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Case report

The early diagnosis and management of mixed delirium in a patient placed on ECMO and with difficult sedation: A case report

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ABSTRACT

Delirium represents a serious problem that impacts the physical and cognitive prognosis of patients admitted to intensive care units and requires prompt diagnosis and management. This article describes the case and progress of a patient placed on Extracorporeal Membrane Oxygenation with difficult sedation criteria and an early diagnosis of mixed delirium. During the case report, we reflect on the pharmacological and non-pharmacological strategies employed to cope with delirium paying special attention to the non-use of physical restraint measures in order to preserve vital support devices (endotracheal tube or Extracorporeal Membrane Oxygenation cannula).

The multimodal and multidisciplinary approach, focused on nursing interventions, strict Pain/Agitation/Delirium monitoring and pharmacological measures, as well as the implementation of measures according to the eCASH (early Comfort using Analgesia, minimal Sedatives and maximal Human Care) concept, were effective, resulting in a relatively short admission considering the severity of the patient's condition and the associated complications. Early independent ambulation was achieved prior to transfer to a hospitalisation unit.

Implications for clinical practice

- Daily care in delirious critically ill patients undergoing ECMO is challenging and hazardous due to extremely critical conditions of these patients and life-threatening devices.
- Conscious sedation and strict monitoring protocols for pain, sedation/agitation and delirium via validated tools, enable an early diagnosis and management of patients.
- Early implementation of pharmacological and non-pharmacological measures is related with better results at discharge from the critical care unit.
- Nursing interventions such cognitive stimulation, non-use of physical restraint measures, reality orientation or the improvement of sleep can be an effective strategy for the management and recovery of critical patients with delirium.

Introduction

Currently, there is an international consensus regarding the need for establishing early diagnosis and treatment of delirium in critically ill patients (Barr et al., 2013; Reade and Finfer, 2014; Jackson and Khan, 2015; Trogrlic et al., 2015). Several authors have acknowledged that failure to diagnose and treat delirium early is a serious problem that negatively affects the physical and cognitive prognosis of the patient (Jackson and Khan, 2015; Trogrlic et al.,

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Table 1
Modifiable and non-modifiable risk factors for the development of delirium (Reade and Finfer, 2014; Jackson and Khan, 2015; Van Rompaey et al., 2008).

Non-modifiable risk factors	Modifiable risk factors
Old age	Total amount of sedation received (*)
Prior neurological or psychiatric disorders	Type of analgesic and sedative drugs (*)
Hypertension (*)	Number of intravenous infusions (*)
Severity of the illness (*)	Use of mechanical restrictions
Mechanical ventilation (*)	Duration of stay at Critical Care Unit (*)
Urgent surgery	Lack of natural light
Multiple organ failure (*)	Non-use of glasses or hearing aid
Metabolic acidosis	Interventions during sleep hours (*)
Coma	Prolonged immobilisation (*)

(*) Risk factors present in the clinical case patient.

Table 2
Manifestations of hypo and hyperactive delirium – Adapted from Arend and Christensen, 2009.

Hypoactive delirium	Hyperactive delirium
Lethargy	Agitation
Confusion	Hallucinations, delusional ideas
Sedation	Paranoia
Low level of awareness	Disorientation
Periods of poor attention	Disruptive behavior – self-removal of invasive devices
Drowsiness	Aggressiveness
Deprivation	Pugnacity
Apathy	

2015; Porhomayon et al., 2015; Reade and Finfer, 2014; Sakuramoto et al., 2015; Van den Boogaard et al., 2012a; Barr et al., 2013). However, delirium is frequently under-diagnosed in intensive care units (ICU) (Glynn and Corry, 2015; Trogrlic et al., 2015; Reade and Finfer, 2014). The real prevalence of delirium in ICU is still not strictly defined with several studies reporting a range from 16% to 89% (Reade and Finfer, 2014; Jackson and Khan, 2015).

According to the definition provided in the forth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), there are four key features for delirium diagnosis: 1) disturbance in consciousness with reduced attention ability, 2) change in cognition that is not accounted by a pre-existing dementia, 3) the disturbance develops over a short period of time and tends to fluctuate during the day and the acute and fluctuating appearance of the same and 4) evidence (via a clinical history, physical exam, or laboratory tests) that the disturbance is a result of the physiological consequences of another medical alteration, intoxication or abstinence of substance abuse (European Delirium Association and American Delirium Society, 2014; Jackson and Khan, 2015). These alterations are frequently described in critically ill patients (Reade and Finfer, 2014; Jackson and Khan, 2015).

