Root Canal Treatment And Canal Morphology Of Maxillary Second Premolars In North East Population Of Nigeria

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Abstract

Aim: This Longitudinal prospective study was carried out to determine the veracity of one canal in maxillary second premolars in coloured population of North East in Nigeria.

Material and Methods: The study involved patient who are attending the dental clinic of a Teaching Hospital passing through the normal screening and diagnosis and were referred to the conservative Dentistry Clinic for treatment. The patients were evaluated and decision reached to the need to have root canal treatment. The study involved one hundred and fifty patients seen between the period of July 2007 through to June 2015. 120 had single tooth treated for thorough root canal treatment while 30 patient had multiple treatment. other data that were collected were gender types, occupation and income.

Results: 150 patients had 180 root canal treatment, 58 in males and 122 in females. There were 46 in number, working class accounted for 97 while non-working class were only 7. One hundred and sixty-two had 2 canals located buccally and palatal having 2 orifices at the apex while Type V canal were found in 17 cases and 1 has a single root canal.

Conclusion: Maxillary second premolars in this environment in a Nigerian population had 2 canal orifices in 95% cases. In this study which is highly significant this confirming the belief that race/ethnicity influences morphology of root canals.

Clinical significance: it is compulsory for every clinician to be conscious of extra canals in every root canal treatment carried out.

Keywords: - Root canal treatment, Maxillary second premolar

INTRODUCTION

Root canal treatment when properly carried out nave a high rate of success compared to other dental procedure and a lot of dental procedures are dependent on how much and well a root canal procedure is carried out. A properly carried out RCT make it possible for a tooth otherwise billed for extraction to be retained and serve as a member of a healthy part of the dental arches.

It is compulsory to have a thorough knowledge and understanding of the anatomy of human teeth the pulp shape, size of pulp chambers and the root canal for a successful root canal treatment in order to maintain the integrity of the badly carious and pulpally involved tooth[1].

There is a certain frequency of variation in pulp canals so clinicians generally depend on their clinical experience, radiographs and knowledge to deal with these variations. In order to prevent undesirable consequences including failure complete canal debridement and removal of the pulp of the pulp tissue both in the pulp space and canals is the basis for success if root canal treatment while missed canals and inadequate cleaning and shaping of canals forms the major reason of endodontic failure. Some studies on maxillary second premolar found out that 60% had a single canal while 40% had extra canal[1,2].

The chemo mechanical removal of microorganisms, their substrate and products from the dentine and pulp space with consequent obturation and sealing of the pulp space is the aim of root canal treatment.

It has noted their variation in tooth form occur even though investigators have concentrated their efforts on the systematic description of dental crown morphology so the diverse aspects and variations in root configuration of the root canal. There is a very definite need for clinician to be aware of the frequency of racially determined forms[2,3].

The description of the frequently occurring root and canal forms of permanent teeth are based largely on studies conducted in Europe and North America and this relate to teeth of predominantly Caucasoid origin. Endodontic texts tend not to deal with the racial differences in root morphology or in influences that known racial variation in tooth form may have upon the canal configurations of such teeth[3,4].

Practitioners who regularly treat Mongoloid population are aware that these values do not coincide with their own clinical experience, thus there is the need to study tooth morphology and root form of the non-Caucasoid origin to show the frequency of racially root and canal variations.[4,5]

A study indicated that maxillary second premolars are among the most difficult teeth to be treated due to factors such as number of roots, number of canals, direction and longitudinal depressions of roots, various pulp cavity configuration, as the difficulties encountered in visualizing the limit by radiographs.[5]

The location and treatment of all canals, complete extirpation and debridement shaping and total oburation with an inert filler material is an antidote to root canal failure[2].

The knowledge of internal anatomy, land marks and its relationships to each other is very important before embarking on root canal treatments and related procedures as many challenges encountered during these procedures can be traced to the variation in root canal morphology. For root canal therapy to achieve the purpose which it was done, it is essential that a thorough knowledge and understanding of the root canal morphology is required to locate all existing canal, properly shape and clean all pulp spaces and obturate the canals as several studies have shown that anatomic variation which at times can be complex, do occur in all groups of teeth.

