The relationship between shock index and measures of cardiac output in cardiogenic shock

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Introduction: In acute infarction myocardial and cardiogenic shock, the shock index (SI) has been associated with poor prognostic in recent researches, but its relation with haemodynamic parameters has not been described.

Purpose: Evaluate relation between SI and measures of cardiac output by pulmonary artery catheter in cardiogenic shock.

Methods: Prospective study of older than 18 years and admitted for cardiogenic shock in two cardiovascular critical units. Included patient with pulmonary artery catheter for cardiac output estimated. Excluded patient with cardiac index (CI) always greater than 2.2 ml/min/m². The measures were performed with standard protocol. In the moment was perform measures, we were calculated the shock index and cardiac power output (CPO). It has been definite as an altered value a SI ≥0.8 CI ≤2.2 and CPO ≤0.6. We have calculated sensitivity, specificity, positive likelihood ratio (+LR) and negative likelihood ratio (-LH). In addition, we have searched a linear relation with Pearson correlation coefficient.

Result: 95 measures of cardiac output were performed. Rhythm during measurements was 75.7% (n=72) in sinus rhythm, 9.4% (n=9) in nodal rhythm and 4.2% (n=4) in atrial fibrillation. Treatments during measurements were 68.5% (n=24) with norepinephrine, 17.8% (n=17) with epinephrine, 10.5% (n=10) with vasopressin, 6.31% (n=6) with dexmedetomidine, and 27.3% (n=26) with amiodarone. Only 7.3% (n=7) measures were in context of recent use of beta-block (24 horas before). CI average was 2.36 (0.9-3.71), CPO average was 0.72 (0.25-1.29) and SI average was 0.8 (0.4-1.5). The relation between SI and CI: sensitivity 64.1% (95% CI 47.1-78.8%), specificity 48.2% (95% CI 34.7-619%), +LR 1.24 (95% CI 0.9-1.7), -LR 0.74 (95% CI 0.45-1.23) and Pearson correlation coefficient -0.175. The relation between SI and CPO: sensitivity 63.3% (95% CI 43.9-80%), specificity 46.2% (33.7-60%), +LR 1.18 (0.83-1.67), -LR 0.79 (0.46-1.36) and Pearson correlation coefficient -0.166. Subsequently, the analysis of relation between SI and CI after excluded nodal rhythm, atrial fibrillation, recent use of beta-block, and use of dexmedetomidine and/or amiodarone was: sensitivity 87.5% (95% CI 61.7-98.5%), specificity 43.6% (27.8-60.4%), +LR 1.55 (1.11-2.16), -LR 0.29 (0.07-1.1) and Pearson correlation coefficient -0.49. The relation between SI and CPO after excluded the same aforementioned variables was: sensitivity 25% (95% CI 12.1-42.2%), specificity 94.7% (74-99.8%), +LR 4.75 (0.65-34.74), -LR 0.79 (0.64-0.98) and Pearson correlation coefficient -0.55.

Conclusion: In the general sample, we did not find a linear relation between SI and CI or CPO. By excluding aforementioned variables, we found a relation between a normal SI and CI >2.2, and between an abnormal SI and CPO ≤0.6. There could be additional variables to cardiac output that explain the relation between SI and poor prognosis. Better validation requires a larger sample.