

ClinicalTrials.gov ID: NCT04173741

Brief Title: Is There Any Correlation Between Respiratory Variation Ratios of Internal Jugular Vein and Inferior Vena Cava?

Official Title: A Correlation Study in the Intensive Care Unit Between the Respiratory Variation Ratios of Internal Jugular Vein and Inferior Vena Cava Before and After Passive Leg Raise

Date: 01 December 2019

Study Protocol: For this prospective observational study, we took consent of the Hacettepe University Non-Interventional Clinical Researches Ethics Board (GO 17/427-34). All adult (aged 18 or older) mechanically ventilated patients admitted consecutively to Hacettepe University Hospital Anesthesiology Intensive Care Unit were screened for study eligibility. Patients with infection or surgical sutures in the site of measurement areas, intraabdominal hypertension, severe aortic regurgitation or lower extremity amputation history were excluded from the study. For eligible patients, we took informed consent from patients themselves or from their guardians.

Ultrasonography (USG) measurements were done separately by 3 different physicians; one senior anesthesiology resident, one critical care medicine fellow (who joined two hands-on USG training before) and one professor in anesthesiology and critical care (USG trainer with more than 1000 USG measurement experience). Anesthesiology resident took 2 hours of didactic lecture about IJV and IVC ultrasonography and performed 5 practices under supervision of the instructor before starting the USG measurements for this study. Physicians neither watched each other's measurements nor were informed about each other's measurement values.

The diameters of inferior vena cava (IVC) and internal jugular vein (IJV) were measured in two different positions. First measurements of IVC and IJV were done in supine position and second ones were done after passive leg raise (PLR) maneuver. For the passive leg raise maneuver legs were elevated 45 degrees. USG measurements were performed 1-3 minutes after PLR.

Philips CX50 Ultrasonography Machine (Philips Ultrasound, Andover, MA, USA) was used for all of the measurements. IJV diameter was measured in the short axis by using linear probe (12-5 MHz) and M-mode. IJV visualized in the junction of cricothyroid membrane level and midclavicular line. Maximum and minimum diameter values were measured in the M mode.

IVC was visualized in the subxiphoid long axis by using convex probe (5-1 MHz). Maximum and minimum diameters of IVC was measured 2 cm caudally to the junction of hepatic vein in M-mode.

Distensibility ($\text{maximum diameter} - \text{minimum diameter} / \text{minimum diameter}$) and collapsibility ($\text{maximum diameter} - \text{minimum diameter} / \text{maximum diameter}$) indices were calculated after USG measurements were done.

Oxygen saturation, heart rate and blood pressure levels were recorded before and after measurements. We also recorded age, gender, weight, height, body mass index, causes of admission, comorbidities, ventilator settings, vasoactive and diuretic medications, fluid intake and output volumes, Acute Physiology and Chronic Health Evaluation (APACHE) II and Sequential Organ Failure Assessment (SOFA) scores in the day of admission, Acute Physiology Score (APS) and SOFA scores on the day of measurement and length of stay in intensive care unit.

Statistical Analysis: We calculated that 44 patients should be included in this study to investigate correlation between IVC and IJV measurements with 0.4 effect size, 0.05 Alfa error and 0.80 power by using G*Power 3.1 software. A total of 46 patients in Hacettepe University Hospital Anesthesiology Intensive Care Unit were required to enroll into this study to reach that number of patients.

We used “IBM SPSS Statistics 23” for statistical analysis. Distribution of the data was analyzed with Kolmogorov- Smirnov Test. For normally distributed data we calculated mean and standard deviation, for the others we calculated median and percentile [5-95] values. We used Spearman correlation test for correlation analysis of measurements of different physicians. We used Spearman correlation test to analyze the correlations between IVC and IJV measurements. Subgroups were listed as patients on vasopressors vs no vasopressors, patients on vasodilators vs no vasodilators, patients on diuretics vs no diuretics, patients with 20mmHg and over vs <20 mm Hg plateau pressure levels, patients with 15mmHg and over vs <15 mm Hg driving pressure levels, patients with over 5mmHg PEEP levels vs PEEP<5 mm Hg, patients with surgical cause of admission vs others, patients who were stayed 1 minute in passive leg raise position vs patients who were stayed 3 minutes in passive leg raise position. A p value less than .05 was considered statistically significant.