

UNIVERSITY OF MEDICINE AND PHARMACY TÎRGU MUREȘ

SCHOOL OF DOCTORAL STUDIES

Clinical and biochemical parameters evaluated in critically ill patients with high abdominal pressure

PhD Candidate: **Claudiu Puia**

Scientific Supervisor: **Prof. Dr. Lucian Pușcașiu**

ABSTRACT

In adults, the normal value of intra-abdominal pressure is about 0-5 mmHg and can be raised up till 12 mmHg in pathological conditions, without inducing significant complications. The organ failure is installed in patients with a pressure higher than 20 mmHg, the lesion being known as the abdominal compartment syndrome. Although there are several studies published in literature about the compartment syndrome, this lesion still presents unfavorable prognosis and is difficult to be managed in the clinical practice.

Key words: abdominal pressure, NGAL, critically ill patients, cardiac output, respiratory parameters.

The personal contribution of the PhD thesis was synthesized in three chapters.

1. Evaluation of the clinicopathological aspects of critically ill patients with high abdominal pressure – comparison of two time intervals

The aim of the study was to analyze the clinicopathological factors in critically ill patients with high abdominal pressure. The retrospective evaluation took into account two time intervals: 2009-2012 (first period) versus 2013-2016 (second period). There were 1602 patients taken into account. In this period of time (2009-2016) we did not observe significant differences between the number of patients admitted in the Intensive Care Unit with high abdominal pressure; the median number was 180-200 patients per year: 837 patients in first versus 765 in the second time interval. The male:female distribution was relatively similar.

The commonest causes of increasing abdominal pressure were ileus, peritonitis, septic status, vascular disorders and pancreatitis. Compared with the first period, in the second period, we have noticed a significantly increasing percentage of cases with hemoperitoneum-inducing high abdominal pressure (13% versus 3%). The peritonitis was more properly managed (only 11% of the cases showed high pressure as result of peritonitis, compared with 21% in the first period) but the vascular disorders and septic status remained in the top causes of inducing high abdominal pressure.

The main conclusion of this chapter is that, for a proper management of critically ill patients, the intra-abdominal pressure should be more frequently monitored in the Intensive Care Units.

2. Evaluation of the relation between the ventilatory parameters and abdominal pressure in critically ill patients

We have hypothesized that the abdominal pressure value can influence the respiratory mechanical parameters and tried to prove that this hypothesis is reliable and can have application for the therapeutic management of critically ill patients.

The respiratory and cardiac functions were evaluated using the PICCO method (Pulse Index Continuous Cardiac Output). Using specific criteria of inclusion, in the 16 patients included for prospective evaluation, a direct correlation between the abdominal pressure values and the patient's age ($p=0.0045$) and body mass index (BMI) was noticed ($p=0.0049$).

This prospective evaluation showed that the respiratory parameters and slightly influenced by the abdominal pressure value, independently from the techniques or devices used for mechanical respiration.

The intra-abdominal pressure is increased in patients with high PEEP and/or high tidal volume.

The conclusion of this chapter was that a proper evaluation of the respiratory parameters and abdominal pressure should take into account the patient's age and BMI.

3. Evaluation of the relation between the neutrophil gelatinase-associated lipocalin (NGAL) expression, cardiac parameters and abdominal pressure in critically ill patients

In this chapter we aimed to test the relation between cardiac parameters and abdominal pressure and also between plasma and tissue level of NGAL in critically ill patients that died as result of postoperative or septic shock. Based on the obtained data, we have postulated a hypothesis regarding the potential NGAL-mediated mechanism of shock. The possible role of NGAL in inducing abdominal compartment syndrome was also explored in 30 randomly selected patients hospitalized in the Intensive Care Unit that underwent mechanical ventilation.

The conclusions of this chapter were the following:

1. Increasing the cardiac output might decrease the intra-abdominal pressure
2. Plasma level of NGAL should be measured in patients with renal failure, to guide the therapeutic management
3. A plasma NGAL level higher than 450 ng/ml is an indicator of low glomerular filtration rate.
4. A high plasma value of NGAL associated with a high APACHE II score is a negative prognostic factor.
5. The NGAL plasma value increased in parallel with decreasing of diuresis but decreasing of the glomerular filtration rate is multifactorial.
6. The tissue expression of NGAL does not reflect its plasma value and cannot be used in clinical practice.
7. NGAL seems to be synthesized by the circulating neutrophils and adipose tissue and can be involved in the pathomechanism of inducing septic or postoperative shock, especially in obese patients.