

Thickness of anterior and posterior divisions of the superior trunk

The dimension of the cross-section area of both divisions showed the following range of values: anterior division 0.789 to 11.033 sq mm, posterior division 0.285 to 17.592 sq mm. The surface area of cross-section of the anterior division was the same on both sides of the single body in 3.0%, and of the posterior division in 12.1%. It was greater on the right side, respectively, in 60.6 and in 45.5%, and it was greater on the left side in 36.3 and in 42.4% of the cases. The thickness of the discussed divisions in males is presented in Fig. 1, and in females, in Fig. 2. The age of subjects is marked on abscissa axis, and the age groups are separated by vertical lines. On the ordinate axis the cross-section area of anterior and posterior part of trunk are plotted. From the above figures it arose that the thickness of both divisions of the superior trunk was the same in 3.8%, the thickness of posterior division was greater in 87.9% (in 89.4% on the right side, in 86.4% on the left side, in 92.4% in males, in 83.3% in females), and the thickness of anterior division was greater in 8.3% of cases (in 10.6% on the right side, in 6.1% on the left side, in 4.5% in males, in 12.1% in females).

The average thickness of the anterior division equalled 4.927 sq mm, and of the posterior division 7.659 sq mm, on the right side it equalled 5.042 and 7.740 sq mm,

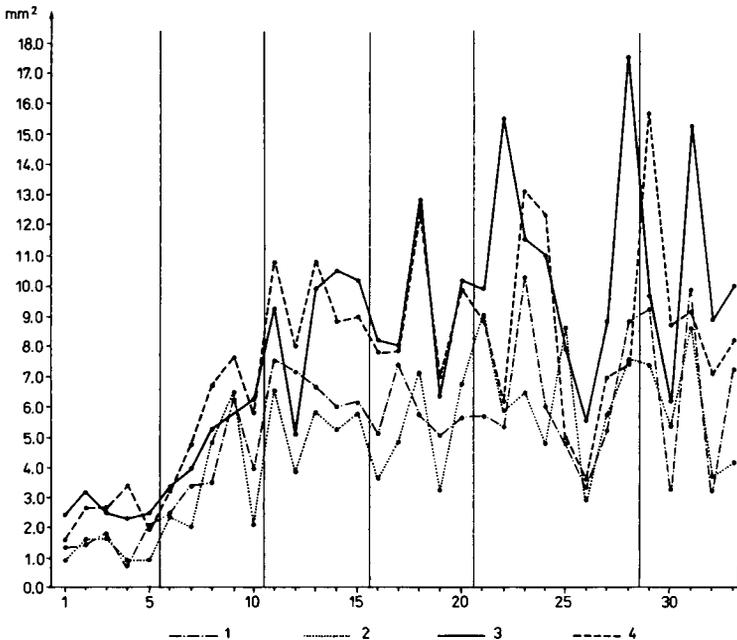


Fig. 1. Thickness of the superior trunk in males; anterior division: 1 — right side, 2 — left side, posterior division: 3 — right side, 4 — left side

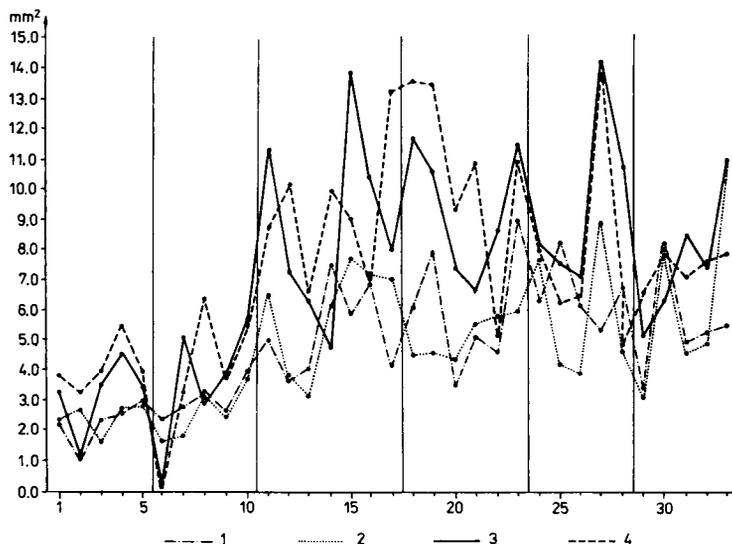


Fig. 2. Thickness of the superior trunk in females; anterior division: 1 — right side, 2 — left side, posterior division: 3 — right side, 4 — left side

respectively, on the left side 4.812 and 7.579 sq mm, in males 4.992 and 7.794 sq mm, in females 4.862 and 7.525 sq mm. The values mentioned above in the age groups come out to be: in group I — 1.919 and 3.105 sq mm, in group II — 3.282 and 4.660 sq mm, in group III — 5.865 and 9.377 sq mm, in group IV — 5.544 and 9.581 sq mm, in group V — 6.262 and 9.441 sq mm, in group VI — 6.042 and 8.721 sq mm, respectively.

