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RESEARCH ARTICLE

INCIDENTAL DETECTION OF A RETROMOLAR CANAL ON CONE-BEAM COMPUTED TOMOGRAPHY: A CASE REPORT

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Abstract

In this case report, a retromolar canal was incidentally detected during a cone beam computed tomography examination of a 36-year-old male patient who was evaluated before orthognathic surgery. Panoramic radiography allowed the assessment of the dental findings, whereas the retromolar canal could only be visualized in detail using cone beam computed tomography. The retromolar canal is one of the most common anatomical variations of the mandibular canal and may increase the risk of complications, including neurovascular injury, bleeding, and paresthesia, during surgical procedures. This case highlights the importance of carefully evaluating mandibular canal variations before surgical treatment planning.

Introduction:-

The mandibular canal is an intraosseous canal that extends bilaterally from the mandibular foramen to the mental foramen. It contains the inferior alveolar nerve, artery, and vein. On radiographic examinations, the canal appears as a radiolucent structure surrounded by radiopaque cortical borders and provides the neurovascular supply to the mandible. Morphologically, the mandibular canal is typically observed as a single canal; however, it has been reported that it may occasionally divide into two or three branches. This variation is thought to result from incomplete fusion during embryonic development of three separate canals supplying the incisor, canine, and molar regions of the mandible. Consequently, bifid and trifid mandibular canals may develop. The retromolar canal represents one of the anatomical variations of the bifid mandibular canal. Recognition of these anatomical variations is of considerable clinical importance for preventing complications during surgical procedures (1-5).

Anatomical variations of the mandibular canal are most commonly identified during radiographic examination. Because these variations are located within the bone, hard tissue imaging modalities are capable of demonstrating their presence. Although these variations may be detected on panoramic radiographs, cone beam computed tomography is considered the preferred imaging modality for evaluating hard tissue morphology. This advantage is attributed to the absence of the limitations associated with two-dimensional imaging techniques, such as distortion, magnification, and superimposition of anatomical structures, as well as its ability to provide three-dimensional visualization of anatomical structures in multiple planes with high geometric resolution (6-8).

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The aim of this case report is to highlight the presence of a retromolar canal, an anatomical variation with the potential to influence surgical procedures.

Case Presentation:-
A 36-year-old Turkish male patient was referred from the Department of Orthodontics to the Department of Oral and Maxillofacial Radiology for preoperative evaluation before orthognathic surgery. A detailed medical history revealed no systemic disease, pathological condition, drug allergy, or previous history of surgical intervention. During the clinical examination, the patient reported pain in the right maxillary posterior region.

Clinical findings:-
No facial asymmetry was observed. Examination of the temporomandibular joints revealed no abnormalities. Intraoral examination demonstrated a deep carious lesion in the maxillary right second molar. The patient reported pain during the consumption of cold foods associated with this tooth. An electric pulp test demonstrated that the pulpal response was within normal limits. A discrepancy was observed between the restorative filling material and the surrounding hard dental tissue of the mandibular left second molar. An occlusal enamel carious lesion was detected in the mandibular right second molar. Mild gingivitis was present, whereas no periodontal attachment loss was identified.

Radiographic examination:- Preoperative assessment before orthognathic surgery was performed by the author of this study using panoramic radiography and cone beam computed tomography.

Panoramic radiographic evaluation:- The deep carious lesion in the maxillary right second molar did not extend into the pulp chamber. In addition, an interproximal carious lesion that had not been detected during the clinical examination was identified on the mesial surface of the maxillary left first molar. A secondary carious lesion beneath the existing restoration was also observed in the maxillary left second molar.

Cone beam computed tomography evaluation:-
The cone beam computed tomography images were acquired using an operating voltage of 110 kilovolts peak and a tube current-time product of 7.06 milliampere-seconds with a slice thickness of 0.3 millimeters. The images were evaluated using NNT Viewer version 16.9 software on a 15.6-inch monitor with a maximum display resolution of 1920 × 1080 pixels. No pathological findings were detected in either the maxilla or the mandible. A soft tissue calcification was observed anterolateral to the airway at the level between the second and third cervical vertebrae. No pathological findings were identified in either the bilateral maxillary sinuses or the mandibular condyles. The mandible was positioned noticeably anterior to the maxilla. During evaluation of the images, a retromolar canal was identified on the left side of the mandible (Figure 1).

