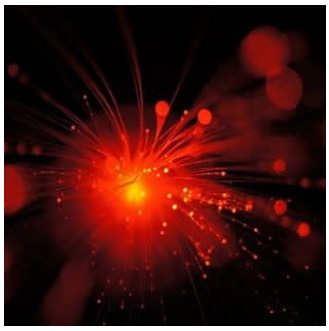
ICU
MANAGEMENT & PRACTICE

Microcirculatory reactivity impaired in patients with circulatory shock



Skin laser Doppler (SLD) with a thermal challenge is a technique that allows simple, noninvasive evaluation of skin microcirculatory reactivity. Using this technique, researchers have demonstrated that reactivity of skin microcirculation during a thermal challenge is decreased in patients with circulatory shock and has prognostic value.

"This simple, noninvasive test could help in monitoring the peripheral microcirculation in acutely ill patients, " according to the study published in the journal Annals of Intensive Care.

Circulatory shock is a life-threatening condition affecting about one-third of patients admitted to the intensive care unit (ICU). Regardless of the underlying pathophysiological mechanisms, the hallmark of shock states is altered tissue perfusion, which if not rapidly corrected leads to organ dysfunction and death.

Local heating of the skin may represent an alternative means of evaluating microvascular reactivity. SLD, also known as laser Doppler flowmetry, can be used to assess skin blood flow (SBF) during a thermal challenge. However, there are no published data evaluating this test in patients with circulatory shock. The researchers hypothesised that reactivity of the skin microcirculation, evaluated as the skin blood flow ratio, during a thermal challenge would be impaired in patients with circulatory shock.

For this study, the research team first evaluated SBF using SLD on the forearm and on the palm in 18 healthy volunteers to select the site with maximal response. Measurements were taken at 37°C (baseline) and repeated at 43°C. The 43°C/37°C SBF ratio was calculated as a measure of microvascular reactivity. Next, the researchers evaluated the SBF in 29 patients with circulatory shock admitted to a 35-bed department of intensive care and in a confirmatory cohort of 35 patients with circulatory shock.

In the volunteers, baseline SBF was higher in the hand than in the forearm, but the SBF ratio was lower (11.2 [9.4–13.4] vs. 2.0 [1.7–2.6], $p < 0.01$) so the researchers used the forearm for the patients. Baseline forearm SBF was similar in patients with shock and healthy volunteers, but the SBF ratio was markedly lower in the patients (2.6 [2.0–3.6] vs. 11.2 [9.4–13.4], $p < 0.01$). Shock survivors had a higher SBF ratio than non-survivors (3.2 [2.2–6.2] vs. 2.3 [1.7–2.8], $p < 0.01$). These results were confirmed in the second cohort of 35 patients. In multivariable analysis, the APACHE II score and the SBF ratio were independently associated with mortality.

"Our data also show that the degree of impairment in microvascular reactivity during a thermal challenge was similar in septic and cardiogenic shock," the authors write. "Nevertheless, studies in patients with just cardiogenic, septic or haemorrhagic shock may be of interest to further investigate whether the effects of a thermal challenge are indeed similar across different shock etiologies."

The study has some important limitations, including the relatively small number of patients, potentially limiting the statistical power of the analyses and possibly accounting for the lack of significant difference in microvascular reactivity between survivors and non-survivors, particularly at 48 hours. Moreover, although similar results were observed in the two cohorts, external validation of the study data is still necessary, the authors say.

Source: Annals of Intensive Care
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