

CASE REPORT

An unexpected cause of in-hospital cardiac arrest

S. Ijmkers, N. van der Lubbe, L. Dawson

Department of Intensive Care Medicine, Reinier de Graaf Hospital, Delft, the Netherlands

Correspondence

S. Ijmkers - susanneijmkers@gmail.com

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Abstract

We describe a patient admitted with pneumonia two weeks after falling down stairs. On admission, spinal cord injury was excluded by computed tomography (CT). At day 3 of admission in-hospital cardiac arrest occurred. With this case, we want to create awareness that even two weeks post trauma, spinal cord injury can be missed on CT with fatal consequences. We advocate an MRI in patients with persistent localised neck pain or neurological deficits as well as in patients with altered mental status to exclude soft tissue injuries.

Introduction

The incidence of traumatic spinal cord injury (SCI) in the Netherlands is among the lowest in the world. There is an increase in age at time of injury with same-level falls becoming a more important cause of SCI.^[1] A multi-detector row computed tomography (CT) scan is generally accepted as a valid tool to rule out SCI.^[2] Magnetic resonance imaging (MRI) is more sensitive than CT in discerning purely ligamentous injuries. A recent study reported that CT scan alone appeared to be safe in clearance of the cervical spine in intoxicated patients with no gross motor deficits, therefore avoiding prolonged and unnecessary immobilisation.^[3] However, a thorough approach to these patients is of utmost importance because cervical SCI may have devastating consequences. Cardiac arrest can occur in the acute phase due to disruption of central sympathetic control and the concomitant unopposed vagal outflow.^[4] Considering the low incidence, resuscitation teams may have little experience of SCI. Identifying the aetiology of cardiac arrest can be of great significance. Another study demonstrated substantial benefit in survival in in-hospital cardiac arrest (IHCA) patients whose causes were recognised by emergency teams during advanced life support.^[5] In this case, we present a patient with unrecognised cervical SCI.

Case history

A 62-year-old male was admitted with dyspnoea, fever and confusion. His medical history included alcohol abuse and atrial fibrillation for which he used vitamin K antagonists. Inflammatory parameters were elevated (C-reactive protein 243 mg/l, leukocytosis $19.0 \times 10^9/l$) and chest X-ray showed bilateral consolidation. Cefuroxime and clarithromycin were started according to the local guidelines on community-acquired pneumonia. On day 2 of admission the patient complained of neck pain. The patient's history was incomprehensible due to delirium, but he reported falling down the stairs two weeks before admission. A neurologist was consulted and a neck collar was adjusted to stabilise the cervical spine. Apart from cervical midline tenderness and a radiating sensation between the patient's shoulder blades during neck flexion, neurological examination was without abnormalities. Multi-detector row CT of the brain and cervical spine revealed cervical spondylosis (*figure 1a*). His neck collar was removed and his neck pain was ascribed to tendomyalgia.

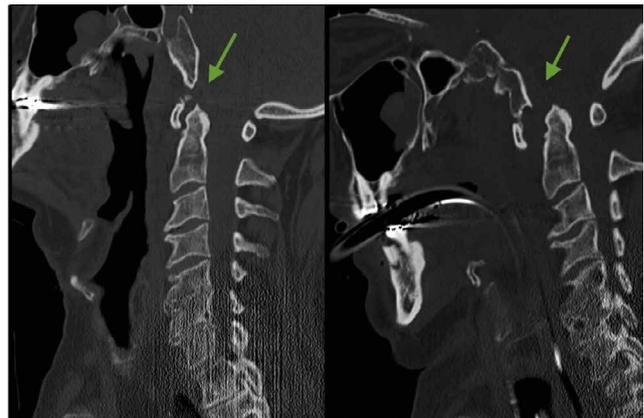


Figure 1a. CT cervical spine on admission demonstrates spondylosis, but normal alignment without fracture.

