

High Central Venous Pressure Associated with Mortality in ICU

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Abstract: Background : For decades Central venous pressure (CVP) has often been used as a measurement of hemodynamics, medication and nutrition for critical patients. In Intensive care unit (ICU) we use APACHE or SOFA score for prediction of mortality. We need a lot of time and procedure to get the prediction. Not every hospital can apply this APACHE and SOFA in their hospital. Since CVP is widely use in ICU for monitoring, we can use the value of CVP as predictor mortality. Method : A retrospective study conducted at H Adam Malik Hospital in Medan. Samples are taken by recording CVP in ICU patients. Patients who have a high CVP (> 8 mmHg) are recorded and seen whether the patient dies or can leave the ICU. Result : During the study period, 100 patients were admitted. 52% were male with mean age 48.5±16.5 years old. The overall mortality of 100 patients was 38%. There was association between high central venous pressure with mortality in ICU (p=0.004). There is a significant relationship between high CVP and mortality. Conclusion : High CVP is associated with mortality rates.

1 INTRODUCTION

The mortality rate in critical patients is quite high. Usually used SOFA, APACHE to assess the patient's death rate (Armiati, 2014; Bello, 2017; Ozaydin, 2017; Bale, 2013; Jones, 2009). Clinical assessment of the severity of illness is an essential component of medical practice to predict the mortality and morbidity of critically ill patients, especially in the intensive care unit (ICU) (Ozaydin, 2017; Bale, 2013; Jones, 2009; Minne, 2008; Saleh, 2015). The Acute Physiology And Chronic Health Evaluation (APACHE), introduced in 1981, takes into consideration various parameters, such as physiological variables, vital signs, urine output, the neurological score, age and co-morbid conditions, which may have a significant impact on the outcome of critically ill patients (Armiati, 2014; Bello, 2017; Ozaydin, 2017; Bale, 2013; Jones, 2009; Minne, 2008; Saleh, 2015).

The APACHE II, formulated in 1985, estimates the risk based on the worst variables available within the first 24 h of admission (Armiati, 2014; Bello, 2017; Ozaydin, 2017; Bale, 2013; Jones, 2009; Minne, 2008; Saleh, 2015). The APACHE II is widely used to quantify the severity of illness in the ICU, and has been validated in many clinical trials (Armiati, 2014; Bello, 2017; Ozaydin, 2017; Bale,

2013; Jones, 2009; Minne, 2008; Saleh, 2015). The Sequential Organ Failure Assessment (SOFA) uses simple measurements of major organ functions to calculate a severity score (Armiati, 2014; Bello, 2017; Ozaydin, 2017; Bale, 2013; Jones, 2009; Minne, 2008; Saleh, 2015). The scores are calculated 24 h after admission to the ICU and every 48 h thereafter. The mean and the highest scores are most predictive of mortality (Armiati, 2014; Bello, 2017; Ozaydin, 2017; Bale, 2013; Jones, 2009; Minne, 2008; Saleh, 2015). But it takes so much time to complete the existing data.

CVP is a tool often used in ICU, the value of the CVP is often interpreted as the adequacy of fluid in critical patients (Damman, 2009; Boyd, 2011; Long, 2017; Williams, 2014; Eskesen, 2015; Bagshaw, 2008; Malbrain, 2014; Coredemans, 2012). In the case of an increase in CVP it is usually predicted that there has been an excess fluid in the patient. whereas excess fluid is associated with increased mortality. We can use the value of CVP as predictor mortality (Damman, 2009; Boyd, 2011; Long, 2017; Williams, 2014; Eskesen, 2015; Bagshaw, 2008; Malbrain, 2014; Coredemans, 2012). From several study show that CVP can be used to predict organ failure such as kidneys (Damman, 2009; Boyd, 2011; Long, 2017; Williams, 2014; Eskesen, 2015; Bagshaw, 2008; Malbrain, 2014; Coredemans, 2012). And kidney

failure is associated with increased mortality. To predict mortality in the ICU, APACHE or SOFA scores were used. However, not all hospitals can measure APACHE and SOFA parameters in each hospital. Therefore from several studies that have high CVP also associated with high mortality rates (Damman, 2009; Boyd, 2011; Long, 2017; Williams, 2014; Eskesen, 2015; Bagshaw, 2008; Malbrain, 2014; Corede-mans, 2012). It is expected that a high CVP can be one way to predict mortality other than APACHE and SOFA score. And in the future it is hoped that CVP can become a parameter for doctors to take medical measures to prevent increased mortality

2 METHODS

A cross-sectional study was conducted from January to December 2017 in ICU Adam Malik Hospital Medan. Patients with age over 18 years admitted to our ICU were included. The demographic data, CVP value collected between survivors and nonsurvivors

Data were analyzed using *SPSS version 18.0*. The quantitative variable was expressed as means and standard deviations. The categorical variables were described by their absolute (n) and relative (%) frequencies. This study was approved by the Ethics Committee of the University of North Sumatra Medical School.

3 RESULTS

During the study period, 100 patients were admitted. 52% were male with mean age 48.5±16.5 years old. The overall mortality of 100 patients was 38% (Table 1). There was association between high central venous pressure with mortality in ICU (p=0.004) (Table 2).

Table 1. Characteristics of subjects

Characteristics	
Mean age (SD), months	48.5 (16.5)
Mean weight (SD), kilograms	57.8 (9.8)
Gender, n (%)	
Male	52 (52)
Female	48 (48)
Mortality, n (%)	
Yes	38 (38)
No	62 (62)
CVP, n (%)	
Tinggi	58 (58)
Rendah	42 (42)

Table 2. Association between high central venous pressure and mortality

Central venous pressure	Mortality		P value
	Yes n	No n	
High	29	29	0.004
Low	9	33	

4 DISCUSSION

In this study we get overall mortality of 100 patients was 38%. There was association between high central venous pressure with mortality in ICU (p=0.004). This is consistent with the research from others (Damman, 2009; Boyd, 2011; Long, 2017; Williams, 2014). Damman K correlated high CVP with AKI and mortality. Long Y found that during the first 24 hours of mechanical ventilation, patients with high central venous pressure had worse outcomes. William JB found that patients for every 5 mmHg increase CVP 6 hours postoperative was strongly associated with in-hospital and 30 day mortality. This increased mortality may be due to organ failure such as the kidneys, heart, lungs and brain (Malbrain, 2014).

High CVP is associated with venous congestion (Damman, 2009). This congestion may be caused by edeme tissue which ends with a compartement (Malbrain, 2014). For example, polycompartments that occur can cause excessive fluid administration which makes oxygenation disrupted due to edema (Malbrain, 2014). High CVP is a sign of the onset of edema or excess fluid which has an impact on cell oxygenation and perfusion. We hope that with the monitoring of each organ such as the heart, lung, kidney and brain compared to the CVP value can prove that CVP can represent organ failure that occurs in the same clinical value as APACHE and SOFA score.

5 CONCLUSIONS

High central venous pressure is associated with mortality in ICU patients, and it could be a simple predictor in addition to APACHE and SOFA score.

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