Number of fascicles

The number of fascicles in both divisions of the superior trunk showed the following range: the anterior division was composed of 1 to 14 and the posterior division, of 1 to 23 fascicles. The anterior division contained most often four fascicles (18.9% of cases), and the posterior division eight fascicles (12.1% of cases). There were 1 to 5 fascicles in the anterior part in 64.4%, and in the posterior part in 39.4%, from 6 to 10 fascicles, respectively, in 30.3 and in 40.9%, and more than 10 fascicles — in 5.3 and in 19.7% of cases. The same number of fascicles on both sides of one body was found in 16.7% in the anterior division and in 6.1% in the posterior division. The number of fascicles was greater on the right side of the body, respectively, in 51.5 and in 51.5%, and it was greater on the left side in 31.8% in the anterior part and in 42.4% in the posterior part. The number of fascicles in both divisions of the superior trunk was the same in 11.4% (in 10.6% on the right side, in 12.1% on the left side, in 15.2% in males, in 7.6% in females). The number of fascicles was greater in the posterior part in 68.2%

(with the same frequency on both sides of the body and in males and females), and it was greater in the anterior part in 20.4% of cases (in 21.2% on the right side, in 19.7% on the left side, in 16.7% in males, in 24.2% in females).

The mean number of fascicles in the anterior division equalled 4.9, and in the posterior division it was 7.2, on the right side, respectively, 5.1 and 7.4, on the left side 4.7 and 7.1, in males 4.3 and 6.5, in females 5.5 and 8.0. In the age groups it came out as follows: in age group I — 4.4 and 6.6, respectively, in group II — 5.3 and 5.7, in group III — 4.6 and 6.2, in group IV — 4.9 and 8.7, in group V — 5.3 and 8.2, in group VI — 5.2 and 7.7 respectively.

Dimension of the cross-section area of fascicles

In the whole material the thickness of an individual fascicle showed the following range of values: 0.002 to 9.899 sq mm in the anterior part, and 0.004 to 9.189 sq mm in the posterior part. Five groups of fascicles were distinguished. They were described in the previous paper (9). They appeared with different frequency in the anterior and posterior division of the superior trunk. Very thin fascicles made 18.3% in the anterior part [on the right side (r) — 19.8%, on the left side (l) — 16.8%, in males (♂) — 18.1%, in females (♀) — 18.5%] and 17.9% in the posterior part (r — 19.1%, l — 16.7%, ♂ — 15.7%, ♀ — 19.7%), thin fascicles made, respectively — 20.7% (r — 21.3%, l — 20.0%, ♂ — 14.5%, ♀ — 25.4%) and 26.5% (r — 26.6%, l — 26.3%, ♂ — 23.9%, ♀ — 28.6%), medium-thick fascicles appeared in 18.6% (r — 17.1%, l — 20.3%, ♂ — 17.0%, ♀ — 19.8%) and 15.8% (r — 16.2%, l — 15.4%, ♂ — 16.2%, ♀ — 15.5%), respectively, thick fascicles — 20.5% (r — 19.8%, l — 21.3%, ♂ — 22.3%, ♀ — 19.1%) and 19.9% (r — 18.0%, l — 21.8%, ♂ — 20.8%, ♀ — 19.1%), very thick fascicles — 21.9% (r — 22.2%, l — 21.6%, ♂ — 28.0%, ♀ — 17.1%) and 19.9% (r — 20.1%, l — 19.7%, ♂ — 23.4%, ♀ — 17.0%) of all the fascicles.

The frequency of occurrence of differently thick fascicles in the described divisions of the superior trunk was unequal in the age groups. The participation of fascicles in the structure of the anterior division was as follows: in age group I — very thin fascicles 38.7%, thin 21.2%, medium-thick 21.2%, thick 11.3% and very thick 7.5%, in age group II it was — 19.8, 26.4, 19.8, 26.4 and 7.5%, respectively, in age group III — 6.4, 19.1, 12.7, 31.8 and 30.0%, in age group IV — 11.2, 24.3, 21.5, 16.8 and 26.2%, in age group V — 16.8, 16.8, 18.2, 21.2 and 27.0%, in age group VI — 23.1, 17.3, 19.2, 12.5 and 27.9%, respectively.

