

原文題目(出處)：	Maxillary first molars with six canals diagnosed with the aid of cone beam computed tomography: A report of two cases. Case Rep Dent 2013, Article ID 406923
原文作者姓名：	Mamta Kaushik, Neha Mehra
通訊作者學校：	Department of Conservative Dentistry and Endodontics, Army College of Dental Sciences, Jai Jawahar Nagar, Secunderabad, Andhra Pradesh, India
報告者姓名(組別)：	林吟品 Intern C 組
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內文：

### 1. Introduction

- (1) 徹底了解根管的解剖構造、變化、側根管的存在，和不尋常的根管形態是不可避免的，因為它決定了根管治療的成功與否。
- (2) 為了確保根管治療的成功，深入、清理並充填所有的管腔這是必要的。然而，根管解剖構造的複雜性和多變性是成功根管治療的挑戰
- (3) 上顎第一大白齒的根管型態已經被多次的研究並發表。傳統上是三個牙跟三個根管，但是有 50,4%~95%的機率是 4 個根管，有 2.25%的機率是 5 個根管。有少數幾篇研究報告是 6 個根管。
- (4) 在 distal buccal canal 有兩個根管的現象頻率較低，只有 3.6%。
- (5) Palatine root canal 的變化在 Christie 學者的研究下研究得很徹底，研究中兩個 roots 的型態可根據 root degree of divergence 可以分成 types I, II, and III
- (6) 其他的研究中有在三個牙根中都各有兩個根管的，就像這篇 paper 的案例。
- (7) 這次的臨床發現和研究是在 operating microscope 和 cone beam computed tomography (CBCT) 下進行。

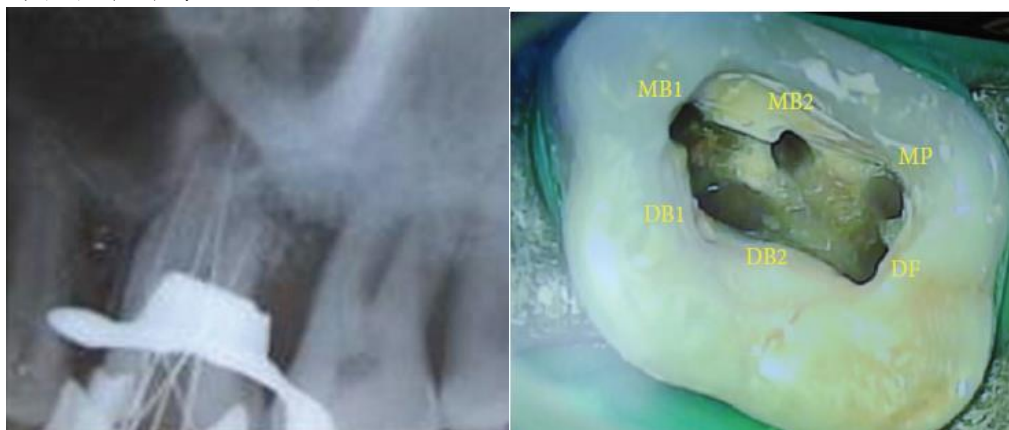
### 2. Case report I

- (1) 一個 43 歲的女性患者主訴是左上後牙疼痛。疼痛是連續的而且對熱刺激有反應，另外夜間也會痛。P't 的病史是 non contributory
- (2) 臨床檢查發現左上第一大白齒有很深的 caries 且有 percussion pain，EPT(Electric pulp testing)的結果是 premature response，顯示牙齒處於發炎反應中。影像檢查中有 radiolucent lesion 從近心牙冠處延伸到牙根。

