma. Compound odontomas involve all dental structures and have numerous tooth-like structures. Complex odontomas are malformations in which all dental tissues are present in a disorder pattern (2,4,5). They are usually asymptomatic and usually diagnosed in routine radiographs. Radiographically odontomas present well-defined borders with radiopaque and radiolucent areas those resemble a tooth depending on the type and degree of calcification. They are usually associated with unerupted permanent tooth. Rarely do odontomas erupt (6-10). Related to the size and location, symptomless swelling may be present. Treatment of an odontoma is surgically excision. Odontomas are usually removed without any complications but care should be attended not to damage adjacent tooth and germ (2,11,12).

Panoramic, periapical and occlusal radiographs are traditional dental radiography techniques which are commonly used for diagnostic purpose. Cone beam computed tomography (CBCT) provides several advantages regarding diagnostic and treatment planning. It provides a three dimensional image of the structural relationships. Images in three planes of sections (axial, sagittal, coronal) make evaluation of anatomical structures possible and accurate (13,14).

The aim of this retrospective study was to present the radiographic and clinical features of odontomas diagnosed and treated at Istanbul Medipol University School of Dentistry.

## MATERIAL and METHODS

This study was approved by the local ethical committee of Istanbul Medipol University. Twenty-three odontomas diagnosed in 21 patients were included in the study. Odontomas were detected on panoramic radiographs. Demographic data of the patients (age and gender), clinical symptoms and treatment methods were recorded.

Following parameters were assessed;

Location (maxilla, mandible), type (compound, complex), position (vestibule/buccal, lingual/palatinal, between the teeth), presence of supernumerary tooth with odontoma, complications related to odontoma (root resorption, hindering eruption, directional change of the tooth), closest distance to the cortical bone and to the associated tooth were assessed. Cone Beam Computed Tomography (CBCT) was taken to assess the presence of supernumerary tooth with the odontoma, position of the lesion and to measure the distances. CBCT scannings were performed by using an I-CAT Next Generation (Imaging Sciences International, Hatfield, USA) 3D volume scanner with 6 x 16 cm FOV, 120 kV and 20,27 mAs energy, 14.7 seconds exposure and 0.25 mm slice thickness. Distances and presence of supernumerary teeth were evaluated on both saggital and coronal planes using Vision software. 1920 x 1020 pixel resolution was selected for evaluation on 24 inch Dell displaying screen.

## RESULTS

A total of 21 patients (12 male, 9 female) were included in the study. Age ranged 12 to 34 years with a mean of 18 years. None of the patients had genetic disease or

syndrome. Three patients had intraoral buccal swelling but the other patients did not have any clinical symptom or complaint.

Twenty-three odontomas were diagnosed on panoramic radiographs and further detailed evaluated using CBCT. Radiographically, odontomas presented well-defined borders with radiopaque and radiolucent areas resembling a tooth. Fifteen lesions (65.2%) located in the maxilla and 8 lesions (34.8%) located in the mandible. Fourteen odontomas (60.8%) located in the anterior maxilla, 2 (8.6%) in the posterior maxilla, 5 (22%) in the anterior mandible, whereas 2 (8.6%) located in the posterior mandible. Eight lesions (34.7%) were compound type, whereas 15 lesions (65.3%) were complex type odontoma. All the compound odontomas (100%) located in the maxilla, 8 of the complex odontomas (53.3%) located in the mandible and the others (46.7%) located in the maxilla. Seven of the lesions (30.4%) were in buccal/vestibule position, 6 (39.2%) were in lingual/palatal position, 7 (30.4%) were between the roots or center of the bone. Only 2 supernumerary teeth were observed with odontomas. The closest distance of the odontoma to the associated crown/root varied between 0 to 4.5 mm with a mean of 1.3 mm. The closest distance of the odontoma to the buccal/palatal/lingual cortical layer varied between 0 to 4.6 mm with a mean of 1.8 mm. No root resorption of the associated teeth was noticed due to presence of odotoma. Twelve odontomas (52.1%) caused impaction of the associated permanent teeth, and 4 odontomas (17.3%) resulted in positional change of the associated permanent tooth. Other odontomas did not cause any complications (30.6%). Associated impacted permanent teeth were left to erupt spontaneously or orthodontic traction was initiated at the same time or at a later stage. Seven of the impacted teeth were orthodontically tracked during surgery and 1 tooth was orthodontically tracked at a later stage. 2 teeth were extracted during surgery and 2 teeth were left to erupt spontaneously.

