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The Medial Root of the Median Nerve and Its Fascicles in Man

Korzeń przyśrodkowy nerwu pośrodkowego i jego pęczki u człowieka

The medial root of the median nerve makes the terminal branch of the medial fascicle of the brachial plexus. It is rather thick, but quite short, and it shows much less variability in comparison with the lateral root of the same nerve. The medial root of the median nerve was not particularly interesting to morphologists, and its internal structure has not been described yet. That is why the author decided to investigate some features of its internal structure on quite wide material.

MATERIAL AND METHODS

The studies were carried out on material obtained bilaterally from the cadavers of 51 males (♂) and 52 females (♀) at the age between 1 day and 87th year of life. 6 age groups were distinguished. They were described in the previous paper (10). Group I included 9 ♂ and 8 ♀, group II — 12 ♂ and 9 ♀, group III — 6 ♂ and 6 ♀, group IV — 10 ♂ and 8 ♀, group V — 8 ♂ and 13 ♀ and group VI — 6 ♂ and 8 ♀. The fascicles of the brachial plexus, the roots and the trunk of the median nerve were visualized by preparation method. The whole medial root of the median nerve or only its beginning part was taken and fixed in formalin. Staining of slides, determining of the thickness of the root and its fascicles, number of fascicles and the index of their cross-section area were described in previous papers dealing with morphology of the peripheral nervous system (9, 10).

RESULTS

The medial root of the median nerve was present in all the cases and it always made terminal lateral branch of the medial fascicle.

Thickness of the root

The size of the cross-section area of the medial root of the median nerve ranged between 0.502 and 14.166 sq mm. The thickness of the root was similar on both sides of one body in 2.9%, greater on the right side in 46.6%, and on the left side in 50.5% of cases. Its average thickness in the examined material figured out at 4.555 sq mm, while on the right side 4.546 sq mm, on the left side 4.364 sq mm, in males 4.616 sq mm, in females 4.298 sq mm. It had the lowest value in the age group I, and the highest — in group IV (Table 1).

Table 1. Mean cross-section area of the medial root of the median nerve

Sex	Side	Age groups					
		I	II	III	IV	V	VI
♂	R	1.859	2.682	5.044	7.068	6.732	5.779
	L	1.595	3.007	5.505	5.991	6.944	5.580
	R+L	1.727	2.844	5.275	6.530	6.838	5.679
♀	R	1.379	3.271	5.972	5.420	4.861	5.878
	L	1.428	2.722	5.957	5.017	5.183	4.865
	R+L	1.404	2.996	5.964	5.218	4.984	5.371
♂+♀	R	1.633	2.934	5.508	6.336	5.574	5.835
	L	1.516	2.885	5.731	5.558	5.806	5.171
	R+L	1.575	2.910	5.620	5.947	5.690	5.503

Explanation: R — right side, L — left side, R+L — right+left.

Number of fascicles

The examined segment of the medial root of the median nerve was composed of 1 to 21 fascicles. It included only one fascicle in 1.9%, two fascicles in 4.4%, three — in 5.8%, four — in 7.3%, five — in 11.7%, six — in 11.7%, seven — in 8.3%, eight — in 5.8%, nine — in 12.6%, ten — in 8.3%, from 11 to 15 in 18.9%, and from 16 to 21 — in 3.4% of cases. The same number of fascicles on both sides of one body was observed in 11.7%, the greater number on the right side — in 45.6%, and on the left side — in 42.7% of cases. The mean number of fascicles in the whole material equalled 7.8, while on the right side 8.0, on the left side 7.7, in males 7.5, in females 8.2. In the distinguished age groups it came out as follows: in group I — 5.4, in group II — 6.5, in group III — 8.4, in group IV — 8.4, in group V — 9.3, and group VI — 9.6.

Size of the cross-section area of fascicles

The thickness of an individual fascicle ranged between 0.001 and 4.066 sq mm. Five groups of the fascicles were distinguished, which were described elsewhere

(9). Very thin fascicles made 22.5% (analogically often on both sides of the body and in both sexes), thin — 43.4% [on the right side (r) — in 45.1%, on the left side (l) — in 41.7%, in males (♂) — in 38.5%, in females (♀) — in 47.9%], medium-thick — 18.8% (r — 17.9%, l — 19.9%, ♂ — 20.9%, ♀ — 17.0%), thick — 12.8% (r — 11.9%, l — 13.8%, ♂ — 15.3%, ♀ — 10.6%), and very thick — 2.4% (r — 2.7%, l — 2.2%, ♂ — 2.7%, ♀ — 2.2%) of all the fascicles.

The frequency of occurrence of the differently thick fascicles in the discussed root was unequal in the age groups. In age group I very thin fascicles were observed in 31.9%, thin in 51.6%, medium-thick in 11.0%, thick in 4.9%, very thick in 0.5%, in group II, respectively — in 22.5, 45.4, 17.7, 12.5 and 1.8%, in group III — in 15.4, 36.8, 26.4, 17.4 and 4.0%, in group IV — in 22.6, 38.5, 17.3, 18.3 and 3.3%, in group V — in 21.0, 44.2, 17.6, 14.8 and 2.3%, and in group VI — in 23.5, 45.1, 23.1, 6.0 and 2.2%.

