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Assessment of Relation Of Mandibular Nerve To Bucco-Lingual Cortexandalso Its Position With in The Bone Using Cbct – Aretrospective study of 108 Cases.

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ABSTRACT

To assess the relation of inferior alveolar nerve canal to bucco-lingual cortex near third molar region, position of mandibular canalwithin the bone and type of impaction using CBCT using samplesizeof108cases.ThisCBCTstudyassessedthattheinferioralveolarnervecanalisfoundtobemorelingualnearthethirdmolarregionandthereexistsasignificantassociationbetweentype of impaction and position of mandibular canal. Most commonposition of mandibular canal is separate type. This CBCT study isconsideredtobeimportantwhileperformingminororalsurgeriesinthethirdmolarregion.

KEYWORDS: CBCT,MandibularThirdmolar(ML3),MandibularCanal(MC),Inferior AlveolarNerve(IAN)

INTRODUCTION

The Inferior Alveolar Canal is an important and necessary landmark thatshouldbenotedbeforeanysurgeryintheposteriorregionofthemandible. The neurovascular bundle may be vulnerable during surgicalprocedures involving the mandible and may even injure lingual cortexwhileplacing implants.Commonsurgicalproceduresthatareperformedincloseproximitytotheneurovascularbundleincludethefollowing:Extractionofthirdmolar,Placementofintraosseousimplants,Placementofscrews,Bilateralsag

ittalsplitosteotomy,Boneharvestingfromthechin,Genioplastyinorthognathicsurgery,BodyOsteotomy,DistractionOsteogenesis,Massetrichypertrophy,NerveLateralisation.(2)

Interestingly, the most commonly affected nerve is the mandibular nerve(ie, reports indicate up to 64.4% of complications are related to thisnerve),followedbythelingualnerve.Encroachmentintothisvitalstructure is a most unpleasant experience for both the patient and thedentist.Complications,suchaschangesinsensation,numbness,pain,andexcessive bleeding, can affect the patient's overall quality of life. Theiatrogenicnatureofthisconditionsignificantlyincreasesthepsychologicaleffects relatedto thisdamage (2)

CBCT(conebeamcomputedtomography)isarecenttechnologyinitially developed for angiography in 1982 and subsequently applied tomaxillofacialimaging.CBCTscanstoinvestigatetheMandibularCanal(MC)locationbelowmandibularposteriorrootapices,thethicknessofthebuccalandlingualboneovertheMC,thediameterofthe MC, and the anterior loop (AL) location (if present) and size near thementalforamen,allofwhichaddtoaknowledgebasefordentalpractitionerThe assessment of the location of the mandibular canal and its relationwith adjacent structures as well as the angulation of the alveolar crestand,inparticular,thebonevolume,isoftenaprerequisiteforanappropriateplanning.Hence,theradiographicexaminationhasto,includecross-sectionaltomography.Severalstudiesreportsthefrequencyofpostoperative IANinjuryrangesfrom0.4%to8%, withlessthan 1% reportingpermanentnumbness.

However, the probability of injury could be more than 10% in higher-riskindividuals.Clinicalstudieshaveinvestigatedtheriskfactorsrelated to IAN injury, such as age, sex, the depth of impaction, andangulation. It has also been reported that the proximity of the LowerMandibularMolartotheInferioralveolarcanal(IAC),therelativeposition between the IAC and the roots of the LM3, and the position andshapeoftheIACinthecoronalplaneonconebeamcomputedtomography(CBCT)areimportantfactorstoavoidIANinjuries.

Surgical Anatomy:

Classificationofthemandibularcanalpositionwithinthebonemarrowspace:

Thewidthofthebuccalsidebonemarrowspaceateachsitecouldbeclassifiedinto threetypes:

1. Separatetypewiththebonemarrowspacevisible

2. Contacttypewiththeoutersurfaceofthecanalandinnersurfaceofthebuccalcorticalbonein contact

3. Fusiontypewiththeoutercorticalplateofthecanalnotevident

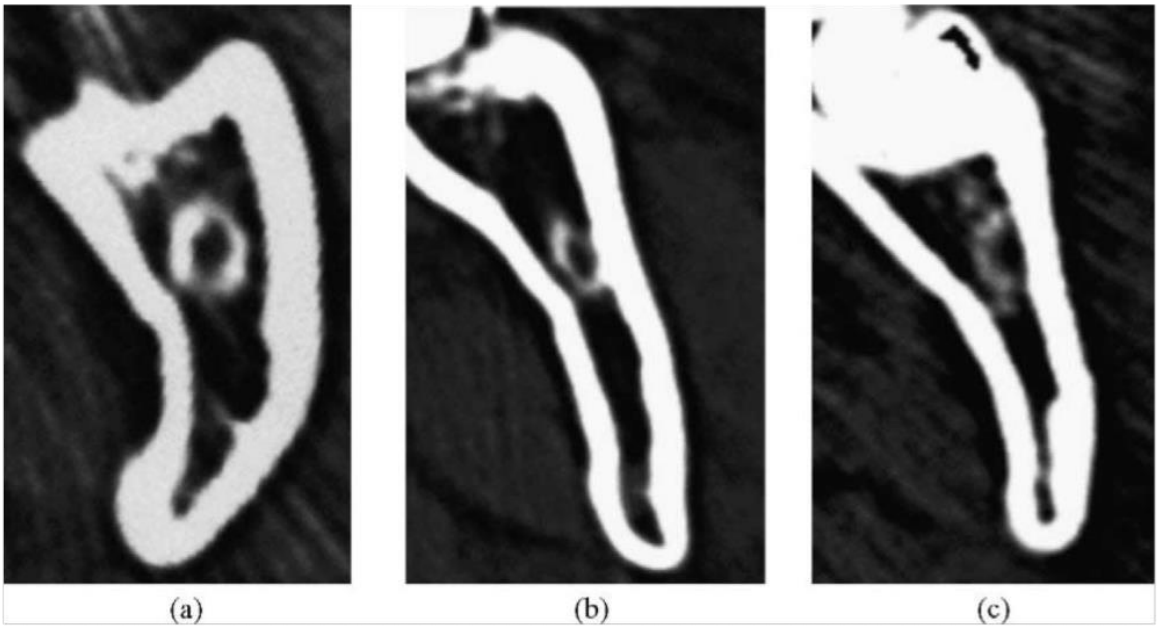
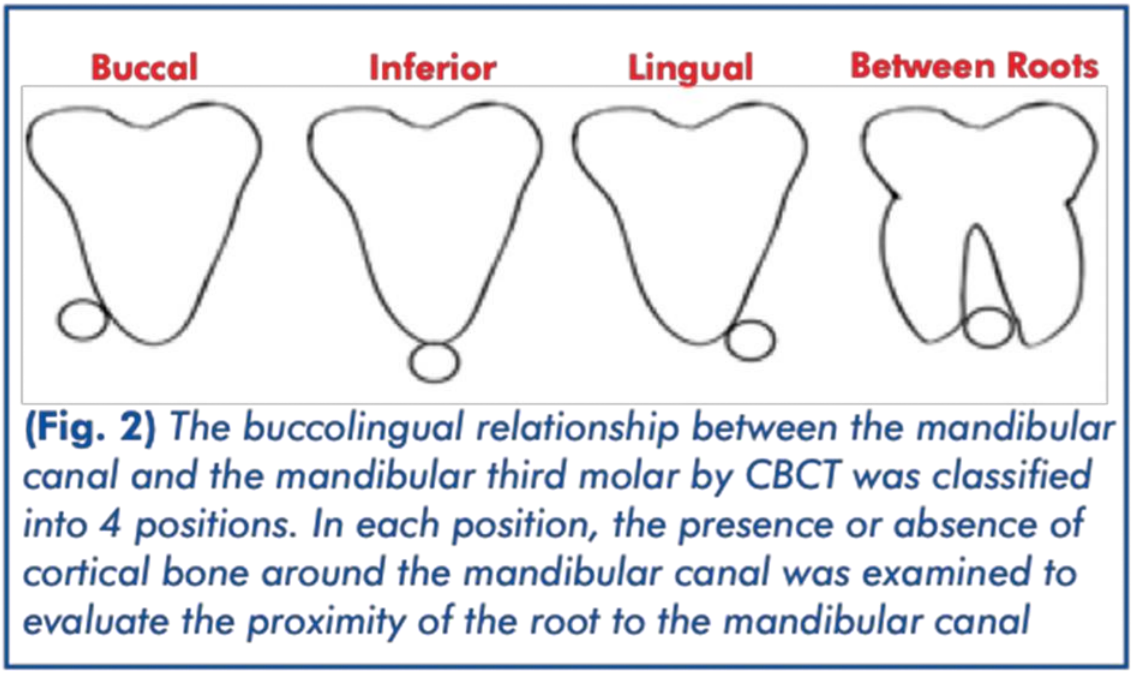


Fig. 6. Classification of the position of the mandibular canal within the bone. (a) Separate type, bone marrow space evident; (b) contact type, outer surface of the canal and inner surface of buccal cortical bone in contact; and (c) fusion type, outer cortical plate of the canal not evident.