Several variations amongst different groups of teeth have been discovered in tooth morphology presentations and these have been found to be dependent on types of study design (in vivo or invitro[6]) ethnicity[7.8], age[9] and gender[10].

The success of a root canal thereby even when there are extra roots and canals starts with case assessment and it must be carried out in preparation of cavity design, canal access, localization of orifices, cleaning and shaping of the root system, cleaning and shaping of the root canal system. These assessment include careful evaluation of more than one radiograph by varying the horizontal angle at 20^0 and 40^0 for maxillary second premolar. This simple procedure was observed to actually show the number of root canals which coincided with actual numbers of canals present in upper second premolars[11].

However diagnostic measure are not limited to radiographs, other method include using sharp explorer to examine the pulp chamber floor, trouphing of grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, performing the sodium hypochloride champagne bubble test visualizing canal bleeding point[12] and Stropko method of cleaning and drying the pulp chamber floor prior to visualizing the canal system and the use of dental – operating microscope/DOM[13]. Literature search showed that only one study Chima O had been carried out on root canal morphology of maxillary second premolars in Nigerians[14] hence this study is to add to the existing knowledge of root canal and morphology in Nigeria and to see the pattern in the North Eastern part of Nigeria.

MATERIALS AND METHODS

There has been a variation in what is the description of what constitutes the canal but a canal in this study is taken as a canal which can be treated and can reach the apical limit within 1 – 3mm of the apex of the tooth radiographically.

This is a longitudinal study of patients that attended the Dental clinic of University of Maiduguri Teaching Hospital, Maiduguri, Nigeria between July 2007 and June 2015 every patient needing to do RCT on the upper second premolars were selected and treated. The criteria used in determining noted in some studies that in most instance secure pain is usually the cause of patient seeking dental treatment. In all cases patients had sleepless night several times with periods of remission over long period and patient reports to the dental clinic when pain becomes intolerable by which time the patient is either in the stage of acute irreversible pulpits or early state of dentalverlar abscess. Radiography also indicated in all cases pulpal involvement of the carious lesion widening of the periodontal membrane space and / or principal pathology in most cases.

TREATMENT PROTOCOL

1. Proper diagnosis clinically and radiographically
2. Administer 2% Lignoaine Hel containing epirephrine 1:100.000
3. Confirm if anesthesia is achieved
4. Open or enlarge the cavity to expose the pulp chamber
5. Remove the pulp tissue if it is present to expose the floor of the chamber
6. Locate the canal by tactile exploration with a No 10 or 15k file
7. Radiographic confirmation of the canals are made
8. Pulp extirpation carried out using barbed broaches
9. Sizes 15 k files or reamers were placed in the canal to determine working length
10. Manual preparation of the canals done to size 35/40 reamers/files
11. Intermittent copious irrigation done between filling/reaming with 2.5% sodium hypochlorite and normal saline alternately
12. Drying if the canal achieved using paper points.
13. Dressing of the access cavity achieved by CMCP in cotton wool in the floor of the pulp chamber while zinc oxide enganol mixed with a pladget of cotton wool was used to close up the access cavity until the next appointment which was fixed at 5 – 7 days.
14. At the next appointment, dressing is removed, canal were tested or patency, cleaned and canal
15. Steps 11 – 14 repeated until there is absence of pain, tenderness, exudates either in the canals or pulp chamber
16. Oburation is done using AH 26 and gutta percha using either single cone technique or lateral condensation technique under cotton wool isolation.

The design of various studies carried out in the past may be responsible for the variation in result reported. Methods of studying the morphology and root canal systems can either be in-vivo or in-vivo (clinical or laboratory)

The clinical method also varies and this may plain endodontic treatment where there is no magnification, or surgical operating microscope is employed, retrospective evaluation of patient records of teeth that has undergone roots canal treatment, evaluation of radiography examination.

Invitro/Laboratory methods include

1. Various types of clearing studies using decalcification method
2. Decalcification with Indian in the injection
3. Injection of Chinese ink
4. In vitro endodontic access which may include

- In vitro endodontic access + radiography and instrumentation
- In vitro endodontic access + instrumentation alone
- In-vitro radiopaque gel infusion + radiography
- In vitro root canal treatment which may be
- In vitro radiography
- In vitro macroscopic examination
- Scanning election microscopic examination of the pulp floor
- Grinding or sectioning

RESULTS

One hundred and sixty five patients were seen during the study period, seven opted for extraction because of funds seven others were lost maybe because of distance to the hospital, family commitment and other unexplained factors while one was a diabetic with a compromised periodontal status.

