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Headache occurrence in cerebral strokes

Headaches arise in connection with irritation of tender structures susceptible to pain localized in this area. Pain affects intracranial structures such as great vessels of the brain base, some parts of the leptomeninx and pachymeninx, cranial sinuses and nerves containing sensory fibres and all extracranial structures. Headaches may arise as a result of a specific illness of cranial structures or as a result of regulation disturbances of vasomotor or nervous character. The etiology of headache in a brain stroke still remains unknown. Some sources postulate that it is connected with the dilation of some arteries of the brain base region (2). It is assumed that the stroke may be the effect of a long-lasting pathological process in vessels, and the headache is the warning sign of it (3, 10, 12).

MATERIAL AND METHODS

The study comprised 85 patients (39 females and 46 males). The average age of patients was 68.0 ± 13.94 (the mean age of female patients was 69.3 ± 14.7 and for male patients 68.0 ± 13.3). The youngest patient was 23 and the oldest 91 years old. The hemorrhagic stroke affected 14 patients and the ischaemic stroke was experienced by 71 patients. All the examined patients were conscious and presented logical verbal contact.

The study was based on the questionnaire examination conducted in the Department of Neurology, Medical University of Lublin and at the Neurological Ward of General District Hospital in Lublin from January to September 2005. The study was concerned with whether a headache preceded the symptoms of a cerebral stroke. It was an attempt to describe the pain character (basing on the subjective feelings of patients), headache localization, irradiation of pain to certain areas, day or night time of occurrence and accompanying symptoms. The study also dealt with analyzing migraines and some risk factors as: hypertension (treated and untreated), diabetes, tobacco smoking, application of hormonal contraceptives and hormone replacement therapy (females), ischaemic heart disease, heart infarct, atrial fibrillation and other arrhythmias, coagulation disturbances, taking anticoagulants, earlier ischaemic episodes, fainting, being overweight.

Duration of a headache after an acute episode of the cerebral stroke was also investigated. The differences between the haemorrhagic and ischaemic cerebral strokes were also compared for that reason. The type of stroke was described basing on the results of computer tomography and MRI investigation.

RESULTS

The headache was common in 28 patients (33%), including 19 women (48.72%) and nine men (19.57%). There was no indication of more frequent headaches in the older or younger group by application of median test and χ^2 -test (median = 70 years of age). Among the patients with a haemorrhagic cerebral stroke (14 patients) headache occurred in 50%, and in patients with an ischaemic cerebral stroke (71 patients) headache occurred in 29.52% (Table 4).

In 90% of patients pain occurred in 72 hours preceding the onset of the stroke (in the haemorhagic stroke in 100% of patients, in the ischaemic stroke in 54% of patients).

The headache was most often: persistent (12%), described by the feeling of 'overpressure from the inner side' (11%), the feeling of 'kneading from the outside' (7%), rising during the day (6%) (Table 1). No dependences between localization of the stroke and the localizations of the headache were reported (too small group members' number). The headache irradiated into other areas in nine patients (32%) which were: the arm, the nape, the shoulders, the thorax, the neck, the back, the eyes, the ear, the nose. In 53.57% of patients with the headache, the headache occurred independently of the daytime. Most common accompanying symptoms were: vertigo, nausea, visual disturbances, vomiting (Table 2).

Table 1. Character of a headache

Character of headache	N	%
Persistent	10	12
Rising during the day	5	6
The feeling of 'kneading from the outside'	6	7
The feeling of 'overpressure from the inner side'	9	11
Pickling, in one place	3	3.5

Table 2. Accompanying symptoms

Accompanying symptoms	N	%
Vomiting	6	7
Nousea	8	9
Vertigo	14	16
Syncope	3	3.5
Visual disturbances	7	8
Phonophobia, photophobia	3	3
Others	4	5

Table 3.1. Character of a headache in the ischaemic cerebral stroke and the haemorrhagic stroke

Pickling headache, in one place	Haemorrhagic stroke		Ischaemic stroke	
	N	%	N	%
No	11	78.57	70	98.59
Yes	3	21.43	1	1.41
χ^2	7.263			
p	<0.01			

Table 3.2. Character of a headache in ischaemic cerebral stroke and haemorrhagic stroke

The feeling of 'kneading from the outside'	Haemorrhagic stroke		Ischaemic stroke	
	N	%	N	%
No	12	85.71	65	91.55
Yes	2	14.29	6	8.45
χ^2	4.569			
p	<0.05			

