International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2018): 7.426

Lingual Vascular Canal: How Far or How Close is it?

C. S. Vane Swetah[1], Dr. Suresh V[2]

[1]Graduate, Saveetha Dental College, Poonamalle High Road, Chennai, India
[2]Reader, Department of Prosthodontics, Saveetha Dental College, Chennai, India

Abstract: ***Research Title: Lingual vascular canal - How far or how close is it? Research question: What is the distance of the lingual vascular canal from the crestal bone, the labial bone and the deviations, if present, from the midline? Aim: To assess the variations in the dimensions from the crestal and the cortical bone to a lesser known lingual vascular canal in the anterior mandible region. Objective: To evaluate the distance of the lingual vascular canal from the crestal bone, the labial bone and the deviations from the midline for implant planning. Materials and Methods: Total sample of 55 CBCT scans were collected out of which 10 showed lingual vascular canal with anterior teeth missing and were subjected to radiological evaluation. The anatomical position of lingual vascular canal to the crestal bone and labial cortical bone along with deviations from the midline were assessed in the cross sectional view. The mean value of the results were obtained and tabulated. Results: The average distance from crestal bone was found to be 14.05 mm and the average distance from labial bone was found to be 5.7mm. The average deviation from the midline was found to be 2 mm towards either the left or the right side.***

Keywords: Lingual vascular canal, crestal bone, labial bone, midline deviation

1. Introduction

The anterior region of the mandible is one of the common regions subjected to surgical procedure. Due to it being a part of the aesthetic zone, care must be taken to given to deliver the most appropriate form of treatment. Dental implants are a new and fast upcoming mode of comprehensive treatment plan for rehabilitation for edentulous patient. A thorough assessment, which includes radiographic evaluation and systemic evaluation, is a compulsory prerequisite for treatment planning.

There are several radiographic methods used for treatment planning. However the use of Cone beam computed tomography is the most preferred and accurate till date [1]. The CBCT helps in visualising the anatomical regions on a three dimensional plane. It shows a detailed assessment of all the bony structures.

Despite having a high success rate, there are several possible complications such as haemorrhage, neural disturbances and Implant failures which can occurs due to placement of implant in resorbed arches [1].

One of the most common complications in the lower anterior region is injury to the lingual vascular canal [2]. Because of the presence of neural as well as vascular components, the implication of canal impingement is high. The vascular canal creeps much closer to the ridge upon resorption and therefore careful Implant length must be selected for a long lasting Implant.

Considering the importance of this region, the present study was conducted to assess the distance of crestal and labial bone from the lingual canal and its deviation from the midline.

2. Materials and Methods

55 CBCT scans were collected from Saveetha dental college in Chennai, India and a retrospective analysis was done. Permission for the collection scans was acquired from the department of Oral medicine and Radiology. Scans of patients with lower anterior teeth missing were selected for this study, which included recently extracted as well as completely edentulous patients.

The CBCT's with lingual vascular canal clearly mapped were 10. The scans were analysed in GALAXIS Galileos implant software. The distances from the labial and crestal bone were assessed, followed by any deviation in the midline.

The mean value of the results were obtained and tabulated.

Inclusion Criteria:

1. Completely Edentulous or partially edentulous patients of Indian ethnicity between ages of 20 and60 years.
2. Healthy and medically compromised patients were included.

Exclusion Criteria:

1. Patients with any history or trauma or mandibular pathologies
2. Patients of non- Indian ethnicity
3. CBCTs which appear distorted or blurred to due incorrect patient positioning.

