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CLINICAL RESEARCH – SURGERY

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Background

Single midline implant placement has become a worthwhile treatment option to solve the problems of retention and stability of mandibular dentures in completely edentulous patients, which improves significantly their quality of life (Kern *et al.* 2018).

The inter-foraminal region has been considered as a safe area for implant installation. However, the presence and the content of the lingual foraminae and their associated canals in this area have been a point of debate for midline implant placement (Bernardi *et al.* 2017). The lingual canals (LCs) contain blood supply supplemented with some innervations, which may lead to postoperative complications following implant insertion. Such complications might be manifested as profuse bleeding, anesthesia, paresthesia, and dysesthesia (Fujita *et al.* 2012).

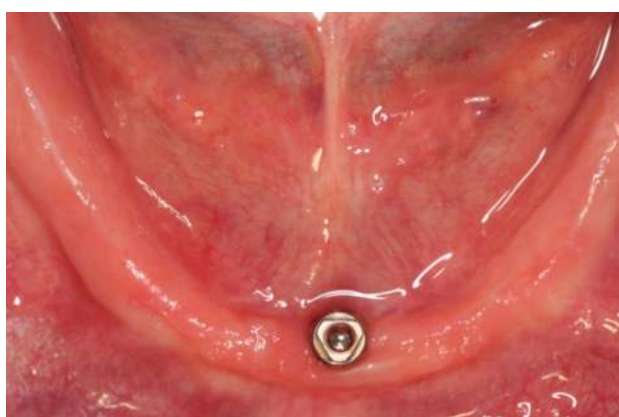


Fig. 1: Single midline implant placed in edentulous patient

Aim of the Study

To investigate whether there are any vascular and/or neurosensory changes following the installation of implants in the midline of the mandible being in close proximity to the mandibular lingual canals.

Methods and Materials

Fifty completely edentulous patients were recruited from the outpatient clinic of the Prosthodontics Department, Faculty of Dentistry, Cairo University. All patients in this study (50 to 69 years old) were seeking to install single implant at the midline of the mandible to improve the retention of their mandibular complete dentures (38 males and 12 females). The patients' complete dentures were duplicated to fabricate radiographic stents, with radio-opaque acrylic resin anterior incisors. A CBCT (ProMax 3D Mid, Planmeca, Helsinki, Finland) was then performed for all patients while wearing their radiographic stent. The Blue Sky Bio software (Blue Sky Plan, version 3.29.18, Grayslake IL, USA) was used for diagnostic and virtual implant planning at the midline of the mandible, following the direction of the radio-opaque acrylic resin teeth. The relation between the potential implant site and the LCs was assessed independently by two Oral and Maxillofacial Radiologists, who examined as well the anatomy and all dimensions of the lingual foramina/canals in the midline.

