Lung function

Neurogenic pulmonary edema in aneurysmal subarachnoid hemorrhage. An analysis of 250 consecutive patients.

*A. Saracen[1], Z. Kotwica[1], A. Woźniak-Kosek[2], P. Kasprzak[3]
[1]Kazimierz Pułaski University of Technology and Humanities in Radom, Faculty of Health Sciences and Physical Education (Radom, Poland)
[2] Polish Armed Forces, Epidemiological Response Centre (Warsaw, Poland)
[3]Medical University of Łódź, Department of Neurosurgery (Łódź, Poland)

Question

Pulmonary complications are the most frequent extracerebral cause of death after subarachnoid hemorrhage (SAH). Neurogenic pulmonary edema (NPE) is observed in a significant central nervous system injuries and has an important effect on results of treatment. The development of NPE is an important predictor of fatal result of treatment and most patients die. In this study we retrospectively studied the files of 250 patients with aneurysmal SAH in order to study the frequency and effects NPE on results of treatment.

Methods and Material

The files of 250 patients admitted between 1995 and 2014 to neurosurgical wards with a diagnosis of aneurysmal SAH were studied. All patients had plain CT performed, followed by angio-CT. We analyzed clinical status according to WFNS classification, location of an aneurysm, the presence of clinical and radiological symptoms of NPE, values of intracranial pressure (ICP) and mortality in this group of patients. For statistical analysis Statistica 6.0 program was used. Patients in grade I to III were surgically treated within the first three day after admission and all aneurysms were clipped. All poor grade patients - grade IV and V had only intracranial pressure measurement tools implanted into the ventricular system. If the state of the patient with poor grade improved, the patient was also treated surgically in the second week after SAH.

Results

There were 140 males and 110 females, 25 to 69 years of age. 186 (74%) patients were admitted in grade I to III in WFNS classification, 32 (13%) were in grade IV, and 32 (13%) in grade V.

NPE was not observed in any patient in grade I to III. From these 186 patients 7 patients died after surgery. From 32 patients in grade IV NPE developed in 9, and in 11 in grade V. From 20 patients with poor grade SAH and NPE 19 died within seven days from SAH. From 44 poor grade patients without NPE died 20, and 24 survived. All poor grade patients had elevated ICP, with values from 24 to 56 mm Hg, mean 31 mm Hg. In patients with NPE ICP values were significantly more elevated than in non-NPE patients mean values 45mmHg and 26 mm Hg consecutively. From 64 poor grade patients no one was treated by surgery within the first week,. There were no correlations between sex or age of patients and development of NPE. NPE developed significantly more frequent in poor grade patients with SAH from anterior communicating artery than with other aneurysm location.

Conclusions

NPE developed in 8% of patients with aneurysmal SAH. In patients in clinical grades 1-3, no one case of NPE was observed. NPE appeared only in poor grade patients - IV and V and NPE was observed in 20 from 64 patients (30%). Patients with NPE had significantly worse results of treatment, only 1 of 20 survived, while from 44 poor grade patients who did not develop NPE mortality was 45% (20 patients). The main predictors of NPE after aneurysmal SAH is poor grade of the patient due to hemorrhage from anterior communicating aneurysm.