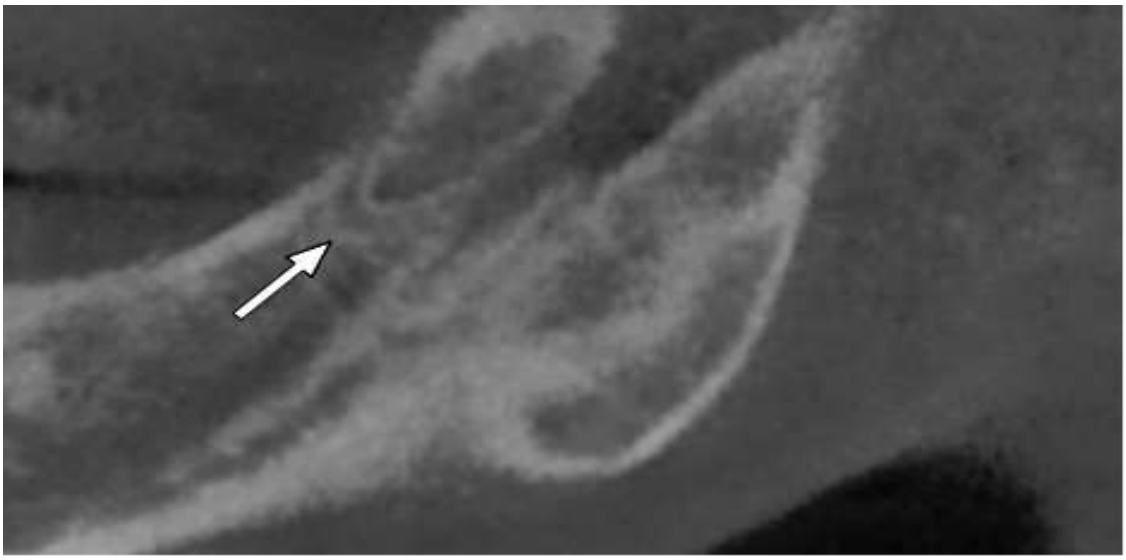

Figure 1. Sagittal cone-beam computed tomography image. The white arrow indicates the retromolar canal.

Discussion:-

Anatomical variations are present in nearly every structure of the human body and may occur in a wide variety of forms. Some of these variations manifest as differences in bone morphology, whereas others affect the morphology of neurovascular structures. Anatomical variations are also observed within the neurovascular structures of the mandible. These variations may have important implications for diagnosis, treatment planning, and surgical procedures. Therefore, a thorough understanding of these anatomical variations is essential. As a result of recent technological advances, modern medical imaging modalities have greatly facilitated the identification and evaluation of these anatomical variations (9-12).

Various imaging modalities are used in dentistry. However, when detailed evaluation of hard tissues is required, cone beam computed tomography is the most widely used imaging modality. This technique offers several advantages. First, it enables three-dimensional assessment of anatomical morphology in multiple planes through sectional imaging. Compared with computed tomography, it is associated with lower radiation exposure, lower cost, and higher geometric resolution. In addition, because the scanning time is relatively shorter than that of computed tomography, motion artifacts are less likely to occur. Although the radiation dose is higher than that of two-dimensional imaging techniques, cone beam computed tomography is not affected by the magnification, distortion, and superimposition that are inherent to two-dimensional imaging. Therefore, it is a highly valuable imaging modality for the evaluation of anatomical variations of the mandibular canal (6, 8, 13-15).

Anatomical variations of the mandibular canal are primarily classified as bifid mandibular canals and trifid mandibular canals. The reported prevalence of bifid mandibular canals in the general population ranges widely from 0.08% to 69%, and these variations are further classified into different subtypes according to the course of the accessory canal and its relationship with the main mandibular canal. When the accessory mandibular canal branches vertically from the main mandibular canal, it is referred to as a forward canal, whereas a horizontally branching accessory canal is known as a buccolingual canal. Additional subtypes include the dental canal, in which the accessory canal is associated with the roots of the molar teeth, and the retromolar canal, in which the accessory canal branches within the mandibular ramus, follows a curved course, and opens into the retromolar region. Among these anatomical variations of the mandibular canal, the retromolar canal is the most frequently encountered subtype (16-19). The retromolar canal may contain an accessory branch of the inferior alveolar nerve together with its accompanying blood vessels. Failure to recognize the presence of this accessory canal may have important clinical implications during surgical procedures. First, unrecognized anatomical variation may result in inadequate local anesthesia. Furthermore, during surgical procedures such as mandibular third molar surgery, dental implant placement, sagittal split ramus osteotomy, and bone graft harvesting from the retromolar region, the presence of a retromolar canal may increase the risk of neurovascular injury, unexpected bleeding, and postoperative paresthesia (20-23). Therefore, recognition of the retromolar canal is of considerable importance in dental practice.

Conclusion:-

The retromolar canal is the most frequently encountered subtype among anatomical variations of the mandibular canal. Owing to its anatomical course and location, it has the potential to cause complications such as bleeding and paresthesia during surgical procedures, including mandibular third molar surgery and sagittal split ramus osteotomy. Because this anatomical variation may also contribute to the failure of local anesthesia, awareness of its presence among dental practitioners is essential for minimizing the risk of surgical complications.

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