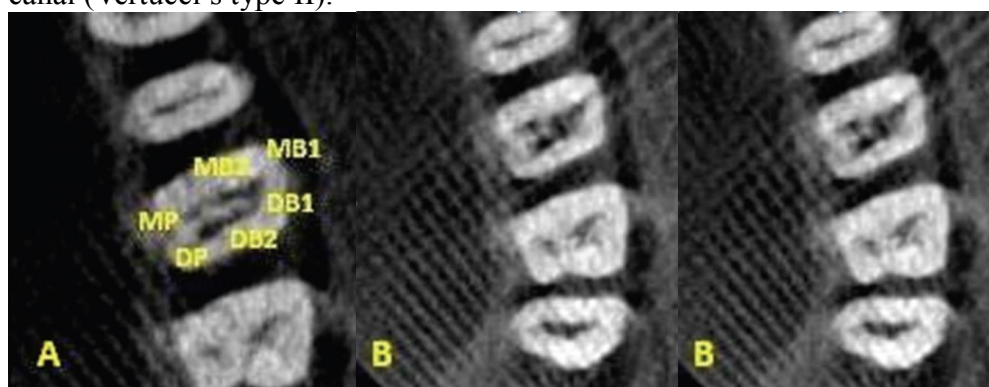


- (3) 經過診斷，判定為 irreversible pulpitis，建議患者做根管治療。

- (4) The tooth was anaesthetised with 1.8mL of 2% lidocaine containing 1 : 80,000 epinephrine (Lignox 2%, Indoco Remedies Ltd., Mumbai, India) followed by rubber dam isolation. A conventional endodontic access cavity was prepared.
- (5) Clinical evaluation of the internal anatomy revealed 3 principal root canal systems: mesiobuccal (MB), distobuccal (DB), and palatal. 用 DG 16 探測後, small hemorrhagic points were noted 2mm palatal to the MB and DB canals. As the dentin that was occluding the orifice of the palatal canal was removed, a second palatal canal was also identified.
- (6) 透過 Surgical Operating Microscope (Seiler, St. Louis, MO) 進一步評估和驗證, 每根根管都有兩個不同的 orifices。



- (7) A sterile cotton pellet and an interim restoration of Cavit (3M Espe, Seefeld, Germany) were placed in the pulp chamber to seal the access cavity.
- (8) 為了要確認這個少見的根管型態的 3D 型態, 所以建議使用 cone beam computed tomography (CBCT)。
- (9) 患者填寫完知情同意書後, 用 CBCT 掃描患者上臉部, with a tube voltage of 80KV and a tube current of 8mA.
- (10) The CBCT images confirmed the presence of six canals. The scans showed two mesiobuccal, two distobuccal, and two palatal canals (Figure 2).
- (11) The mesiobuccal followed Vertucci's type IV classification. The distobuccal canals merged in the coronal third (2.4mm from the orifice) and the palatal in the middle third (5.4mm from the orifice) of the root to follow as a single canal (Vertucci's type II).



- (12) At the next visit, the working lengths of each canal were estimated by an electronic apex locator (Propex II, Dentsply) and confirmed with a radiograph (Figure 1(b)). The cleaning and shaping were performed using ProTaper nickel-titanium rotary instruments (Dentsply Maillefer, Switzerland).
- (13) Irrigation between each instrument was done using 2.5% sodium hypochlorite

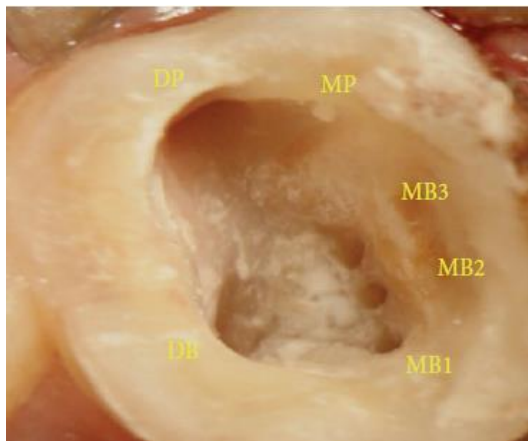
solution and 17% EDTA. The canals were dried and obturation was performed using cold lateral compaction of gutta-percha (Dentsply Maillefer) and a resin-based sealer (AH Plus, Maillefer, Dentsply, Konstanz, Germany).