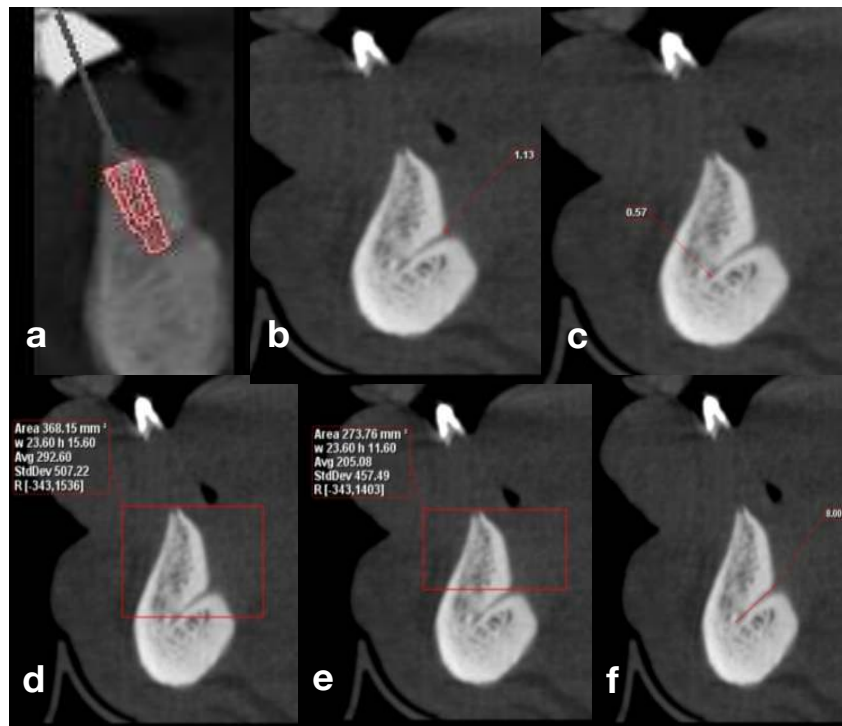


Fig. 2: Measurements of the identified lingual canals (LC)

a: The distance between the virtual implant and the LC

b&c: Diameter of the buccal and lingual terminal ends of the LC

d&e: Distance between the upper borders of both the buccal and the lingual terminal ends of the LC

f: Length of the lingual canal

The radiographic stent was then converted into a surgical stent to be used for implant installation. All inserted implants were 3.7 mm in diameter and 10 mm in length (Tapered screw vent, Zimmer Dental, Indiana, USA). During and after implant placement, all vascular changes were recorded, and 2 weeks later different physical neurosensory tests were carried out for all patients, including pin pressure, static touch detection, direction of movement, and two-point tests. All patients were then recalled after 3 months from implant installation for the prosthetic loading and the evaluation of the neurosensory changes were reassessed again. Any reported vascular and/or neurosensory changes were given a score of (1), otherwise a score (0) was given when these changes were absent.

Statistical analysis was performed using Statistical Package for Social Sciences (IBM SPSS for Windows, Version 21.0, IBM SPSS, Inc., and Chicago, IL, USA). Data were explored for normality using Kolmogorov-Smirnov test and Shapiro-Wilk test. A two-way analysis of variance with repeated measures was used accordingly. Comparisons between both the vascular and neurosensory changes and the different variables were done using the independent t-test. Categorical data were summarized as percentages; differences were analyzed with χ^2 (chi square) tests and Fisher's exact test. Adjustments of p value were done using the Bonferroni method for multiple testing, so that P-values ≤ 0.05 were considered significant.

Results

All 50 patients showed at least one canal. A supra-spinosum canal was found in 49 patients, where 8 patients showed two canals. An infra-spinosum canal was found in 38 patients, where 10 patients showed two canals.

Only 6 patients (12%) had reported profuse bleeding throughout the osteotomy during implant placement, which was stopped easily by applying gauze pressure for 5 minutes, and no further hemorrhagic complications were reported postoperatively, with a non-statistically significant correlation to all of the considered factors (patient's related and LC's related).

Thirteen patients (26%) had encountered transient neurosensory changes, which disappeared after 3 months, with also non-statistically significant correlation to all considered factors (patient's related and LC's related).

According to virtual implant planning, 44 patients (88%) had their implants, with possible invasion of the LCs. Even though, only 6 patients of them have reported vascular changes (14%), and 12 of them have reported sensory changes (27%), which were transient changes. Only one patient experienced both vascular and sensory changes. For the 6 patients who had their implants not invading the canal, no vascular changes were reported, and only one patient had reported transient neurosensory changes, with also a non-statistically significant correlation to the factors considered. Being in close proximity to the LC (possible injury of the canal) showed no statistically significant correlation to the reported vascular and neurosensory changes.

Conclusion

The mandibular lingual canals seem to be constant anatomical landmarks that are present in the midline of the mandible. Injuries of the supra-spinosum lingual canals during implant placement in the midline of the mandible without perforation of bone cortices did not result in any serious vascular or permanent neurosensory changes in this study.

References

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