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Letters to the Editor

Fenestration of the mandibular buccal cortex by the inferior alveolar neurovascular bundle

Dear Editor,

It has been observed that the presence of anatomical variations in the mandible is frequently overlooked in clinical management. The aim of this article is to describe two rare clinical cases of fenestration of the mandibular buccal cortex by the inferior alveolar bundle, detected by cone beam computed tomography (CBCT).

The first case was a 58-year-old female patient who was referred to the private clinic for rehabilitation with dental implants. The patient underwent an examination by CBCT (Kodak 9000, Carestream Health, Rochester, NY, USA) to assess the bone quality and quantity for placement of dental implants in the edentulous regions. In cross-sectional slices and in 3D reconstructions of the left mandible (Fig. 1), it was observed that the mandibular canal lacked cover by the buccal cortex.

The second case was a 68-year-old male patient who was referred to the department of oral surgery for placement of dental implants in the posterior regions of the mandible. Preoperative panoramic radiography revealed normal shape, size, and course of the mandibular canals, thus no significant alterations were observed (Fig. 2). The patient underwent an examination by CBCT (Kodak 9000). In this examination fenestrations of the mandibular buccal cortex were observed – bilateral in the retromolar region (Fig. 3).

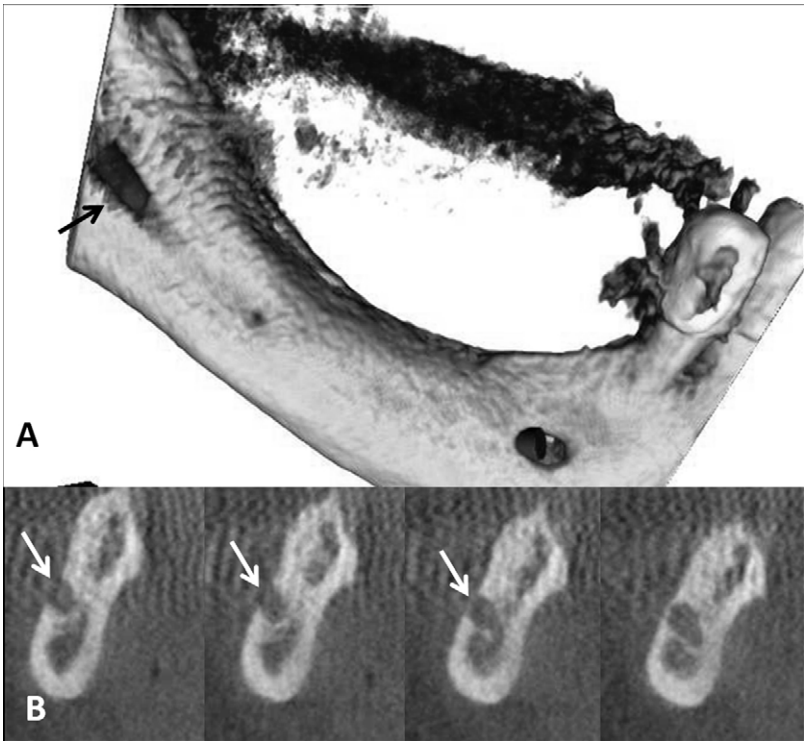

Fig. 1. CBCT images of the left mandibular body showing fenestration of the mandibular buccal cortex by the inferior alveolar bundle in 3D reconstruction (A, black arrow) and cross-sectional slices (B, white arrows).

The presence of anatomical variations associated with the mandibular canal has great clinical implications during surgical procedures such as dental implant placement, orthognathic surgery, lower third molar extraction, and sagittal mandibular osteotomies. Inaccuracy in locating anatomical variations in the mandible can result in injury to the inferior alveolar neurovascular bundle (IANB), such as traumatic neuroma, paresthesia, anaesthesia, and haemorrhage.[1,2]

In the present cases, it was not possible to determine if the IANB was exposed. Instead, we believed the IANB to be covered by the periosteum and to be safe from all procedures except those including elevation of the periosteum (e.g. extraction of impacted third molars and sagittal split ramus osteotomies) and in cases of orthognathic surgery (metal plates are fixed in the buccal cortex).

A PubMed search was conducted (articles published in the English language literature, Table 1) in order to review case reports of fenestration in the buccal cortex by the inferior neurovascular bundle. Only two cases of fenestration of the mandibular buccal cortex by the IANB have been described, both confirmed by computed tomography (CT).[3,4] In those cases, the fenestrations were associated with pathological processes. However, the present cases are the first in the literature showing

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Fig. 2. Panoramic radiography of the case, showing normal mandibular canals.

