

# CLINICAL AND RADIOGRAPHIC ESTIMATION OF THE NUMBER OF ROOT CANALS IN MAXILLARY SECOND PREMOLARS AMONG A GROUP OF NORTH JORDANIAN DENTAL PATIENTS

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## ABSTRACT

*The purpose of this study was to determine the variations of root canal morphology and to evaluate the percentage of maxillary second premolar teeth that have two canals from orifice to apical foramen among a sample of north Jordanian population in routine endodontic practice.*

*A total of 148 north Jordanian patients, 89 females and 59 males, referred to the conservative clinics in Prince Rashid hospital for root canal treatment of 2nd maxillary premolars from June 2018 to January 2019 formed the study group. They were examined clinically and radiographically by two specialists.*

*The results of the study revealed that of the 148 second maxillary premolars teeth treated, there were 84 teeth with two canals from orifice to foramen. Fiftyone were females and 33 males. Only one patient had three canals.*

*It was concluded that most of the maxillary 2nd premolars had two canals so endodontist must pay attention to these variations.*

**Keywords:** Maxillary 2nd premolars, radiographic determination, two canals, three canals.

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## INTRODUCTION

Knowing variations of tooth anatomy is an important factor in root canal treatment success.<sup>1</sup> Any missed root canal may lead to failure of root canal treatment, furthermore, bacteria can proliferates leading to apical periodontitis, so dentists should be aware of complex root canal anatomy.<sup>2</sup> There are many researches that worked on teeth morphology and anatomy.<sup>3</sup> It is impossible for cleaning, shaping and filling of root canal adequately without knowing anatomy and morphology of root canal in details. Most common causes of root canal treatment failure are incorrect root canal instrumentation and incomplete root canal obturation.<sup>4</sup> Radiographic examination of the root and canal system is the best

method for evaluation, and is recommended in root canal treatment.<sup>5,6</sup> Radiographic examinations can be obtained by many methods, periapical radiographs that involves different cone angles or cone beam CT are the most commonly used techniques that reflect the morphological characteristics of root canal system.<sup>7,8</sup> Cone beam CT provides accurate data about root canal morphology and anatomy.<sup>1,9</sup> Reviewing the literatures, there is a divergence of opinion relating to anatomical configuration of root canal of premolars and molars.<sup>10,11</sup> Variations are found in root canal anatomy.<sup>12,13</sup> They are difficult to treat endodontically due to many factors which include numbers of roots, canals, direction and vertical of their roots and visual difficulties of apical area by radiographs.<sup>14</sup> Maxillary second premolar usually described as having one canal with possibility of second canal, rarely maxillary 2<sup>nd</sup> premolar has three canals.<sup>15</sup> The purpose of this study was to investigate the variations of root canal morphology and to evaluate the percentage of maxillary second premolar teeth that have two canals from orifice to apical foramen among a sample of north Jordanian population in routine endodontic practice.

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## MATERIALS AND METHODS

This sample consisted of 148 north Jordanian patients, 89 females and 59 males, referred to the conservative clinics in Prince Rashid Hospital for root canal treatment from June 2018 to January 2019. The mean patient age was 39.5 ranged from 14-65 years.

Ethical approval by the Human Research Ethics Committee of the Royal Medical Services was obtained prior to commencing the study. All patients agreed to participate in this study. Clinical and radiographic evaluation by at least two clinicians out of six clinicians (two endodontists and four endodontic residents) in two separate sessions.

Teeth with incomplete root formation and apical resorption were excluded. Examined teeth were only new cases with no previous treatment. The total of 148 teeth were evaluated to find out canal configurations.

The clinical evaluation included that one endodontist had to do access and identify the canals in the first session, another endodontist had to modify the access if needed and inspect the canals again in the second session.

The radiographic evaluation included that one endodontist had to take a periapical working length radiograph in the first session, while the other endodontist had to take the cone fit periapical radiograph in the second session.

## RESULT

As shown in table-1, the results of the study reveal that of the 148 second maxillary premolars teeth treated, there were 84 teeth with two canals from orifice to foramen which is equal to 56.76%.

Table-2 showed that in female patients the total number of teeth having two canals from orifice to foramen were 51.

Table-3 showed that the position of the tooth did not have significant difference.

According to the age group, dividing the patients to 5 groups as in table-4) shows that about 100 patients of the study sample had age range between 21 and 40 years old, and this age group had a good expression of the final result that is because 62 patients had two canals from the orifice to the foramen, which is very near to the final percentage mentioned in the table (1).

