EGDT Modifications Using IVC Diameter And IVC Collapsibility Index To Provide Intravascular Adequacy For Sepsis Management In Remote Areas

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ABSTRACT

Early goal directed therapy (EGDT) protocols can still be considered to provide clear guidelines for bedside clinicians to treat sepsis. The use of EGDT protocols requires central venous catheter (CVC) installation to calculate the central venous pressure (CVP). In the field, especially in remote areas, the installation of a CVC often cannot be done due to unavailability of tools or other reasons. Wiryana et al. found that there was a strong negative correlation between CVP and collapsibility index of the inferior vena cava (IVC) and that the IVC collapsibility index (IVC-CI) could replace CVP. Therefore, IVC-CI could be used to replace the role of CVP on modified EGDT protocols. The IVC diameter and IVC-CI was measured on 5 patients after initial fluid therapy. There was an expiratory IVC diameter and a IVC-CI belonging to the CVP group of 11–15 cm H2O according to Katja, et al.

Keywords: Sepsis, EGDT, IVC, IVC-CI, Hemodynamic Monitoring, Non-Invasive


BACKGROUND

Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection morphology, cell biology, biochemistry, immunology, and circulation. Until now, the mortality rate due to sepsis in the hospital was very high at 10%, which is higher than the death rate due to ST-elevation myocardial infarction (8.1%).

morphology, cell biology, biochemistry, immunology, and circulation. Sepsis can occur in any area including remote areas. Therefore, special attention should be paid to cases of sepsis ranging from early recognition to management.

The EGDT protocol provides obvious and applicable guidelines for the management of septic patients. Although EGDT is no longer recommended, bedside clinicians still need guidance on how to treat patients with sepsis who have high mortality and morbidity morphology, cell biology, biochemistry, immunology, and circulation. Thus, the use of EGDT protocol for the management of sepsis is still safe and can be considered. However, the application of EGDT protocols in remote areas has constraints that require the use of medical devices that are not necessarily available, namely the installation of a CVC, measurement of CVP, measurement of central venous oxygen saturation (Scvo2) and lactate examination. Therefore, it is necessary to modify the EGDT protocol without overriding the clinical significance of each stage. Wiryana et al. found that there was a strong negative correlation between CVP and IVC-CI and therefore, IVC-CI could replace CVP in the modified EGDT protocol.

SERIAL CASE REPORT

From August to October 2017 at Paniai Hospital, there were five cases of sepsis treated through the EGDT modification protocol by using IVC diameter and IVC-CI instead of a CVC use in determining the adequacy of intravascular fluid. Patients were all women aged 17 to 29 years. All these patients were diagnosed with sepsis through the criteria of a quick SOFA (qSOFA). Four patients had a systolic blood pressure criteria below 100 mmHg and respiratory rate above 22x/min while one patient had a blood pressure criteria below 100 mmHg but had decrease of consciousness based off the Glasgow Coma Scale (GCS) E3V4M5. All patients were treated with oxygen, crystalloid fluids, broad-spectrum anti-biotics, catheter insertion, and routine laboratory examination. Four patients were given 30 mL/kg of initial crystalloid fluids and one patient was given 40 mL/kg of initial crystalloid fluids with a target of IVC-CI below 50%. The results obtained after administration of fluid therapy were described in table 1.
DISCUSSION

Management of sepsis in these patients refers to the EGDT protocol with modification. Management of sepsis with the EGDT protocol can provide guidance and target for bedside doctors in treating sepsis cases. It is said by Gao, that Rivers work on EGDT provides a standard for aggressive treatment of sepsis, resulting in significant decreases in mortality and disability.

In practice, the EGDT protocol requires the use of several tools that are not necessarily available in remote areas, such as the installation of CVC for CVP assessment, examination of blood gas analysis, and lactate examination. In these patients, CVC installation cannot be performed due to unavailable tools, as well as a local culture that tends to resist invasive and relatively new medical measurements. Therefore, modification of the EGDT protocol is required to be done by measuring IVC diameter and IVC-CI as a substitute for CVP measurement. An ultrasonography (USG) image is performed by a probe placed in the subxyphoid area with a marker pointing to the right of the patient. While looking for the heart image and still focusing on the IVC, the probe is turned 90 degrees with the marker pointing to the cranial. Currently, an image of IVC is obtained in the longitudinal position, and the IVC diameter is measured at a location of 2 cm from the right atrium. The IVC diameter was then measured during expiration and inspiration and the IVC-CI was calculated. Wiryana et al. found that there was a strong negative correlation between CVP and IVC-CI and that IVC-CI could replace CVP. Meanwhile, according to Ilyas et al., there is a positive relationship between CVP and the minimum and maximum IVC diameters but an inverse relationship to the IVC-CI. According to Katja et al., an IVC diameter of 1.5-2.5 cm coupled with a IVC-CI <50% corresponds to CVP 11-15 cm H₂O. These patients, after initial fluid therapy, had an expiratory IVC diameter and IVC-CI belonging to the CVP group of 11-15 cm H₂O. The MAP in each of these patients had reached a target above 65 mmHg therefore vasopressor administration was not necessary.

CONCLUSION

EGDT modification using IVC diameter and IVC-CI can be used to provide information about intravascular fluid adequacy in lieu of a CVP assessment that requires a CVC. This can be applied to remote areas where the availability of medical devices is very limited.

REFERENCES