All the lesions were removed under either local or general anaesthesia through an intraoral approach. Postoperative healing was uneventful in all cases. Neighbouring primary teeth and if present, supernumerary teeth were extracted. Patients were recalled for clinical and radiological controls. Final diagnosis of the odontomas was confirmed after histopathological examination. Samples of cases were given in figures 1, 2, 3 and 4.

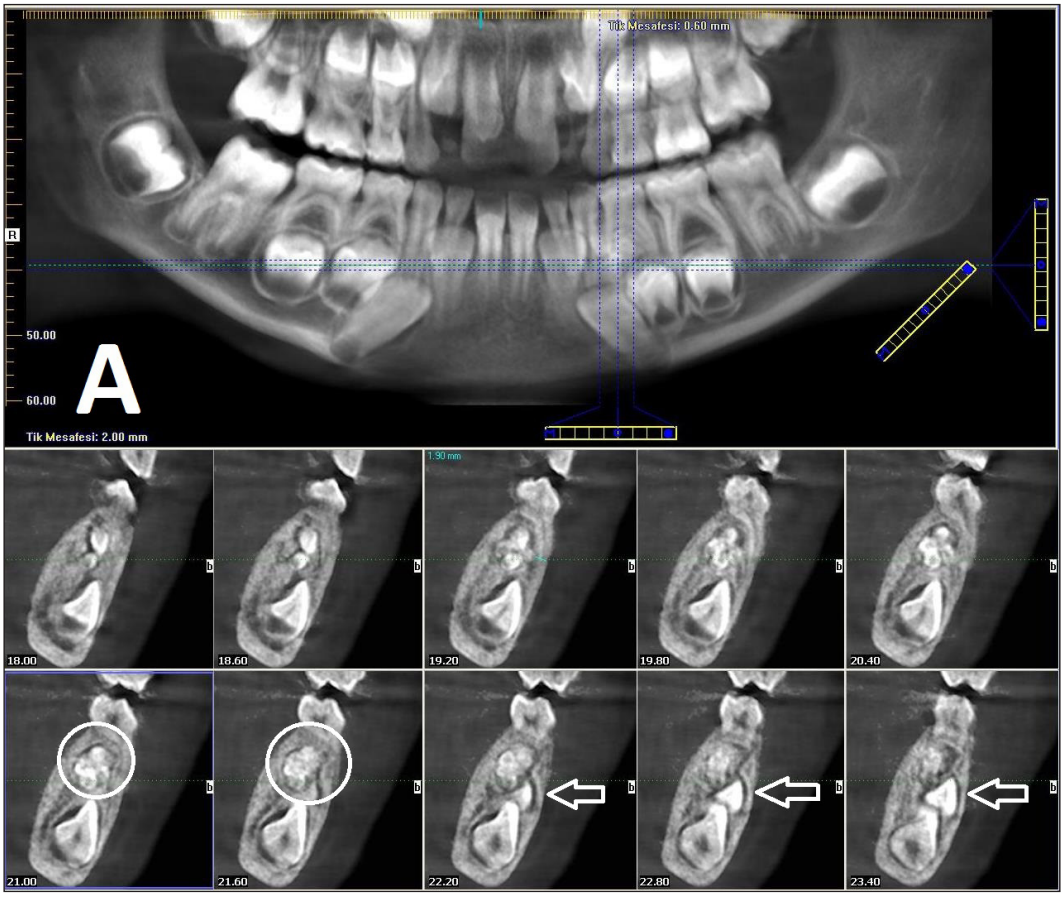


**Figure 1:** Association of a complex type odontoma (circle) with an supernumerary tooth (arrow).

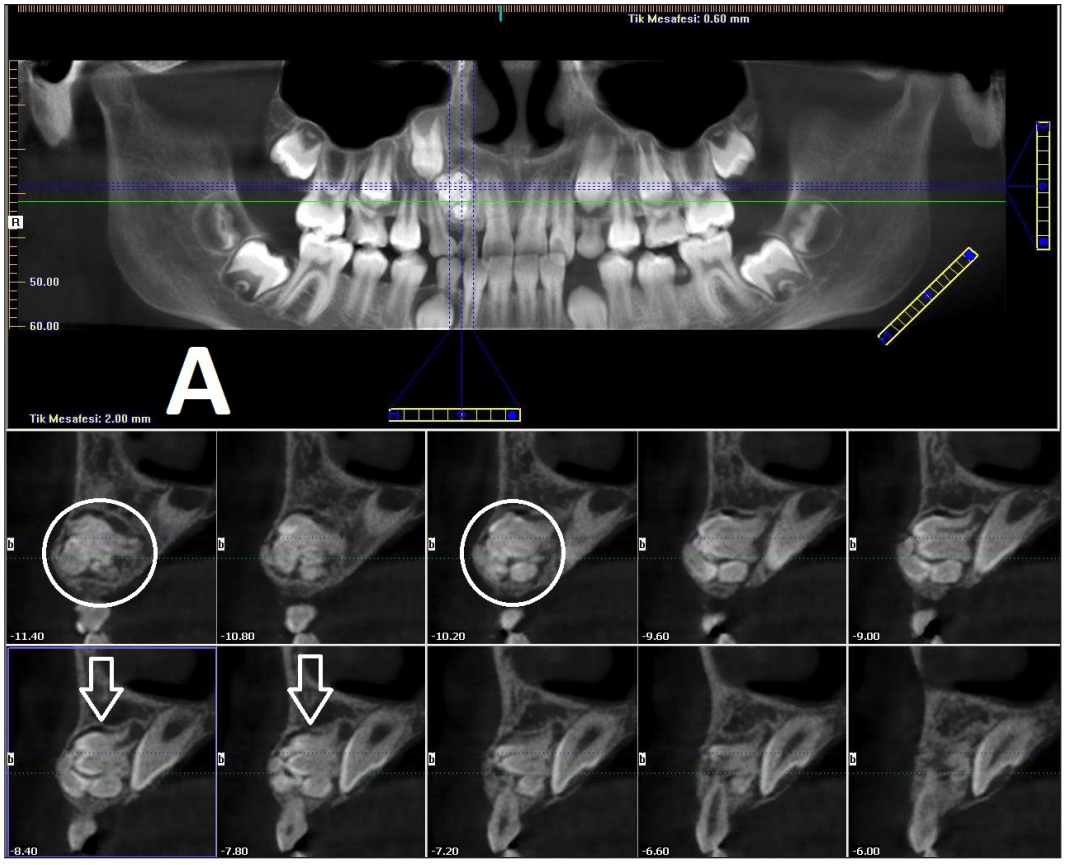


**Figure 2:** Appearance of compound odontoma (circle).

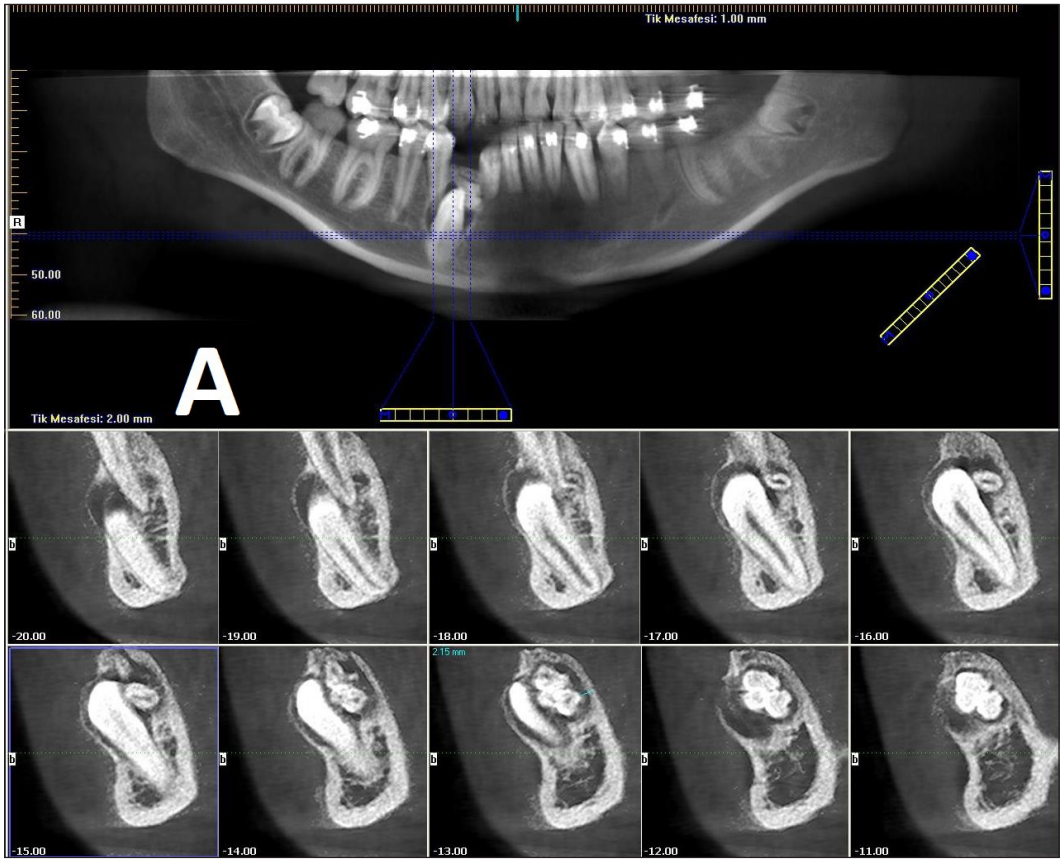


**Figure 3:** Impaction mandibular canine due to presence of odontoma.

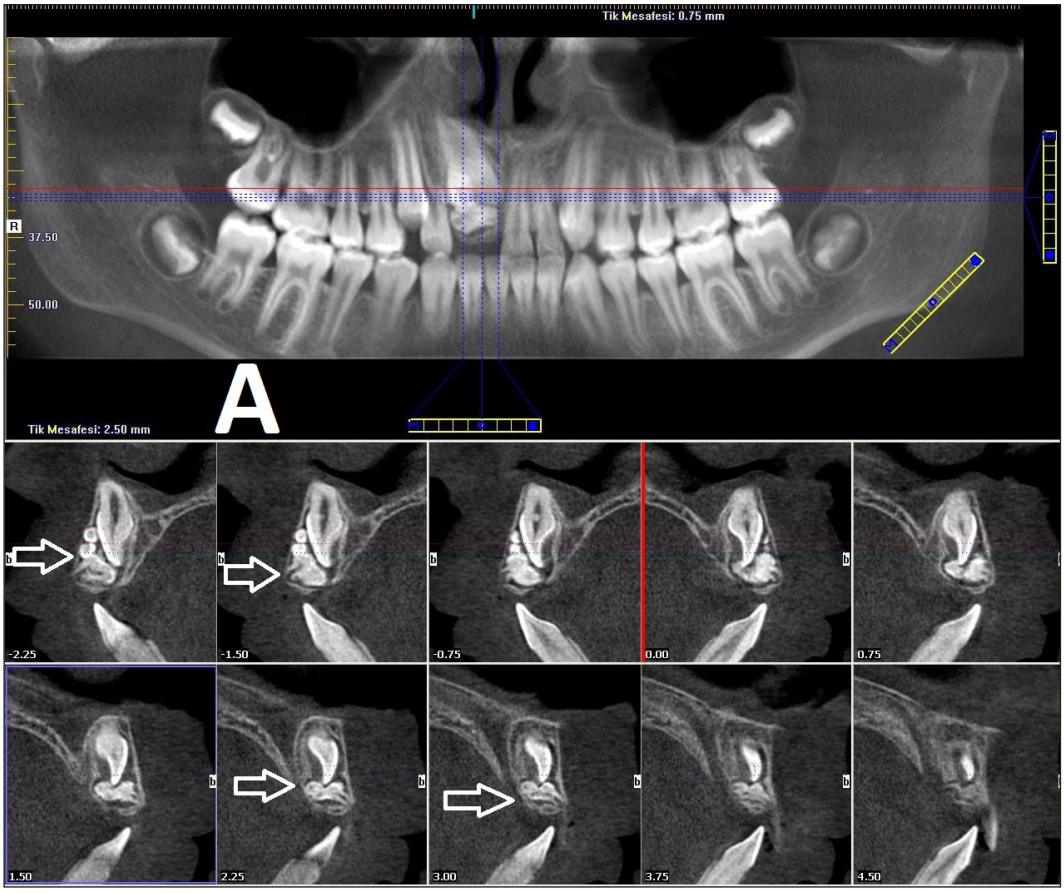


**Figure 4:** Impaction of a maxillary central tooth due to odontoma (arrow).

## DISCUSSION

Odontomas are classified as mixed odontogenic tumours histologically consisted of enamel, dentin, cement and pulp. Odontomas are commonly seen odontogenic lesions of the jaws (1,2). They are rarely diagnosed before the second decade of life without gender predilection. The mean age (18 yrs) and gender distribution of odontoma patients (12:9) in this study are consistent with the literature (1-3). Trauma and local infection are considered as the main causative factors whereas hereditary abnormalities (Gardner and Hermann's syndrome) may