One hundred and fifty patients were therefore involved in this study, 120 out of them had only one maxillary second premolar while thirty of them had RCT done on both right and left maxillary second premolars therefore in all eighty teeth were root treated from one hundred and twenty patients.

This study started in July 2007 through June 2015 a period of 96 months and the distribution pattern per year and by gender are as follows.

According to Table 1, 58 teeth were root-treated in males while 122 teeth were root-treated in female which is ratio 1:2 male to female Table 1 while the actual teeth treated were more than ratio (male to female).

The patient were calibrated according to the occupation and working categories were more than students and non-workers initially, it was noted that in the last year of the study, students increase tremendously.

In table 4, categorization into working class, schooling and non-working class reveal that out of the 150 patients, non-working class constituted 4.67%, while student were 30.67% and workers constituted 64.67%.

The distribution of canals radio graphically were classified using Vetucci's canal configuration[1,8]

TYPES1 – A single canal present from the pulp chamber to the apex

TYPE II – Two separate canals leave the pulp chamber and join short of the apex to form one canal

TYPE III – One canal leaves the pulp chamber, divides into two within the root and then merges to exit in one canal

TYPE IV – The separate and distinct canals are present from the pulp chamber to the orifice

TYPE V- single canal leave the pulp chamber but divides into two separate canals with two separate apical foramina

TYPE VI –Two separate canal leave the pulp chamber but join at the mid point and divides again into two separate canal with two separate apical foramina

TYPE VII –One canal leaves the pulp chamber, divides and rejoins within the canal and finally re divide into two distinct canal short of the apex

TYPE VIII- Three separate canal leave the pulp chamber to end up as three separate apical formina.

FIG.1. CLASSIFICATION ACCORDING TO VERTUCCI

FIG.2.SELECTED PERICAL X-RAYS OF ROOT TREATED TEETH

DISCUSSION

This is a pioneer prospective longitudinal study carried out at the Dental Centre of University of Maiduguri Teaching Hospital, Maiduguri, a north eastern state in Nigeria and work and literature search showed that there was one study carried in Nigeria and no study had been carried out in any teaching hospital in Nigeria. This was an in-vivo study of root canal morphology in Nigerians through not deliberate but was a finding that arose during root canals procedures.

This is a longitudinal prospective in-vivo study of root canal treatment carried out on maxillary second premolar of 150 patients without the use of magnifying glass and all the radiographs taken were in- vivo while some studies involves extra oral procedures to determine canal morphology.

162 of those teeth had 2 canals located bucally and palatally having 2 different orifices with separate apical foramina. (Type IV vertucci configuration) accounting for 95% of teeth treated. 17 showed a type V vertucci configuration (3.81%) while I has single canal with one apical foramina (type I vertucci configuration).

Knowledge of root canal anatomy couples with adequate treatment plan use of essential investigations will lead to proper diagnosis and successful endodontics. The variations in canal geometry including the various pathway that root canals take to the apex which is being commonly

reported recently affect the shaping and cleaning method to be adopted which eventually affect the success of enododontic procedures.[15-18]

Root canal morphology has been studied by various method which include clearing + staining with hematoxylin dye[6,7,19], scanning election microscopy,[20] radiography[21], use of dental operating microscope (DOM[13,22-25], sectioning and macroscopic observation[26] computed tomography of spiral computed tomography[27].

Locating the orifice of a canal during clinical treatment is of utmost importance because no matter the geometry seen, for instrumentation to be possible it is essential that the orifices are accessible. There are several method that has been advocated ranging from and probing of the pulp chamber floor with sharp explorer, fine, reamer or file, toughing of grooves with ultra sinic tips, staining of chamber flow with 1% methylene blue dye, sodium hydroclorite champagne bubble test, visualizing canal bleeding point, use of stropko irrigator fitted with 27G notched endodontic irrigating needle and 17% aqueous EDTA and 95% ethanol dental and DOM.

