Commentary

Perioperative goal directed haemodynamic therapy – do it, bin it, or finally investigate it properly?

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See related research by Lopes *et al*., http://ccforum.com/content/11/5/R100

Abstract

The literature concerning the use of goal directed haemodynamic therapy (GDHT) in high risk surgical patients has been importantly increased by the study of Lopes and colleagues. Using a minimally invasive assessment of fluid status and pulse pressure variation monitoring during mechanical ventilation, improvements were seen in post-operative complications, duration of mechanical ventilation, and length of hospital and intensive care unit (ICU) stay. Many small studies have shown improved outcome using various GDHT techniques but widespread implementation has not occurred. Those caring for perioperative patients need to accept the published evidence base or undertake a larger, multi-centre study.

In this issue, Lopes and colleagues [1] add to the list of studies investigating the concept of goal directed haemodynamic therapy (GDHT). GDHT in high risk surgical patients has been investigated for over 20 years [2]. A variety of strategies and monitoring modalities have been applied and in general have resulted in improved patient outcomes [3]. We have worked through pulmonary artery catheters, Doppler probes, and less invasive methods of cardiac output measurement, but the recent paper is the first to use a truly minimally invasive technique to assess the requirement for further fluid infusions above normal perioperative care. In their study of goal directed fluid management based on pulse pressure variation monitoring during high risk surgery, they demonstrate a spectacular improvement in outcome using their monitoring and fluid management strategy. Pulse pressure variation in mechanically ventilated patients has been shown to be a good predictor of fluid responsiveness and by targeting this parameter Lopes and colleagues increased the mean volume of intra-operative fluid infused from 1,694 ml in the control arm to 4,618 ml in the treatment arm. Despite comparable pre-operative demographics, improvements were seen in post-operative complication rates, duration of mechanical ventilation and length of hospital and intensive care unit (ICU) stay. It is the dramatic outcome improvement that will be the talking point in this study and questions will be raised about the nature of treatment given to the control group – were they undertreated, what protocols were used for them and is this baseline mortality comparable to experience in my institution? On this last point it is noteworthy that other studies from South America have shown similar control outcomes [4].

Despite the quantity of evidence in support of the principle of GDHT, implementation has been patchy. There are a number of reasons for this including a lack of familiarity with preventative medicine in the perioperative setting, confusing terminology, problems with identifying patients who might benefit, doubts about the evidence, little peer pressure to undertake such protocols, a confusion with the debate on efficacy of pulmonary artery catheterisation and the use of GDHT in the situation of sepsis, and implementation issues such as requirement for investment, identifying suitable clinical areas and personnel.

On these last points the current study may be very influential as the advantage of the approach used by Lopes and colleagues is that the technique is simple and requires very little extra investment.

However, another reason for the slow uptake of this concept is that the evidence for GDHT loses some of its strength when closely examined. The meta-analysis by Poeze and colleagues [5] demonstrated that small, 'poor quality' studies generally produce much larger treatment effects than bigger, higher quality studies. In this meta-analysis there was only one trial with a smaller sample size than the trial by Lopes and colleagues, and when only higher quality trials were included in the analysis there was no statistically significant

GDHT = goal directed haemodynamic therapy; ICU = intensive care unit.

improvement in outcome from GDHT. One reason that the study was so small is that it was stopped early because marked clinical benefit was observed. While one can sympathize with the trialists' desire to move as soon as possible to treatment that they observe improving patient outcome, the practice of stopping trials early due to benefit has been seriously questioned. In the analysis by Montori and colleagues this practice has been shown to result in exaggerated treatment effects [6].

It is unusual in medical care to have proposed a relatively simple treatment that has received considerable positive support from randomised clinical trials over a number of years, in different clinical settings; and in economic analyses has proved to be cost effective; which has not been adopted. Parallels can be seen in the failure of widespread adoption of selective decontamination of the digestive tract [7]. It seems unlikely that further small trials will result in the breakthrough to widespread implementation that the evidence seems to warrant and it seems quite clear that what is required is a large, multicentre, randomised trial of a GDHT in high risk surgical patients. If the strategy suggested by Shoemaker and investigated now by Lopes and colleagues and resulting in 20 or so original trials in the intervening period [8] continues to deliver the observed reductions in complications and length of stay in a larger trial setting then it may truly revolutionise perioperative care for all patients.

Competing interests

The authors declare that they have no competing interests.

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