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FIBRE ANALYSIS OF THE LATERAL PTERYGOID NERVE

by

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Of the receptors that govern the movements of the mandible (*Freimann*, 1954; *Voss*, 1956; *Blom*, 1960) muscle spindles occur in large numbers in all the masticatory muscles except the lateral pterygoid, which, according to *Freimann*, is devoid of such nerve endings. This exception might appear strange since this muscle is actively engaged in the movement of the mandible (*Carlsöö*, 1952). For this reason the calibres of the fibres composing the lateral pterygoid nerve were measured, as it is known that there is some relationship between the calibre of afferent fibres and their type of nerve endings.

MATERIAL AND METHOD

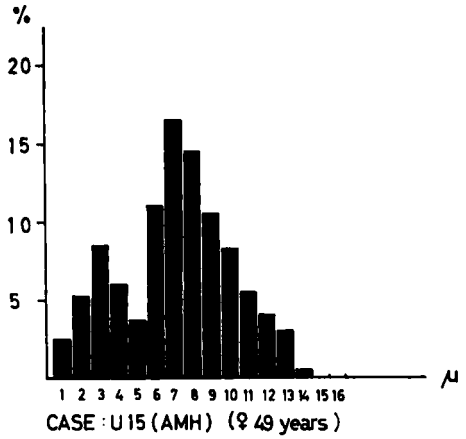
Eight lateral pterygoid nerves removed at autopsy from 8 cadavers (men and women aged 35—49 years) were mounted with glass pins on paraffin plates. Five of them were impregnated with one per cent osmium tetroxide (pH 7.3) for 12 hours; 3 were fixed in formalin for 24 hours and after sectioning were stained by Häggqvist's modification of Alzheimer—Mann's method for glia (AMH). The sections ranged from 5 to 10 μ in thickness. The

ones intended for determination of the fibre diameters were taken from the same level in each nerve, that is to say, slightly before the entry of the nerve into the muscle. The sections were photographed on glass plates at a magnification of ×750, and the diameters of the nerve fibres were measured on prints by the method evolved by *Häggqvist* (1936) and described in detail by *Rexed* (1944). The nerve fibres were grouped with respect to diameters: 0.0—0.9, 1.0—1.9 μ etc. Account was taken of shrinkage (25 per cent) during staining with AMH, and the values in Table I and in the histograms in Fig. 1 relate to the corrected calibres.

RESULTS

Since the fibres of different calibres were equally distributed in the nerve it sufficed to perform measurements on random samples; most of them were recorded, however. The numbers of

Fig. 1 A. Cross-section of lateral pterygoid nerve, near its entry in the muscle. (AMH) × 160.



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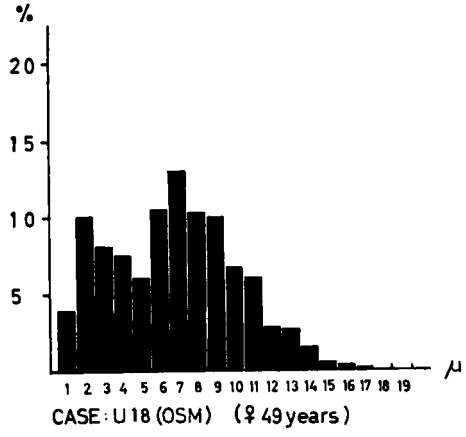

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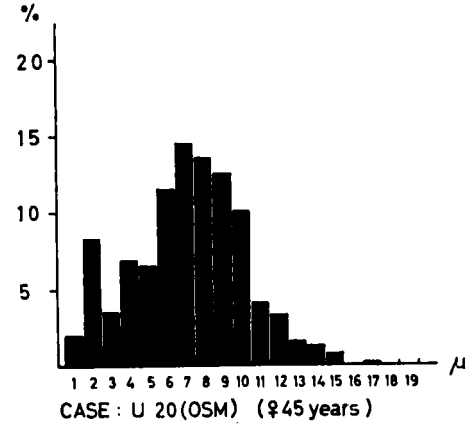

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Fig. 1. B—D. Histograms showing the calibre spectra of the lateral pterygoid nerve.

Table I.

Calibre spectrum for the lateral pterygoid nerve.

