A CASE OF MASSIVE INTRACEREBRAL HEMORRHAGE DUE TO AMPHETAMINE ABUSE

Ilina Brainova
Ilina L. Brainova, MD, PhD Student
Department of Forensic Medicine and Deontology – Medical University, Sofia
Zdrave 2 Str., Sofia 1431, Bulgaria
Tel.: 0889364148
e-mail: ilinka_brainova@yahoo.com

ABSTRACT

Introduction: Over 50% of brain strokes are due to intracerebral hemorrhage. The most common etiology of intracerebral hemorrhage is the hypertension. It mainly affects men over the age of 60. Amphetamines are drugs of abuse, that increase blood pressure and that may be the cause of fatal outcomes due to cerebral vascular incidents. Materials and methods: To establish the cause and manner of death a full forensic medical examination, including external and internal examination, histological examination, and toxicological analysis were performed. Case Presentation: A case of fatal outcome of 36-years old men due to inrecerebral hemorrhage is presented. There was a lack of data about circumstances and possible cause of death. During the gross examination of the cadaver there were no traumatic injuries, including needle tracks found. The internal examination revealed massive intracerebral hemorrhage located in the fronto-temporal lobe of the left hemisphere, with a breakthrough to the subarachnoid and subdural spaces; hypertrophy of the left heart ventricle; hypertensive nephropathy of the kidneys; spot-like hemorrhages under the inner layer of the pleura; severe edema of the brain and lungs; purulent pyelonephritis; fatty liver. By histological examination were established only non specific findings such as severe lung and cerebral edema, venous congestion in the internal organs, myocardiofibosis. The toxicological analysis showed presence of amphetamine and acetone in the samples. Discusion: The cause of death was the massive intracerebral hemorrhage due to amphetamine induced hypertension. The morphological findings refer to long-term amphetamine abuse in the past. Conclusion: In cases of intracerebral hemorrhage due to hypertension in relatively young individuals drug abuse should be suspected and excluded. In this cases the toxicological analysis is an useful method that might help etiological diagnose.

Key words: *Drug abuse, Amphetamine, Intracerebral Hemorrhage*

INTRODUCTION

Approximately 52% of all brain strokes registered are due to intracerebral hemorrhage (Tshikwela et al, 2012). The most common etiology for spontaneous intracerebral hemorrhage is the hypertension (Sang et al, 2011). Hypertension is considered as a major risk factor for intracerebral hemorrhage. It mainly affects men over the age of 60 (Hu et al, 2013). Other causes of nontraumatic intracerebral hemorrhages are hemorrhagic infarction, bleeding disorders, septic embolism, anticoagulants, brain tumors, vasculopathy, and drugs (Choi et al, 2013).

Stimulants are commonly used drugs with high potential of abuse. The most frequently abused stimulants are cocaine, amphetamine, methamphetamine, and cathinone (Preda, 2011). Amphetamines are one of the most commonly abused substances in Europe in the last few years (ЕЦМНН, Годишен доклад 2011). Amphetamines are a group of substances similar in chemical structure. Their effects include central nervous system stimulation. Amphetamines are indirect symphathomimetic drugs, which increase the release of biogenic amines in the synaptic cleft. Amphetamine abuse may lead to fatal outcome due to: seizures – status epilepticus; hypertension; tachicardia; hypertermia; vascular incidents; acute myoacrial infarcton (Handly, 2012). The examinations of cadavers of deceased amphetamine addicts shows high incidence of cardiovascular pathology, injuries of coronary arteries, cardiomegaly, and intracranial hemorrhages (Karch et al, 1999; Pilgrim et al, 2009).

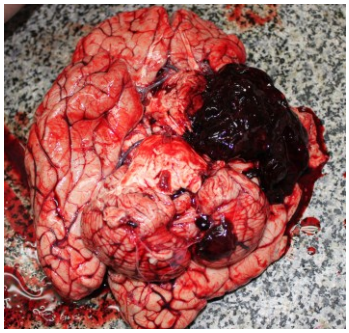
MATERIALS AND METHODS

In order to establish the cause and manner of death full forensic medical examination of the cadaver including external and internal examination, histological examination, and toxicological analysis were performed.

CASE PRESENTATION

It is a case of 36-years old man, who died suddenly. There were no data about the circumstances and the cause of death. There was also no information about any diseases prior to death. The cadaver was fully examined at The Department of Forensic Medicine and Deontology – Medical University Sofia.