be involved. Although they are asymptomatic, impaction or delayed tooth eruption, persistence of primary teeth or eruption of odontoma are the most frequent clinical signs. In severe cases pain and infection may be observed (2,10,15). In our cases, nearly half of the odontomas detected caused impaction or delayed eruption of the associated teeth. Odontomas mostly occur in the maxillary anterior region. Complex type odontomas have predilection to mandibular molar region (2,4,7). In our study the anterior region of the jaws were the primary sites for location.

Detection of the odontomas is achieved by clinical and radiological examination. It appears as a mixed radiolucent-radiopaque mixed tooth-like structure surrounded by a dense cortical border. Differential diagnosis include; cementofying or ossifying fibroma, adenomatoid odontogenic tumour and periapical cemental dysplasia (1,2,13,14). Panoramic radiographs help to evaluate the vertical position of the odontomas and occlusal radiographs are used to evaluate the proximity to adjacent teeth; however, CBCT scan offers volumetric images (2,13,14,16). In our cases diagnosis of the odontomas was made on panoramic radiographies; however, it is not always possible to determine the presence of any supernumerary teeth or impacted permanent teeth because of the superimposition of the odontoma. We required CBCT scan to achieve detailed assessment of odontoma and impacted teeth regarding position, measuring distance to associated tooth and to adjacent cortex as well as occurrence of root resorption.