The various configuration of root canal morphology may be difficult to detect clinically as the various method used to detect the variation were ex-vivo while some of the variation may be impossible to negotiate using the instrument available for now. Vertucci in his study demonstrated all of his eight configuration in the (maxillary second premolar, however, noting that specific types of anal morphology appears to be affected or influenced by race. This is seen in a study[28] where black patient were seen to have more than one canal (7.8%) in mandibular second premolars while Asians were reported to have different percentages of canal configuration than those seen in Caucasians and Africans[19].

There are one hundred and fifty patients involved in this study out of which one and twenty had I tooth treated each while had 30 patient two second premolar treated thus the total numbers of second premolar treated amounted to one hundred and eighty. The ratio of female to male increases with the year treatment while the total number of patients treated also increases as the year progresses. The steady increase was a result of a conservative dentistry specialist which was consequent upon the establishment of a dental school thus the dental clinic become established atony specialty lines. The advent of national health insurance scheme which culminated in the university insuring the student under the university scheme and the health care providers extending the NHIS to cover RCT was part of the reason for increased patient treatment 2012-2015.

Forty out of all one hundred and fifty patient had a class I blacks cavity while one hundred and two patients presented with class II cavities on their second premolars. our of the one hundred and eighty premolar teeth fifty two were class I while one hundred and twenty eight were class II cavities. Thirty out of the one hundred and fifty patients had right and left upper 2nd premolars treated for root canal therapy.

Table 2 compared some of the various studies that has been carried out on maxillary second premolars even tough the method of study differs from each other. It is pertinent to note that that this particular study is a clinical study which did not have the benefit of what invitro studies had which includes decalcification and clearing, sectioning and microscopic observations, computer tomography. Spiral or helical computed tomography, stereomicroscopy or direct observation with microscope which are in a new innovation in root canal therapy. These various studies[30,31,34-36] that showed a percentage of between 44-82% of presence of 2 canal at the apex was a combination of the vertucci classification variants of types IV,V VI and VII. Another study[14] conducted on Nigerians showed that 70-732 of maxillary second premolar had 2 root canals most studies conducted in the past showed that had lower figures[5,10,29,32,33] In contrast to all these studies this particular study had 90% of the maxillary second premolar had IV canal configuration, which was higher than the other studies carried out. This study was based in north eastern region of Nigeria and all the patients are of Kanuri/Hausa tribe in Nigeria while only 1.2%showed type (configuration which is a single canal and single orifice at the apex of the tooth.

There were fifty males and one hundred are female involves in the study and none of the teeth involves in this study were lost due to failure of root canal treatment is failure to locate all canals present in tooth (stewart GL evaluation of endodontic procedures, endodontic topics 2005; 10:3-29.

Table III if consideration is given to year on basis, more female are treated more to as patient and the number of root canal treatment carried out were more in females than males which is consistent also with study carried out in Ibadan that showed that more female were treated in the Dental Centre of a Teaching Hospital[29]

The sample of radiograph taken during the procedures are as shown in Fig1 to confirm the clinical finding. Even through the previous study conducted on Nigerians was lower than this study, it however confirmed the ethnic/ racial differences that can occur in the morphology of root canal in premolar teeth.

A case study[38] described a case of a maxillary second premolar to have 3 root canals while another one,

Yet in another study[40] earlier found out that 75% had one root canal, 24% had 2 root canal while only 1% had three root canal.

Out of the total of 217 maxillary second premolar, 120 (55.3%) had one root, 96 had 2 roots (44.2%) and one tooth has three roots (10.46%).

Root canal configuration showed that one canal with one canal with one apical foramen was 13.8%, 2 canals with one apical foramen was 24.9% while 2 canals with 2 apical foramen accounted for 60.8%.

Meanwhile another study[41] in a Saudi population showed single canal to account for 30%, 2 canal 65% and 3 canals 5% and clarified it according to vertucci classification of type IV and V (23%), type I (17%), type III (9%), type II (7%) and type VII (2%).

CONCLUSION

The morphology of root canals and apical orifices of maxillary second premolars in Nigerians showed a higher incidence of type VI vertucci configuration (95%) type V was 3.8% while type I was 1.2% even though the a racial discrepancy may account for this huge difference, the fact that another study conducted in the eastern part of Nigeria may also indicate an ethinc discrerancy in the morphology of root canal pattern.

