



Perioperative exercise

Exercise training has been well documented as feasible and safe in patients with a spectrum of severe cardiac and pulmonary conditions. There is increasing interest and evidence in preoperative (prehabilitation) and postoperative (rehabilitation) optimization of physical fitness, with the aim of improving outcomes after surgery.

The role of physical fitness

Surgery is associated with a significant burden of perioperative morbidity and mortality for older patients. The association between low fitness levels and increased postoperative mortality rates in elderly patients was first identified in 1993 (Older et al, 1993) and has since been repeatedly replicated. Preoperative assessment before major surgery should include functional capacity. Patients often significantly overestimate their activity levels. There are a number of independently validated tests of which cardiopulmonary exercise testing has the largest evidence base.

Aerobic fitness is the coordinated capacity of the cardiovascular, respiratory and musculoskeletal systems to boost delivery and handling of oxygen within the body. A structured preoperative exercise programme should increase functional capacity and therefore functional reserve. This should mean patients are better able to cope with the physiological stress of surgery leading to a faster recovery and return to functional 'normality' even in the presence of complications. This is probably more relevant for high-risk patients, particularly the sedentary, frail or elderly.

Evidence for preoperative exercise training



While there is extensive evidence that improving functional capacity and fitness predicts postoperative outcome, there is less evidence on preoperative exercise training. The UK clinical trials database identifies 51 new trial evaluating prehabilitation and specifically exercise in a variety of surgical populations. Substantial new data should be available in the near future - including the UK-based PREPARE-ABC (<http://www.uea.ac.uk/prepare-abc/about>) and the WesFit trial - Wessex Fit-4 Cancer Surgery trial (www.wesfit.org.uk). The majority of published trials and reviews support the thinking that preoperative exercise has beneficial effects on fitness and postoperative outcomes but highlight the need for large multicentre randomized controlled trials to clarify this.

Latterly there has been a focus on patients who are receiving neoadjuvant chemoradiotherapy. A study in 2015 found that rectal cancer patients having neoadjuvant chemoradiotherapy had an average decrease in peak oxygen uptake (peak VO_2) of 1.9ml/kg/min. Patients were then allocated to either exercise or usual care (no exercise). The exercise group improved peak VO_2 by an average of 2.65ml/kg/min whereas the control group worsened by a further 1.25ml/kg/min (West et al, 2015; Loughney et al, 2016). The impact of exercise and physical fitness on transforming cancer outcomes and survival is being studied in the WesFit trial.

Questions have been raised about the trainability of older patients and the most beneficial exercise programme. Any exercise programme needs to fit into the restraints of a perioperative treatment pathway, particularly for cancer patients. Measurable improvements in fitness can be achieved within this timeframe by adopting high intensity interval training programmes. A meta-analysis in 2014 found that high intensity interval training in patients with chronic cardiometabolic lifestyle diseases improved cardiorespiratory fitness almost two times more than continuous moderate intensity exercise (Weston et al, 2014).

Conclusions

The evidence behind perioperative exercise and the best



programme is still being investigated. However, what is clear is that the period around surgery is characterized by an increased focus on personal health along with multiple patient interactions with health-care professionals. This time can be seen as a 'teachable moment' and an opportunity to embed meaningful and sustained lifestyle changes in behaviour, particularly related to exercise, at a time when patients are focused on improving their health.

References

- Loughney L, West MA, Kemp GJ et al. The effects of neoadjuvant chemoradiotherapy and an in-hospital exercise training programme on physical fitness and quality of life in locally advanced rectal cancer patients (The EMPOWER Trial): study protocol for a randomised controlled trial. *Trials*. 2016 Dec;17(1):24. <https://doi.org/10.1186/s13063-015-1149-4>
- Older R, Smith R, Courtney B, Hone R. Preoperative evaluation of cardiac failure and ischemia in elderly patients by cardiopulmonary exercise testing. *Chest*. 1993 Sep;104(3):701-704. <https://doi.org/10.1378/chest.104.3.701>
- West MA, Loughney L, Lythgoe D et al. Effect of prehabilitation on objectively measured physical fitness after neoadjuvant treatment in preoperative rectal cancer patients: a blinded interventional pilot study. *Br J Anaesth*. 2015 Feb;114(2):244-251. <https://doi.org/10.1093/bja/aeu318>
- Weston KS, Wisløff U, Coombes JS. High-intensity interval training in patients with lifestyle-induced cardiometabolic disease: a systematic review and meta-analysis. *Br J Sports Med*. 2014 Aug;48(16):1227-1234. <https://doi.org/10.1136/bjsports-2013-092576>



Dr Catrin Williams
Consultant in Anaesthesia and Perioperative Medicine, University
College Hospital, London

Trainees with an Interest in Perioperative Medicine [TriPom]
An educational collaborative run by and for trainees and all other
professionals who are involved with the surgical patient
www.tripom.org . @triperioeratil