INTRODUCTION

The infratemporal fossa consists of two pterygoid muscles, maxillary vessels and the mandibular nerve and its branches. It is one of the areas for a lateral surgical approach to the base of the skull. Therefore it is a prerequisite for the orthopaedician, neurosurgeon, otorhinolaryngologist, dentist, maxillofacial surgeon or radiologist to be aware of the normal anatomy of the contents of the infratemporal fossa and its common variations. Variations in the mandibular nerve and its branches and the maxillary vessels may give rise to neurovascular compression causing numbness, regional pain and headache. Such variations have been reported as a cause of inadequate oral and dental anaesthesia and failed treatment of trigeminal neuralgia, and may be involved in iatrogenic accidents and associated complications. In the present report, we describe one such rare variation of the inferior alveolar nerve having multiple roots of origin, and its topographical relationship to the maxillary artery.

CASE REPORT

An adult male cadaver, aged about forty years, was dissected. During the dissection, the ramus was excised above the mandibular foramen to expose the infratemporal fossa. In the right infratemporal fossa, the inferior alveolar nerve was seen to emerge from three different roots from the posterior division of the mandibular nerve. These variant roots emerged from the posterior division of the mandibular nerve, the auriculotemporal nerve just distal to its origin from the mandibular nerve, and the lingual nerve. These roots were named the superficial (SR), deep (DR) and anterior (AR) roots respectively. We also found that the maxillary artery passed medial to the lateral pterygoid muscle and was encircled by the nerve loop formed by the SR and DR. The other finding in the present case was that the auriculotemporal nerve had a single root and passed deep to the middle meningeal artery.
The third root, called the anterior root (AR), branched from the lingual nerve 1 cm from its emergence from the mandibular nerve. It measured 1.6 cm in length and passed between the maxillary artery and chorda tympani nerve to join the nerve formed by the SR and DR. Thus formed, the inferior alveolar nerve traversed a distance of 2.0 cm before entering the mandibular foramen. It branched to give rise to the nerve to the mylohyoid just before entering the mandibular foramen. The branching pattern of the maxillary artery was found to be normal.

**DISCUSSION**

In the present case the inferior alveolar nerve of the right infratemporal fossa had three roots and the maxillary artery passed between two of them. A similar case was reported by Pretterklieber et al. in which the maxillary artery passed between the inferior alveolar and lingual nerves. Ortug and Moriggl also reported a case in which the roots from the auriculotemporal nerve passed between any pair of them. An interconnection between the inferior alveolar and lingual nerves has been found in 25% of cases. Anil et al. reported a very similar case in which the roots from the auriculotemporal, mandibular and lingual nerve formed the inferior alveolar nerve but the maxillary artery did not pass between any pair of them. An interconnection between the inferior alveolar and lingual nerves has been found in 25% of cases. Anil et al. reported a maxillary artery passing through an inferior alveolar nerve with two roots. Roy et al. reported two roots of the inferior alveolar nerve and the mylohyoid nerve originating from the deep root. So the present case is unique in that the three roots originated from three different nerves and the maxillary artery passed through a loop formed by two of them.

Embryologically, the mandibular nerve and its branches develop from the neural crest cells in the cephalic region, which migrate ventrally through the mesoderm of the mandibular arch with the help of multiple cell matrix interactions, contact repulsion and chemorepulsion. F-spondin and T-cadherin liberated from the caudal somites are thought to inhibit neural crest cell migration and may lead to variations in these nerves. As the inferior alveolar nerve is a mixed nerve, separate developmental pathways for the motor and sensory fibres may lead to the formation of different roots, which may reunite to form a single trunk.

The maxillary artery is developed from a vascular network in the infratemporal region, contributed by the pterygoid mass of myoblasts. The stapedial artery feeds the network first, followed by the external carotid artery in later development. During this process the vascular network disappears except for some vessels that develop into the maxillary artery. The persistent vessels may be present between the loops of the variant nerve, so the artery may be developed within the loop.

In the present case, the pulsating artery may compress the SR or DR. The DR is present lateral to the pterygoid plate and may also be compressed by the lateral pterygoid muscle. In addition, SR may be compressed during chewing as it lies between the lateral pterygoid muscle and the maxillary artery. In both cases, compression may lead to mandibular or trigeminal neuralgia resulting in altered sensitivity of the mandibular gingival mucosa. In the present case the chorda tympani nerve is crossed by the AR and SR of the inferior alveolar nerve and may be compressed, possibly leading to altered sensation (paraesthesia) from the tongue. The maxillary artery may also be compressed by the roots of the inferior alveolar nerve. These are speculations on the basis of this anatomical observation, but such associations may be considered in future clinical-radiological studies. Variations of the inferior alveolar nerve should be kept in mind during dental anaesthesia, since ignorance of them may result in inadequate anaesthesia. Knowledge of the variation reported here may also prove useful for surgeons in regard to several operations involving the infratemporal fossa.

**REFERENCES**