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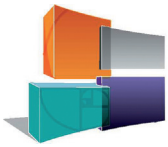

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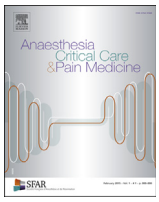

Original Article

Epidural analgesia in the intensive care unit: An observational series of 121 patients☆

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ABSTRACT

Background: Epidural analgesia (EA) has been more investigated during the perioperative period than in the intensive care unit (ICU) setting. Recent studies support beneficial effects for EA beyond analgesia itself. However, data on feasibility and safety are still lacking in the ICU. Our goal was to assess the feasibility and practice of EA in ICU patients.
Methods: Multicentre observational study in 3 ICUs over a 10-month period. Goals were to report the incidence of EA-related complications and EA duration. All ICU patients receiving EA were included, whether EA was initiated in the ICU or elsewhere, e.g. in the operating room. Demographics, clinical and biological data were prospectively recorded. Epidural catheter tips were sent to the microbiology laboratory for culture.
Results: One hundred and twenty-one patients were included (mean age 60 years), with mean SOFA and median SAPS II scores of 3.2 and 32, respectively. Reasons for EA initiation included trauma (14%), postoperative pain management after major surgery (42%), and pancreatitis (31%). No EA-related neurologic complication was recorded, and one case of epidural abscess is discussed. No other EA-related infectious complications were observed. Median duration of EA was 11 days. Reasons for EA discontinuation included efficient analgesia without EA (60%) and accidental catheter removal (17%). 22% of epidural catheter cultures were positive for skin flora bacteria.
Conclusion: EA seems feasible in the ICU. Its apparent safety should be further validated in larger cohorts, but these preliminary results may stimulate more interest in the assessment of potential benefits associated with EA in the ICU setting.

1. Introduction

Epidural analgesia (EA) has been mostly investigated for labour and delivery [1], and for perioperative care after thoracic and major abdominal surgery, providing the most effective analgesia [2]. Beyond its analgesic properties, EA effects on the postoperative neurohumoral stress response, cardiovascular pathophysiology, and intestinal dysfunction have been the focus of both experimental and clinical investigations [3–7]. EA may reduce perioperative morbidity and mortality after major abdominal and thoracic

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surgery, through putative anti-ischemic effects in cardiac and non-cardiac surgery, improved intraoperative intestinal oxygenation and postoperative bowel motility. Experimental studies also suggest that EA may protect intestinal barrier function, improve mucosal capillary perfusion in acute experimental pancreatitis and in sepsis [8], as well as increase anastomotic mucosal blood flow after oesophageal resection [9]. Furthermore, EA may influence tumour progression after oncological surgery [10–13].

Many of these benefits, including EA's analgesic effects, may be relevant to the intensive care unit (ICU) patient. However, the use of EA is related to specific complications and contraindications. The major complications of EA are rare but potentially severe, including infection, epidural haematoma formation and nerve damage [14]. Absolute indications and contraindications for EA in ICU patients are unlikely to be easily defined [15]. EA may be proposed in critically ill patients, such as postoperative or trauma patients [16]. The risk to benefit ratio of EA in the ICU may vary depending on the patient and on the type and the time course of diseases. This area of uncertainty has been illustrated by reported practice on the use of EA in ICUs in England showing wide variation [17]. Contraindications for EA introduction and indications for removal showed heterogeneity, and only one-third of ICUs based these decisions on written guidelines. Only a few data on EA in critically ill patients are available to date [18,19]. In particular, EA in septic patients or patients receiving sedation and/or mechanical ventilation remain a controversial issue, despite results from experimental and clinical studies suggesting potentially beneficial effects [20,21].

In light of these facts, we conducted a prospective, multicentre observational study to assess the feasibility and safety of EA in ICU patients, as we considered this step as mandatory before EA could be eventually tested as a therapeutic option in future studies.