Figure 1b. CT cervical spine post cardiac arrest demonstrates atlantoaxial dislocation with compression on the myelum and lower brainstem.

MRI of the cervical spine was scheduled for day 3 to exclude spondylodiscitis. Diagnostic lumbar puncture was considered but not performed since clinical suspicion of meningitis was low, the INR was elevated (3.7) and the inflammatory parameters as well as the dyspnoea were decreasing.

At day 3, completely unexpectedly, asystolic witnessed cardiac arrest occurred and cardiopulmonary resuscitation (CPR) was initiated. The cause of cardiac arrest was not immediately evident to the emergency team. After 18 minutes of advanced life support, return of spontaneous circulation was achieved. The patient was intubated and transferred to the intensive care unit where he received a jugular central venous catheter for administration of inotropic drugs. Despite our respiratory and haemodynamic support, he remained hypotensive with recurrent episodes of bradycardia. Several causes of shock were excluded. Neurogenic shock was considered because of his recent fall together with unresponsiveness, apnoea and noteworthy bradycardia. Also, after evaluation, the patient appeared to have warned the nurses directly prior to cardiac arrest that he was unable to move his legs. Lumbar puncture was performed after correction of the INR, and showed macroscopic red blood cells after which another CT was performed to exclude subarachnoid haemorrhage. Surprisingly this CT revealed atlantoaxial (C1-C2) dislocation with a relatively high position of the dens in the foramen magnum compromising the myelum and lower brainstem (*figure 1b*). The patient did not qualify for neurosurgical intervention due to his comorbidity and poor overall clinical condition with locked in syndrome. Shortly after initiation of palliative treatment he died. Postmortem a subtle bruise was noticed beneath the beard under his chin (*figure 2*).



Figure 2. Postmortem photograph of the patients chin demonstrates submental hematoma.

Discussion

When IHCA occurs, information regarding patient comorbidity and preceding signs can be obtained by the resuscitation team to provide insight into the aetiology. In this case no preceding vital dysfunctions were determined. There were, however, preceding subjective signs such as the acute loss of motor function indicated

by the patient directly prior to cardiac arrest, unfortunately unknown to the emergency team at time of CPR.

The patient was primarily admitted with pneumonia. Suspicion of spinal cord injury (SCI) was low since repeated neurological examination and the initial CT showed no objective abnormalities two weeks post trauma. The bruise on his chin could have exposed the impact of the trauma, indicative of hyperextension with severe mechanical force exerted on the spinal cord. In elderly patients with spondylosis, even relatively mild trauma can cause SCI.^[1,6] In case of clinicoradiological mismatch in a patient with previous blunt trauma such as our patient, careful protocolled evaluation and management is warranted including consultation of a trauma surgeon.^[7,8] First a neck collar is indicated to maintain spine immobilisation and secondly an MRI has to be performed to detect soft tissue injuries including haemorrhage, oedema, and injuries to the adjacent ligaments or spinal cord itself.^[4,8]

Retrospective evaluation of clinical signs and symptoms of our patient finally resulted in the diagnosis of cervical SCI and neurogenic shock leading to IHCA. We believe that this patient was predisposed to SCI due to ligamentous injury not observed on the initial CT scan. Furthermore, we hypothesise that atlantoaxial dislocation originated directly prior to cardiac arrest but we cannot exclude that it occurred during intubation, transport to the ICU or insertion of the central venous catheter. Oedema, haemorrhage with prolonged INR or contusion could also have led to acute exacerbation of the SCI. In this case, MRI in an early stage could have revealed unstable SCI.

With this case we want to illustrate that even two weeks post trauma, SCI with unknown ligamentous injury can be a cause of cardiac arrest. Therefore we propose that when a clinicoradiological mismatch is present, even two weeks after an accident, MRI should be obtained to exclude ligamentous or soft tissue injury. The recent trauma and the bruise on the patient's chin appeared not to be an innocent bystander but the clue to an unexpected cause of IHCA.

Disclosures

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