Figure 1 shows a periapical radiographs of one canal maxillary 2<sup>nd</sup> premolars.

Figure 2 shows periapical radiographs of two canals maxillary 2<sup>nd</sup> premolars

Figure 3 shows a periapical radiographs of three

TABLE 1: MAXILLARY 2ND PREMOLAR NUMBER OF CANALS DISTRIBUTION

Canals number	Total 148
One canal	63
Two canals	84
Three canals	1

TABLE 2: NUMBER OF CANALS DISTRIBUTION BY GENDER

C a n a l s number	Female 89	Male 59	Total 148
One canal	37	26	63
Two canals	51	33	84
Three ca-nals	1	0	1

TABLE 3: NUMBER OF CANALS DISTRIBUTION BY SIDE

C a n a l s number	Right 73	Left 75	Total 148
One canal	33	30	63
Two canals	40	44	84
Three ca-nals	0	1	1

TABLE 4: NUMBER OF CANALS DISTRIBUTION BY AGE GROUP

C a n a l s number	11-20	21-30	31-40	41-50	51-70
One canal	6	10	27	8	3
Two canals	8	28	34	9	4
Total	14	38	62	17	7

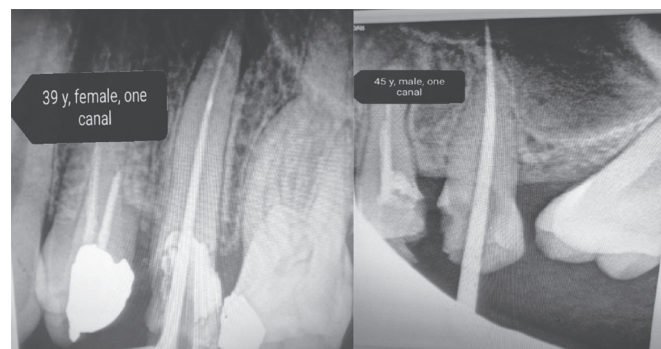


Fig 1: Maxillary 2nd premolars with one canal canals of maxillary 2<sup>nd</sup> premolars

