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On the Problem of Usefulness of Angiography in the Diagnosis of Intracranial Aneurysms

W sprawie przydatności angiografii w rozpoznawaniu tętniaków śródczaszkowych

Пригодность ангиографии в диагностике внутричерепных аневризм

Despite the progress of the modern methods of radiologic diagnostics such as computer tomography, the angiography of cerebral arteries is still the technique of choice in detection, and the estimation of efficiency of treatment of intracranial aneurysms.

The purpose of that report is to show the efficiency of cerebral angiography in the diagnosis of intracranial aneurysms. The amount, size and the localization of intracranial aneurysms with correlation of their occurrence, according to the age and sex of patients was also reported.

MATERIAL AND METHOD

The authors analysed the group of 153 patients, who were treated in Neurosurgical Clinic of Medical Academy in Lublin in 1981—1985 due to subarachnoid haemorrhage. The authors found 190 intracranial aneurysms in previously mentioned group. The serial cerebral angiography was carried out by means of the AOT seriograph made by Elema-Schönander (24×30 cm). Usually 10 ml of Uropolin 60% ("Polfa") was injected intraarterially in every case by means of the automatic injector Mark IV or Unipan 403B.

The program of investigation was as follows: within 1 second 2 films per 1 sec. were done, and next within 5 sec. 1 film per 1 second was exposed. The venous phase was found in the fourth or the fifth second of the examination, starting from the point of the contrast injection. As a rule two oblique films for the left and the right side were done during the arterial phase of the examination. The quality of the collateral circulation was checked in the cases of the unilateral

visualization of the aneurysm. Sometimes the program of the examination was different according to the changed conditions of the cerebral blood circulation. The carotid angiography was done in a general anaesthesia. The carotid arteries were punctured percutaneously in the neck region. The angiography of the vertebral arteries by Seldinger's method was done, if the result of the carotid angiography was negative.

DISCUSSION

The size and site of intracranial aneurysms and the correlation of their occurrence in men and women in different groups of ages was discussed. The problem of multiple aneurysms was reported separately. The presence of other accompanying pathological processes was also mentioned.

The obtained results were statistically analysed using the test of independence X^2 . The correlation between the results was statistically essential if X^2 which was calculated was bigger than X^2 taken from the suitable table.

The division of patients according to their age and sex was shown in Table 1. There were 89 men (58.2%) and 64 women (41.8%) in the group of 153 patients. The other authors reported similar data (4, 8, 9). No statistically essential difference was seen in the morbidity of women and men in different groups of ages. Anyhow, the pathologic process was observed more frequently in men in the group of young patients up to the age of 30.

Table 1. The age and sex of patients

Age	Women		Men		Total	
	n	%	n	%	n	%
0-20			1	1.1	1	0.7
21-30	5	7.8	13	14.6	18	11.8
31-40	10	15.6	15	16.9	25	16.3
41-50	21	32.8	23	25.8	44	28.8
51-60	23	35.9	32	36.0	55	35.8
61-70	4	6.3	5	5.6	9	5.9
over 71	1	1.6			1	0.7
Total	64	100.0	89	100.0	153	100.0

The size and amount of intracranial aneurysms in the group of men and women were demonstrated in Table 2. All intracranial aneurysms were divided into 6 groups according to their size from 0 to 20 mm. The difference between each group was 3 mm. The biggest group of intra-



Fig. 1. The angiography of vertebral arteries revealed the presence of the aneurysm at the basilar artery 0.5 cm in diameter

cranial aneurysms were these, which had the size from 4 to 7 mm in diameter (55—28.9% of all aneurysms). The small-sized aneurysms were equally seen in the groups of men and women (0—11 mm). The occurrence of the big-sized aneurysms more than 12 mm in diameter was statistically more common in the group of examined men. There was no statistically essential correlation between the age of patient and the size of the intracranial aneurysms. According to our results the biggest amount of intracranial aneurysms was detected in the fourth and the fifth decade of age of our patients (125—65.8% of all cases).

Table 2. The size and amount of intracranial aneurysms in the group of examined patients

Size	Women		Men		Total	
	n	%	n	%	n	%
0-3	6	40.0	9	60.0	15	100.0
4-7	28	50.9	27	49.1	55	100.0
8-11	20	50.0	20	50.0	40	100.0
12-15	16	39.0	25	61.0	41	100.0
16-19	4	30.8	9	69.2	13	100.0
over 20	4	15.4	22	84.6	26	100.0
Total	78	41.1	112	58.9	190	100.0

The localization and frequency of occurrence of intracranial aneurysm on particular cerebral arteries was demonstrated in Table 3. In the cases of the anterior cerebral artery, the middle cerebral artery and the internal carotid artery, the right and the left side were analysed separately. There was no statistically essential correlation between the sex of patients and the localization of aneurysms communicating artery and the right anterior cerebral artery were more frequently revealed in the group of the examined men. The aneurysms at the posterior communicating artery were more commonly seen in women. The aneurysms were most often seen at the internal carotid artery (31%), as well as at the anterior communicating artery (29.5%), and at the middle cerebral artery (26.3%).

