

THE INTRA-MANDIBULAR COURSE OF THE INFERIOR DENTAL NERVE

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UNTIL two years ago it was generally accepted by dental surgeons that the inferior dental nerve of one side overlapped as far, at least, as the canine tooth of the opposite side. This statement was based on the results which were obtained from block anaesthesia of that nerve. Stewart and Wilson⁽²⁾, while carrying out an investigation into the results of regional anaesthesia, obtained evidence which suggested that this overlap frequently did not occur, and that when it did it never extended further, at the most, than the lateral incisor. On account of the discrepancies between these views, it was felt that a re-investigation of the intra-osseous course of the inferior dental nerve might give definite information as to its precise termination. It was with this aim therefore that the present investigation was undertaken.

The material used was taken from dissecting room subjects, supplemented by the mandibles of some of the commoner mammals. The bones were decalcified in 10 per cent. nitric acid and then dissected with mounted needles under a dissecting microscope. This was found to be somewhat difficult on account of the small size of many of the nerves, which often resembled strands of fibrous tissue, and also because of the fat associated with the nerves. The latter was removed by means of ether, and the nervous nature of the fibres was determined by establishing their continuity with the main nerve trunk. In doubtful cases a small portion of the structure was removed and examined microscopically.

The inferior dental nerve is usually described as entering the mandibular foramen in the form of a single trunk which lies anterior and superior to the inferior dental artery. It then gives off dental branches which may form a plexus from which the actual fibres to the teeth arise. The main trunk ends by dividing into the mental and incisive branches.

In 1927⁽¹⁾ Olivier gave a much fuller account, and described two types in the arrangement of the main trunk of the inferior dental nerve. In Type I, seen in 66 per cent. of his dissections, the nerve formed a single bundle until it divided into its terminal branches at the mental foramen. The filaments to the teeth came off from the undivided trunk a little posteriorly to the roots that they were going to supply.

In Type II, seen in 34 per cent. of his dissections, the nerve divided into a larger mental branch which passed out at the mental foramen, and a smaller dental branch which formed a plexus and supplied the teeth. The incisor nerve did not form a separate branch, but was an extension of the dental plexus.

Olivier found that the incisor nerves lay free in the spongy bone and had neither a fibrous nor a bony sheath. These nerves took one of three directions:

(a) They passed forwards and upwards, by a direct route, to the alveus of the central incisors.

(b) The first ran horizontally, then turned sharply upwards into the alveus of the central incisors.

(c) They passed forwards and downwards towards the lower border of the jaw, where a branch was sometimes given off to the bone, and then turned upwards towards the central incisors.

No communicating branches between the right and left nerves were seen.

In our dissections certain observations were made which differ in some respects from those of Olivier, and these will now be described.

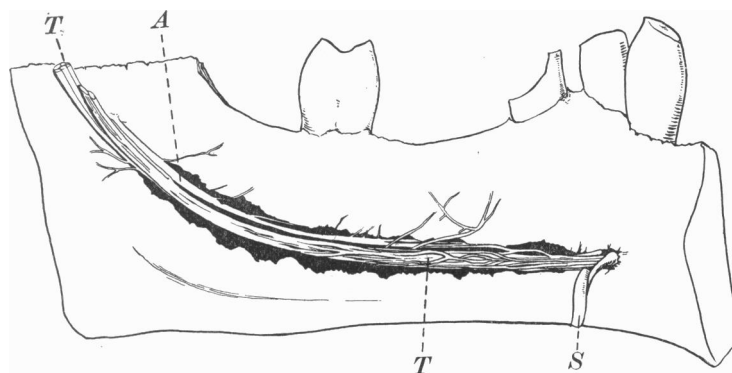


Fig. 1. Human mandible (internal aspect).

Figs. 1 and 2 are taken from a dissection of the intra-osseous course of the inferior dental nerve. In this specimen the nerve, immediately after entering the mandibular canal, divided into several branches, one of which, the alveolar branch, was separate from the rest. It ran forwards to the first premolar tooth in a plexiform manner, the "alveolar" plexus from which were given off the filaments to the molar, premolar, and possibly the canine teeth. At the premolar it divided into internal and external branches. The internal rejoined the main nerve trunk, whilst the external ran forward to supply fibres to the incisor plexus. The rest of the branches, three or four in number, ran forward for a short distance and then rejoined. This process was repeated and resulted in an increase in the number of branches, so that by the time the mental foramen was reached there were fifteen or more branches. These had a large amount of very soft connective tissue between them.

At the level of the canine tooth the majority of the fibres became enclosed in a common sheath and emerged from the mental foramen as the mental nerve. The remaining bundles were joined by the terminal fibres of the external

branch of the alveolar nerve, described above, and formed a very intricate "incisor" plexus, from which twigs ran to the periosteum and the roots of the incisor teeth.

This incisor plexus is situated on the external aspect of the jaw, and does extend posterior to the canine tooth. It is extremely complex, as fig. 2 shows, and forms a most elaborate network in this part of the jaw. Microscopic examination demonstrated quite clearly that the fibres of the incisor plexus were actual nerves.