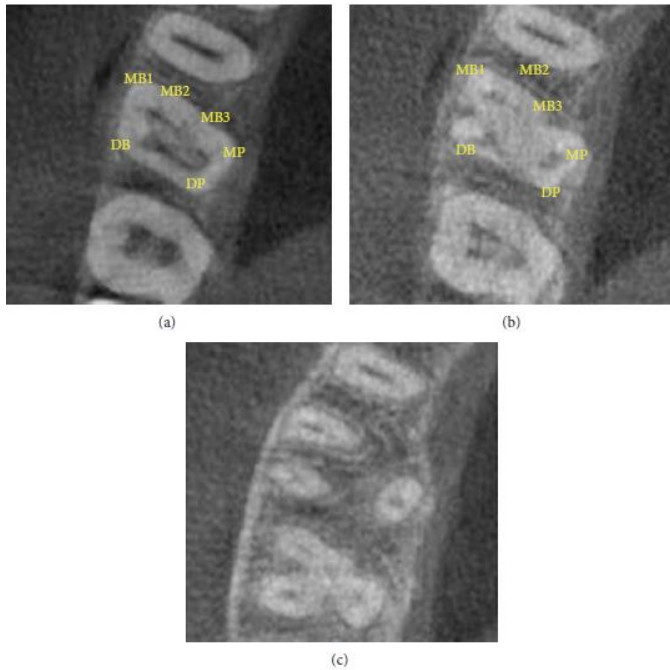
- (14) The tooth was then restored with a posterior composite resin core (P60; 3MDental Products, St. Paul, MN). The patient as advised a full-coverage porcelain crown and was asymptomatic during the follow-up period.

### 3. Case report 2

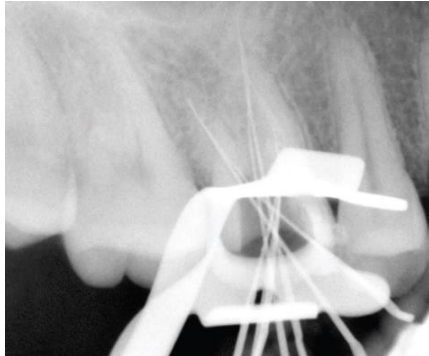
- (1) 一個 28 女性患者主訴是左上後牙疼痛。疼痛是連續的而且對熱刺激有反應。P't 的病史是 non contributory
- (2) 臨床的診斷和影像學檢查判定是 irreversible pulpitis，建議患者做根管治療。
- (3) The tooth was anaesthetised with 2% lidocaine containing 1 : 80,000 epinephrine (Lignox 2%, Indoco Remedies Ltd., Mumbai, India). A conventional endodontic access cavity was prepared under rubber dam solation.
- (4) Clinical evaluation of the internal anatomy revealed 3 principal root canal systems: mesiobuccal (MB), distobuccal (DB), and palatal. After probing with a DG 16 endodontic explorer, small hemorrhagic points were noted palatal to the mesiobuccal canal. On evaluation MB2 and MB3 were identified.
- (5) Further exploration led to the identification of a second palatal canal. The distobuccal orifice also seemed to be indicating multiple canal system.



- (6) This was evaluated and verified by a Surgical Operating Microscope (Seiler, St. Louis, MO). The access cavity was sealed with Cavit (3M Espe, Seefeld, Germany).
- (7) 為了進一步評估這個不尋常的形態，建議照牙齒的 CBCT 成像。一位知情
- (8) 取得病人共識， CBCT 掃描的上頷左側(Kodak 9000 3D) with a tube voltage of 80KV and a tube current of 8mA.
- (9) The CBCT images confirmed the presence of six canals. The scans showed three mesiobuccal, two palatal, and an oblong distobuccal canal systems.



- (10) The MB1 was an independent canal but the MB2 and MB3 merged (Vertucci's type II) to progress as one. The mesiopalatal and distopalatal canals (Vertucci's type II) merged in the middle third of the root to follow as a single canal.
- (11) At the next visit, the working lengths of each canal were estimated by an electronic apex locator (Propex II, Dentsply) and confirmed with a radiograph.