Table 4. Headache occurrence in haemorragic stroke and ischaemic stroke

Headache occurrence directly before acute stroke onset	Haemorrhagic stroke		Ischaemic stroke	
	N	%	N	%
No	7	50.00	50	70.42
Yes	7	50.00	21	29.58
χ^2	6.365			
p	<0.02			

Table 5. Dependence between a headache and hypertension

Hypertension	Lack of a headache before acute stroke onset		Occurrence of a headache before acute stroke onset	
	N	%	N	%
Yes	34	62.96	14	58.33
No	20	37.04	10	41.67
χ^2	0.429			
p	>0.05			

Only one patient in the studied group who had a diagnosed migraine (1% of the studied group number) experienced a haemorrhagic stroke. No statistically significant differences between a headache in 'hypertension' or 'no hypertension' patients were reported (Table 5). Headaches were

more frequent in patients who presented more than four risk factors of the stroke. Headaches were statistically more frequent in patients who were reported with the following risk factors: ischaemic heart disease, heart infarct, coagulation disturbances, taking anticoagulants, fainting. Headaches were less frequent with tobacco smokers and patients with atrial fibrillation.

In 66.67% of patients, reported with a headache, the headache was also persistent after acute stroke episode. Analyzing the dependences between the character of the headache and the type of the stroke reported, it was stated that there occurs more frequently, statistically significant, 'kneading from the outside' or a 'pricking' headache in patients with haemorhagic stroke rather than in patients with ischaemic stroke (Table 3.1, 3.2). In haemorrhagic strokes the headache also affected specific head and was not diffused. In haemorrhagic stroke patients, in more statistically significant way, the pain irradiated into a specific body area: the arm, the neck, the back, the ear, the nose. The symptoms that accompanied more often the headache in haemorrhagic stroke than in ischaemic stroke were: nausea, vomiting, vertigo. Taking into account the risk factors, the patients with a haemorrhagic stroke were more frequently affected with diabetes, they smoked tobacco, had ischaemic heart disease, atrial fibrillation, other arrhythmias or hypertension.

DISCUSSION

The results of our study confirm the fact that headaches are a frequent phenomenon in strokes. Our result – 33% is consistent with other research results (Vestergaard et al. – 27%, Jorgensen et al. – 28%). In our study, the headache was more often reported in female patients (48.72%) than in male patients, as compared to other research data on the subject (4, 10, 12). Only in Edmead's research the headaches were reported to be more frequent in male patients, as far as Vestergaard's research is concerned, there were no differences between sexes. It is possible that in men the source of pain is affected by the lesions of vessels and other intracranial structures, while in female patients other reasons can be taken into account (tension, migraine pain). There was a greater frequency in headache occurrence with a haemorrhagic rather than an ischaemic stroke (1, 4, 7, 8), which was connected with the different mechanism of pain formation. In the haemorrhagic stroke, the headache is caused by the mechanical compression of the extravasated blood on neighbouring tissues and the irritation of nerve endings by blood components (1, 7), the increase of intracranial pressure, irritation of nerve endings in the vessels due to their rupturing (1). In the ischaemic stroke, pain is created by activating of nociceptive endings of the trigeminal-vascular system and by the change in arteries diameter which underwent occlusion, excretion of the products from the ischaemic tissues or blood platelets (serotonin, prostaglandins), and by stretching and/or deformation of pain sensitive structures in the region or in the neighbourhood of the impaired areas (4).

In 90% of our patients, the headache was common during 72 hours preceding the onset of stroke symptoms similarly to Vestergaard et al. study (87%). In our study the headache was most often of: a persistent character (12%), the one of the feeling of 'overpressure from the inner side' (11%), and one with the feeling of 'kneading from the outside' (7%). In Vestergaard's study the headache was of kneading, pulsating and pricking character; in Portenoy's study – it was pulsating. It was not possible to specify the dependence between the headache localization and the stroke localization although in the literature it has been postulated that the localization of the headache is consistent with localization of the stroke. If the stroke appeared in the area supplied by the cervical arteries – the pain was localized in the forehead area; if it appeared in the area supplied by vertebral arteries it was accentuated in the occipital area of the head (1, 12). Headache occurred statistically more frequently in the occipital region, which is related to a greater sensitivity or the number of nociceptive endings

in the trigeminal-vascular system (2, 7, 12). Moreover, if the stroke was one-sided the headache occurred on the same side (8, 12). In nine of 28 patients, a pain radiated into other areas of the body (the arm, the nape, the shoulders, the thorax, the neck, the back, the ear, and the nose), which may develop as a result of irritation of nerves containing sensory fibres or those of cerebro-spinal meninges. Among most frequent symptoms accompanying the headache one can distinguish: nausea, vomiting, oversensitivity to light and sound (12).