In the posterior two-thirds of their intra-mandibular course the inferior dental nerve and vessels were surrounded by a sheath of compact bone, and a tough thick layer of connective tissue. The bony sheath disappeared more anteriorly, but the fibrous layer could still be traced along the larger branches

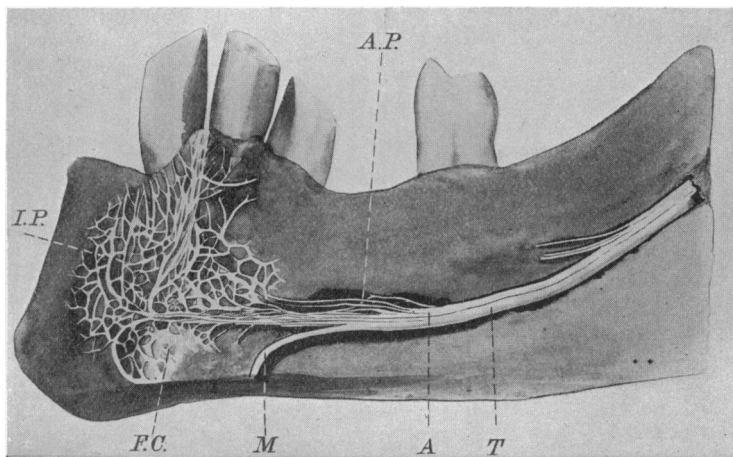


Fig. 2. Human mandible (external aspect).

of the nerve. As in Olivier's cases, the smaller branches of the nerve appeared to be without a sheath.

Four more dissections were made of the intra-mandibular course of the inferior dental nerve and showed the same features of:

- (1) An alveolar branch given off early to supply the teeth posterior to the incisors.
- (2) An incisor plexus.
- (3) A dense fibrous sheath surrounding the nerve and vessels.

In these four specimens certain variations from the type specimen were noted. In one the nerves to the incisor teeth came off the mental nerve. The nerve supply to the canine was variable, it either came from the alveolar nerve, or the incisor plexus. The sheath of compact bone was seen in two of the specimens.

In each of the five specimens there was a part of the jaw near the root of the canine teeth which contained little or no bone, but was filled with fat (see fig. 2).

The terminations of the inferior dental nerves in the region of the symphysis were now investigated. In ten specimens which were examined, it was found that the nerves at first ran forwards with possibly a slight inclination downwards or upwards. In each case when the nerves arrived near the actual symphysis they altered their course and turned sharply upwards towards the teeth, so that the two nerves now ran more or less parallel to each other (fig. 3). In only six of the specimens was it found to be possible to make a satisfactory

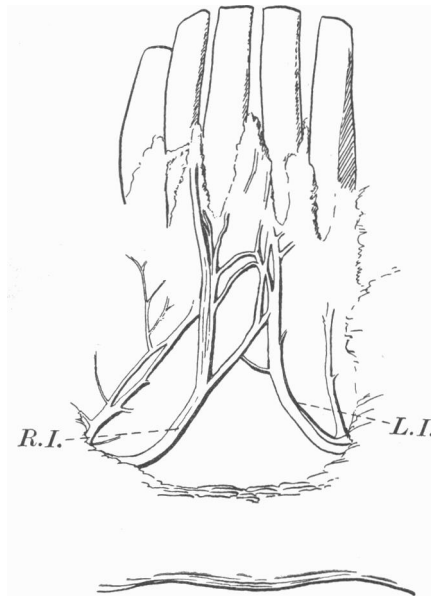


Fig. 3. Human mandible (anterior aspect).

dissection of the finer branches of the nerves without damaging them. Unlike Olivier we were able on four occasions to trace distinct anastomotic fibres across the symphysis as shown in fig. 3. In the remaining two cases the most careful dissection failed to reveal any fibres connecting the one nerve with the other.

These results tally with those of Stewart and Wilson(2), who showed clinically that in many patients there was no overlap, and in those where it was present it generally did not extend beyond the central incisor and never beyond the lateral ones on the opposite side.

Dissections were made of the jaws of the cat, rabbit and sheep. In all of them a tough fibrous sheath surrounded the main nerves and its larger branches. The sheath of compact bone was only seen in the cat. All the specimens showed

the "incisor" and "alveolar" plexuses to a varying degree. The former supplied the incisor and canine teeth and the latter the remainder. No communicating fibres crossed the symphysis in any of these animals. The alveolar nerve was always present and came off from the inferior dental nerve soon after it entered the mandibular canal. This branch formed the larger part of the alveolar plexus.

SUMMARY

The paper contains an account of the intra-mandibular course of the inferior dental nerve. The following observations were made:

1. There are two definite plexuses: (a) a postero-internal alveolar plexus; (b) an antero-external incisor plexus.
2. The molars and bicuspid receive their nerve supply from the alveolar plexus, the incisors from the incisor plexus, and the canines from either of them.
3. The inferior dental nerves do not always extend across the symphysis and so overlap. If such an overlap is present it seldom extends beyond the central, and never beyond the lateral incisor teeth of the opposite side.

We have to express our thanks to Prof. Stopford for his kindness in allowing us to carry out the investigation in his department. We are also indebted to Miss Davidson for the admirable drawings with which this paper is illustrated.

ABBREVIATIONS USED IN FIGURES

<i>A.</i> Alveolar branch.	<i>M.</i> Mental branch.
<i>A.P.</i> Alveolar plexus.	<i>R.I.</i> Right incisor branch.
<i>F.C.</i> Fat cavity.	<i>S.</i> Fibrous sheath.
<i>I.P.</i> Incisor plexus.	<i>T.</i> Main nerve trunk.
<i>L.I.</i> Left incisor branch.	

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