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Description	

Technical note

Alternative technique to repair damaged inferior alveolar nerve using data fusion from computed tomographic and magnetic resonance imaging

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Iatrogenic inferior alveolar nerve damage may occur as a result of third molar extractions, placement of dental implants, orthognathic surgery, removal of a cyst, and the excision of maxillary tumours.¹ Severe damage to the inferior alveolar nerve requires repair, and there are three steps to the method. The first step is the removal of the buccal side cortical bone of the damaged nerve after the raising of the flap, followed by removal of the cancellous bone to aid the approach to the inferior alveolar nerve. The third step is nerve repair by neurolysis, direct epineurial repair, or an indirect neurorrhaphy. This method is challenging due to the narrow intraoral operative route. The surgical procedure becomes highly complex in an attempt to cover the position of the damaged nerve. It is further complicated by the position of the cortical bone in relation to the damaged nerve. We report the clinical approach and the safety margin of the operation, which targeted the soft tissue lesion in the jaw (invasive squamous cell carcinoma) using 3-dimensional computed tomography (CT) and magnetic resonance imaging (MRI).² We present a case in which we were able to use a minimally invasive and accurate approach to repair inferior alveolar nerve damage using a surgical guide derived from data fusion derived from CT and MRI images.

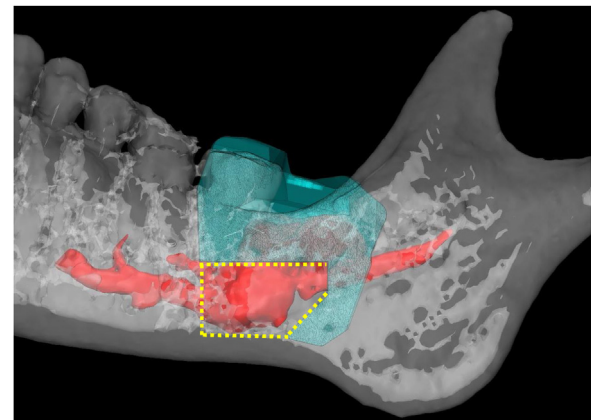


Fig. 1. The 3D image showing mandible with traumatic neuroma fused between CT and MRI, and planned form of surgical guide.

A 61-year-old woman had had her inferior alveolar nerve damaged after a left-sided mandibular third molar extraction in a dental clinic. A diagnosis of neurotmesis was made, using Seddon's classification,³ with the formation of a traumatic neuroma and we decided to attempt nerve repair after inspecting imaging and noting the patient's symptoms. We examined fusion data from CT and MRI (showing the nerve and mandible) before an operation using planning software (Materialise Mimics) (Fig. 1). The fusion data was obtained from the mandibular canal by CT, and the inferior alveolar nerve by MRI, and three points were recorded as common

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Fig. 2. Surgical guide produced by the 3D fusion data.

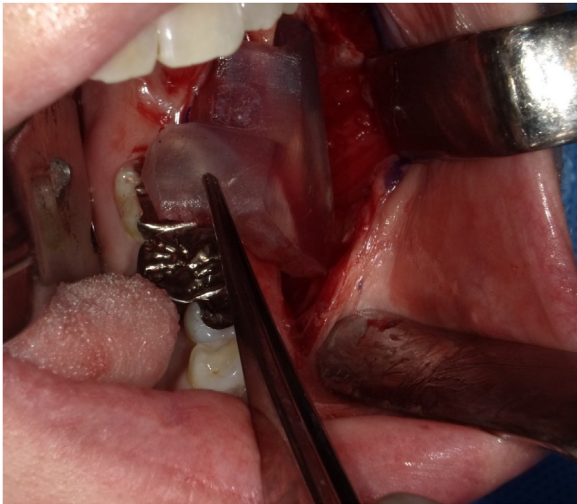


Fig. 3. The surgical guide set on the left mandible with the second molar as an anchor.

points in both sets of radiological data. A surgical guide was produced, using this 3-dimensional fusion imaging, to serve as an anchor and ^{1–3} facilitate the removal of the cortical bone on the buccal side (Figs. 2–4). The guide included the thickness up to the mandibular canal on this side. We excised the neuroma once the inferior alveolar nerve was visible and transplanted the great auricular nerve. The excision lesion was about 23 mm, which was planned after radiological diagnosis.

Fusion images of CT and MRI helped to visualise the damaged nerve in the jaw. Compared with CT alone, the addition of MRI data makes it possible to identify the condition

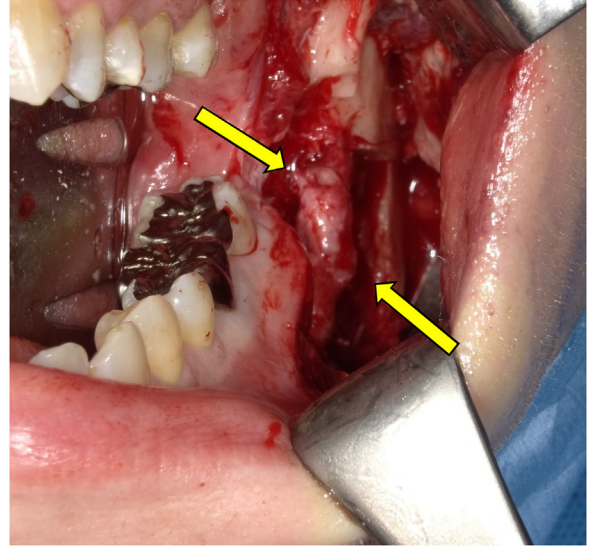


Fig. 4. The traumatic neuroma was revealed after removal of the buccal cortical bone.

and extent of the injury to the nerve and is an important aid in deciding a diagnosis and operation plan. In addition, it makes it possible to use minimal intervention, and ensures the safety and success of the operation by helping to produce the surgical guide from the fusion of the two imaging types.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patient's permission

Ethics approval was not required. Consent was given by patient for use of their photographs in this publication.

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