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Research Article

**MORPHOMETRIC ANALYSIS OF FURCATION AREAS OF
MULTIROOTED TEETH IN A TUNISIAN POPULATION**¹Aqeela Perveen¹Demont Morency College of dentistry Pakistan.

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Abstract:**Objective:** This study is aimed to observe the characteristics of the morphometric analysis in multirooted teeth.**Materials and Methods:** In this study 104 mandibular and maxillary molars were included in which 33 were first molars of mandibular and 19 were the second molar of mandibular whereas the first molars of maxillary were 34 and second molars of maxillary were 18. With the help of micro caliber interradicular width space, vertical dimensions and roots length was measured. In mandibular and maxillary various type of root trunk were also observed. Using t-test statistical analysis was also done**Results:** From 1st to 2nd molar the length of roots was considerably reduced. In mandibular molars this decrease in length was more prominent. In mandibular molars the prevalence of root trunk B was 51.9% and in maxillary molars this was 67.3%. In both molars the length of root trunk was observed to be increased from 1st to 2nd molar. Interradicular width space between and on same teeth also varied.**Conclusion:** This study provides epidemiological data about root trunk vertical dimension, interradicular space and molars root length in a Tunisian population that could help clinicians in endodontic and periodontal therapy.**Corresponding author:****Dr. Aqeela Perveen,**

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INTRODUCTION:

The word Furcation is defined as “the anatomic area of the multirooted tooth where the roots diverge” and “furcation invasion refers to the pathologic resorption of bone within a furcation”.

In this literature the Furcation morphology of multirooted teeth has been addressed extensively. There are some anatomical variations that contribute to the etiology and therefore the conceded prognosis of furcation involved teeth. These factors include furcation entrance width, length of root trunk, roots of concavities, enamel projections, and enamel pearls which influence the development of interradicular lesions as well as progression of periodontal disease. The challenges and success of periodontal therapy has been presented by Furcation. It has been demonstrated that there are a lot of variables which alter the oral environment, like the presence of Osseo integrated implants, topographic hard-to-reach areas, or orthodontic appliances. Many studies evaluated the influence of topographic anatomy of molars on periodontal therapy and have revealed that unavailability or inaccessibility of these areas for cleaning as well as the narrowness of the furcation entrance makes adequate instrumentation and plaque control difficult. It leads toward improper access for instrumentation and consequently, a persistence of pathogenic microbial. The better understanding of the furcation and root surface anatomy is necessary for effective management of the furcation area. The aim of this study was to assess the characteristic of root trunk dimension, the furcation areas along with the type of maxillary and mandibular molars and determine the influence of furcation involvement on the diagnosis and management of molars.

DATA EXTRACTION AND METHODOLOGY:

For this examination, the example of 430 multirooted teeth was chosen from an assortment of extricated human teeth of a Tunisian populace, which was acquired from different private facilities. The reasons of this information extractions were following the serious periodontitis illness, endodontic contamination and caries and orthodontic reasons. During a day, the separated teeth were put in an answer 3% sodium hypochlorite. The morphology qualities of tooth were recognized, and afterward arranged into four gatherings: The first is maxillary molars, second one is maxillary molars, third one is first mandibular molars, and fourth one is second mandibular molars. During this examination, the mandibular molars with two roots and maxillary molars with three roots were incorporated. The flawless crowns and Intact cemento-enamel intersection (CEJ) were incorporated. Molars with broke roots, third ethics, caries or

reclamations inside the furcation regions were additionally the rules of prohibition. The chose last example of 104 teeth was held and created by 34 maxillary first molars, 33 first mandibular molars, 18 maxillary second molars and 19 second mandibular molars. Teeth were cleaned under running water to dispose of or eliminate trash and afterward sterilized in an answer of 3% sodium hypochlorite. On the off chance that any math clouded the root trunk, these analytics was taken out delicately by utilizing a manual curette scaler.

Morphometric Analysis:

The parameter which were measured on the selected molars are:

- (1) The length of root from the enamel-cementum junction to the apex of root
- (2) The length of each root trunk from the enamel-cementum junction to the entrance of furcation.
- (3) The width of the interradicular space, 1 milli meter from the furcation entrance, measured between the internal sides of the roots

In this study 104 mandibular and maxillary molars were included in which 33 were first molars of mandibular and 19 were the second molar of mandibular whereas the first molars of maxillary were 34 and second molars of maxillary were 18. With the help of micro caliber interradicular width space, vertical dimensions and roots length was measured. In mandibular and maxillary various type of root trunk were also observed. Using t-test statistical analysis was also done

Using Ochsenbein's classification, the root trunk was classified into three types: A (short), B (medium), and C (long) Maxillary molars with root trunks of 3 mm or less were classified as short, 4 mm trunks were classified as medium, and 5 mm or more trunks were classified as long. For mandibular molars, a short root trunk was considered to be 2 mm or less, medium root trunks were 3 mm, and long root trunks were 4 mm or longer.