2. Materials and methods

2.1. Ethics statements

The Rhône-Alpes-Auvergne inter-regional research ethics committee gave its approval for the study. According to the committee, patients, or their next of kin, provided written consent to participate in this study.

2.2. Study design

A principal investigator at each site took responsibility for data collection, and follow-up until hospital discharge. The main goal of our study was to assess feasibility of EA in critically ill patients, assuming that the anaesthesiologists in our ICUs already use this technique on a routine basis [16,22].

2.3. Study patients

This observational, prospective, multicentre study included 121 consecutive ICU patients receiving EA, whether the EA catheter was inserted in the ICU or outside the ICU, e.g. in the operating room. All the patients older than 18 years who were admitted to three intensive care units (two from a University Hospital and one from a local hospital: Réanimation Adultes, Estaing University Hospital, Clermont-Ferrand, France; Réanimation Médico-Chirurgicale Gabriel-Montpied University Hospital, Clermont-Ferrand, France; Réanimation Polyvalente, General Hospital, Le Puy-en-Velay, France) between August 2011 and May 2012 and who required EA were eligible. The medical staff in each participating ICU established patient selection and indications for EA.

2.4. Management of epidural analgesia and catheter

The modalities for EA, including epidural catheter insertion technique, site of insertion, choice of drugs and duration of EA, were left at the discretion of the patient's clinician. All clinicians from all ICUs were both anaesthesiologists and critical care medicine specialists, ensuring implementation of the standard of care for EA management.

Contraindications for epidural catheter placement or removal that were related to coagulation disorders or anticoagulant therapy included: a platelet count below 100 G/L, an international normalized ratio (INR) above 1.4, and curative treatment with anticoagulants, unless interrupted for more than 8 hours.

To report the degree of difficulty in EA catheter insertion, a self-assessment questionnaire was filled out by operating clinicians, and difficulty was reported as absent, moderate or major. Based on participating ICU routine protocols, EA was withdrawn for the following reasons: analgesia no longer required, failed block, local discharge (serous or purulent) at the insertion site, accidental dural puncture or migration of the catheter into an epidural vessel, neurological signs of spinal hematoma, abscess or meningitis, and accidental epidural catheter removal. The tip of the catheter was cultured whenever possible; colony types were counted and identified by standard methods and criteria [23].

2.5. Data collection and follow-up

The following data were recorded: age, sex, indication, duration and site of catheter insertion (thoracic or lumbar), leukocyte count, septic status including distant foci of nonbacteremic or bacteremic infection, fever, lowest arterial blood pressure and need for vasopressors or mechanical ventilation during EA initiation and ICU stay. The sepsis-related organ failure assessment score [24], and the simplified acute physiology II score [25] were calculated within 24 hours after admission to the ICU as indexes of disease severity. The McCabe score (three classes: fatal during hospitalization, ultimately fatal within 5 years, and not fatal) was used as an index of the severity of the underlying medical condition. Daily evaluations performed until epidural catheter removal included assessment of general signs of infection (fever, chills, leukocytosis), inflammation at the insertion site (erythema, either serous or purulent discharge) and neurological signs of spinal space infection. Other-site infections were diagnosed according to the usual criteria published for nosocomial infections [26]. Dorsolumbar magnetic resonance imaging was performed in patients with suspected spinal hematoma, abscess or meningitis. Any deaths occurring in the ICU were recorded.

2.6. Outcome measures

The primary outcome was the development of a major EA-related complication, defined as a potential life-threatening complication requiring interventions or leading to death; major complications included the following: serious neurological complications due to EA, adverse events due to the insertion, the presence or the removal of the EA catheter, adverse events related to epidural drug administration, and EA-related infection.

2.7. Statistical analysis

Variables were tested for normal distribution by the one-sample Kolmogorov-Smirnov test. Normally and non-normally distributed data were presented as medians [interquartile range, IQR] and means (Standard deviation, SD), respectively, and proportions were reported as percentages (%) with 95% confidence intervals (CI).