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EDITORIAL COMMENTARY

Peripheral Perfusion Index – Magic Wand in Prediction of Shock?

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During early stages of shock in children, many of the clinical signs are subtle and subjective making its recognition difficult for a clinician. Many of these signs are influenced by factors like type of shock (hypovolemic, cardiogenic, vasodilatory), its etiology, body temperature and ambient temperature, requiring high index of suspicion. Each of these clinical signs, when considered alone, have poor sensitivity and specificity for prediction of shock. A combination of these signs can perform better. Various definitions of shock based on combination of signs have been described [1]. The quest for an ideal combination of signs is ongoing which can help in early shock recognition and better outcomes.

Sivaprasath et al. [2] in this issue of journal, have evaluated usefulness of peripheral perfusion index (PI) for prediction of shock in children aged 1 mo to 12 y admitted to pediatric intensive care unit. Perfusion index, in simple terms, is the strength of the pulse indicating the measure of peripheral blood flow and not oxygenation. It is measured as a ratio of pulsatile and non-pulsatile components of blood flow at the sensor site. Advantages are the non-invasive nature, ease of use and affordability and disadvantage being inability to use in patients with cool peripheries, significant interpatient and intra-patient variability between the sites of measurement. In the index study, authors have correlated clinically assessed shock and blood pressure with PI. Patients with cool peripheries, heart diseases and those having poor signal pick up at sensor site were excluded. They found that age related PI values ranging from 1.15 to 1.55 correlated with shock and PI had a strong correlation with pulse pressure. However, PI did not predict hypotension in critically ill children. Core to periphery temperature gradient being an important correlate of PI has not been reported in the index study [3]. Also, shock has been defined as, presence of tachycardia, weak, fast pulse and capillary refill time > 3 s (core peripheral temperature gradient has not been included).

PI correlates with pulse pressure, which in turn is determined by vasomotor tone and influenced by many factors including type and etiology of shock, peripheral temperature, site of measurement, age, use of vasoactive agents and cardiac output [3–5]. Normal values vary with age; in term neonates median PI was 1.7 (interquartile range 1.18–2.5), in adults varying from 0.3–10 [3, 6]. Understandably, warm shock would have higher PI whereas cold shock, a low PI. Similarly, anesthetic agents causes vasodilation, increase in PI and thus can predict a successful induction [7]. Neonatal studies report low PI as a strong predictor of illness severity [8]. In the index study, children with shock had a significantly lower PI compared with those without shock [2].

As with any monitoring parameter, PI gains its clinical application in pediatric ICU with monitoring of its trends. Authors report an important finding that, a reduction of 57% from baseline PI is a predictor of impending shock [2]. We could presume that majority of these were in cold compensated shock because warm shock at the onset should have increased the PI due to vasodilation rather than decreasing it. This data on trend of PI could serve as an important non-invasive hemodynamic monitoring tool to predict onset of shock in critically ill children. Since PI represents the regional tissue perfusion, its role can further be expanded to monitor regional organ perfusion similar to near infrared spectroscopy in post-transplant recipients.

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Compliance with Ethical Standards

Conflict of Interest None.

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