



A case report of unusual anatomical variation: externalisation of inferior alveolar nerve

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ABSTRACT

INTRODUCTION: The risks of third molar surgery have been well documented with damage to the inferior alveolar nerve (IAN) being one of the largest concerns.

PRESENTATION OF CASE: This case report presents an impacted third molar with associated dentigerous cyst in which the IAN is externalised and runs along the lateral surface of the mandible.

DISCUSSION: This is an extremely rare anatomical variation with most IANs lying inferior and lingually to third molars. This case reiterates the limitations of standard radiographic techniques such as the orthopantomogram (OPG).

CONCLUSION: We would advocate the use of cone beam computed tomography (CBCT) in cases which have adverse plain radiographic features to allow appropriate surgical planning.

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1. Introduction

Third molar surgery remains one of the commonest procedures carried out by oral surgeons. One of the main concerns whilst performing this procedure is inferior alveolar nerve (IAN) damage. We present a case of an unusual anatomical variation in which the inferior alveolar nerve was externalised. This case reiterates the need for appropriate pre-operative radiological assessment to identify the anatomic relationship of IAN with third molar teeth. In this occasion, an altered approach was required to preserve the IAN. This report is in line with the SCARE criteria [1].

2. Presentation of case

A medically fit 50-year-old male presented with a longstanding sinus in the right lower third molar region with intermittent pain, swelling and discharge. A standard orthopantomogram (OPG) showed the tooth to be horizontally impacted with an associated cystic lesion. Deviation and narrowing of the inferior alveolar canal was also noted on the OPG, suggesting a close approximation to the IAN. A computerised tomography (CT) scan was obtained to further assess the relationship and course of the nerve. This showed the nerve could be seen traversing laterally and superiorly in the buccal cortical bone within a corticated channel (Figs. 1 and 2). Apart

from the aforementioned cystic lesion, no other adverse features were reported by the consultant radiologist.

During surgery, resistance was noticed whilst reflecting a mucoperiosteal flap to expose the third molar. Careful inspection revealed a cord like structure adherent to the flap. This structure was gently dissected off the mucoperiosteal flap and on closer inspection was identified as the IAN. It was exteriorised without any bony coverage and ran outside the buccal cortex of the mandible for 1.5 cm (Fig. 3) before re-entering the mandible. At this stage, a further review of the CT images confirmed that the IAN exited the buccal cortex and ran freely within an open channel with normal bone present between the nerve and the cyst (Fig. 4). This radiological finding was reconfirmed clinically as there was sound bone remaining following removal of the cyst lining. Radiological examination of left IAN showed normal anatomical appearance. To ensure that the IAN was preserved, a coronectomy was performed and the lesion was closed using an advancement flap.

Post-operative review at 3 months did not reveal any residual altered sensation along the distribution of the IAN. A repeat OPG confirmed good bony infill and a stable position of the residual root segments. Histopathological features were in keeping with those of a dentigerous cyst as the specimen showed a chronically inflamed cyst wall which is focally lined by inflamed squamous epithelium.

3. Discussion

There have been many human anatomical studies and, more recently, radiological studies that examine the course of the IAN [2–4]. In the majority of cases, the IAN is found inferior to the impacted third molar. Positional variation of the nerve in relation

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Fig. 1. Axial CT showing IAN exiting the mandible.



Fig. 2. Coronal CT showing IAN superior and lateral to cystic lesion.



Fig. 3. Exposure showing externalisation of IAN.

to the tooth tends to be in the buccolingual plane. Maegawa et al. showed that 74% of IANs travel inferiorly and lingually to mandibular third molars. A superior and buccal placement of the IAN, as in this case, is extremely rare [5]. We believe this is the first report of an externalised IAN with clinical and radiological correlation (Figs. 2 and 3). No information is currently present in the literature regarding the incidence of this variation. Some may argue that our finding is secondary to the cyst rather than a true anatomical



Fig. 4. IAN raised to show trough in cortical bone.

cal variance. However, given that there was no bony expansion or change to the mandibular contour, we feel this variance is most likely to be anatomical, rather than pathological. The fact that there was intact cortical bone between cyst and nerve further supports our hypothesis. We appreciate that odontogenic cysts can displace the IAN canal. However, despite 18.1% of odontogenic cysts being dentigerous in nature [6], the externalisation of the IAN has not been reported a finding with these lesions. Thus, in the balance of probabilities, we feel that externalisation of nerve seen in this case is indeed due to an anatomical variation rather than a result of pathology.

4. Conclusion

Incidence of permanent IAN damage ranges from 0.35% to 8.4% [7]. Although a rare complication, the implications of nerve damage can be significant for the patient. Timely and accurate pre-operative visualisation of nerve is paramount in a safe clinical practice and reduces the risk of unnecessary litigations. Although the OPG has classically been used in the prediction of nerve proximity to lower third molars [8], it is limited in that it does not permit three-dimensional assessment of the inferior alveolar canal position. Cone beam CT has been proven to have better sensitivity and specificity in demonstrating nerve and tooth relationships [9]. It allows the surgeon to plan the surgical approach to minimise risk and deliver a safe service. The CT, in this case, provided vital information regarding the proximity and externalisation of the nerve, leading to the modification of surgical technique. Without this vital information, damage to the IAN could have been caused on reflecting the flap. The authors advise the use of Cone beam CT to assess third molars which have adverse features on plain film radiographs.

Conflicts of interest

Nil conflicts of interest.

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Ethical approval

Ethics committee approval not needed for this case report.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Vijay Santhanam and David McAnerney conceived the idea of the project. David McAnerney and Shadi Basyuni carried out the literature search and wrote up the paper. All authors contributed to refinement of the case report and approved the final manuscript.

Guarantor

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