

A NEAR-HANGING PATIENT WITH PTSD AND ACUTE STROKE - AN UNUSUAL CONDITION FOR "OFF LABEL" THROMBOLYSIS

Svjetlana Šupe¹, Zdravka Poljaković¹, Mario Habek¹, Goran Pavliša² & Stanislava Stojanović-Špehar³

¹Department of Neurology, Intensive Care Unit, University Hospital Center Zagreb, Zagreb, Croatia

²Department of Diagnostic and Interventional Radiology, University Hospital Center Zagreb, Zagreb, Croatia

³Department of Family Medicine, School of Public Health Andrija Štampar, School of Medicine, University of Zagreb, Zagreb, Croatia

received: 19.12.2012;

revised: 19.4.2013;

accepted: 29.4.2013

* * * * *

Introduction

Stroke as the terminal stage of neurovascular diseases is the third cause of mortality and morbidity and the leading cause of disability in contemporary population (Donnan et al. 2008). Recent investigations show that, except common stroke risk factors, there is a strong connection between stress, especially prolonged and chronic psychological stress, and increased stroke risk caused by maladaptation to stressful situations (Šupe et al. 2011). In patients who suffered extreme traumatic experience and have the diagnosis of posttraumatic stress disorder (PTSD), hanging is one of the most common methods of suicide (Stein et al. 2007). Carotid artery injuries occur in approximately 3% of cervical near-hanging victims, either as a dissection or occlusions and may lead to the occurrence of acute stroke (Nichols et al. 2009).

The benefit of thrombolysis by applying the tissue plasminogen activator (t-PA, Alteplase) for acute stroke patients is well known and is almost ten times higher compared to the potential harm of bleeding in patients with such indications (Wahlgren et al. 2007). The thrombolytic therapy has shown to be effective if administered within the so-called "time window" of three hours from the symptoms onset. Thrombolytic agents restore the blood perfusion by clot dissolving, reduce the infarction zone of the brain parenchyma and prevent the development of severe neurological deficits (Matijević et al. 2010). There are well-defined recommendations for thrombolytic treatment in acute stroke patients, as well as contraindications for thrombolytic therapy including head or facial trauma within 3 months, acute trauma with bone fracture, acute bleeding, etc. In some unusual conditions, stroke experts face the challenge to presume the feasibility of thrombolysis as a life saving option out of standard protocols ("off label" thrombolysis) for acute stroke patients, against recommendations, being aware of the risk of complications and untoward outcomes consequent to treatment (Guillan et al. 2012).

We report the case of a psychiatric patient with PTSD who has tried to commit suicide by hanging. As the result of damage after his failed suicide attempt, he

developed symptoms of acute stroke due to the severe post-strangulation stenosis of the right internal carotid artery (ICA).

Despite the high risk of bleeding and the potential deterioration of neurological deficits, and contrary to the established recommendations for thrombolysis, we assumed the risk and performed thrombolysis with successful recovery of the patient's neurological deficits.

Case report

A 52-year old male with the 15-year history of PTSD, chronic alcohol abuse and hypertension tried to commit suicide by hanging. His wife found him approximately 2 minutes after the attempt and managed to lower him on the floor. On arrival at the Emergency Service, he was deeply somnolent, without any focal neurological deficits. Urgently performed brain CT was normal, except chronic vascular lesion in the left frontal lobe.

The neck CT showed fracture of the hyoid bone, surrounded by local neck hematoma consequential to the pressure of the strangulation cord. Twenty five minutes after the initial brain CT scan had been performed, the patient developed the left-sided hemiplegia (National Institutes of Health Stroke Scale - NIHSS score 14) (Fink et al. 2002). The repeated brain CT scan did not show any acute ischemic lesion and the patient was admitted to the Neurological Intensive Care Unit (NICU). Although he had had the recent traumatic injury of the hyoid bone and a large post-strangulation neck hematoma, we decided to apply intravenous thrombolytic therapy with the tissue plasminogen activator (t-PA 0.9 mg/kg).