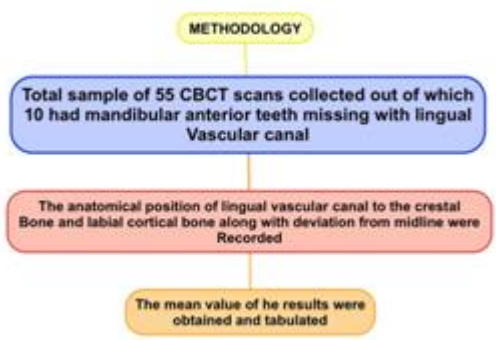

Figure 1: Mind map of the methodology

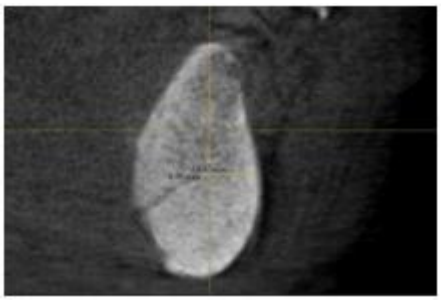

Figure 2: Scan showing the lingual vascular canal and the distance from the lingual and cortical bone

3. Results

The study included 5 male and 5 female patients. The lingual vascular canal was found in the axial images of the scan.

The average distance from the crestal bone was found to be 14.05 mm and the distance from the labial bone was found to be 5.7 mm.

The average deviation from the midline was seen with a shift of 2mm either to the right or left side.

Table 1: Results

Average distance from crestal bone	Average distance from labial bone	Average deviation from midline
14.05mm	5.7mm	2mm

4. Discussion

The mandibular anterior region is greatly used for several procedures such as oral implants for edentulous arches or even as a viable donor site for several procedures. Thus, it is necessary to understand the anatomy of the neurovascular bundle in that region for a holistic treatment approach [3]. The extent of the neurovascular bundles present implies a higher potential risk during surgical procedures. With an increase in complications associated with trauma to vascular canal, this study was undertaken to identify the positions of canal from the surrounding bone to help prevent such complications.

The lingual vascular canal is a common structure often undetected in the mandible. Several researchers such as Ennis, Suzuki and Sakai, McDonnell et al., Darriba and Mendonca-Cardad and Givol assumed that the content in the vascular lingual canal is an anastomosis of the sublingual branch of left and right lingual arteries [4, 5, 6, 7, 8]. This implies that the size of the artery could be sufficient enough to provoke a haemorrhageintraosseously or in connective tissue which will be hard to control. This view is in contrast to Goaz and white who stated that the canal were termination of the incisalbranch of the mandibular canal [9].

CBCT and CT scans are the gold standard for visualisation of the lingual canal as stated by Yoshida et al, who stated the difficulties of radiographic evaluation of the canal [10]. CT is important tool for visualising accurate anatomical structure and position, bone topography, osseous pathology associated with dental implantology. [11]. Another option for visualisation in the MPR of multiple aliases reformation. It provides an accurate visualisation of midline mandibular structures depicting the size and shape of the lingual vascular canal which correlates to the anatomic literature. [12, 13, 14]. The difference is due to the limited resolution capacity of the CT as compared to a MPR.

In several studies, the lingual canal was found in the midline. According to McDonnell et al., lingual foramen was present in 99% in midline of mandible [6]. In the study found by Jaju and Jaju, [2] the most common location found for this vascular canal was in midline of the mandible with 75%.

As per Jaju and Jaju [2], the mean distance of the canal measured from the inferior border of mandible was 0.56 mm. The mean distance in males was 0.64 mm while for females it was 0.45 mm. The longest canal distance was 16.9 mm while the shortest distance was 1.5 mm. The largest diameter of vessel noted was 1.6 mm while the smallest vessel diameter was 0.01 mm. The mean diameter of the vessel was 0.31 mm. The mean diameter for males and females was 0.36 mm. There was no significant correlation found between different age groups and sexes with respect to frequency, number, and size of the canal. Where as Gultekin et al, revealed a mean diameter of lingual canal as 0.8 mm±0.2 mm in the middle [15].

Cova et al., found that 0-5 canals were found in individual patients. [16] whereas Scaravilli et al., found that the 90.3% had at least one lingual vascular canal and 45.6% had multiple (up to) canals [17].

There were no literature studies with the measurement of lingual and cortical bone distance for further evaluation or comparison.

Age related changes and osteoporotic factors can influence the canals position. The ossification around the canal can reduce which in turn can reduce visibility of canal during radiographic evaluation. Additionally, the structures are based on quality of the radiographs which will vary. With age based resorption, the lingual vascular canal can creep closer to the ridge which makes Implant length selection an important process to avoid complications.

