



## Extraction of A Four Rooted Maxillary Third Molars: A Case Series of Rare Occurrence.

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**Abstract:** It is uncommon to find maxillary molars with four roots, known to have three roots (two buccal and one palatal); it might also have three, sometimes fused roots. Maxillary third molars have a wide range of morphologies, making it challenging clinically and difficult to distinguish them radiographically. Given the proximity of the maxillary tuberosity and the floor of the maxillary antrum, the presence of an accessory root may complicate a rather straightforward exodontia of the maxillary third molar. We present a case series of three maxillary third molar extractions. The extracted tooth had four roots, an unusual variation in root shape. This case series focuses on morphological changes in the roots of maxillary third molars that are difficult to detect on routine radiographs. Also, this case series highlights the potential for extensive morphological variation in the maxillary third molar, which could make a simple extraction challenging. To avoid difficulties, cautious extraction maneuvering is required. Hence it is advisable to prepare for the possibility of an accessory root on a maxillary molar in endodontic and oral surgical clinical practice to prevent difficulties after surgery. The lesson to be learned from this case series is there can be a possibility for an extra root in the maxillary third molar, and the dentist must always be alert.

**Keywords:** Maxillary Third Molar, Four Roots, Root morphology, Exodontia, Rare Occurrence

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## I. INTRODUCTION

Depending on available space, maxillary third permanent molars typically begin to erupt clinically between the ages of 17 and 21. However, their roots may not fully develop until as late as 25 years<sup>1, 2</sup>. Typically, the maxillary molar has three roots, two buccal and one palatal<sup>1</sup>. The maxillary molars having four roots is an uncommon occurrence. The incidence was reported to be 0.9% for the maxillary first molars, 0.4% for the second molars, and 1.8% for the maxillary third molars<sup>3-6</sup>. Third molar extraction is a common minor oral surgical procedure that oral surgeons or a dentist see on a regular basis<sup>7</sup>. Because the wide range of anatomical variation that may be seen in their roots and makes it difficult to make predictions in radiography, as well as the wide range of potential difficulties that can arise during their extraction, the last maxillary molars are of considerable clinical significance. Due to the closeness of the maxillary tuberosity and the floor of the maxillary antrum, the presence of an accessory root may complicate an otherwise normal exodontia of the maxillary third molar<sup>3</sup>. In endodontic and oral surgery clinical practice, it is advisable to anticipate the possible presence of attached roots in maxillary molars to avoid post-treatment difficulties. This case series aims to highlight the extraction of a rarely occurring four-rooted maxillary third molar and its potentially complicated morphology and to increase dental surgeons' understanding of the varied root morphology through this case study series.

### I.1 Ethical Statement

Participants were explained the study's purpose, and written informed consent was obtained from the participants before

conducting the study. The participant signed informed consent to conduct and publish this case series. The study was conducted according to the guidelines of the Declaration of Helsinki for biomedical research involving human subjects.