The patient was monitored at the NICU and, as the result of thrombolytic therapy, his neurological deficit improved to mild left-sided hemiparesis (NIHSS score of 5). The follow-up brain CT after 24 hours of thrombolytic treatment revealed an acute ischemic zone in the irrigation territory of the right middle cerebral artery (MCA). The Color Doppler Ultrasound of carotid arteries showed peak-systolic velocities of 355 cm/s,

pulsatility index 3.0 indicating stenosis above 85% in the right internal carotid artery (ICA) and approximately 60% stenosis in the left ICA with peak-systolic velocities of 210 cm/sec. The CT angiography showed on the short segment of the right ICA a subocclusive stenosis and in the left ICA 70% stenosis in the same location according to the NASCET (North American Symptomatic Carotid Endarterectomy Trial) criteria without signs of the arterial wall dissection (Hacke et al. 2006). During the hospitalization at the NICU, the patient was treated with dual antiplatelet therapy (aspirin and clopidogrel), ACE inhibitors, and simvastatin, along with therapy recommended by the psychiatrist. He underwent physical rehabilitation procedure in the Rehabilitation Center during four weeks, accompanied by supportive and pharmacological psychiatric therapy. His neurological disability recovered to the NIHSS score of 3 (mRS 1). Six weeks after stroke the patient was rehospitalized at our Department of Neurology for endovascular treatment. The digital subtraction cerebral angiography (DSA) was performed, followed by balloon angioplasty and stent placement into the right ICA. The endovascular procedure went without any complications (Figures 1, 2, 3), followed by further neurological and psychiatric monitoring and controls.



Figure 1. DSA of the right ICA showing subtotal stenosis



Figure 2. DSA during the stent implantation in the right ICA



Figure 3. Control DSA after balloon angioplasty and stenting, showing normal blood flow

Discussion

Suicide is the eighth leading cause of death in males, while strangulation injuries account to approximately 2.5% of all traumatic deaths worldwide. Hanging is one of the most common methods of suicide (22.6%), especially among victims who have suffered extreme traumatic experiences and have a diagnosed PTSD (Mihaljević et al. 2012, Omalu et al. 2011). Injuries emerging in cervical near-hanging victims depend upon the type of strangulation cord, the knot location, the height of the fall, complete or incomplete suspension and duration of hanging (Singhal et al. 2002a). Carotid artery injuries in patients who have tried to commit suicide by hanging occur in approx. 3% of victims, either as dissection or occlusions, which may be unilateral or bilateral. The brain injury mechanism after near-hanging may be the result of either hypoxic encephalopathy without ischemia or cerebral infarction (Singhal et al. 2002b). Treatment options in cases with acute cerebral infarction are limited due to abundant comorbidity and numerous contraindications for iv. thrombolytic therapy that usually accompany near-hanging victims, primarily acute bleeding and bone fractures.

Thrombolysis using t-PA is an accepted procedure for the treatment of patients with acute ischemic stroke within "time window" of three hours from the symptoms onset. There are established protocols for the application of thrombolytic treatment with strong recommendations and contraindications to avoid any potential risks and complications of therapy, particularly fatal bleeding.

Sometimes stroke experts are challenged to presume feasibility of "off label" thrombolysis in rather unusual conditions, since there is a high risk of severe bleeding, worsening of neurological deficits and possible mortality as the complication of thrombolytic treatment. The main dilemma is the decision whether to thrombolyse stroke patients with acute head trauma, bone fractures and acute hemorrhage against recommendations (Barber et al. 2001).

In the presented case of a near-hanging victim with PTSD, the mechanism of brain injury was cerebral infarction due to severe posttraumatic (post-strangulation) stenosis of the right ICA and subsequent embolisation and occlusion of the right MCA. Being aware of the whole risk/benefit ratio and the potential risk of severe intracranial hemorrhage as the consequence of thrombolytic treatment, we decided that a life saving option would be to thrombolysed this acute stroke patient against recommendations, although he had acute head and neck trauma with local hemorrhage due to the constriction of the strangulation cord. The patient had an excellent recovery of neurological deficits as the result of thrombus dissolution and reperfusion of brain tissue due to the thrombolysis without signs of hemorrhage into the infarct zone, as presented in the control brain CT. Some data suggest that the overall bleeding risk in cases of "off-label" thrombolysis may not be as high as presumed in selected patients (Meretoja et al. 2010). The decision to perform an "off-label" thrombolysis should be individualized according to the existing protocols, individual patient's condition and the family consent. In our case it was successfully performed.

