Sedation outside the operation room

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COGNITIVE AIDS „A MUST” FOR PROCEDURES PERFORMED BY MULTIDISCIPLINARY SEDATION TEAMS OUTSIDE THE OR?

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Submitted BMJ Case Reports
We all know, the human brain might not perform optimally during stressful situations. Therefore, essential steps in the treatment of unexpected periprocedural situations and emergencies especially in unfamiliar surroundings outside the operation room (OR) may be missed. Cognitive aids help health care providers to take all treatment steps in correct order, to use the same terminology in multidisciplinary teams, and thereby to improve the quality of patient treatment in critical situations outside the OR.

We present the case of a severe anaphylactic reaction during a radiologic intervention to drain an echinococcosis cyst outside the OR, in which cognitive aids were successfully used to optimise patient care.

A 35-year-old male, ASA physical status II (85 kg, 180 cm) was scheduled for percutaneous transhepatic drainage under deep sedation of a multivesicular hydatid cyst located in the right liver lobe in close contact to the bifurcation of the vena porta.

On admission, the patient was normotensive (112/62 mmHg), in sinusrhythm (75 bpm), and with a peripheral oxygen saturation (SpO\textsubscript{2}) of 100%.

In the radiology suite an 18-gauge IV was inserted and lidocaine 50 mg and clemastin 2 mg were given intravenously. Two L/min of oxygen were administered by nasal cannula. Heart rate (HR), SpO\textsubscript{2}, electrocardiogram (ECG), non-invasive blood pressure (NIBP), and exhaled carbon dioxide (exCO\textsubscript{2}) were constantly monitored. After time-out with the radiologist, the sedation specialist – a sedation trained anaesthesia nurse - injected 250 mcg alfentanil and started propofol infusion aiming for an Modified Observer’s Assessment of Alertness/Sedation (MOAA/S) score of 2, meaning that the patient responds only after mild shaking. After achieving this sedation level, the radiologist started the procedure. Immediately after injecting contrast material into the cyst, spill from the cyst occurred towards the right vena portae. Simultaneously, the patient developed a sinus-tachycardia (106 bpm) and hypotension (41/16 mmHg).

The sedation specialist directly called for help and started mask ventilation. At arrival of the anaesthesiologist, sinus-tachycardia had increased to 140 bpm, while NIBP and SpO\textsubscript{2} were unrecordable. No pulsations of the carotid artery or femoral artery were palpable. A cardiac arrest scenario secondary to an anaphylactic reaction was declared and cardiac compressions were started. For treatment of the anaphylactic shock, 1 mg adrenaline was administered intravenously. The patient was intubated without any problems and ventilated with a FiO\textsubscript{2} of 1.0. A further 1 mg adrenaline and 2 mg phenylephrine was given iv. during CPR. Shortly thereafter the patient regained return of spontaneous circulation with low systemic pressure (52/32 mmHg). Continuous infusions of 0.1 mcg/kg/min adrenaline and 0.08 mcg/kg/min noradrenaline were started and an attending medical student was asked to read aloud the cognitive aids concerning anaphylactic reaction to ensure that all required actions have been taken. It turned out that two treatment interventions had been missed. First, no additional intravenous fluids had been given. Four bags of NaCl 0.9% had
been placed next to the patient but not been connected with his IV line. After realising this omission, the patient received 1l of NaCl 0,9% and 1l of colloids within 10 min. Starting from here, blood pressure stabilised (98/67 mmHg).

The second omission was “consider corticosteroids to decrease biphasic response”. The attending anaesthetist had assumed that application of corticosteroids was a standard procedure before percutaneous hydatid cyst drainage. However, this was not the case. Thereupon the patient received 50 mg prednisolone iv. Ten minutes later the patient was in haemodynamic stable condition transferred to the ICU. The trachea was successfully extubated the following day, and the patient discharged home two days later.

Percutaneous treatment of a hydatid cyst is usually performed under deep sedation outside the OR with a team consisting of a sedation specialist, a radiologist and a radiology technician. Anaphylactic reactions during the procedure are rare (1.7%), but carry a mortality rate of 0.03%. In such a critical situation it is important that all members of this multidisciplinary team speak the same “language” and use the same approach. Although in the presented case the medical team managed this emergency in a professional manner, two important things – fluid therapy and corticosteroids – would have been missed without the critical aids.

The literature shows that multidisciplinary teams dealing with emergency situations frequently omit critical treatment steps. Cognitive aids can help to reduce the number of omitted steps and improve communication within the team during a crisis. Cognitive aids should provide a framework with all the cardinal treatment steps of a crisis to off-load some of the teams cognitive duties. This will allow the team to increase its bandwidth to more effectively deal with the more complicated issues like e.g. underlying causes of the crisis. In our hospital, the Academic Medical Centre in Amsterdam, cognitive aids have been implemented since 2013 and are routinely used during clinical emergencies. They also have a central role in teaching, for residents and staff, as well as for nurse anaesthetists. In the presented case we cannot be certain that the outcome of the patient would have been less good without the use of a cognitive aid. However, with the cognitive aid the omitted steps were identified intermediately. We know that the human brain is fallible, especially under stress and in situations with a high cognitive load. Cognitive aids can never replace the expertise or skills of medical personnel, however they can reduce human error and hereby improve quality of care.
REFERENCES