These variable ninetonic structures are pointers to the fact that clinicians must be aware of complex and variable root canal configuration during endodontic procedures.

References

1. Vertucci Fj. Root Canal anatomy of the human permanent teeth. Oral surgery Oral Med Oral Pathol Oral Radiol Endond. 1984; 58:598-599
2. Stewart G.G. Evaluation of Endodontic results. Dental Clin. North Am 1967; 11:712-22.
3. P.H Ford (ed.) Hartys Endodontics in Clinical practices. 4th ed. Edinbugh: Butterworth Heinemann 1997.
4. Hull TE, Robertson PB, Steinar JC, del Aguila MA. Patterns of Endondentic care for a Washgton J. Endod.2003,29:553-6.
5. Pecora JD, Soussa Neto MD, Saguy PC, Wodfel JB. In vitro study & root canal anatomy of maxilary Second Premolars Braz Dent J. 1992,3:81-5.
6. Awawdeh L, Abdullah H, Al-Oudah A. Roof form and canal morphology of jordanian maxillary first premolars J. Edod. 2008; 34:956-61.
7. Gulabrala K, Aung TH, Alav, A, NgYL. Root and canal morphology of Burmese mandibular molar Int. Endod J.2001,34:359-70.
8. Awawdeh L, Al-Qudah AA. Root form and canal morphology of premolars in a Jordanian population, Int. Endod J. 2008, 41:240-8.
9. Neaverth EJ, Kotler LM, Kattenbach RF Clinical Investigation (in-vivo) of endodontically treated maxillary first molars. J. Endod. 1987; 13:506-12.
10. Sert S, Bayarli GS. Evaluation of the root canal configurations of the mandibular and maxillary permanent teeth by gender in the Turkish population J. Endod. 2004; 30:391-8.
11. Martinez-Lozano, Former – Navani L, Sandez-Cortes JL, Analysis of radiologic factors determining premolar root canal systems. Oral Surg oral med oral Radiol Endod 1999;88:719-222.
12. Nattress BR, Martin DM. predictability of radiographic diagnosis of variations in root canal anatomy of mandibular incisor and premolar teeth. Int. Endod J. 1991; 24:58-62.
13. Stropko JJ. Canal Morphology of maxillary molars, clinical observations of canal configurations. J. Endod. 1990; 25: 446-50.
14. Chima O. Number of root canals of the maxillay second premolars in Nigerians Odontostomatol Trop. 1997; 78: 31-2.
15. Peters OA, Schonenberger K, Laib A. Effects of four Ni-Ti preparation techniques on root canal geometry assessed by microcomputed tonoggraphy Int. Endod J. 2001;34:221-230.
16. Hess W; Zurcher E. The anatomy of root canals of the teeth of the permanent and deciduous dentitions. New York: William Wood & Co. 1925.
17. Weine FS Endodontic Therapy 5th Ed. St. Louis Mosby – Yearbook Inc. 1996:243.
18. Vertucci Fj, Seeling A, Gillis R, Root canal morphology of the human maxillary second premolar. Oral Surg oral Med Oral Pathol Oral Rodiol Endod 1974; 38: 450-464.
19. Frank J. Vertucci Root Canal Morphology and its relationship to endodontic procedures. Endodontic Topics 2005;10: 3-29.
20. Vertucci FJ. Anthony RL. A scanning electron microscopic investigation of accessory foramina in the furaction and pulp chamber floor of molar teeth Oral Med. Oral Surg Oral Pathol oral Radiol Endo 1986; 62:319-326.
21. Wittershausen B, Tekyatan H, Kusaj A, Marroquin BB. Roentgenographic in vitro investigation of frequency and location of ciurvatures in human maxillary premolars J. Endod 2006;32:307-311.
22. Baldassari-Gruz LA, Lilly JP, Rivera EM. The influence of dental operating microscopes in locating the mesiolingual canal orifices. Oral Surg oral Med. Oral Pattol oral Radiol Endod 2002;93:190-194.
23. Coelho de Carvalho MC, Zuolo ML. Orifice locating with a microscope J. Endod 2002; 26: 532-4.
24. Gorduysus MO, Gorduysus M, Friedman S. Operating microscope improves negotiation of second mesiobuccal canals in maxillary molars J. Endod 2001; 27:683-6.
25. Shwarzee T, Bathge C, Steher T, Geurtsen W. Identification of second canals in the mesiobuccal root of maxillary first and second molars using magnifying loupes or an operating microscope Aust Endod J. 2002; 28:57-60.
26. LuTY, Yang SF, Pai SF, Complicated root canal morphology of mandibilar first premolar in a Chinese population using the cross-section method J. Endod 2006; 32: 932-6 (PubMed).
27. Renben J, Velmurugan N, Kandaswamy D. The evaluation of root canal morphology of the mandibular first molar in an Indian population using spinal computed tomography scan: An in vitro study.J. Endod.2008;34:121-249 (PubMed).
28. Trope M, Elfenbein L, Tronstad L. Mandibular premolars with more than one root canal in different race groups J.Endod 1986;12:343-5.
29. A. O. Olaleye, Gender Distribution of Amalgam restoration and treatment pattern in regular attendees of a Teaching Hospital in Nigeria in World Journal of Dentistry, 2014;5(2):109-112.