Conclusion

Sometimes psychiatric patients, especially those with PTSD, require urgent neurological treatment, as in the situations of acute stroke development. In some unusual conditions, stroke experts are faced with the consideration of "off label" thrombolysis against recommendations. Main doubts and dilemmas whether to apply it emerge in situations when a patient has suffered an acute head trauma and local hemorrhage that increases the risk of severe bleeding after thrombolytic treatment, with possible deterioration of neurological deficits and death. It is necessary to make a decision to perform an "off-label thrombolysis" individually for each patient, depending on his condition and comorbidity according to the existing protocols. We performed the procedure successfully.

Acknowledgements: None.

Conflict of interest : None to declare.

Correspondence:

Svjetlana Šupe, MD, PhD
Department of Neurology, Intensive Care Unit,
Zagreb School of Medicine and University Hospital Center Zagreb
Kišpatićeva 12, 10 000 Zagreb, Croatia
E-mail: ssupe2@hotmail.com

References

1. Barber PA, Zhang J, Demchuk AM, Hill MD, Buchan AM: Why are stroke patients excluded from tPA therapy? An analysis of patient eligibility. *Neurology* 2001; 56:1015–20.
2. Donnan GA, Fisher M, Macleod M, Davis SM: Stroke. *Lancet* 2008; 371:1612–23.
3. Fink JN, Selim MH, Kumar S, et al.: Is the association of National Institutes of Health Stroke Scale scores and acute magnetic resonance imaging stroke volume equal for patients with right- and left-hemisphere ischemic stroke? *Stroke* 2002; 33:954–8.
4. Guillan M, Alonso-Canovas A, Garcia-Caldentey J, Sanchez-Gonzalez V et al: Off-label intravenous thrombolysis in acute stroke. *Europ J Neurology* 2012; 19:390–394.
5. Matijević V, Alvir D, Malojčić B, Unušić L, Šupe S, et al: Systemic thrombolysis with recombinant tissue plasminogen activator in acute ischaemic stroke: first Croatian experiences. *Neurol Sci* 2010; 31:693-7.
6. Meretoja A, Putaala J, Tatlisumak T, Atula S, Arto V: Off-label thrombolysis is not associated with poor outcome in patients with stroke. *Stroke* 2010; 41:1450-8.
7. Mihaljević S, Aukst-Margetić B, Vuksan-Cusa B, Koić E, Milošević M: Hopelessness, Suicidality and Religious Coping in Croatian War Veterans with PTSD. *Psychiatr Danub* 2012; 24:292-7.
8. Nichols SD, McCarthy MC, Ekeh AP, Woods RJ: Outcome of cervical near-hanging injuries. *J Trauma*. 2009; 66:174-8.
9. Omalu B, Hammers JL, Bailes J, Hamilton RL: Chronic traumatic encephalopathy in an Iraqi war veteran with posttraumatic stress disorder who committed suicide. *Neurosurg Focus* 2011; 31:5.
10. Reiff T, Stingele R, Eckstein HH, et al: Stent-protected angioplasty in asymptomatic carotid artery stenosis vs. endarterectomy: SPACE2 - a three-arm randomised-controlled clinical trial. *Int J Stroke* 2009; 4:294-9.
11. Singhal AB, Topcuoglu MA, Koroshetz Linnau KF, Cohen WA: Radiologic evaluation of attempted suicide by hanging: cricotracheal separation and common carotid artery dissection. *AJR Am J Roentgenol* 2002; 178:214.
12. Singhal AB, Topcuoglu MA, Koroshetz WJ: Diffusion MRI in three types of anoxic encephalopathy. *J Neurol Sci* 2002; 196:37-40.
13. Stein DJ, Seedat S, Iversen A, et al: Post-traumatic stress disorder: medicine and politics. *Lancet* 2007; 369:139-44.
14. Šupe S, Poljaković Z, Kondić Lj, et al: Neurological basis of stress and stroke risk. *Neurol Croat* 2011; 60:21-28.
15. Wahlgren N, Ahmed N, Davalos A, et al: Thrombolysis with alteplase for acute ischaemic stroke in the Safe Implementation of Thrombolysis in Stroke-Monitoring Study (SITS-MOST): an observational study. *Lancet* 2007; 369:275-282.