In the maxillofacial region, there are some situations that cannot be interpreted from 2D images and will benefit from multiplanar viewing. CBCT uses a cone shaped X-ray beam by flat panel detectors with high spatial

resolution (17). Furthermore, CBCT presents relatively high level of radiation dose. However, the dose received by the patient in CBCT scan is equivalent to a full-mouth intraoral radiographic examination. It is lower than that of multi-slice CT, 3-7 times more than panoramic radiography and 40% less than conventional CT. The use of CBCT is a helpful technique for detecting the position of odontomas and impacted teeth, presence of any supernumerary teeth and root resorption associated with odontoma. Also it is a very useful technique in orthodontic treatment planning of the odontoma patients with impacted permanent teeth (13,14,16).

Recently, CBCT evaluation of odontomas has gained interest with several diagnostic benefits and surgical planning. Kobayashi et al. (14) reported evaluation of an unerupted tooth using CBCT. They noticed presence of an impacted supernumerary tooth and odontoma in association with the unerupted tooth which were not diagnosed on panoramic radiograph. Nematolahi et al. (13) reported a similar case report describing presence of an odontoma and an impacted permanent tooth diagnosed on CBCT.

Thanks to CBCT, one can identify the accurate localisation, cortical thickness, and those structures not visible on planes radiographs. Measuring the cortical thickness may help the surgeon to plan surgical access particularly if the odontoma is localised between the roots or on the crown. As noticed in our study, close relation between the odontoma and crown/root may necessitate precise surgery in order not to damage the tooth and surrounding vital structures.

Eruption of odontomas is rare and often encountered in adult patients. Resorption of alveolar bone or growth of the capsule around odontoma may play role in the eruption (6,8,9,10). In this study we only evaluated unerupted odontomas. The treatment of odontomas comprises surgical excision of the lesion (2,9,11). In our patients all the lesions were surgically removed. Neighbouring persistent primary teeth and if present, supernumerary teeth were extracted. Associated impacted permanent teeth were left to erupt spontaneously or orthodontic traction was performed at the same time or at a later stage.

## CONCLUSION

As a conclusion;

- Impaction of teeth may be a result of presence of odontoma
- Close proximity of odontoma to cortical plate and to associated tooth should be taken into consideration.
- CBCT evaluation will be helpful for presurgical planning for odontoma removal in order to protect the teeth and surrounding structures.

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