METRICAL ANALYSES OF THE LOCATION OF THE MANDIBULAR CANAL USING CBCT

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Saif Yousif Abdullah

1st of July 2011

DECLARATION

I certify that this research report is based on my own independent work, except where acknowledged in the text or by reference. No part of this work has been submitted for degree or diploma to this or any other university.

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ABSTRACT

Introduction: The increased neurosensory disturbances and hemorrhage after surgical intervention in the mandibular canal region increased the demand for presurgical planning and proper assessment to avoid those complications.

Aims: Determine the path and course of the mandibular canal of dentate Malaysian patients, mandibular canal diameter, mandibular foramen diameter and the incidence of bifid canal using the Cone Beam Computed Tomography (CBCT).

Materials and Methods: The subjects for this study included imaging of 60 patients (30 males and 30 females) from the Division of Oral radiology, with ages ranging from 20 to 60 years (mean age, 47 years). The samples were selected according to gender, race and age groups. The position of the mandibular canal and mandibular canal diameter were measured at five different locations. Linear measurements were done in the coronal view just posterior to the mental foramen at 10 mm interval (D1, D2, D3, D4 and D5). Mandibular foramen diameter and incidence of bifid mandibular canal were also recorded. The samples were imaged using CBCT and SimPlant software and data analyzed through SPSS (v.12).

Results: In this study the mandibular canal was identified in all samples with 100% good visibility. The measured data were expressed as minimum, maximum, median, K-S value and mean ± standard deviation. The results showed that the position of the right mandibular canal is similar to the position on the left side of the jaw.

Apicocoronal position of the mandibular canal showed that the superior measurements were 14.85 ± 3.64 mm at D1, 13.94 ± 3.85 mm at D2, 12.99 ± 4.08 mm at D3 and 14.22 ± 1.52 mm at D4. The inferior measurements of the canal was 9.37 ± 1.69 mm at D1, 8.24 ±

1.69 mm at D2, 7.96 ± 1.93 mm at D3, 9.65 ± 2.54 at D4 and 15.21 ± 4.18 mm at D5. The buccolingual position were 3.89 ± 1.00 mm (buccal) and 4.33 ± 1.25 mm (lingual), 5.59 ± 1.20 mm (buccal) and 3.35 ± 1.20 mm (lingual), 6.71 ± 1.34 mm (buccal) and 3.25 ± 1.32 mm (lingual), 5.68 ± 1.63 mm (buccal) and 3.08 ± 1.46 mm (lingual), 4.24 ± 1.59 mm (buccal) and 2.12 ± 1.40 mm (lingual) at D1,D2,D3,D4 and D5 respectively.

The minimum mandibular canal diameter recorded was 2.00 mm and the maximum was 3.40 mm. In this study the average mean was 2.16 ± 0.30 mm with the least mean diameter at D2 location (2.01 ± 0.42 mm) and the largest mean diameter at D1 (2.25 ± 0.47 mm) and D5 (2.25 ± 0.43 mm). The average mandibular formamen diameter was measured to be 2.55 ±0.43 mm.

The incidence of bifid mandibular canal was greatest in Malays (n=18), followed by Indians (n=9), while no bifid canal was noticed in the Chinese.

Conclusion: Position of the canal changes due to changes in the mandibular bone. Measurements showed that the mandibular canal curves toward the lingual side the more distal it is away from the mental foramen. Apicocoronal assessment of the canal reveals that it is curving downward towards the inferior mandibular border until D3 and then it curves upwards. This CBCT study reveals there are variations in the position of the mandibular canal. It is highly recommended that careful assessment and planning using computed tomographic imaging is done prior to any surgical intervention in the mandibular canal region to avoid untoward complications.

Keywords: Cone Beam Computed Tomography (CBCT), Mandibular Canal, Inferior Alveolar Nerve (IAN), Simplant Software, Malaysian Population, Indian, Chinese, Malays

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LIST OF SYMBOLS AND ABBREVIATIONS

IAN	Inferior alveolar nerve
CBCT	Cone Beam Computed Tomography
MC	Mandibular canal
MF	Mandibular foramen
B	Buccal
L	Lingual
I	Inferior
S	Superior
BSSO	Bilateral sagital split osteotomy
CT	Computed Tomography
MPR	Multiplanar Reconstruction
D1	The location of the mandibular canal at the distal aspect of mental foramen
D2	The location of the mandibular canal at 10 mm away from D1 distally
D3	The location of the mandibular canal at 10 mm away from D2 distally
D4	The location of the mandibular canal at 10 mm away from D3 distally
D5	The location of the mandibular canal at 10 mm away from D4 distally
MCd	The mandibular canal diameter measurements
ManFd	The mandibular foramen diameter measurements
2D	Two dimensional
3D	Three dimensional
SCT	spiral computerized tomography
HR-CT	High resolution computed tomography
HR-MRI	High resolution magnetic resonance imaging
IMB	Inferior mandibular border
LC	Virtual horizontal line touching the highest buccal point of the alveolar crest