Relationship of Mandibular Canal to the Third Mandibular Molar



(Fig. 2) *The buccolingual relationship between the mandibular canal and the mandibular third molar by CBCT was classified into 4 positions. In each position, the presence or absence of cortical bone around the mandibular canal was examined to evaluate the proximity of the root to the mandibular canal*

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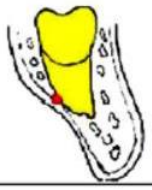
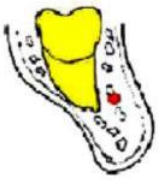
RelationshipofMandibularCanaltotheThirdMandibularMolar

	Lingual	Interradicular	Buccal	Inferior
Contact: NO bone tissue between mandibular canal and third molar				
No Contact: bone tissue between mandibular canal and third molar				

Schematic CBCT Evaluation Of Proximity Of Impacted Third Mandibular Molar to Mandibular Molar

ThestudywasconductedatDepartmentofOral&Maxillofacialsurgery, Thai Moogambigai Dental College and Hospital, Chennai –600037.ModernLab&X-rays,EastMoggapair,Chennai.

The study protocol was approved by the Institutional Ethical Committee.A total of 108 mandibular CBCT were obtained and assessed in thisstudy.All were in the age group of 16 to 46 years (mean age = 31years)ofeithergender.Designofthestudyisaretrospectivestudy.

DISCUSSION

Impaction is the cessation of eruption of a tooth caused by a physicalbarrier or ectopic positioning of a tooth. Dental impactions have beenreported to affect as many as 25-50 per cent of the population with thethirdmolarsandmaxillarycaninesbearingthehighestincidence(50).

Inourstudy,216impactedmandibularthirdmolarswereassessedaccordingtoangulation(Winter'sclassification)intofourgroupsnamelymesioangular, distoangular, vertical, and horizontal depending upon thelong axis of third molar in relation to the long axis of second molar [52] inCBCT images and it was found that most common was mesioangulartype(66.3%),followedbyvertical(13.8%),horizontal(10.6%),and Distoangular(9.3%)(Fig1).

Previous studies evaluated the prevalence of neurosensory disturbanceaccordingtothepresenceorabsenceofmarrowspacebetweenthemandibular canal and the external cortical bone. They found that themandibular canal came into contact with the external cortical bone in 10outof40.Theseparatetypewasmostprevalentinourstudy(n1⁄4255of 280, 91.1%), followed by the contact and fusion types. Twenty-fiveout of 280 scans (the majority sited at MP or MA) showed no bonemarrowspaceon thebuccalside.

Inourstudythedistanceofinferioralveolarcanaltothebuccalboneis
0.68mmandthedistancebetweenmandibularcanaltolingualboneis
0.58mm.

CBCTimagesshowedthattheinferioralveolarnervedescendsdownwards from the mandibular foramen and the course of the inferioralveolar nerve progress more lingually near the third molar region, andnear the second molar region more centrally and near the first molarregion the nerve courses towards the buccal bone and while reaching thepremolar region the nerve further progress more Bucally and exits outthroughthementalforamenin buccalbone.

CONCLUSION:

In conclusion, The Vertical sections of CBCT showed three types ofmandibular canal position within the bone - Contact type - 33 (14%),Fused- 14 (6.4%) , Separate- 169 (80.6%).The mean distance of the Mandibular canal to the buccal bone is 0.68mm and the mean distance of the mandibular canal to the lingual bone is0.58mm.In this study, frequency of mesioangular impaction is 66.3%, Vertical is13.8%,Horizontalis 10.6%and Distoangular is9.3%.This study can guide oral surgeons and can be applied to evaluate andpredict the relationship between the IMTM and the IAC before surgeriessuch as Extraction of third molar, Placement of intraosseous implants,Placement of screws, Bilateral sagittal split osteotomy, Bone harvestingfrom the chin, Genioplasty in orthognathic surgery, Body Osteotomy,DistractionOsteogenesis,Nervelateralisation,Massetrichypertrophy.

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