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INNERVATION OF THE TEMPORO- MANDIBULAR DISC IN MAN

by

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To judge from the few previous studies, almost all of them on laboratory animals, there are certain differences in innervation of the temporo-mandibular disc at early and later ages.

It was found by *Baumann* (1951) on the guinea pig and man and by *Masson* (1953) also on the rat and rabbit, that the disc was penetrated by a number of fine nerve fibres, which formed nerve-endings referred to as »appareil metatérminale» by *Weber* (1947), whose silver staining method was used in the studies. At later ages these nerve fibres were considered to degenerate, and to persist only in the capsule. *Hromada* (1960) also observed nerves in the discs of young rabbits and guinea pigs (3 weeks old) on staining with methylene blue. In the older animals, however, nerves were found only in the periphery of the disc, at its border with the capsule. *Hromada* found only free nerve endings.

As has been reported by *Palmgren* (1960) there are large variations in staining properties of different tissues with the same staining technique. By varying, for instance, the impregnation time and pH threshold for his silver method *Palmgren* found that the staining effect could be altered so as to suit the specimen under examination.

By means of *Palmgren's* silver staining method it has been shown in an earlier study on the innervation of the temporo-mandibular capsule in man that there are nerves in the part of

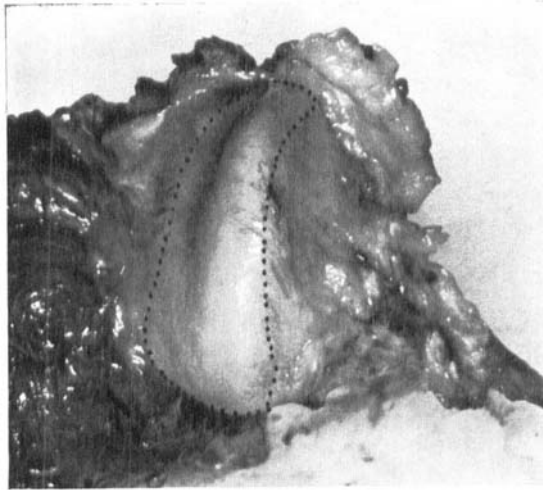


Fig. 1. Temporomandibular joint, seen from above. The dotted line indicates the border between the capsule and the disc where the dissection was made.

the capsule bordering the disc, and particularly in the loose tissue of the capsule posterior to the disc (*Thilander, 1961*). The capsule was dissected from the disc (Fig. 1). The present study was performed to establish whether the nerves in the capsule continue into the articular disc and innervate it.

MATERIAL AND METHOD

The material had the following composition

- (i) Twelve fetuses from the third month to birth.
- (ii) Four children and adolescents aged 6—14 years.
- (iii) Twelve adults aged 30—52 years.

This constituted part of a material for which the composition and histologic technique have been described in greater detail elsewhere (*Thilander, 1964*). Every tenth section used for the examination of the nerves was stained by a modification of *Palmgren's* silver method (1960). One half of the head of one of the 12 fetuses was cut into serial sections. This specimen has been used in a previous study on the innervation of the capsule (*Thilander, 1961*).

RESULTS AND CONCLUSIONS

Histologic examination of the sections of the half foetal head showed that the nerve fibres from the auriculo-temporal, masseteric and posterior deep temporal nerves passed to the temporo-mandibular disc (Fig. 2). Since, at so early a foetal stage, the boundary between the disc and capsule cannot be discerned, it was difficult to decide how far into the disc these nerve fibres penetrated; there was, however, no evidence that they completely transversed the disc; they penetrated only its posterior and anterior parts. These fibres followed the blood vessels and/or terminated as free nerve endings. No other types of nerve endings were found. These observations were confirmed on the other 11 foetuses.

