

Accuracy of Inferior Vena Cava, Aorta, and Jugular Vein Ultrasonographic Diameters in Identifying Pediatric Dehydration

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Abstract

Introduction: Evaluating intravascular volume is an important but complicated matter in management of critically ill patients, especially in children. Although invasive techniques have the ability to accurately estimate the intravascular volume, but they have dangerous side effects. Therefore, the present study was designed with the aim of comparing the diagnostic accuracy of sonographic diameters of inferior vena cava (IVC), aorta, internal jugular vein (IJV), and IVC/aorta ratio in identifying pediatric dehydration in children presented to the emergency department (ED). **Methods:** The present prospective cross-sectional study was carried out with the aim of determining the diagnostic accuracy of sonographic diameters of IVC, IJV, and aorta, in estimation of dehydration rate for children presented to the ED with mild to moderate dehydration. Their screening performance characteristics, such as area under the ROC curve, sensitivity and specificity, were calculated and used for this purpose. The data were analyzed using STATA 11.0 and 0.05 was considered as significance level. **Results:** In the end, 54 patients were enrolled in the study (57.4% male, mean age of 4.9 ± 2.7 years). Area under the ROC curve for IVC in diagnosis of moderate dehydration in sagittal and transverse planes were 0.775 (95% CI: 0.65 – 0.91) and 0.8086 (95%CI: 0.96 – 0.93), respectively. In addition, the diameter of aorta in this regard were 0.658 (95%CI: 0.51 – 0.81) for the sagittal and 0.7126 (95% CI: 0.57 – 0.86) for the transverse plane. IJV diameter had an area under the curve of 0.7332 (95% CI: 0.59 – 0.88). Comparing the area under the ROC curves for the studied parameters showed that IVC diameter in the sagittal ($p = 0.004$) and transverse ($p < 0.001$) planes is a better index for diagnosis of moderate dehydration. **Conclusion:** Based on the findings of the present study, it seems that IJV, IVC, and aorta diameters are not very accurate for determining the condition of pediatric dehydration, since even sonographic IVC diameter, which was more accurate than the other parameters, had a sensitivity of 81.48% and specificity of 48.15% in differentiating mild and moderate dehydration.

Key words: Dehydration; diagnosis; ultrasonography; aorta; jugular veins; vena cava, inferior