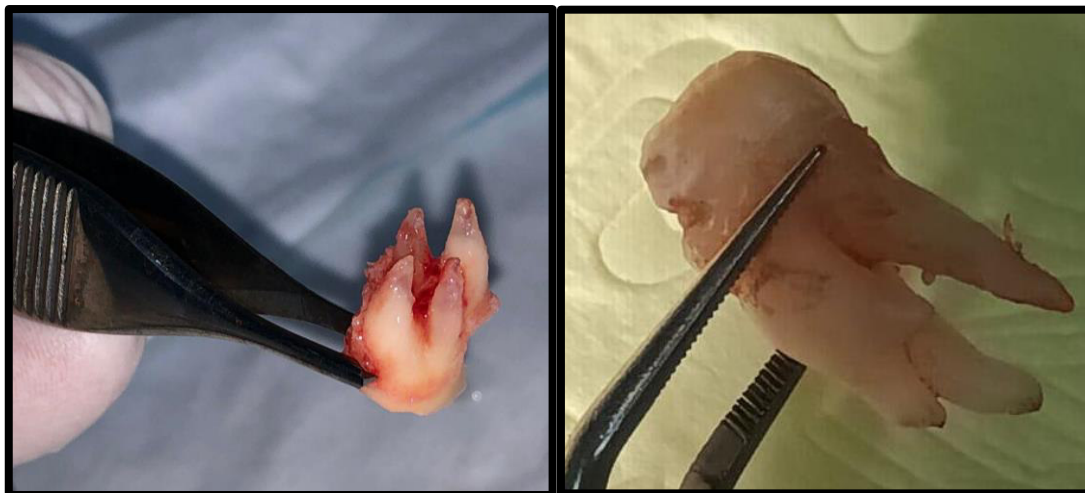
### I.2 Case Series

#### I.2.1 Case report I

A 36-year-old male patient without any relevant medical condition reported to the oral surgery department with a chief complaint of pain in the upper left back region of the oral cavity for 15 days. The pain was sudden onset, intermittent, aggravated by chewing food, and relieved by taking analgesics. An intraoral examination revealed adequate mouth opening and good oral hygiene. A badly carious maxillary left third molar was observed. The tooth was tender to percussion; no associated swelling or purulent discharge was observed. Radiograph revealed large coronal radiolucency involving the pulp. (Figure 1). The patient was taken for routine maxillary left third molar extraction under local anesthesia with 1:80,000 epinephrine. Buccal and palatal local infiltration was administered using 2% lignocaine with 1:80,000 epinephrine. First, the Warwick James elevator was utilized to remove the tooth, and then the upper third molar forceps delivered the tooth. There were no difficulties after extracting the left third molar on the maxilla. Clinical observation after the extraction revealed a four-rooted maxillary third molar (Figure 1a, 1b). Post-operative analgesics were prescribed, and the postoperative review after 7 days was uneventful.



Fig 1: Radiograph of Tooth Number 28.



**Fig 1a and 1b: Extraction of the Tooth Revealed Four Roots**

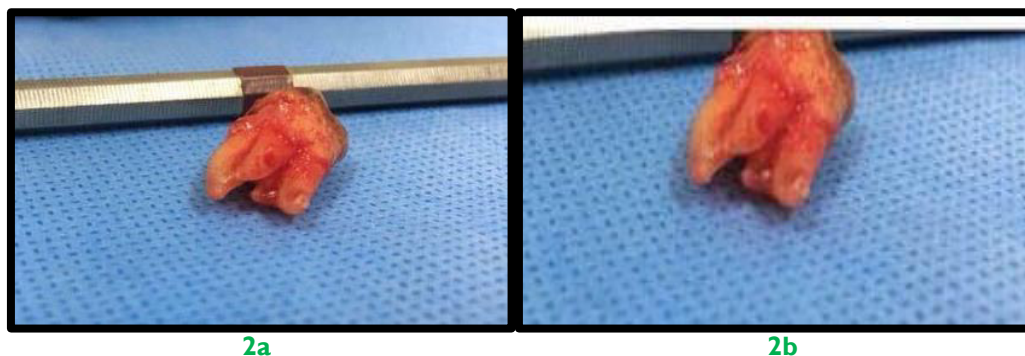
### 1.2.2 Case Report 2

A 40 years old male patient without any relevant medical condition reported to the oral surgery student's clinic with severe pain in his upper right back teeth for 10 days. The pain was severe, intermittent, and relieved by taking analgesics. Past dental history revealed that the patient had undergone restoration for the same teeth a few years back. Consider adding an article. Orthopantomogram (OPG) radiograph (Figure 2) showed a large carious lesion involving the distal side of the tooth with pulp involvement. The patient was taken

for routine maxillary right third molar extraction under local anesthesia with 1:80,000 epinephrine. Buccal and palatal local infiltration was administered using 2% lignocaine with 1:80,000 epinephrine. The tooth was attempted first with Warwick James elevator. The tooth was luxated with the elevator but could not be delivered; then, the upper third molar was used for extraction of the maxillary third molar. The maxillary right third molar extraction was uneventful, and there were no postoperative complications. Clinical observation after the extraction revealed a four-rooted maxillary third molar (Figure 2a, 2b).



**Fig 2: OPG radiograph reveals large coronal radiolucency involving the distal half of the tooth**



**2a**

**2b**

**Fig 2a and 2b: The extracted maxillary right third molar shows four distinct and fully formed roots**

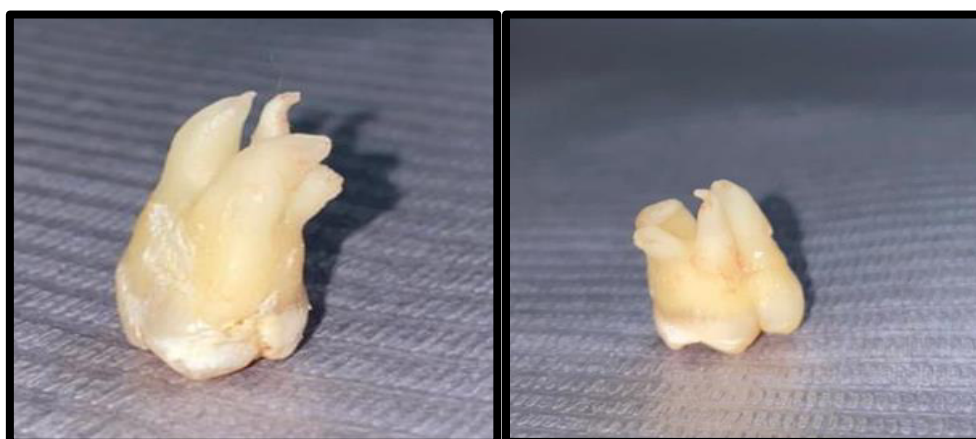
**1.2.3 Case report 3**

A 40- year- old female patient presented to us with the chief complaint of pain in the upper back left tooth for the last 1 month. The pain was sudden onset, intermittent, aggravated by chewing food, and relieved by removing stimulus. The pain did not radiate to any other regions of the face or neck. The