The difference in results could be due to difference in machines, protocols and observer variability, which should be taken into account.

Further studies should focus more on clinical and radiological variations of the lingual vascular canal and their involve the in complications to provide a better standard of treatment.

5. Conclusion

With an increase in trend in the placement of dental implants, there is an increase in post operative complications as well. Damage to the lingual vascular canal is one such complication which can lead to haemorrhage and Implant failure. However, with the use of cone beam computed tomography and CT scans, we can visualise the jaw anatomy with great accuracy and thereby reducing any post operative complications which arises due to poor mandibular Anatomy and poor treatment planning.

References

[1] Kumar V, Satheesh K. Application of Cone Beam Computed Tomography (CBCT) in implant treatment planning. JSM Dent 2013;1:1-8.
[2] Jaju P, Jaju S. Lingual vascular canal assessment by dental computed tomography: A retrospective study. Indian J Dent Res 2011;22:232-6
[3] Parnia F, Moslehifard E, Hafezeqoran A, Mahboub F, Mojaver-Kahnamoui H. Characteristics of anatomical landmarks in the mandibular interforaminal region: A cone-beam computed tomography study. Med Oral Patol Oral Cir Bucal 2012; 17:e420-5.
[4] Liang X, Jacobs R, Lambrichts I, Vandewalle G, van Oostveldt D, Schepers E, et al. Microanatomical and histological assessment of the content of superior genial spinal foramen and its bony canal. Dentomaxillofac Radiol 2005;34:362-8.
[5] Suzuki M, Sakai T. The foramina on the lingual surface of the mandible in the Japanese. Med J ShinahuUniv 1957;2:1-10.
[6] Mc Donnell D, Reza Nouri M, Todd ME. The mandibular lingual foramen: A consistent arterial foramen in the middle of the mandible. J Anat 1994;184:363-9.
[7] Ennis LM. Roentengraphic variations of the maxillary sinus and the nutrient canals of the maxilla and mandible. Int J Orthod Oral Surg 1937;23:173-93.
[8] Darriba MA, Mendonca-Cardad JJ. Profuse bleeding and life threatening airway obstruction after placement of mandibular dental implants. Int J Oral MaxillofacSurg 1997;55:1328-30.
[9] White SC, Pharoah MJ. Oral radiology: Principles and interpretation. 5th ed. Toronto: CV Mosby: Year Book Inc; 2004. p. 181-2.
[10] Yoshida S, Kawai T, Okustu K, Yosue T, Takamori H, Sunohara M, et al. The appearance of foramen in the internal aspect of mental region of mandible from Japanese cadavers and dry skulls under macroscopic observation and three dimensional CT images. Okajimas Folia Anat Jpn 2005;82:83-7.
[11] Rothmall SL, Chafetz N, Rhodes ML, Schwartz MS. CT in the preoperative assessment of the mandible and maxilla for endosseous implant surgery. Radiology 1988;168:171-5.
[12] DuBrul EL. Sicher's oral anatomy. 7th ed. St Louis: Mosby; 1980. p. 427-47.
[13] Schiller W, Wiswell O. Lingual foramina of the mandible. Anat Rec 1954;119:387-90.
[14] Andre G, Ursula H, Gabor T, Michael P, Susanne S, Konstantin Z, et al. Lingual Vascular Canals of the Mandible: Evaluation with Dental CT. Radiology 2001;220:186-9.
[15] Gultekin S, Araç M, Celik H, Karaosmaoglu AD, Iºik S. Assessment of mandibular vascular canals by dental CT. Tani Girisim Radyol 2003;9:188-91.
[16] Cova M, Ukmar M, Bole T, Morra A, Lubin E, Pozzi Mucelli R. Evaluation of lingual vascular canals of the mandible with computed tomography. Radiol Med 2003;106:391-8.
[17] Scaravilli MS, Mariniello M, Sammartino G. Mandibular lingual vascular canals (MLVC): Evaluation on dental CTs of a case series. Eur J Radiol 2010;76:173-6