Case	Sex	Age (years)	Stain	1 — 1.9 μ	2 — 2.9 μ	3 — 3.9 μ	4 — 4.9 μ	5 — 5.9 μ	6 — 6.9 μ	7 — 7.9 μ	8 — 8.9 μ	9 — 9.9 μ	10 10.9 μ	11 — 11.9 μ	12 — 12.9 μ	13 — 13.9 μ	14 — 14.9 μ	15 — 15.9 μ	16 — 16.9 μ	17 — 17.9 μ	No. of fibres measured
U 18	♀	49	OSM	48	126	103	95	76	134	165	130	126	84	77	35	34	19	4	5	1	1.262
U 20	♀	45	OSM	13	54	23	45	42	75	95	88	82	64	26	22	10	8	5		1	653
U 26	♀	38	OSM	11	28	39	29	19	58	83	73	53	38	25	18	10	6	4			494
U 23	♀	41	OSM	11	38	17	46	49	90	57	45	44	16	10	7	2	1				433
U 25	♂	35	OSM	6	22	48	36	52	82	54	40	34	12	8	4	2	1		1		402
U 13	♂	44	AMH	8	28	36	18	19	48	35	57	42	30	39	22	16	6				403
U 15	♀	49	AMH	14	32	52	36	22	66	100	88	62	50	54	24	18	4				602
U 17	♂	49	AMH	9	24	35	21	11	24	28	45	58	63	94	55	52	23	8	4	1	555

OSM osmium tetroxide

AMH Häggqvist's modification of Alzheimer-Mann's method.

fibres measured ranged from 402 to 1262 (Table I). The distribution was distinctly bimodal, with one peak at 6—10 μ and a smaller peak at 2—3 μ (Fig. 1). Most of the fibres were found in the groups 6—10 μ. Fibres exceeding 10 μ constituted only 15.9 per cent of the total number measured.

DISCUSSION

Calibre spectra of nerve fibres to flexor and extensor muscles have shown that the afferent fibres are arranged in three groups with the maxima at 2—3, 7—8 and 11—13 μ. Of these the coarse fibres come from the muscle spindles (nuclear bag) and Golgi tendon organs (*Rexed & Therman,* 1948; *Lloyd & Chang,* 1948; *Hagbarth & Wohlfart,* 1952; *Hunt,* 1953). The efferent fibres, on the other hand, are arranged in two groups (*Eccles & Sherrington,* 1930) with the maxima at 4—5 and 11—13 μ (*Rexed & Therman,* 1948).

Fibres exceeding 10 μ occurred in relatively small numbers in the lateral pterygoid nerve (15.9 per cent of the total number of measured fibres). It is impossible to say which fibres are afferent and which are efferent. According to *Fex & Wohlfart* (quoted by *Carlsöö,* 1958) 34—40 per cent of the coarse fibres to the gastrocnemius muscle are afferent. On the basis of their estimates a calculation pertaining to the examined nerve shows that the afferent coarse fibres would thus constitute only a small percentage (about 5—6 per cent). These coarse afferent fibres may be connected with muscle spindles and Golgi tendon organs. The number of muscle spindles could not be determined by this analysis of calibre; however, it is evident that if spindles are present in the lateral pterygoid muscle they must be fairly few in number.

SUMMARY

Eight lateral pterygoid nerves were removed at autopsy from cadavers (men and women aged 35—49 years), with the object of measuring the calibre of the fibres. Staining was performed with osmium tetroxide and by Häggqvist's modification of Alzheimer—Mann's method.

The distribution was definitely bimodal, with one peak at 6—10 μ and a smaller peak at 2—3 μ. Fibres over 10 μ constituted only 15.9 per cent of the total.

It is concluded that if muscle spindles occur in the lateral pterygoid muscle they must be few in number.

RÉSUMÉ

ANALYSE DES FIBRES DU NERF DU PTÉRYGOÏDIEN EXTERNE

Huit nerfs du ptérygoïdien externe ont été prélevés à l'autopsie de cadavres des deux sexes âgés de 35 à 49 ans, dans le but de mesurer le calibre des fibres. La coloration a été faite à l'acide osmique et suivant la modification de Häggqvist à la méthode d'Alzheimer—Mann.

La distribution était nettement bimodale, avec un sommet à 6—10 μ et un sommet moins élevé à 2—3 μ. Les fibres de plus de 10 μ ne représentaient que 15,9 p. cent du total.

L'auteur conclut que s'il existe des fuseaux neuro-musculaires dans le muscle ptérygoïdien externe, ils doivent être peu nombreux.

ZUSAMMENFASSUNG

FASERANALYSE DES NERVUS PTERYGOIDEUS LATERALIS

An einem Obduktionsmaterial (Männer und Frauen im Alter zwischen 35 und 49 Jahren) wurde in 8 Fällen der Nervus pterygoideus lateralis herauspräpariert, mit der Absicht, dessen Kaliberspektrum zu untersuchen. Sowohl Osmiumfärbung als auch eine Färbung nach Alzheimer—Mann—Häggqvist wurden durchgeführt.

Das Resultat zeigt, dass die Verteilungskurve deutlich bimodal ist, mit einem Gipfel bei 6—10 μ und einem kleineren Gipfel bei 2—3 μ. Fasern über 10 μ kommen nur in 15,9 % vor.

Aus dem Resultat wurde geschlossen, dass, falls Muskelspindeln im Musculus pterygoideus lateralis vorkommen, deren Frequenz klein sein muss.

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