Thorough debridement of the root canal system is a prerequisite for successful endodontic therapy. To achieve this goal the clinician must identify all the root canals and to do so one must be aware of the various morphological variations that can occur. Maxillary permanent first molars present with many variations in the root canal morphology. Majority of maxillary first molars have three roots and 4 canals. This case series presents some anatomical variations in permanent maxillary first molar. In this case series the number of root canals ranged from 2 to 5.

Case report 1
A 26 year old female patient presented with a chief complaint of spontaneous toothache in her right posterior maxilla for 2 days.

From the clinical and radiographic findings, a diagnosis of symptomatic apical periodontitis in relation to 16 and irreversible pulpitis in relation to 15 was made and endodontic treatment was suggested to the patient Radiographic evaluation in relation to the canal anatomy(Figure 1). The tooth was anesthetized with 1.8 mL of 2% lignocaine with 1:200,000 epinephrine (Xylocaine; AstraZeneca Pharma Ind Ltd, Bangalore, India) followed by rubber dam isolation. An endodontic access cavity was prepared.

Clinical examination with a DG-16 endodontic explorer (Hu-Friedy, Chicago, IL) revealed one canal opening in each of the distobuccal, mesiobuccal roots and 2 canal openings in palatal root (Fig 2). The working length was determined with the help of an apex locator (Root ZX, J Morita) and later confirmed using a radiograph. Cleaning and shaping was done under rubber dam isolation using ProTaper nickel-titanium rotary instruments (Dentsply, MailleferBallaigues, Switzerland) with a crowndown technique. Irrigation was carried out using normal saline, 2.5% sodium hypochlorite solution. An inter appointment intracanal calcium hydroxide dressing(RC Cal, Prime dental products, India) was given.

At the second appointment, the patient was free of symptoms. Obturation was completed by cold lateral compaction of gutta-percha and zinc oxide eugenol sealer. The tooth was then restored with a posterior composite resin core (Figure 3). The patient was advised full-coverage crown.

Discussion:
The thorough knowledge of root canal anatomy is a prerequisite for successful endodontic therapy. Generally permanent maxillary first molar presents with 3 roots and 4 canals. The three roots include 1 palatal root, 1 mesiobuccal root and 1 distobuccal root. Majority of mesiobuccal roots show 2 canals and palatal and distobuccal roots show 1 canal each. Many cases have been reported regarding the anomalies in the anatomical presentation of maxillary first molars with the number of roots ranging from 1 to 4 and the number of canals ranging from 1 to 7. Variations may be due to ethnicity, gender and age. In the present case report the teeth presented with 3 roots and the 4 canals. The incidence of 2 roots according to Al Shalabi et al (2000) is 7.40%, according to Thomas et al(1993) 5.6% and according to Barrett(1925) 6.3%. This case report has shown a similar configuration of root canals in the palatal root as reported by Johal et al. Such variations in the palatal root morphology have been reported by Hartwell and Thews. Literature reviews have shown that the incidence of second mesiobuccal canals is about 54.7%. With the use of advanced magnification aids such as surgical operating microscope the incidence of mb 2 canal reported was much higher. A two dimensional radiograph can alert the clinician about the morphology of the tooth but it would be of limited use to predict the presence of anatomical aberrations. Careful observation of the deformation of stainless steel files can also provide valuable information regarding the canal anatomy.

This case highlights the variations in root canal morphology and it requires clinicians to be able to detect them in order to perform successful endodontic therapy.
3 : Post obturation radiograph

REFERENCES