The pathophysiology of delirium is defined as being multifactorial and complex (Reade and Finfer, 2014; Jackson and Khan, 2015). Several risk factors (RF) are related to the development of delirium in the critically ill patient (Reade and Finfer, 2014; Jackson and Khan, 2015; Van Rompaey et al., 2008), some of which are modifiable or non-modifiable. These RFs are outlined in Table 1.

The critically ill patient may manifest different presentations of delirium: hypoactive, hyperactive and mixed. The most frequent manifestations of hypoactive and hyperactive delirium are displayed in Table 2, whereas mixed delirium presents alternating manifestations of hypo and hyperactive delirium (Reade and Finfer, 2014). Past studies have described an increase in the diagnosis of hyperactive delirium, whereas hypoactive delirium is more frequently under-diagnosed, despite its greater prevalence (Jackson and Khan, 2015).

The diagnosis of delirium based on clinical suspicion is considered insufficient (Jackson and Khan, 2015; Barr et al., 2013). Rather, monitoring is suggested using validated tools: the Intensive Care Delirium Screening Checklist and Confusion Assessment Method for Intensive Care Units (CAM-ICU) (Jackson and Khan, 2015; Van den Boogaard et al., 2012b; Trogrlic et al., 2015; Barr et al., 2013). The latter has an excellent correlation with the Richmond Agitation Sedation Scale (RASS) (Palencia-Herrejón et al., 2008; Barr et al., 2013).

Although at present there is a lack of conclusive evidence to support a single pharmacological treatment in order to treat delirium once it is established (Barr et al., 2013; Jackson and Khan, 2015; Reade and Finfer, 2014), there are a series of preventive measures. These include: constant reorientation measures; avoidance of certain drugs (opioids, benzodiazepines etc.); non-use of physical restraint (PR); early mobilisation; conscious sedation strategies based on analgosedation; prevention of sensory deprivation, such as use of glasses and hearing aids; and avoidance of sleep deprivation (Barr et al., 2013; Jackson and Khan, 2015; Reade and Finfer, 2014).

The ICU nursing staff are in a privileged position at the patients' bedside as they are able to apply many of the preventative measures of delirium described, as well as being able to identify the condition early on via the systematic use of screening assessments and implementing therapeutic non-pharmacological measures (Christensen, 2014; Glynn and Corry, 2015).

There are frameworks that guide nurses in identifying and managing delirium, such as the "Pain, Agitation and Delirium (PAD) management" (Barr et al., 2013) or the "Early Comfort using Analgesia, minimal Sedatives and maximal Human Care (eCASH)" model (Vincent et al., 2016). Nevertheless, current evidence suggests that critically ill patients management can be improve by implementing the "ABCDEF" bundle: Assess, prevent and manage pain; Both spontaneous awakening trials and spontaneous breathing trials; Choice of analgesia and sedation; Delirium: assess, prevent and manage; Early mobility and exercise; Family engagement and empowerment (Barnes-Daly et al., 2017). In the present case we identify "being a patient placed on Extracorporeal Membrane oxygenation (ECMO)" as new variable; this factor can make delirium prevention and management more difficult.

The aim of this article is to present the case of a patient placed on ECMO, who was diagnosed as having a mixed delirium and difficult sedation criteria, and outline the different assessment strategies and the pharmacological and non-pharmacological management employed.

Presentation of the clinical case

Ramón (fictitious name) was a male patient aged 55 years old, admitted to the ICU with a respiratory failure subsequently classified as eosinophilic pneumonia and acute respiratory distress syndrome.

Ramón had been an ex-smoker for four years and drinks alcohol at weekends. His past medical history included arterial hypertension currently under pharmacological treatment and controlled dyslipidemia with dietary measures. He suffered from an ischemic cardiopathology for which he received a stent in the right coronary artery. He had no known drug allergies at the time of admission.

During his stay his respiratory function deteriorated and he developed respiratory acidosis (pH = 7.25, pCO_2 = 52.8 mmHg, pO_2 = 97 mmHg, Bicarbonate = 22.5 mEq/L), poor respiratory mechanics, use of accessory muscles and dispersed bilateral crackles and was intubated within the first hours of admission due to respiratory exhaustion.

During the first five days he required invasive ventilation (pressure controlled ventilation), using the following settings: FiO_2_max = 1, Peep_max = 10 cmH_20, Respiratory

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