In our group there was only one patient with a diagnosed migraine. The mechanism of pain occurring in migraine and in an ischaemic stroke may have the same character (9, 11). In both cases what matters is the irregular blood flow, over reactivity or structural changes in vessels, cardiological insufficiencies such as: mitral valve cusp prolapsing, immunological factors, disturbances in production of vasoactive substances such as: prostaglandins, noradrenergic and cholinergic neurotransmitters and their receptors, carbon oxide and histamine (9, 11). Similarly to the data provided by Mendel et al. it was not possible to show the difference between the occurrence of headaches in patients with hypertension and without hypertension. The connection of headaches occurrence with ischaemic heart disease (4, 6) may result from the application of nitrates which are a recognised reason of headaches. The less frequent occurrence of headaches was confirmed in tobacco smokers (4, 6, 7, 12), although Jorgenses et al. did not confirm such dependence. There was no direct connection, however, with other risk factors such as: diabetes (4, 7, 12) and heart infarct (4).

CONCLUSIONS

1. Headaches were confirmed prior to the cerebral stroke.
2. Headaches occur more frequently in the haemorrhagic stroke rather than in the ischaemic one.
3. There was no connection in the occurrence of headaches in patients with hypertension and without hypertension.
4. There was not any dependence between stroke localization and the localization of the headache.
5. Headache more frequently occurs in patients with the history of: heart infarct, coagulation disturbances, fainting and in those taking anticoagulants. Headaches were less frequently reported in patients who smoked tobacco and in those with arterial fibrillation.

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SUMMARY

The aim of this study is the evaluation of the occurrence of headaches in the acute episode of cerebral stroke, the description of the headache character, its localization, radiation, time of occurrence and the accompanying symptoms. The headaches were analyzed in connection with migraine and some other factors contributing to the cerebral stroke. The duration of headache after the acute episode of the cerebral stroke was examined as well as the differences between haemorrhagic stroke and ischaemic one. The study based on the questionnaire research conducted in the Department of Neurology, Medical University of Lublin and the Neurological Ward of General District Hospital in Lublin and the MRI and CT findings. The study comprised 85 patients (39 females and 46 males). The average age was 68.0 ± 13.94. Headache was common with 33% of the examined patients and was more common with patients with the haemorrhagic stroke (50%) rather than with the ischaemic stroke (29.5%). There was no statistically important difference in the occurrence of headaches in patients with hypertension and without hypertension. There was no dependence between stroke localization and the localization of the headache. Headache more frequently occurred in patients with the history of: ischaemic heart disease, heart infarct, coagulation disturbances, fainting and the patients relying on anticoagulants. Headaches were less frequently reported in patients who smoked tobacco and in those with arterial fibrillation.

Występowanie bólów głowy w udarach mózgu

Celem pracy była ocena częstości występowania bólów głowy w ostrym epizodzie udaru mózgu, określenie charakteru bólu, lokalizacji, promieniowania, pory dnia w jakiej występował, objawów towarzyszących. Analizowano występowanie bólów głowy w związku z migreną i niektórymi czynnikami ryzyka udarów mózgu. Zbadano utrzymywanie się bólów głowy po ostrym okresie epizodu udarowego, a także występowanie różnic między udarem krwotocznym i niedokrwiennym względem tych cech. Praca powstała na podstawie badań ankietowych przeprowadzonych w Klinice Neurologii AM oraz Oddziale Neurologii WSS oraz wyników badań TK i MRI. Badaniem zostało objętych 85 pacjentów (39 kobiet i 46 mężczyzn). Średnia wieku całej grupy wynosiła 68,0 ± 13,94. Ból głowy występował u 33% badanych chorych. Ból głowy częściej występował u pacjentów z udarem krwotocznym (50%) niż z niedokrwiennym (29,52%). Nie wykazano statystycznie istotnej różnicy między występowaniem bólów głowy u pacjentów z nadciśnieniem i bez. Nie stwierdzono zależności miedzy lokalizacją udaru a lokalizacją bólu głowy. Ból głowy statystycznie częściej występował u pacjentów, którzy mieli następujące czynniki ryzyka: choroba niedokrwienna serca, zawał serca, zaburzenia krzepnięcia, przyjmowanie leków przeciwkrzepliwych, omdlenia. Rzadziej obserwowano go u palących tytoń i u pacjentów z migotaniem przedsionków.