For the evaluation of the variables, root length, root trunk, and interradicular space width, statistical analysis was performed using a *t*-test. Statistical analysis was performed using IBM statistical package for the social sciences statistics 21 programs (IBM SPSS statistics, Armonk, NY, USA). Correlations between root trunk length and interradicular space width, root trunk length, and root length were calculated using Pearson's correlation coefficient.

RESULTS:

The mean values of root length (RL), root trunk length (RTL), and interradicular space (IRS) width of the examined teeth are presented in Tables and illustrates the comparison of the different studied parameters.

Root Length:

At maxillary molars, distobuccal root was the shortest ($p = 0.002$) followed by the mesiobuccal root and the palatal root (12.32 mm, 13.17 mm, 13.38 mm), respectively. However, this order was not always conserved as the palatal root was not always the longest one ($p = 0.747$). Some molars with mesial roots longer than the palatal one were also noticed. At mandibular molars, the mesial root was the longest (14.69 mm) followed by the distal root (13.74 mm), and this result seemed to be statistically significant ($p = 0.002$) (Table 3). Root lengths decreased from the first to the second molars. decrease seemed to be pronounced at mandibular molars.

Root Trunk Length:

The length of the root trunk expanded from the first to the second molars in both maxillary and mandibular. request of the expanding normal of root trunks was the equivalent for the main molars and second maxillary molars: buccal, distal, and mesial. It tends to be seen

that in the Tunisian populace, the mesial root trunk was the longest one on maxillary molars. buccal root trunk was the most brief one in examination with other root trunks in the two curves. The most watched root trunk type was type B with a predominance of 67.30% in maxillary molars and 51.92% in mandibular molars. mean estimation of root trunk length for maxillary molars extended from 3.96 mm to 4.90 mm, while for mandibular molars, root trunk length shifted from 3.75 mm to 4.47 mm.

Interradicular Space Width: Lists the mean values of the width of the interradicular spaces in maxillary and mandibular first and second molars. mean width of the interradicular spaces varied on the same tooth and between the teeth. Regarding the interradicular space dimensions of maxillary molars, the buccal interradicular space was the narrowest, followed by the mesial than the distal one whereas in mandibular molars, the buccal interradicular space was larger than the lingual one. It can also be observed that with the increasing mean of root trunk length, there was a decrease in the interradicular space width. It was interesting to note that for mandibular molars, lingual furcation was characterized by a long root trunk associated with narrower interradicular space.

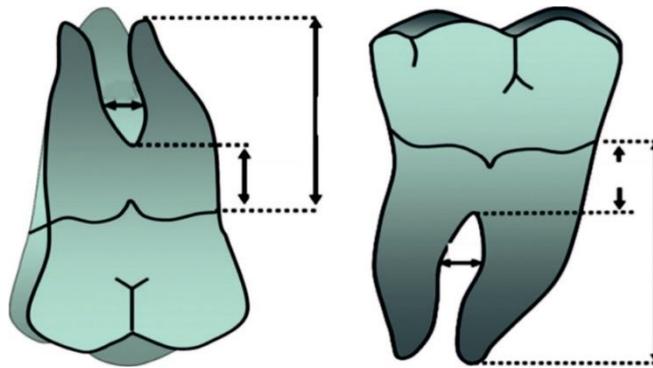


FIGURE 1: Different measured parameters in maxillary molar (a) and mandibular molar (b). RL: root length, RT: root trunk, and IRS: interradicular space.

TABLE 1: Means \pm SD (standard deviation) of root trunk length and interradicular space width of investigated teeth

Tooth/ side	Root trunk length (mm)		Interradicular space width (mm)	
First maxillary molars				
Buccal	3.96	0.77	1.18	0.39
Mesial	4.32	0.90	1.55	0.45
Distal	4.00	\pm 0.74	1.96	\pm 0.39
	\pm			\pm
Second maxillary molars				
Buccal	4.28	\pm 1.06	0.98	\pm 0.29
Mesial	4.90	1.05	1.44	0.34
Distal	4.46	\pm 1.09	1.53 \pm	0.2
	\pm			\pm
First mandibular molars				
Buccal	3.75	\pm 0.58	1.41	\pm 0.32
Lingual	4.40	0.67	1.29	0.37
	\pm			\pm
Second mandibular molars				
Buccal	3.90	\pm 0.74	1.06	\pm 0.25
Lingual	4.47	\pm 0.94	0.96	\pm 0.22
	\pm			\pm

DISCUSSION:

From 1st to 2nd molar the length of roots was considerably reduced. In mandibular molars this decrease in length was more prominent. In mandibular molars the prevalence of root trunk B was 51.9% and in maxillary molars this was 67.3%. In both molars the length of root trunk was observed to be increased from 1st to 2nd molar. Interradicular width space between and on same teeth also varied.