- (12) The cleaning and shaping were performed using ProTaper nickel-titanium rotary instruments (Dentsply Maillefer, Switzerland) with copious irrigation of 2.5% sodium hypochlorite solution and 17% EDTA. The canals were dried and obturation was performed using cold lateral compaction of gutta-percha (Dentsply Maillefer) and a resin-based sealer (AH Plus, Maillefer, Dentsply, Konstanz, Germany).



- (13) The tooth was then restored with a posterior composite resin core (P60; 3M

Dental Products, St. Paul, MN). The patient was advised a full-coverage porcelain crown and was asymptomatic during the follow-up period.


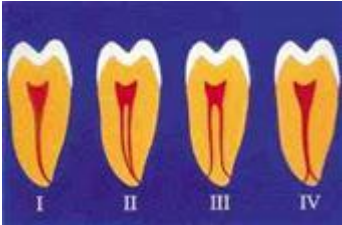
#### 4. Discussion

- (1) 上顎第一大臼齒常出現解剖構造異常，從 1~7 個根管都有出現過。It is generally accepted that maxillary first molar has three roots and three canals with a fourth canal (MB2) seen in 50.4–91% of cases
- (2) 同時出現的雙根管系統在所有的上頷白齒牙根是一個不尋常的發現
- (3) Case I 中所有牙根都有雙根管很少見，有幾篇 paper 發表過，但是像 case II 這樣有 MB3 的 case 更少見。
- (4) 是當的 open 和修型是能正確地找到並辨認出根管的重要方法。平常的 open 是三角形的，但是在本案例中應採取梯形較能提高找到的機會。
- (5) 要定位 orifice 的方法有：
  - i. multiple preoperative radiographs
  - ii. examination of the pulp floor with a sharp explorer
  - iii. troughing of grooves with ultrasonic tips
  - iv. staining the chamber floor with 1% methylene blue dye
  - v. performing the hypochlorite champagne bubble test
  - vi. visualising canal bleeding
- (6) In the presented cases, examination of the pulpal floor to follow the dentinal map and exploration of haemorrhagic points with the DG16 was the first indication to hint at presence of extra orifices and canals.
- (7) An important aid for locating root canals is the Surgical Operating Microscope (SOM). It brings minute details into clear view by enhancing lighting and visibility.
- (8) 研究顯示 SOM 的高放大率和提供照明可以大大增加 MB2 找到的機會。
- (9) Radiographic examination 對根管治療是必要的，但是他會將 3D 的影像變成 2D，這時候 CBCT 的存在可以提供更好更清晰的牙齒內部構造。
- (10) Although conventional CT scans produce a high level of detail, it is essential that the radiation dosage is kept as low as reasonably possible
- (11) 在本次的 case 中，CBCT 可以幫忙確認根管的精確構造和型態。(詳細型態前面已經提過，這裡不贅述。)
- (12) 如 case II 這樣 MB 有 3 個根管，Palatal 有 2 個根管的 case 並不常見，使用 CBCT 可以幫忙確認並定位整個根管系統。

#### 5. Conclusion

- (1) 多根管的變化是少見但不該被忽略的。仔細的檢查 x 光和牙齒內部的解剖構造是必要的。本次案例強調精確檢查和高照明下治療的必要性，另外強調項 CBCT 這種星的影像學在術前評估的重要性。

題號	題目
1	請問以下牙根是屬於哪種 canal configurations?

	 <p>(A) Type I (B) Type II (C) Type III (D) Type IV</p>
<p>答案(B)</p>	<p>出處：Woelfel's Dental Anatomy, eighth edition, p.233</p> 
<p>題號</p>	<p>題目</p>
<p>2</p>	<p>上頷第一大白齒最常出現的是下列哪種型態?</p>
	<p>(A) 三個牙根三個根管 (B) 三個牙根四個根管 (C) 四個牙根三個根管 (D) 四個牙根四個根管</p>
<p>答案(B)</p>	<p>出處：Woelfel's Dental Anatomy, eighth edition, p.238</p>