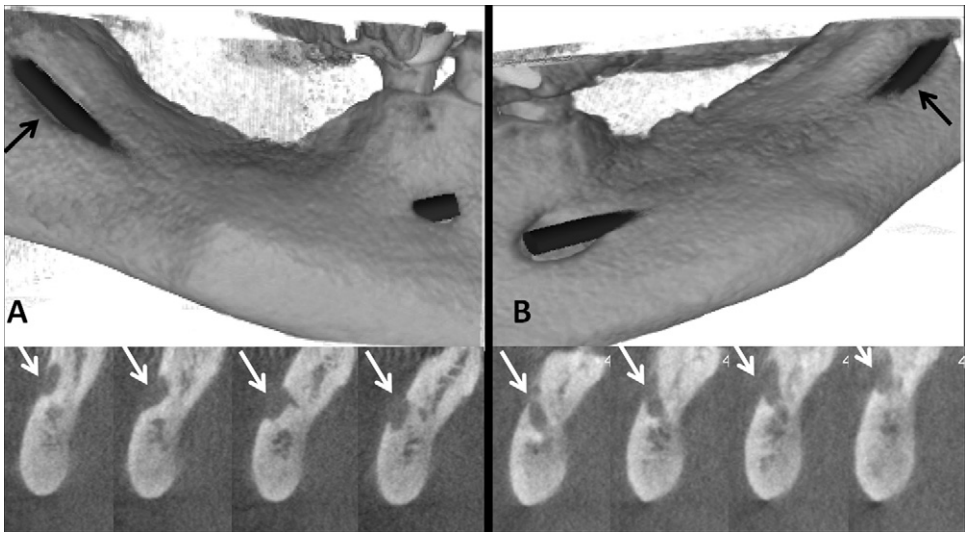

Fig. 3. 3D reconstruction and cross-sectional slices of the right (A) and left (B) mandibular bodies, showing fenestration of the mandibular buccal cortex by the inferior alveolar bundle (black and with arrows).

Table 1. Cases of fenestration of the mandibular buccal cortex by the inferior alveolar bundle.

Ref.	Age/gender	Location	Fenestration	Image modality	Pathological process
Reuter[3]	42/M	Right mandibular body	Lingual cortex	Panoramic radiography and CT	Yes (Stafne bone defect)
Manikandhan et al.[4]	20/F	Right mandibular ramus	Buccal cortex	Panoramic radiography and CT	Yes (hemifacial microsomia)
Present article	58/F	Left mandibular body	Buccal cortex	CBCT	No
Present article	68/M	Bilateral mandibular body	Buccal cortex	Panoramic radiography and CBCT	No

CBCT, cone beam computed tomography; CT, computed tomography; F, female; M, male.

a true absence of mandibular buccal cortex by the IANB without any association with pathological processes.

CBCT it is an imaging technology used in several areas of dental medicine, because it allows the 3D evaluation of maxillofacial structures, offering clear structural images with high contrast. Although the exposure dose remains a controversial concern with 3D imaging, it has been shown that a proper selection of exposure parameters and field size may produce relatively low-dose CBCT examinations, especially if compared to CT.[5] In the second case of fenestration, the mandibular cortex was only visualized in the CBCT images, being misdiagnosed by panoramic radiography.

In conclusion, CBCT imaging was fundamental for the diagnosis of fenestrations in the mandibular buccal cortex by the IANB. Knowledge of this anatomical variation is important in the management of surgical procedures, especially in cases of sagittal split ramus osteotomies, third molar extractions, and orthognathic surgery.

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Competing interests

None declared.

Ethical approval

Not required.

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References

1. Claeys V, Wackens G. Bifid mandibular canal: literature review and case report. *Dentomaxillofac Radiol* 2005;**34**:55–8. http://dx.doi.org/10. 1259/dmfr/23146121.
2. Naitoh M, Hiraiwa Y, Aimiya H, Ariji E. Observation of bifid mandibular canal using cone-beam computerized tomography. *Int J Oral Maxillofac Implants* 2009;**24**:155–9.
3. Reuter I. An unusual case of Stafne bone cavity with extra-osseous course of the mandibular neurovascular bundle. *Dentomaxillofac Radiol* 1998;**27**:189–91. http://dx.doi.org/10.1038/sj/dmfr/4600349.
4. Manikandhan R, Mathew PC, Naveenkumar J, Anantanarayanan P. A rare variation in the course of the inferior alveolar nerve. *Int J Oral Maxillofac Surg* 2010;**39**:185–7. http://dx.doi.org/10.1016/j.ijom.2009.12.007.
5. Ludlow JB, Ivanovic M. Comparative dosimetry of dental CBCT devices and 64-slice CT for oral and maxillofacial radiology. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2008;**106**:106–14. http://dx.doi.org/10.1016/j.tripleo.2008.03.018.

http://dx.doi.org/10.1016/j.ijom.2013.01.010

Congenital maxillomandibular fusion: report of three cases

Dear Editor

I read the article ''Congenital maxillomandibular fusion: a report of three cases'' by Hegab et al. with great interest.[1] The occurrence of syngnathia is quite rare and there are no protocols or guidelines for managing such cases. There is high morbidity and even mortality associated with managing these cases. I would like to make two comments on the subject so that morbidity and mortality associated with these cases can be reduced.