TABLE 2: Comparison of the different studied parameters of investigated teeth.

Maxillary root length	Mandibular root length
MBR	DBR = 0.002
	PR = 0.747
	PR = 10^{-3}
DBR	MR DR = 0.002
	MBR = 0.002
	MBR = 0.747
PR	DBR = 10^{-3}
Maxillary root trunk length	Mandibular root trunk length
MRT	BRT = 0.005
	DRT = 0.017
	MRT = 0.017
DRT	BRT LRT = 10^{-3}
	BRT = 0.854
	DRT = 0.854
BRT	MRT = 0.005

Maxillary interradicular space width	Mandibular interradicular space width
MIRS	BIRS = 10^{-3}
DIRS	DIRS = 0.276 BIRS = 10^{-3}
BIRS	LIRS BIRS = 0.106 MIRS = 0.276 MIRS = 10^{-3} DIRS = 10^{-3}

MBR: mesiobuccal root, DR: distal root; DBR: distobuccal root, PR: palatal root, MR: mesial root, MRT: mesial root trunk, BRT: buccal root trunk, DRT: distal root trunk, LRT: lingual root trunk; MIRS: mesial interradicular space, DIRS: distal interradicular space, BIRS: buccal interradicular space, and LIRS: lingual interradicular space.

TABLE 3: Distribution of root trunk type in maxillary and mandibular molars.

Root trunk type	Maxillary molars (%)	Mandibular molars (%)
Type A	19.23	44.23
Type B	67.30	51.92
Type C	13.46	3.84

The root trunk is defined as the area of the tooth extending from the cemento-enamel junction to the furcation. The present study showed that the most observed type was type B followed by type A and type C for both maxillary and mandibular molars. Prevalence of type C in the present study (13.46% in maxillary molars and 3.84% in mandibular molars) was

The root trunk length expanded from the first to the second molars at both maxillary and mandibular curves. Finding was as per those detailed by Kerns et al. Furthermore, the principle finding of the current examination was that the buccal furcation was anatomically different from the lingual, mesial, and distal furcations for all the assessed estimations. Buccal root trunk length was shorter than the mesial and distal root trunk and the mesial root trunks were the longest root trunk in maxillary molars. Information was in concurrence with others established in other. Nonetheless, it couldn't help contradicting some different investigations that found that the distal root trunk was longer than the mesial one. In mandibular molars, the buccal root trunk was shorter than the lingual root trunk. Finding was as per the morphometric investigations of root trunk.

Root trunk length importantly affects the pathogenesis of the periodontal ailment. It is one of the keys to anatomical factors that make molars especially vulnerable to periodontal ailment. Short root trunk is bound to grow early furcation contribution and connection misfortune within the sight of periodontal infection because it has less surface territory for periodontal connection. Despite the fact that, when the illness is introduced, decreased root trunk length will in general prompt agreeable periodontal treatment results due to its simpler access. Then again, a long root trunk makes admittance to the proximal furcation more difficult contrasted with different sides, especially while neighboring teeth are available. Conclusion and treatment could be better with careful presentation on account of furcation association due to an absence of access.

The present study showed that the mean of the interradicular space width was superior to 0.98 mm at 1 mm of the furcation entrance. Result could be a micrometric characteristic of the Tunisian population, which seemed to be similar to the dimension of standard Gracey curettes (75 to 0.95 mm). Finding indicated that the use of curettes alone might be suitable for root preparation in the furcal area.

However, the micrometric measurements of the present study were more important than those reported in several studies. In fact, Kodovic et al. reported that 81% of all furcation entrances diameters were <1 mm and

58% were <0.75 mm. Sixty-three percent of maxillary molars and 50% of mandibular molars were <0.75 mm. Different findings.

TABLE 4: Comparison of root trunk dimension of mandibular and maxillary molars between this study and other studies.

Author/year of publication	Maxillary molars			Mandibular molars	
	MRT	DRT	BRT	LRT	BR T
present study	4.61	4.23	4.12	4.43	3.82
Dababneh et al	4.98	4.31	3.97	4.31	3.75
Roussa	3.49	4.14	3.46	3.5	2.8
Plagmann et al	4.8	4.5	4.3	4.3	3.3
Dunlap and Gher	3.6	4.8	4.2		
Dunlap and Gher				4.0	4.0
Rosenberg	5.0	3.5	3.0		
Mandelaris et al.				4.17	3.14
Kerns et al	4.7	4.7	4.1	4.3	3.3
Porci'uncula et al	4.44	4.26	3.50		

CONCLUSION:

This study provides epidemiological data about root trunk vertical dimension, interradicular space and molars root length in a Tunisian population that could help clinicians in endodontic and periodontal therapy.

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