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# An Unexpected Outcome of Cervical Near-Hanging Injury

## A case report

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**Abstract :** Cervical near- hanging injuries are most frequent in the young adult population. However, the literature gives little guidance regarding diagnostic evaluation of these patients, although it is well known that their initial clinical presentation has limited prognostic value. This case report presents a patient who actually survived a suicidal near-hanging attempt and was later able to walk and talk to his physician. He died the next day due to carotid dissection and cerebral ischemia. In this case report we emphasize the importance of thorough radiological investigation in the accurate assessment of these patients. Early imaging should be performed routinely after near-hanging injury, in order to establish the correct diagnosis and allow appropriate treatment to be started.

**Key words :** near-hanging ; prognostic factors ; carotid dissection ; radiological investigation.

### INTRODUCTION

Most cervical hangings are successful (60-79%) (1) and the victims die before reaching the hospital. As defined by NICHOLS *et al.*, near-hanging refers to those cases that do not result in death. Survival in these patients is frequently associated with a variety of complications. Suicidal strangulation accounts for approximately 2,5% of trauma deaths, involving predominantly men of 25-30 years of age (3). The evaluation and treatment of cervical near-hanging injuries has not been sufficiently addressed in the literature (2).

### CASE REPORT

A 56 year old man with a past history of depression, hanged himself above the stairs at home, at 9 am. After a few moments he changed his mind and managed to get himself free from the rope. He was transported by his partner to the family physician by car. At this time the patient was able to walk, but was pale and complained of dizziness and lack of balance. Physical examination did

not detect any pathological findings and the patient was discharged.

Around noon, while sitting in the car on the way back home, he became unwell and unable to speak. His eyes became fixed and loss of muscle power on the right side of the body followed.

The patient was taken to the emergency department of our University Hospital where the initial GCS was recorded as E4M6V1 (aphasia). The eyes were open and fixed to the left, both pupils being isocore and reactive to light. There was paralysis of the right facial nerve and paralysis of the right upper and lower extremities. The vital signs remained stable with an arterial oxygen saturation of 100% while breathing spontaneously on room air. Noninvasive blood pressure (BP) was 170/85 mmHg and there was a regular heart rate of 85/min.

The radiological investigations were started immediately upon the admission.

Anteroposterior and lateral radiographs of the cervical spine showed no dislocation or fracture. There were no specific features of airway compromise. Computed Tomography Angiography and Digital Subtraction Angiography of the carotid arteries showed a total occlusion of the left internal carotid artery at the bifurcation (Fig. 1.). This was due to dissection and subsequent angiography did not show any possibility for therapeutic interventional options. In the following hours, this occlusion resulted in a large cerebral infarction with diffuse cerebral swelling and midline shift (Fig. 2.).

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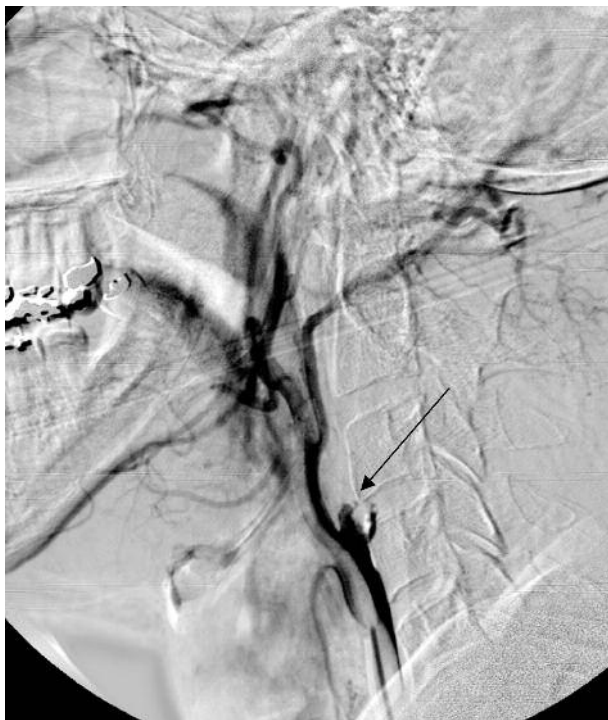


Fig. 1. — Obstruction of the left internal carotid artery, just proximal to the bifurcation.

The patient was transferred to intensive care where a multidisciplinary consultation among the surgeon, radiologist, neurologist and the anaesthesiologist took place. It was concluded that the prognosis was unfavorable due to extensive cerebral ischemia of the left hemisphere. Palliative care was started and the patient died the next day.

#### DISCUSSION

The human neck is extremely vulnerable to compression injuries during strangulation or hanging, due to close proximity of the airway, spinal cord and major vessels. That is why the cervical bone and laryngo-tracheal injury must be suspected and ruled out immediately upon the admission of the victim.

Hanging injury can have the following course: due to interrupted venous return congestive signs (such as conjunctiva hemorrhage) appear. Arterial obstruction produces loss of consciousness within 15 seconds. The compression of large vessels causes cerebral hypoxia and death. In survivors, ischemic neuronal death may lead to permanent brain damage.

According to Boots *et al.*, poor initial presentation, such as a GCS of 3 or even the need for cardiopulmonary resuscitation is of limited prognostic value and does not exclude a good recovery, espe-



Fig. 2. — CT of the brain with infarction and swelling of the left hemisphere.

cially in suicidal near-hangings. Most published reports on near-hanging injuries present patients brought to the emergency room in critical condition: low GCS, dilated non-reactive pupils and need for immediate resuscitation. Some of these patients survive even without serious neurological damage. Boots *et al.* performed a retrospective outcome analysis of 38 patients who had been admitted to hospital with a GCS of 3. Thirty-two percent of these patients returned to independent living (63% died); fifty-two % of the patients received cardio-pulmonary resuscitation (CPR), of whom 46% had an independent functional outcome.

On the contrary, good initial presentation in our patient caused an underestimation of the near-hanging injury which later on led to an unexpected fatal outcome. Our patient had internal carotid injury. This was probably induced by hyperextension and rotation of the neck, which stretched the internal carotid artery over the upper cervical vertebrae, producing an intimal tear (5). During arterial dissection of the carotid artery, blood enters the space between the inner and outer layer of the vessel, causing occlusion. Even complete occlusion may remain asymptomatic if sufficient collateral circulation through the circle of Willis keeps the brain well perfused. Symptoms appear when blood clots start to break off and form emboli. Emboli, traveling through the arteries towards the brain can block the blood supply resulting in ischemia and

irreversible brain damage. In the study of LEE *et al.*, 60% of patients with carotid artery dissection, had cerebral infarctions documented on neuroimaging. In our patient as well, a large infarction and diffuse cerebral swelling was found.

We recommend the following radiological investigations after near-hanging injury : antero-posterior and lateral views of the cervical spine ; CT scan of the brain to exclude cerebral injury ; CT angiography of head and neck to examine cervical vasculature, the soft tissues and the bony structures (3).

Early radiological investigations are infrequently performed despite a low GCS, precluding accurate assessment. The goal of this assessment is prevention of development or continuation of neurological deficit by means of early revascularization, using thrombolytic therapy or by surgical intervention.

Failure to suspect carotid artery injury in our patient led to irreversible neurological sequelae and death. This is considered one of the pitfalls after near-hanging, described by ERNOEHAZY *et al.* (7).

#### CONCLUSION

All near-hanging victims should be admitted for observation, as their condition might deteriorate

later. As there are no reliable prognostic factors after near-hanging injury, early radiological investigation should rule out the following : cervical bone and laryngo-tracheal injury, and injury to brain and cervical vasculature.

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