In the posterior division in age group I very thin fascicles made 30.1%, thin fascicles 36.1%, medium-thick fascicles 19.5%, thick fascicles 8.3% and very thick fascicles 6.9%, in age group II, respectively — 22.8, 24.6, 15.8, 19.3 and 17.5%, in group III — 14.2, 18.9, 10.8, 22.3 and 33.8%, in group IV — 17.7, 20.3, 14.6, 24.5 and 22.9%, in group V — 15.5, 33.3, 16.4, 16.9 and 17.8%, in group VI — 11.0, 25.2, 18.1, 26.5 and 19.4%.

The cross-section area of all the fascicles forming the anterior division of the superior trunk ranged between 0.455 and 9.899 sq mm, and for the posterior division value ranged between 0.169 and 11.227 sq mm. It showed similar values on both sides of one body in 6.1% in the anterior division, and in 4.5% in the posterior division, greater on the right side, respectively, in 56.1 and in 47.0%, greater on the left side in 37.8 and in 48.5% of cases. The sum of the thickness of fascicles of the posterior division compared with the respective sum of the anterior division was greater in 87.1% (r — 87.9%, l — 86.4%, ♂ — 89.4%, ♀ — 84.8%), but lesser in 12.9% of cases (r — 12.1%, l — 13.6%, ♂ — 10.6%, ♀ — 15.2%).

The average value of the cross-section area of fascicles of the anterior division equalled 3.275 sq mm, and of the posterior division 4.921 sq mm, on the right side, respectively, 3.313 and 4.939 sq mm, on the left side 3.238 and 4.902 sq mm, in males 3.293 and 5.023 sq mm, in females 3.258 and 4.812 sq mm. It was different in the age groups: in group I in the anterior division 1.262 sq mm, and in the posterior division 1.969 sq mm, in group II, respectively — 2.141 and 3.020 sq mm, in group III — 3.919 and 6.266 sq mm, in group IV — 3.675 and 6.479 sq mm, in group V — 4.141 and 5.892 sq mm, in group VI — 4.086 and 5.183 sq mm.

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

The size of the index of the fascicle's area of both divisions showed the following range: anterior division 47.5 to 89.7, the posterior division 42.1 to 85.3. It showed similar values on both sides of the single body in 12.1% in the anterior part and 4.5% in the posterior part, greater on the right side, respectively, in 36.4 and in 47.0%, greater on the left side in 51.5 and in 48.5% of cases. The size of IAF of both parts of the superior trunk was similar in 6.8% (r — 7.6%, l — 6.1%, ♂ — 9.1%, ♀ — 4.5%). It was greater in the posterior part in 40.2% (r — 39.4%, l — 40.9%, ♂ — 39.4%, ♀ — 40.9%), and it was greater in the anterior part in 53.0% of cases (with the same frequency on both sides of the body, and in males in 51.5%, in females in 54.5%). The average value of IAF in all material equalled: in the anterior part 66.5, and in the posterior part 64.2, on the right side, respectively, 67.7 and 63.8, on the left side 67.3 and 64.7, in males 66.0 and 64.4, in females 67.0 and 64.0. The value mentioned above, in the age groups ranged as follows: in group I — in the anterior part 65.8, and in the posterior part 63.4 in group II, respectively — 65.2 and 64.8, in group III — 66.8 and 66.8, in group IV — 66.3 and 67.6, in group V — 66.1 and 62.4, in group VI — 67.6 and 59.4.

DISCUSSION

The superior trunk, making the connection between two, or less frequently three roots of the brachial plexus and lateral and posterior fascicles divides into

anterior and posterior parts. There are not any publications about their internal structure in literature. The presented investigations of some features of the internal texture of these both divisions have shown a great individual variability and asymmetry, similarly to other cranial and spinal nerves (1—11). The discussed divisions of the superior trunk differed between each other in thickness, number of fascicles, size and index of their cross-section area.

The thickness of both divisions was the same only in 3.8%. The posterior division was thicker than the anterior division in 87.9% of cases (it was thicker at least twice in 23.5%, no less than by $3/4$ in 13.6%, by over $1/2$ in 25.8%, and less than by $1/2$ in 25.8% of cases). The anterior division was thicker than the posterior division in 8.3% of cases (few times thicker in 1.5%, from $1/3$ to $3/4$ in 3.8%, and less than by $1/5$ in 3.0%). In postnatal life the thickness of the posterior part increased 3.1 times, and of the anterior part 3.3 times. In the whole material the average thickness of the posterior part was greater by 55.4% than the average thickness of the anterior part, but in age group I by 61.8%, in group II by 42.0%, in group III by 59.9%, in group IV by 72.0%, in group V by 50.7%, and in group VI by 44.3%.