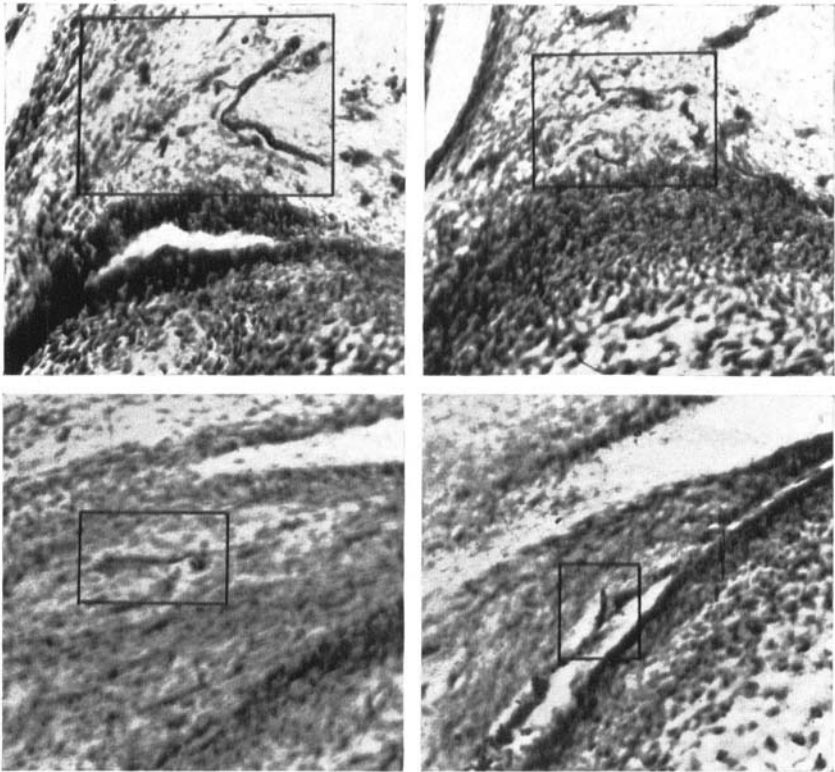


Fig. 2. (Framed areas) Nerve fibres that penetrate the posterior (upper figures) and anterior parts (lower figures) of the foetal disc. *Palmgren's* staining method. x 125.

In the adult material nerves were found only in the peripheral parts of the discs, that is where the disc was dissected from the capsule (Fig. 1). Most nerve fibres were found in the posterior part. This part was also well supplied with blood vessels, which were followed by most of the nerve fibres. Since only every tenth section was stained it cannot be concluded for certain that these fibres entered the adventitia, but some sections suggest that this was the case. However, in an earlier study on sectioned capsules it was found that some of the fibres innervated the vessels. Since this was found to be the case for the vessels entering the capsule near its border with the disc, it would seem that it might also apply to the peripheral part of the disc. No complicated nerve endings were observed in this region. Since only every tenth section was stained, such nerve endings could have been present in the intervening sections, but it is improbable that this chance occurrence would apply to so many specimens. Since complicated nerve endings were not observed in the part of the capsule adjacent to the disc, it would seem highly improbable that they were present in the peripheral part of the disc. These observations were confirmed by an examination of the specimens of children and adolescents.

It would thus seem as if the nerve fibres that enter the peripheral part of the disc primarily innervate the vessels and/or form free nerve-endings, just as was observed to be the case in corresponding areas of the capsule. That these fibres penetrated further into the foetal disc may be due to the fact that at this early age the tissue in the disc is not yet undergoing functional adaptation. During the foetal stage the disc also contains vessels which are accompanied by nerves.

SUMMARY

The innervation of the temporo-mandibular disc in man was studied in 12 fetuses (including a serially sectioned half of a head), 4 children and adolescents (6—14 years) and 12 adults (30—52 years). The sections were stained by a modification of *Palmgren's* silver method.

Nerve fibres were observed in the posterior and anterior parts of the foetal discs. In the adult and child groups the fibres were

observed only in the peripheral parts — that is, at the border between disc and capsule — chiefly in the posterior portion. All the nerve fibres either accompanied the vessels and innervated them or terminated as free nerve endings.

RÉSUMÉ

INNERVATION DU MÉNISQUE DE L'ARTICULATION TEMPORO-MANDIBULAIRE CHEZ L'HOMME

L'innervation du ménisque de l'articulation temporo-mandibulaire chez l'homme a été étudiée sur 12 fœtus (comprenant des coupes en série d'une hémisphère), 4 enfants et adolescents (âgés de 6 à 14 ans) et 12 adultes (âgés de 30 à 52 ans). Les coupes ont été colorées par une modification de la méthode d'imprégnation à l'argent de Palmgren.

Des fibres nerveuses ont été observées à la partie postérieure et à la partie antérieure des ménisques chez le fœtus. Dans le groupe des adultes et dans le groupe des enfants, les fibres n'ont été observées que dans les parties périphériques, c'est-à-dire à la limite entre le ménisque et la capsule, principalement dans la portion postérieure. Ou bien les fibres nerveuses accompagnaient les vaisseaux et les innervaient, ou bien elles finissaient comme terminaisons nerveuses libres.

ZUSAMMENFASSUNG

DIE INNERVATION DES DISCUS ARTICULARE BEIM MENSCHEN

Die Innervation des Discus articulare bei dem Menschen wurde an 12 Embryos studiert (eine Kopfhälfte davon in Serienschnitte), 4 Kindern und Jugendlichen (von 6 bis 14 Jahren) und 12 Erwachsenen (von 30 bis 52 Jahren). Die Färbung war eine Modifikation von Palmgrens Silberfärbung.

Bei Embryos wurden Nervenfasern in dem Posterior- und Anteriortheil beobachtet. Bei Erwachsenen, Kindern und Jugendlichen wurden hingegen Nervenfasern nur in den peripheren Theilen beobachtet, d. h. an den Übergängen in die Kapsel und hauptsächlich in den hinteren Partien. Sämtliche Nervenfasern folgen entweder den Gefäßen und innervieren diese oder hören in freien Nervenendigungen auf.

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