The other authors (8, 10, 15) reported the biggest amount of the intracranial aneurysms at the anterior communicating artery (from 36.5 to 50%), and at the internal carotid artery (from 25 to 29.2%). The aneurysms of the posterior cerebral cavity according to other authors from 1.74 to 15% (8, 17). In presented material such aneurysms were observed only in 1.1% (Fig. 1). In a series of 153 cases we found multiple aneurysms in 30 patients (19.6% of all examined cases), while the other authors reported their presence from 5 to 29% of all such patients (1, 2,

Table 3. The localization and number of intracranial aneurysms on particular cerebral arteries in the group of examined patients

Localization		Women		Men		Total		Total	
		n	%	n	%	n	%	n	%
Anterior cerebral artery	left	4	44.4	5	55.6	9	100.0	19	10.0
	right	1	10.0	9	90.0	10	100.0		
Middle cerebral artery	left	10	52.6	9	47.4	19	100.0	50	26.3
	right	16	51.6	15	48.4	31	100.0		
Internal carotid artery	left	13	43.3	17	56.7	30	100.0	59	31.0
	right	15	51.7	14	48.3	29	100.0		
Anterior communicating artery		15	26.8	41	73.2	56	100.0	56	29.5
Posterior communicating artery		3	75.0	1	25.0	4	100.0	4	2.1
Basilar artery posterior cerebral artery		1	50.0	1	50.0	2	100.0	2	1.1
Total		78	41.1	112	58.9	190	100.0	190	100.0

7, 11, 16). There were 18 men and 12 women in our group of patients. The age of patients ranged from 26 to 65 years. As a matter of fact, 40% of all multiple aneurysms occurred in men in the fifth decade. There were observed 2 aneurysms in each person in 25 cases, 4 patients had 3 aneurysms each, and one patient had even 5 aneurysms.

It is interesting that the multiple aneurysms were the most frequently seen at the right middle cerebral artery, at the anterior communicating artery, and at the right internal carotid artery. The multiple aneurysms were found symmetrically in 8 cases (22.6%) at bilateral anterior cerebral arteries, at middle cerebral arteries, and at internal carotid arteries. We observed very often the coexistence of multiple aneurysms at the anterior communicating artery and at the right middle cerebral artery (23.3%).

Sometimes other pathological changes were observed in that group of patients. Among them, the spasm of intracranial arteries was seen more often in 38.5% of all cases. Such incidence the other authors observed in 32—50% of all their patients (3, 6, 12). The extravasation of contrast medium in the surroundings of the aneurysm was seen in 4 cases (2.6%). The presence of intracranial haematoma was observed in 16 patients (10.5%).

The coexistence of intracranial aneurysms and other pathological processes is very rare, and it was mentioned by few authors (5, 8, 13). We found in our material one case with occlusion of the left internal carotid artery, the presence of arterio-venous angioma was seen in two cases, and the combination of the intracranial aneurysm with the brain tumour was observed in one case.

Conclusions

1. No statistically essential difference was found in the morbidity of women and men in different groups of ages.

2. The frequency of occurrence of big-sized aneurysms (more than 12 mm in diameter) is statistically more common in the group of examined men.

3. There was no statistically essential correlation between the age of patients and the size of aneurysms.

4. The biggest number of aneurysms was observed in patients in the fourth and the fifth decade.

5. The most frequently aneurysms occurred at the internal carotid artery (31%), at the anterior communicating artery (29.5%), and at the middle cerebral artery (26.3%).

6. The multiple aneurysms were located symmetrically at bilateral cerebral arteries in 26.6% of all cases. Multiple aneurysms coexisted at the anterior communicating artery and at the right middle cerebral artery in 23.3% of all the patients.

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STRESZCZENIE

Rozpatrzono przydatność angiografii tętnic szyjnych i kręgowych w rozpoznawaniu i umiejscowieniu śródczaszkowych tętniaków tętniczych. Wśród ogólnej liczby 153 chorych, u których przeprowadzono badanie angiograficzne, stwierdzono obecność 190 przypadków tętniczych tętniaków umiejscowionych nadnamiotowo, przy czym jedynie u 1 chorego wykazano związek anomalii naczyniowej z systemem tętnic kręgowych. Otrzymane wyniki w znacznej mierze ułatwiają podejmowanie właściwego postępowania leczniczego.

РЕЗЮМЕ

Авторы обсуждают пригодность ангиографии шейных и позвоночных артерий в диагностике и локализации внутричерепных артериальных аневризм. 190 случаях из всего числа 153 больных, у которых проведено ангиографическое исследование обнаружено наличие артериальных аневризм мозга, расположенных супратенториально, при чем у одного больного установлена связь сосудистой аномалии с системой позвоночных артерий. Полученные результаты способствуют избранию верного терапевтического воздействия.