There were no traumatic injuries, including needle marks, found during the external examination of the cadaver. The internal examination revealed the following findings: 1. Massive intracerebral hemorrhage located in the fronto-temporal lobe of the left hemisphere (Pictures 1, 2, 3) with a breakthrough to the subarachnoid and subdural spaces. There also was blood in the cerebral ventricles. 2. Hypertrophy of the left heart ventricle – its wall was 2sm thick. 3. Hypertensive nephropathy of the kidneys. 4. Severe edema of the brain and lungs. 5. Fatty liver.



Picture 1

Picture 2

Picture 3

The histological examination revealed non-specific changes: severe lung and cerebral edema, venous congestion in the internal organs, myocardiofibosis.

The results of toxicological analysis performed by the methods of thin laminar chromatography, UV-spectrophotometry, and gas chromatography (GC/NPD) showed presence of amphetamine and acetone in the tissue samples (Table №1).

	stomach, intestine and contents sample	liver and kidney sample	blood sample	urine sample
Amphetamine (mg%)	0,0400mg%	0,0400mg%	traces	0,1000mg%
Acetone	–	–	–	20‰

Table №1 – Results from toxicological analysis.

DISCUSION

The cause of death is the massive intracerebral hemorrhage located in the fronto-temporal lobe of the left hemisphere with a breakthrough to the subarachnoid and subdural spaces. It is due to hypertensive rupture of intrecerebral blood vessels. In this case the hypertension is effect of amphetamine abuse, which is proven by the toxicological analysis. The presence of left ventricle heart hypertrophy and hypertensive nephropathy refers to hypertensive disease, which in this case

most probably developed as a result of amphetamine abuse for a longer period of time prior to death. The fatty liver degeneration is another finding that points to drug abuse.

CONCLUSION

Cerebral hemorrhages due to hypertension is most common in men men over the age of 60 (Hu YZ1, Wang JW, Luo BY, Epidemiological and clinical characteristics of 266 cases of intracerebral hemorrhage in Hangzhou, China, J Zhejiang Univ Sci B. 2013 Jun;14(6):496-504). When younger individuals exhibit symptoms indicating possible cerebral stroke drug abuse has to be considered. It might be useful collecting data about drug abuse and addiction, last intake of drug, and presence of hypertension in the past of the patient. Toxicological analysis is a needful and informative method of examination in such cases.

REFERENCES

1. Европейски център за мониторинг на наркотиците и наркоманиите, Амфетамини, естази, халюциногенни вещества, GHBи кетамин, Годишен доклад 2011: Състоянието на проблема с наротиците в Европа, 63-77.
2. Choi, G., D. Park, S. Kang, Y. Chung, 2013. Glioma Mimicking a Hypertensive Intracerebral Hemorrhage, J Korean Neurosurg Soc, 54(2): 125–127.
3. Handly, N., 2012. Amphetamine Toxicity, Medscape, Apr 2, 2012.
4. Hu, Y., J. Wang, B. Luo, 2013. Epidemiological and clinical characteristics of 266 cases of intracerebral hemorrhage in Hangzhou, China, J Zhejiang Univ Sci B,14(6):496-504.
5. Karch, S., B. Stephens, C. Ho, 1999. Methamphetamine-Related Deaths in San Francisco: Demographic, Pathologic, and Toxicologic Profiles, Journal of Forensic Sciences, 44(2):359-68.
6. Pilgrim, J., D. Gerostamoulos, O. Drummer, M. Bollmann, 2009. Involvement of Amphetamines in Sudden and Unexpected Death, J Forensic Sci, 54(2):478-85.
7. Preda, A., 2011. Stimulants, Medscape, Oct 28, 2011.
8. Sang, Y., H. Su, W. Wu, K. So, R. Cheung, 2011. Elevated blood pressure aggravates intracerebral hemorrhage-induced brain injury, J Neurotrauma, 28(12):2523-34.
9. Tshikwela, M., B. Longo-Mbenza, 2012. Spontaneous intracerebral hemorrhage: Clinical and computed tomography findings in predicting in-hospital mortality in Central Africans, J Neurosci Rural Pract, 3(2): 115–120.

FIGURE LEGEND

Table 1. Results from toxicological analysis.

Picture 1. Gross view of the brain base - massive intracerebral hemorrhage located in the fronto-temporal lobe of the left hemisphere with a breakthrough to the subarachnoid and subdural spaces.

Picture 2. Gross view of brain after 10% Formalin fixation – cavity formed by the intrecerebral hemorrhage.

Picture 3. Cross section of the brain after 10% Formalin fixation – cavity formed my the intracerebral hemorrhage. Blood in the cerebral ventricles.