30. Caliskon MK, Pehiliven Y, Sepeticioglu F, Turkun M, Tuncerr S. Root canal morphology of human permanent teeth in a Turkish population. J. Endod. 1995; 21:200-4.

31. Kartal, N, Ozselik B, Cimilli H. Root canal morphology of maxillary premolars. J. Endod 1998;24:417-9.

32. Wing XL, Yu SB, Zhao SL, Wang HG, Mu T, Tang RY. Root canal morphology of permanent maxillary teeth in the Han nationally in Chinese Guanzhong area: A new modified root canal staining technique. J. Endod. 2009; 35:651-6.

33. Jayasimha Raj. U, Mylswamy S. Root canal morphology of maxillary second premolars in an Indians population J. Conserv Dent. 2010 Jul-Sept; 13(3): 148-151.

34. Pineda F, Kuttler Y. Mesiodistal and buccolingual roentgeno-graphic investigation of 7,275 root canals. Oral Surg Oral med. Oral pathol 1972; 33:101-10.

35. Bellizi R, hartwell G. Radiographic evaluation of root canal anatomy in vivo Endodontically treated maxillary premolars J. Endod. 1985; 11:37-9.

36. Khuram PS, Khokhar HN, Siddiqui MI. Frequency of two canals in maxillary second premolars tooth J. Coll. Physicians Surg Pak 2007; 17:12-14.

37. Rozylo TK, Miazek M, Kalinowska RI, Burdan F. Morphology of root canals in adult premolar teeth. Folia Morphol (Warsz) 2008;67:280-5.

38. Almedia-Gomez FD, De Souza BC, De Souza FD, Dos Santos RA, Ferreira RA. Three root canals in maxillary premolars. Indian J. Dent. Res 2009; 20:241-2

39. Elkady A, Allouba K. Cone bean computed tomographic analysis of root canal morphology of maxillary premolars in Saudi Sub-population. Egypt Dent J. 2013;59:3419-29.

40. MMF Al-Ghananeem, Khattar Haddadin, Abeer Salem Al-khreisat, Moenn Al-weshah, Nidal Al Habahbeh. The number of roots and canals in the maxillary second premolars in a group of Jordanian population. INV. J Dent. 2014; Article ID: 767692.

41. Mutasim Elnour, Abdul Khabeer, Emad Alshwaimi. Evaluation of root canal morphology of maxillary second premolars in a Saudi Subpopulation: An in-vitro micro computed tomography study. Saudi Dent J. 2016; Oct 28(4): 162-168.