The number of fascicles of the examined divisions of the superior trunk was the same in 11.4%. In the posterior part there was observed a greater number of fascicles than in the anterior part in 68.2%; it was greater at least twice in 26.5%, 3—4 times in 18.2%, and more than four times in 8.3% of cases. The anterior part had a greater number of fascicles in relation to the posterior part in 20.4% of cases: at least twice in 6.1%, 3—4 times in 3.8%, and more than four times in 0.8% of cases. The mean number of fascicles, greater by 47% in the posterior part than in the anterior part, showed no differences related to the age.

Unequal participation of fascicles of a different thickness was in the anterior and posterior divisions structure. In the former there were observed more often than in the latter medium-thick and very thick fascicles, but considerably rarely thin fascicles. Thin fascicles occurred more often on the right side in the anterior division, and were present equally on both sides of the body in the posterior division. Medium-thick fascicles were found more often on the left side in the anterior division, but on the right side in the posterior division. Certain differences in the fascicular structure were observed in relation to the sex: very thin fascicles occurred more often in females in the posterior division, but were present equally in the persons of both sexes in the anterior division. Medium-thick fascicles appeared more often in females in the anterior division, and in males in the posterior division. The participation of fascicles of different thickness changed in postnatal life equally in both divisions: the occurrence of very thin, thin and medium-thick fascicles decreased, and the share of thick and very thick fascicles increased.

The size of the cross-section area of all the fascicles of the posterior part in

relation to the respective size of the anterior part was greater in 87.1% of cases: at least twice in 20.5%, no less than by 3/4 in 10.6%, by over 1/2 in 24.2% and less than by 1/2 in 31.8% of cases. It showed greater values in the anterior part than in the posterior part in 12.9% of cases: greater at least twice in 2.3%, no less than by 1/2 by 1.5%, from 1/5 to 1/2 in 3.0%, and less than by 1/5 in 6.1% of cases. The size of cross-section area of all fascicles, both of the posterior and anterior parts, increased in the postnatal life 3.3 times. In the whole material the average value of the cross-section area of fascicles of the posterior part was greater by 50.3% of respective size of the anterior part, but in age group I by 56.0%, in group II by 41.0%, in group III by 59.9%, in group IV by 76.3%, in group V by 42.3%, and in group VI by 26.8%.

The size of the index of the fascicle's area of both divisions was similar in 6.8%. It was greater in the posterior division in 40.2% (by over 1/3 in 4.6%, from 1/5 to 1/3 in 3.0%, and less than by 1/5 in 32.6% of cases), and it was greater in the anterior division in 53.0% of cases (by over 1/3 in 10.6%, from 1/5 to 1/3 in 7.6%, and less than by 1/5 in 34.8% of cases). The average value of index, greater by 3.6% in the anterior division in relation to the posterior division, was not age-dependent.

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STRESZCZENIE

Powstałe z podziału pnia górnego końcowe części, przednią i tylną, badano obustronnie na zwłokach 66 osób obojga płci. Różniły się one grubością, liczbą pęczków i wielkością powierzchni ich poprzecznego przekroju oraz wielkością wskaźnika powierzchni pęczków. Grubość obu części była taka sama tylko w 0,8%, większa części tylnej w 88,6%, a części przedniej w 10,6% przypadków. Przeciętna grubość części przedniej wynosiła 4,927 mm², części tylnej 7,659 mm². W życiu pozapłodowym grubość części tylnej zwiększała się 3,1 razy, części przedniej 3,3 razy. Liczba pęczków w badanych częściach pnia górnego była taka sama w 11,4%, większa w części tylnej w 68,2%, a w części przedniej w 20,4% przypadków. Przeciętna liczba pęczków, większa o 47% w części tylnej w porównaniu z częścią przednią, nie wykazywała różnic związanych z wiekiem. Wielkość powierzchni poprzecznego przekroju pęczków miała większe wartości w części tylnej w 87,1%, w części przedniej w 12,9% przypadków. Zwiększała się ona w życiu pozapłodowym 3,3 razy zarówno w części przedniej, jak i w tylnej. Średnia wielkość powierzchni poprzecznego przekroju pęczków osiągała w części tylnej 4,921 mm², w części przedniej 3,275 mm². Wielkość wskaźnika powierzchni pęczków była podobna w obu częściach w 6,8%, większa w części przedniej w 53,0%, w części tylnej w 40,2%. Średnia wielkość wskaźnika, większa o 3,6% w części przedniej w porównaniu z częścią tylną, nie wykazywała różnic związanych z wiekiem.