

Cardiopulmonary exercise testing: valuable stratification tool or waste of time?

Cardiopulmonary exercise testing is gaining popularity as an objective, non-invasive assessment of functional exercise capacity in patients being considered for high-risk surgery with national guidelines recently published (Levett et al, 2018; Reeves et al, 2018). The host of physiological variables produced correlate with outcomes in a number of high-risk surgical specialties (Reeves et al, 2018), although sceptical colleagues are often not hard to find. This article discusses the arguments for and against the value of cardiopulmonary exercise testing.

For cardiopulmonary exercise testing in perioperative risk stratification

Performance at cardiopulmonary exercise testing was first shown to correlate with outcome in colorectal cancer surgical patients. Since then, similar findings have been seen in other high-risk specialties including hepatobiliary, vascular and oesophagogastric surgery (Levett et al, 2018). However, as well as being a tool to risk stratify patients and triage postoperative critical care beds, other benefits of cardiopulmonary exercise testing include:

- Diagnosis of unexpected comorbidity
- Optimization of pre-existing disease
- Rationalization of preoperative investigations (e.g. echocardiography)
- Improved shared decision making
- Assisting with decisions on radicality and/or timing of surgery
- Guiding prehabilitation programmes.

Subjective assessment of functional capacity is unreliable – is an inability to climb two flights of stairs caused by problems with

the heart or the knees? Cardiopulmonary exercise testing allows identification and/or optimization of significant cardiorespiratory disease while reducing the use of limited resources such as echocardiography.

Advancing surgical techniques and an aging, frailer population require better tools to help clinicians to select the best surgical candidates. Cardiopulmonary exercise testing can improve shared decision making and help both the perioperative team and the patient in planning the way forward. This may mean that surgery is not always the best option.

With cardiopulmonary exercise testing patients can undergo ‘one-stop’ objective functional assessment and specialist anaesthetic review in 45–60 minutes, possibly preventing the need for additional visits for spirometry, echocardiography and high-risk clinic review.

Against cardiopulmonary exercise testing in perioperative risk stratification

A systematic review supported the use of cardiopulmonary exercise testing in patients undergoing generic intra-abdominal surgery, but evidence is lacking in areas including colorectal, upper gastrointestinal and bariatric surgery (Moran et al, 2016). A systematic review of its use in vascular surgical patients drew a similar conclusion (Young et al, 2012). None of the indications for cardiopulmonary exercise testing in the latest guidelines (Levett et al, 2018) have grade A evidence-based recommendations.

While cardiopulmonary exercise testing may be used to improve shared decision making or triage postoperative critical care admission, data regarding the validity of such decision making are lacking. The risk remains that decision making is unduly influenced through misinterpretation of cardiopulmonary exercise testing data or by placing increased weight on study outcome variables with significant implications for patients.

Running a cardiopulmonary exercise testing clinic is resource-intensive. With unclear evidence, it is difficult to justify the use of these resources in a cash-strapped system.

Doctors are taught to only do a test if it will change management. Arguably, performing cardiopulmonary exercise testing only acts to delay surgery without adding any real tangible benefits. For example, vascular surgical procedures are often high risk by their very nature and are conducted on patients with significant comorbidities. However, these patients invariably have no other option but surgery – essentially, these procedures could be considered ‘palliative’.

Conclusions

The debate over the value of cardiopulmonary exercise testing is not over and its real value likely lies somewhere between the two sides of the argument. A test offering improved shared decision making and a reduced burden of perioperative morbidity and mortality surely cannot be so bad. However, it is not a panacea and must be used at the right time, in the right way, for the right patients. **BJHM**

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