The first comment regards Case 1, who died suddenly during jaw physiotherapy on the third postoperative day. The possible reason for this could have been prolonged apnea and activation of the trigemino-cardiac reflex during jaw physiotherapy. One should be aware of the triad of decreased mouth opening, severe retrognathia, and obstructive sleep apnea, which can lead to hypoxia and hypercarbia during jaw physiotherapy. When the mouth is opened forcefully during jaw physiotherapy, the already compromised airway is further obstructed by the descending mandible, leading to apnea.

There may also be activation of the trigemino-cardiac reflex due to pain and pressure during jaw physiotherapy, which can lead to bradycardia. A combination of hypoxia and bradycardia can lead to convulsions, asystole, and cardiac arrest, as might have happened in the case managed by the authors. The reader is referred to an excellent paper by Andrade et al. on this subject, in which they discuss this problem in detail.[2]

Secondly, as evident from the reported cases, another main problem in managing syngnathia cases is the recurrence of fusion.[3] There seem to be two main reasons for recurrence: a high osteogenic potential and difficulty in instituting jaw physiotherapy in neonates. Therefore, a strategy is needed to prevent the formation of heterotopic bone in these patients. The interposition of autogenous or alloplastic material in the gap created after release of the fusion has decreased the chances of relapse in temporomandibular joint ankylosis. I have effectively used the buccal pad of fat as interposition material in a case of syngnathia, as highlighted by the brief case report below.

An 8-year-old boy suffering from congenital maxillomandibular fusion was

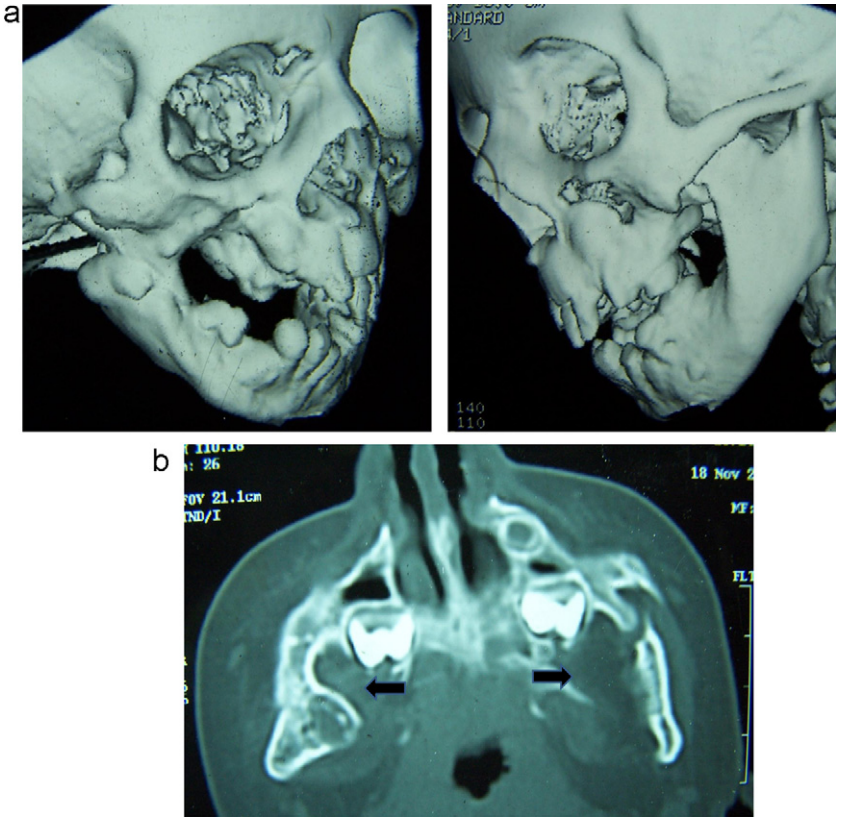

Fig. 1. (A) Computerized 3D scan of the patient showing maxillomandibular fusion on the right and left side. (B) Black arrows show the close proximity of the buccal pad of fat to fusion in an axial computerized tomography scan.