The size of the cross-section area of all the fascicles of the medial root ranged between 0.370 and 5.131 sq mm. The value was similar on both sides of one body in 1.9%, greater on the right side in 51.5%, and on the left side in 46.6% of cases. The average value of the cross-section area of the fascicles of the root in the whole material equalled 2.245 sq mm, while on the right side 2.322 sq mm, on the left side 2.169 sq mm, in males 2.267 sq mm, in females 2.224 sq mm. The discussed value in the age groups came out to be: in group I — 0.948 sq mm, in group II — 1.780 sq mm, in group III — 3.120 sq mm, in group IV — 2.798 sq mm, in group V — 2.682 sq mm, and in group VI — 2.345 sq mm.

ε Index of the cross-section area of fascicles (IAF)

The value of the index of the fascicle's area ranged from 24.8 to 79.7. It was similar on both sides of one body in 6.8%, greater on the right side in 42.7%, and on the left side in 50.5% of cases. The average value of IAF in the whole material was 50.4, while on the right side — 51.1, on the left side — 49.7, in males — 49.1, in females — 51.8. In age groups it equalled: in group I — 60.2, in group II — 61.2, in group III — 55.5, in group IV — 47.0, in group V — 47.8, in group VI — 42.6.

DISCUSSION

The medial root of the median nerve was always present and in all the cases it was the terminal lateral branch of the medial fascicle. The internal structure of the root, like in cases of various cranial and spinal nerves (1—11), is characterized by great variability and asymmetry, in contradiction to its site and the way of leaving the plexus, which have not showed many variations. The similar values of all the examined features of the root were not observed not only

in people belonging to the same age group and having the same height and similar body weight, but also in the same individuals on both sides of one body. The similar values on both sides of one body, even of a single feature, were found rather seldom: the thickness—in 2.9%, the size of the cross-section area of fascicles—in 1.9%, the number of fascicles—in 11.7%, and the index of the fascicle's area—in 1.9% of cases. In the same person: the thickness of the root was greater on the right side in 46.6%, on the left side—in 50.5%, the size of the cross-section area of fascicles was greater on the right side in 51.5%, on the left side—in 46.6%, the number of fascicles was greater on the right side in 45.6%, on the left side—in 42.7%, and the index of the fascicle's area was greater on the right side—in 51.5%, on the left side—in 46.6% of cases.

The average numbers characterizing the examined features of the medial root showed some differences related to the side of the body and to the sex. The greater on the right than on the left side were: the thickness of the root—by 4.2%, the size of cross-section area of fascicles—by 7.1%, the index of the fascicle's area—by 2.8%, and the number of fascicles—by 5.3%. The greater in males compared with females were: the thickness of the root—by 7.4% and the size of cross-section area of fascicles—by 1.9%, on the contrary in females greater than in males were: the index of the fascicle's area—by 5.5% and the number of fascicles—by 9.3%.

The participation of fascicles of different thickness in the structure of the medial root showed some differences related to the side of the body and to the sex too. Thin and very thick fascicles appeared more often on the right side, and medium-thick and thick fascicles — more often on the left side. Medium-thick, thick and very thick fascicles were observed more often in males than in females, but thin fascicles — more often in females than in males.

The examined features of the root underwent big changes in the period of the postnatal life, mostly up to the 22nd year of life. The thickness of the root increased 3.8 times, the size of the cross-section area of fascicles — 3.3 times, and the number of fascicles—by 77.8%, but the index of the fascicle's area decreased by over 40%. The participation of fascicles of different thickness in the structure of root changed too. Very thin and thin fascicles of the cross-section area up to 0.3 sq mm, constituted over 4/5 of all fascicles of the root in children up to 1 year of age. In the age between the 1st and the 22nd year of life their participation in the root structure decreased, while the share of fascicles with the cross-section area greater than 0.3 sq mm increased considerably.

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STRESZCZENIE

Badania przeprowadzone obustronnie na zwłokach 51 osób płci męskiej i 52 osób płci żeńskiej wykazały stałą obecność korzenia przyśrodkowego nerwu pośrodkowego, który we wszystkich przypadkach stanowił końcowe, boczne odgałęzienie pęczka przyśrodkowego. Miejsce i sposób odejścia korzenia ze splotu nie wykazywały odmian, natomiast jego wewnętrzną budowę charakteryzowała duża zmienność i asymetria. W żadnym przypadku nie obserwowano podobnych wartości wszystkich badanych cech nawet u tej samej osoby po obu stronach ciała. Stosunkowo rzadko występowały obustronnie podobne wartości pojedynczych cech korzenia: grubość w 2,9%, wielkość powierzchni poprzecznego przekroju pęczków w 1,9%, liczba pęczków w 11,7% oraz wskaźnik powierzchni pęczków w 1,9% przypadków.

W życiu pozapłodowym grubość korzenia zwiększała się 3,8 razy, powierzchnia poprzecznego przekroju jego pęczków 3,3 razy, a liczba pęczków o 77,8%, natomiast wskaźnik powierzchni pęczków zmniejszał się o ponad 40%.

