Anterior Loop Length of the Inferior Alveolar Nerve to Estimate Safe-Zone for Implant-planning in Malaysian-Chinese Population

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Introduction

The anterior loop (AnL) of the inferior alveolar nerve (IAN) is an important clinical landmark in implant dentistry as it may be injured during implant placement.

Methodology

A total of 244 cone-beam computed tomography (CBCT)-Digital Imaging and Communications in Medicine (DICOM) files were chosen through simple random sampling from the pool of ongoing or completed cases in the Oral Health Centre at the International Medical University in Malaysia.

Inclusion criteria (Fig. 1):

- Dentulous, partially or fully edentulous Malaysian-Chinese patients between the ages 18 and 80.
- Medically fit, medically compromised, and previously irradiated patients but not involving the interfornamental region.
- Patients with a history of surgical intervention to the interfornamental region such as orthognathic surgery or chin graft harvesting procedures.
- Distorted or blurred CBCT images.

Exclusion criteria (Fig. 1):

- Patients with congenital or developmental anomalies, any syndrome affecting the mandible, history of trauma, or pathology in the mandible such as cysts and tumours.
- Patients with a history of surgical intervention to the interfornamental region such as orthognathic surgery or chin graft harvesting procedures.

The purpose of this retrospective study was to measure the prevalence of the AnL in the left and estimate side-, gender-, and age-related variations in AnL in the Malaysian-Chinese population.

In full-arch implant-supported fixed prosthesis, the AnL of the IAN limits the placement of implants in the mental foramen area by being a determining factor in minimising the distal cantilever length. \(^1\)

All images were interpreted by the same observer, and 12 images were randomly selected to be reviewed again 2 weeks later to ensure intra- and inter-examiner reliability with a minimum Cronbach’s alpha value of 0.8 achieved (Fig. 3).

The IAN was traced and highlighted to identify its route throughout the mandible until it exited the mental foramen in the i-CAT software (Figs. 4, 5 and 6). Data collected were:

A) Existence of the AnL of the IAN.
B) Average AnLL on the left and right side of the mandible.

This study measured the actual AnLL along its long axis which was oriented diagonally in the mandible as shown in Fig. 7.1

The mean AnLL was found to be greater in this present study when compared to the study done by Wong and Patil,\(^2\) which had a smaller sample size (n=34) of Malaysian-Chinese.

Both the AnLL and mesiodistal spread of AnL of the IAN can directly suggest the safety limit near the mental foramen in the horizontal and vertical direction by using the mental foramen as a reference point.

This could be an appropriate clinical recommendation in radiographic evaluation, especially when surgeons do not have access to CBCT.

Discussion

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Conclusion

There were no significant differences when comparing the mean AnLL between different sides of the mandible. Thus, it can be deduced that the AnLLs of the IAN are symmetrical.

Overall, AnLL ranged between 3.04 and 9.63mm, which minimising the distal cantilever length.\(^1\)

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Limitation:

CBCT with slice thickness of 0.25mm was used. Smaller slice intervals could reduce measurement errors.

References