medical history was not significant. Intra-oral examination of the involved tooth revealed on palpation the tooth had grade II mobility. The tooth was extracted under Local anesthesia with epinephrine 1:80,000 using upper-third molar forceps. Clinical observation after the extraction revealed a four-rooted maxillary third molar (Figure 3, 3a, 3b).



**Fig 3: Root morphology of the extracted upper wisdom tooth. Apical view with four roots clearly**



**Fig 3a: Mesial view with roots    Fig 3b: Distal View with roots**

**2. DISCUSSION**

A literature search for extraction of a maxillary third molar with four roots resulted in three case reports published.

**Table 1: Reported cases in the literature on extracting a maxillary third molar with four roots.**

Author/ Year	Age/ Gender	Maxillary 3 <sup>rd</sup> molar	Reason for extraction	No: of Roots	Type of extraction
Olamide BB et al <sup>3</sup> , 2018	35/M	Right	Badly decayed with pulp involvement	4 roots	Trans-alveolar extraction
Yadav S <sup>8</sup> , 2017	48 / M	Left	Deep proximal dental caries with apical periodontitis	4 roots	Simple extraction
Ismail SM <sup>9</sup> and Hariri F, 2020	26 / F	Left	Buccally inclined, over erupted, and was intruding on the mandibular mucosa	4 roots	Simple Extraction

All of the teeth in the dental arch have the predisposition to develop additional roots. A maxillary molar with four roots is far less frequently present. The incidence of molars with four roots is less than 1% of molars<sup>10</sup>. In Their vitro study (Zhang et a., 2018)<sup>11</sup> studied the morphology of 130 permanent maxillary molars in a Chinese population and found 51.5% had single fused roots, only 19.2% had double roots while 25.4% had 3 roots, the percentage of four-rooted maxillary third

molars was 3.8% (5/130 teeth), and the extra root was either located palatally and revealed double palatal roots, or was between the 2 buccal roots<sup>11</sup>. The Hertwig epithelial root sheath may divide or fold, resulting in the development of additional roots. It could result in developing two similar roots or one independent root<sup>12</sup>. (Christie WH et al., 1919)<sup>13</sup> gave a classification of four-rooted maxillary molars, which has been described in the literature:

- **Type I:** are those with long, tortuous, and divergent palatal roots;
- **Type II:** have short blunt and parallel roots; and
- **Type III:** is the one with three convergent roots and a distinctly divergent fourth distobuccal root.

Based on the relationship between the accessory root and the crown, Carlsen "et al." <sup>14</sup> further divided maxillary molars. The four-rooted molars were classified as radix mesiolingualis and radix distolingualis groups. The maxillary molar's mesiopalatal part is directly related to the radix mesiolingualis, while the distolingualis radix has an accessory root that is affinity to the maxillary molar's distopalatal region. In our case series: Case 1 (Figure 1, 1a, 2b) and Case 2 (Figure 2, 2a, 2b) fall into the type II category, and Case 3 (Figure 3a, 3b, 3c) appears most likely to fall into type III category. Caries, an unfavorable inclination, and the overeruption of a nonfunctional maxillary third tooth are all reasons for upper third molar extraction. The maxillary third molars are typically small with convergent roots, making them relatively easy to extract<sup>9</sup>. In the majority of Maxillary third molar extractions, Warwick James elevators and upper third molar forceps are helpful instruments. Most of the time, the path of delivery of maxillary third molars gets difficult due to the limited space and access, which partially gets obstructed by the coronoid process of the mandible whenever the patient is asked to open his mouth wide during the procedure<sup>9</sup>. Warwick James elevator hockey stick can be applied on the third molar, the elevator is placed as apically as possible, and a controlled force is used to move the tooth distally and downwards <sup>15</sup> and use of maxillary third molar forceps ( Bayonet Forceps) can be of great help in delivering the maxillary third molar out, Because third molar tooth varies in shape and size, the beaks of the forceps are broad and identical (without projection), so that these forceps may be used for extraction of both the left and right third molar of the upper jaw. In our case series: Case 1 (Figure 1, 1a, 1b) was initially attempted with Warwick James elevator and later extracted by maxillary third molar forceps. Because of the multiple roots, Warwick James elevator could not luxate the third molar. Regarding Case 2 (Figure 2, 2a, 2b), Warwick James's elevator could luxate the tooth but couldn't deliver the tooth out. None of the cases in our case series experienced any difficulty, nor was there any root fracture of the third molars, as compared to the cases reported by ( Ismail SM and Hariri F)<sup>9</sup>, who experienced difficulty in spite of being rendered luxated and mobile after the application of the elevators, but because of the presence of the multiple roots couldn't be delivered out and another case report by ( Olamide BB et al.)<sup>3</sup> for extraction of maxillary four rooted third molar, who initially attempted simple extraction that proved difficult: Then trans-alveolar extraction was carried out while raising the mucoperiosteal flap, and the buccal cortical plate was reduced with a handpiece. The tooth was delivered out. None of the cases reported in our case series and those reported in the literature had encountered any complications. The maxillary third molar extraction procedure can result in fractured roots, maxillary tuberosity fractures, and oro-antral communication<sup>9</sup>. The presence of an extra root may complicate a routine simple exodontia of the maxillary third molar because of the proximity of the floor of the maxillary sinus and the tuberosity of the maxilla<sup>3</sup>. Oral and maxillofacial surgical procedures frequently involve the extraction of third molars from the mandible and the maxilla<sup>7</sup>. However, due to the variety of potential problems, this surgical procedure is a significant area of clinical discussion. During maxillary third molar extraction procedures, one