TABLE 1: GENDER DISTRIBUTION

Year	Male	Female	Total
2007 July – June 2008	2	7	9
2008 July – June 2009	2	12	14
2009 July – June 2010	1	4	5
2010 July – June 2011	1	5	6
2011 July – June 2012	5	9	14
2012 July – June 2013	8	13	21
2013 July – June 2014	13	21	34
2014 July – June 2015	18	29	47
	50	**100**	**150**

TABLE 2 The result was categorized into different classes of occupation

Year	Schooling (student)	Working Class	Non-working class	Total
2007 July – June 2008	1	7	1	9
2008 July – June 2009	2	12	-	14
2009 July – June 2010	1	4	-	5
2010 July – June 2011	-	06	-	6
2011 July – June 2012	2	10	2	14
2012 July – June 2013	5	14	2	21
2013 July – June 2014	10	23	1	47
2014 July – June 2015	25	21	1	47
	46	**97**	**07**	**150**

TABLE 3 Distribution of Treated Teeth According to Gender

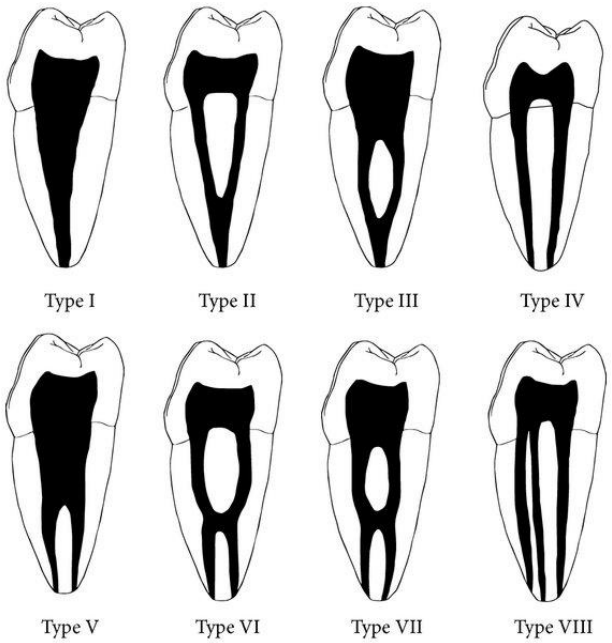
Year	Male	Female	Total
2007 July – June 2008	2	9	11
2008 July – June 2009	2	14	16
2009 July – June 2010	2	5	7
2010 July – June 2011	2	5	7
2011 July – June 2012	7	11	18
2012 July – June 2013	11	16	27
2013 July – June 2014	14	24	38
2014 July – June 2015	18	38	56
	58	**122**	**180**

TABLE 4 GENDER CLASSIFICATION IN RELATION TO OCCUPATION

	WORKING CLASS		NON WORKING CLASS		SCHOOLING		TOTAL
	M	F	M	F	M	F	
2007/2008	2	5	-	1	-	1	9
2008/2009	2	10	-	-	-	2	14
2009/2010	1	3	-	-	-	1	05
2010/2011	1	5	-	-	-	-	6
2011/2012	5	5	-	2	-	2	14
2012/2013	8	6	-	2	-	5	21
2013/2014	9	14	-	1	4	6	34
2014/2015	10	11	1	-	7	18	47
	38	**59**	**1**	**6**	**11**	**35**	**150**
	97 (64.67%)		**07 (4.67%)**		**46 (30.67%)**		**100%**

PERCENTAGE OF ROOT CANAL OF MAXILARY 2nd PREMOLARS IN VARIOUS STUDIES

Authors	Year of publication	No of teeth	% of 1 canal	% of 2 canals	3 canals
Pineda and kutler[33]	1972	282	81.8	182	0
Vertucci[1]	1974	100	75	24	1.0
Bellizi and Hartwell[34]	1985	630	40.3	58.6	1.17
Pecora et al[5]	1992	300	67.3	32.4	0.3
Caliskan et al[29]	1995	100	72	28	0
Chima Okorie[14]	1997	200*	64.1%	35.4%	0 0
Kartal et al[30]	1998	300	55	44.4	0.6
Sert and Bayirili[10]	2004	200		48 24	1 3
Khuram et al[35]	2007	100**	M = 37 F=47	63 53	0 0
Rozylo et al[36]	2008	56	14.7	85.3	0
Weng et al[31]	2009	65	27.7	72.3	0
Jayasimha et al[32]	2010	200	64.1	35.4	0
This study	2013	80	1.25	98.75	0
Mustamin Elnour et al	2016	100	30%	65%	5%
Elkady et al	2013		96%	24%	
Muna M.F Al-Ghananecm et al	2014	217	38.7%	60.8%	



Diagrammatic representation of Vertucci's Canal Configuration[19]