

apnea screening tool and postanesthesia care assessment.
ANESTHESIOLOGY 2009; 110:869–77

(Accepted for publication February 16, 2015.)

Prehabilitation versus Rehabilitation

To the Editor:

We read with a great interest the article of Gillis *et al.*¹ In this study, 77 patients undergoing colorectal resection for cancer were randomized to receive either prehabilitation or rehabilitation. Prehabilitation group was able to walk significantly further in 6 min, showing that a prehabilitation program could improve postoperative functional exercise capacity.

Rigorously, the authors scheduled in the study design to measure patients' compliance to the postoperative rehabilitation program. This program was based on exercise, nutrition, and psychological interventions. It was reported in the study that the compliance to this trimodal rehabilitation program from surgery to 4-week period was significantly higher in the prehabilitation group than in the rehabilitation group (53 vs. 31%, respectively, $P < 0.001$). As a result, we could hypothesize that the enhance in exercise capacity observed in the prehabilitation group could be the result of a greater compliance to the postoperative program rather than the usefulness of a prehabilitation program.

We would like to know how the authors dealt with this problem.

Competing Interests

The authors declare no competing interests.

Julien Bordes, M.D., Mickaël Cardinal, M.D., Eric Kaiser, M.D. Sainte Anne Military Teaching Hospital, Toulon, France (J.B.). bordes.julien@neuf.fr

Reference

1. Gillis C, Li C, Lee L, Awasthi R, Augustin B, Gamsa A, Liberman AS, Stein B, Charlebois P, Feldman LS, Carli F: Prehabilitation versus rehabilitation: A randomized control trial in patients undergoing colorectal resection for cancer. ANESTHESIOLOGY 2014; 121:937–47

(Accepted for publication February 21, 2015.)

In Reply:

We thank Bordes *et al.* for the opportunity to clarify this point. Our results¹ indicate that the compliance to the trimodal program in the first 4 weeks postsurgery was significantly higher in the prehabilitation group than in the

rehabilitation group (53 vs. 31% respectively, $P < 0.001$). Bordes *et al.* thus hypothesized that the observed improvement in functional walking capacity in the prehabilitation group could be the result of a greater compliance to the postoperative program rather than the usefulness of a prehabilitation program.

We would argue that the usefulness of the prehabilitation program is directly linked to the ability to maintain compliance postoperatively. Our argument is based on two main points: (1) Prehabilitation maintains functional integrity so that patients are physically capable of complying with the trimodal program postoperatively; and (2) Prehabilitation is rooted in the belief that the preoperative period is an opportune time to encourage compliance by educating and preparing patients for the tasks that need to be completed in the postoperative period.

The prehabilitated patients gained, on average, +25.2 m (50.2 m) in functional walking distance before surgery; a mean difference of distance walked of approximately 40 m between groups. This preoperative difference was considered clinically and statistically significant ($P < 0.001$) and substantiates the impact of prehabilitation. The finding attests to successful attainment of a “buffer” (*i.e.*, reserve) against the expected decline in physical function and overall well-being that is typically observed postoperatively. Moreover, a number of investigations have identified preoperative physical fitness as a predictor of surgical complications and early convalescence.^{2–6}

Compliance was tabulated subjectively, based on adherence to the *entire* trimodal program. The value reported is an equally weighted average among all three interventions, as prehabilitation is believed to be a work of synergy. It should be noted that the self-reported physical activity, as measured using the validated CHAMPS questionnaire, 4 weeks after surgery was not significantly different between the two groups. This implies that prehabilitated patients were more compliant with the nutrition and psychological component, rather than the exercise component, of the trimodal intervention after surgery. Although anxiety reduction strategies likely contributed to overall well-being, there is no direct link between these techniques and improvement in functional capacity. Similarly, maintenance of adequate dietary protein is essential to preserve lean body mass and therefore skeletal muscle function; however, it is generally accepted that exercise is the main anabolic stimulus and that adequate nutrition augments the effect.^{7–9} Adherence to the nutrition intervention after surgery may have been useful in sustaining the functional gain achieved in the preoperative period, yet unlikely to stimulate anabolic gains independent of increased exercise.

Finally, the use of preoperative counseling to provide information on the expectations of surgical procedures is believed to reduce fear and anxiety and enhance postoperative recovery.^{10,11} It is a fundamental component of Enhanced Recovery Programs.¹¹ Preoperative instruction

that focuses on the tasks expected of the patient during the perioperative period is also believed to improve adherence to the guidelines and thus improve recovery.^{11–13} Prehabilitation can be perceived similarly. It is likely that patients who begin and establish a routine preoperatively find it easier to continue the routine postoperatively. Indeed, it has been found that intention increases rates of goal achievement, *only* in the absence of strong antagonistic habits.¹⁴ The preoperative period thus allows time to identify barriers¹⁵ and counterproductive habits early, which enables later adherence.

In conclusion, we would argue that the ability of the prehabilitation group to comply with the trimodal program earlier than the rehabilitation group after surgery simply suggests that prehabilitation was implemented successfully.

Competing Interests

The authors declare no competing interests.

Chelsia Gillis, R.D., M.Sc., Liane S. Feldman, M.D., Ann Gamsa, Ph.D., Francesco Carli, M.D., M.Phil. McGill University, Montreal, Quebec, Canada (F.C.). franco.carli@mcgill.ca

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(Accepted for publication February 21, 2015.)

Effect of Thoracic Epidural Anesthesia on the Tolerance to Acute Normovolemic Anemia: Issues Warranting Comment

To the Editor:

I read with great interest the article by Pape *et al.*¹ in which the authors assessed the effect of sympathetic nerve blockade induced by thoracic epidural anesthesia (TEA) with ropivacaine on the tolerance of anesthetized pigs to acute normovolemic anemia (ANA). The authors made this assessment from a determination of the hemoglobin at which whole-body oxygen consumption ($\dot{V}O_2$) demonstrated supply dependency and decreased from the baseline value, the so-called critical hemoglobin (Hb_{crit}). Whole-body $\dot{V}O_2$ was calculated from the product of cardiac output, determined by thermodilution, and the difference in oxygen content of arterial and mixed venous blood samples. The authors found that the Hb_{crit} (2.5 ± 0.6 g/dl) was identical with and without TEA.

There are two issues pertaining to this study warranting comment. The first issue relates to the limitation inherent in using a systemic index of oxygen supply and demand. Although the authors acknowledge this fundamental shortcoming, it deserves to be underscored and more thoroughly discussed. Because the index represents an aggregate of the responses in the individual body tissues, it provides no organ-specific information. A constancy of whole-body $\dot{V}O_2$ during ANA either alone or