should pay particular attention to migration, infection, and the creation of oroantral perforation as a potential complication of this procedure. Displacement of maxillary third molars in the infratemporal space, although it is a seldom described condition with an unknown incidence. Iatrogenic displacement of maxillary third molars is possible. Third molar displacement into the maxillary sinus is another possibility that has been documented; the most frequent causes are believed to be improper surgical technique and excessive apical force <sup>16</sup>. According to (Iwata et al., 2020)<sup>17</sup> maxillaries third molars are more likely to produce oro-antral communication during the extraction if the relation of the third molar crown is more apical than the second molar's occlusal plane<sup>17</sup>. It's a rare occurrence, usually affecting the maxillary second molar, to have a maxillary molar with two palatal roots. Therefore, accessory roots are not typically anticipated when planning endodontic or surgical operations on maxillary molars. When accessory roots are present, inadequate preoperative planning and poor radiologic assessment may lead to unexpected problems. The short, curving roots can be broken by a careless and forceful extraction, leaving them behind, and there may be a chance of fracturing the maxillary tuberosity also<sup>9</sup>. OPA (periapical radiograph) is a two-dimensional representation of a three-dimensional structure, and anatomical features such as the zygomatic process of the maxilla, the floor of the antrum, and the coronoid process of the jaw are superimposed on periapical radiographs of the posterior maxillary region; it is not easy to see extra roots there<sup>3</sup>. In all three cases in our case series and three cases reported in the literature, the maxillary third molar having four roots was clinically discovered only after the extraction of the maxillary third molars. In a practice where facilities are available, cone-beam computed tomography (CBCT) can be used to look into a maxillary molar to find an additional root. The CBCT can locate the accessory root and provide a three-dimensional representation of the root canal and morphology for endodontic and oral surgical reasons<sup>3</sup>. But the question is can we use CBCT for routine extraction cases? Hence, Dental professionals should be familiar with the anatomical variety of roots, particularly concerning the possible presence of additional roots with atypical morphologies.

### 3. CONCLUSION

Through our case series, we highlight: It can be difficult to detect morphological variations in the roots of maxillary third molars on routine radiographs. Also, be prepared for the possibility of four roots in the upper third molar tooth to avoid complications during routine tooth extractions in dental clinics. Our case series shows that root morphological changes can occur in the maxillary third molar and can be difficult to detect radiologically. This case series aims to make dentists more aware of the various root morphologies. A cross-sectional examination that focuses on the existence of four roots is necessary to determine the number of roots in the maxillary third molar.

### 4. ACKNOWLEDGEMENTS

We thank the participants who all contributed samples to the study.

### 5. AUTHORS CONTRIBUTION STATEMENT

Dr. Fareedi Mukram Ali, Dr. Alanood Mansour Somili, and Afnan Yahya Shabi conceptualized and gathered the data with



regard to this case report. Dr. Farheena Ustad gave the necessary inputs and managed the literary searches. Dr. Thuraya Saleh Gadah and Dr. Ghazala Suleman provided valuable inputs on the manuscript. Dr. Rashed Hussain Mohammed Mahzari and Dr. Raneem Abdullah Ali Areshi curated the data and provided valuable inputs toward the

design of the manuscript. All authors discussed and contributed to the final version of the manuscript.

## 6. CONFLICT OF INTEREST

Conflict of interest declared none.

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