## DISCUSSION

This study investigated the number of root canals

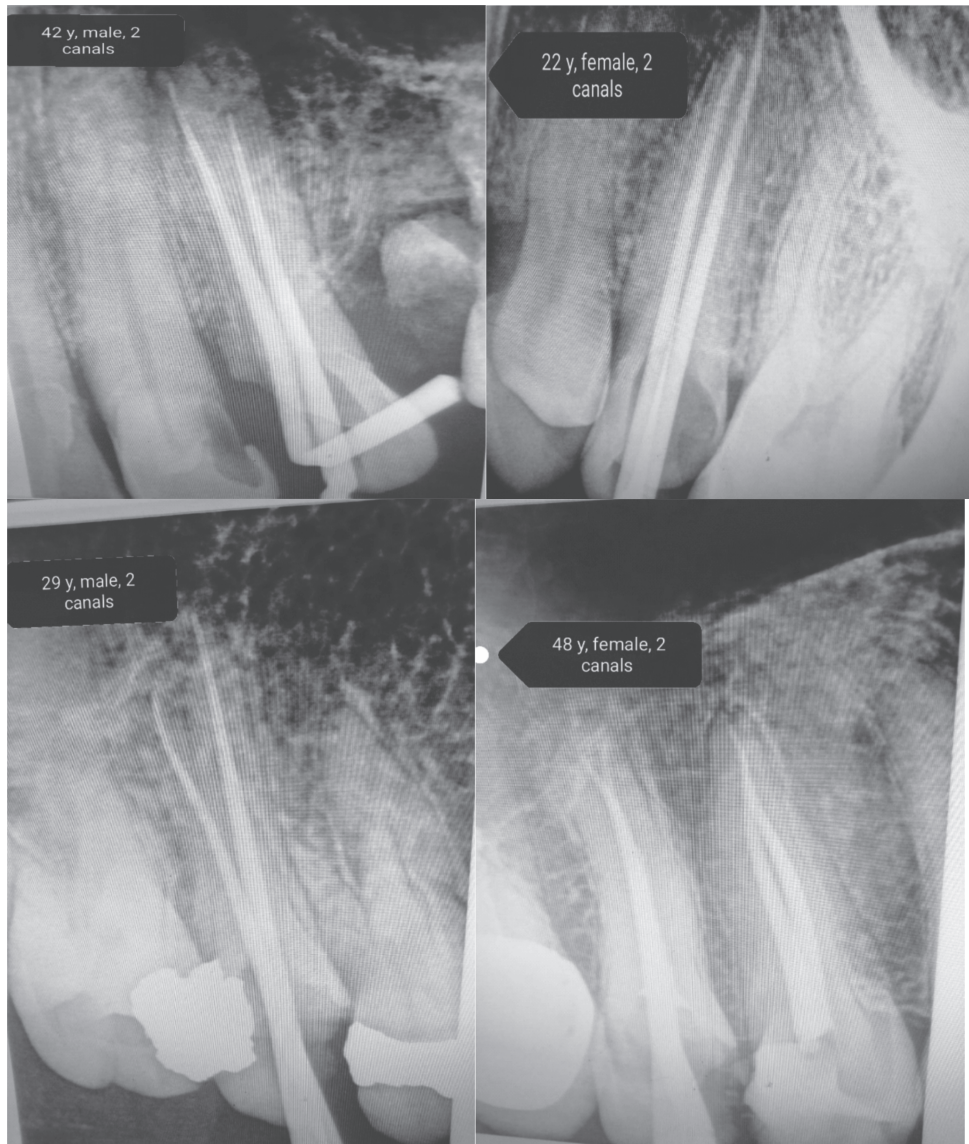


Fig 2: maxillary 2nd premolars with two canals

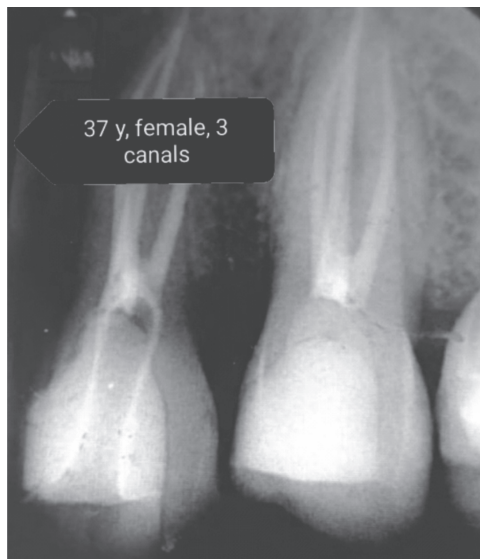


FIG 3: MAXILLARY 2ND PREMOLAR WITH THREE CANALS

in maxillary second premolars among a group of north Jordanian population. Maxillary second premolars may have one, two, or three roots and canals. Previous studies have reported variations in the morphology and numbers of canals and roots. Jayasimha Raj et al. found that between 27.70% and 48.66% maxillary second premolars had a single canal, and the frequency of two canals varied between 50.64% and 72.30%.<sup>14</sup>

According to previous studies in Saudi Arabia, Al-nazhan et al. found that 59.4% of maxillary second premolars had two root canals, and this result was slightly more than present study (56.76%).<sup>16</sup> Alnour et al. study reported that 65% of maxillary second premolars contained two canals which is also more than this study.<sup>17</sup>

Many other studies have reported that percentage of the presence of three canals in maxillary second premolars ranged from 0-2% of teeth which is in agreement



with the present study.<sup>18,19</sup> Algananeem et al. found that 55% of maxillary second premolars had two canals which is slightly lower than the current study.<sup>20</sup>

In the present study, one canal was recorded in 41.57% of female patients compared with 44.07% of male patients which are totally different from Alnazhan study who found that 47.01% of females have one canal compared with 29.44% of males.<sup>16</sup>

Number of three canals in maxillary second premolars are very rare. This root canal configuration is present only in (0.3%-2%) of maxillary 2nd premolar.<sup>21</sup> In the present study it occurred in 0.68%. Despite of that dentist should be aware of this possibility. Maxillary 2nd premolars have highly variable root canal morphology and sometimes possessing three separate roots.<sup>22</sup> A new case report documented a maxillary 2nd premolar with 4 roots and canals.<sup>23</sup> Success of endodontic treatment depends in the knowledge of such variations.<sup>24</sup>

Reviewing the literatures we could not find any study that compared between right and left second maxillary premolar canals number. In the present study it was found that right maxillary second premolars had one canal more than left one's, 33 to 30 respectively which is clinically insignificant.

## CONCLUSION

In this study 84 second maxillary premolars had two canals. Fiftyone were females & 33 males. In one patient there were 3 canals in the second premolar.

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