Editorial

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The Enhanced Recovery After Surgery (ERAS) program: benefit and concerns

Peter B Soeters

Department of Surgery, Maastricht University Medical Center, Maastricht, Netherlands

Enhanced Recovery After Surgery (ERAS) programs have successfully challenged many dogmas that existed in surgery 40 y ago. At that time, as young surgeons, we were taught to slowly increase the oral intake of solid food in patients after major surgery. Full mobilization was delayed, nasal tubes and bladder catheters were left in for days, and intravenous fluids were administered liberally, aiming for urine production of ≥50 mL/h. Patients undergoing minor or major surgery were discharged from the hospital only after 7 and 14 d, respectively, when wounds had healed and stitches had been removed. Pain was treated predominantly with opioids the first 4–7 postoperative days.

Inspired by a Danish surgeon, the ERAS program was developed starting in the 1990s (1). The program included earlier mobilization and nutritional intake, modern anesthesiology techniques, and pain medication with paracetamol (acetaminophen) and nonsteroidal anti-inflammatory drugs without opioids. Peristalsis was stimulated and nasal tubes, bladder catheters, drains, and intravenous fluids were used as little as possible. Glucose drinks were administered preoperatively. Scientific evidence was searched for supporting new measures, and old measures without evidence were discontinued (2). The aim was to restrict perioperative metabolic stress to the surgical trauma alone, with the hope to benefit outcome and to enhance recovery. Many ERAS-inspired studies have shown that length of stay in the hospital could be significantly shortened compared with historical or contemporary conventionally treated patients and that perioperative discomfort could be alleviated. Morbidity was reported to be diminished, although beneficial effects on surgical complications and mortality were not shown (3).

The publication by Yeung et al. (4) in this issue of the Journal highlights the difficulty of performing studies of the ERAS program, because inevitably there will be carryover effects of the program to conventionally treated patients in the same institution, hampering adequate randomization. The authors may therefore have opted to perform an observational study of an ERAS cohort in one institution and a conventionally treated cohort in another institution. The cohorts were not very comparable because of different institutional methods (e.g., when monitoring nutritional intake and due to differences in patient mix and surgical approach). In the ERAS institution, more often laparoscopic surgery was performed, which diminishes superficial wound infections and the degree of surgical stress. Length of stay in the ERAS cohort was shorter and is probably partly real but should be put in perspective of the shortcomings of the study.

The primary objective of the study was predominantly to assess preoperative nutritional state and postoperative nutritional intake (including protein) and adequacy in both cohorts, and their effect on outcome. No patient ingested the full recommended protein requirements, but in the patients who ingested >60% of presumed requirements, fewer complications developed. This finding led the authors to advocate undertaking studies in which different amounts of protein are provided, implicitly signifying that they consider the possibility that the 15 g protein/d ingested per patient in excess of intakes in the low-protein group may have improved outcome.

Several arguments support an opposite view. Patients with complications and slow recovery suffer from a more severe inflammatory stress reaction, which interferes with peristalsis and causes anorexia, in turn diminishing food intake. The authors support this possibility by reporting that nausea appeared to have interfered with nutritional (and thus also protein) intake and by showing that C-reactive protein (CRP) concentrations were higher in the low-protein group.

Another argument is that several studies, including studies published in high-impact journals, have not provided evidence and even concluded the contrary, that covering full energy and protein requirements immediately after the primary (surgical) trauma or acute illness instead of (semi)starvation is harmful (5, 6). Neither is there convincing evidence that full nutritional support immediately postoperatively diminishes peripheral (muscle) protein losses and promotes the immune response and wound healing. In fact, references 1, 5, and 6 in the article by Yeung et al (4) also do not show this. Extremely depleted individuals who are not able to generate a beneficial hyperdynamic inflammatory response may be the exception.

The next argument has been belittled in view of its claimed philosophical character but, in defense, much of what we do in clinical practice is based on belief or "philosophy" and not

Address correspondence to PBS (e-mail: pb.soeters@maastrichtuniversity.nl).

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supported by evidence. When wild or domestic animals suffer from trauma or disease, food intake stops almost completely, even when food is offered. In humans, similar behavior has still allowed our genome to survive despite being catabolic in the immediate inflammatory recovery phase, unless this phase is prolonged and severe. The study by Yeung et al., in fact, shows that even when trying hard to fully cover nutritional requirements postoperatively, recommended requirements cannot be met. Should we then not consider that the organism is orchestrated to limit metabolism to the inflammatory response during the first proinflammatory phase instead of superimposing food-related metabolism by trying to ingest food in amounts meeting presumed requirements?

In this respect, treatment is sometimes inspired by our wish for patients to look "normal." We symptomatically treat pain and fever, sometimes force patients to mobilize and eat, or administer artificial nutrition, so that they outwardly seem to do well even when the immediate postoperative proinflammatory phase has not yet been successful. The ERAS approach sometimes suffers from similar problems. When aiming to implement the program successfully, patients are sometimes urged to follow the ERAS guidelines even when their recovery stalls. Essentially, the ERAS program is implemented so as not to delay recovery unnecessarily and to withhold measures that are not effective or even harmful.

However, new dogmas may have been introduced. As suggested in earlier paragraphs, post-traumatic or disease-related anorexia may be adaptive, so that stimulating food intake in patients who are nauseated and anorectic immediately after surgery may be harmful. The view that insulin resistance is damaging needs to be reconsidered. Only before elective surgery in fasting, non-stressed individuals might a glucose drink remove the necessity to be insulin resistant, but this effect cannot be carried over after surgery. To deliver appropriate substrate to the immune system and healing tissues after surgery, the organism must be insulin resistant to spare glucose for these nonoxidative anabolic purposes, as happens in any condition in which rapid cell proliferation is required (7). Opioids decrease intestinal motility, but large dosages of nonsteroidal anti-inflammatory drugs have been reported to interfere with anastomotic healing (8), to increase the risk of postoperative sepsis (9), and to have damaging effects on the heart, kidney, and intestine (10).

In the past 2 decades, the ERAS approach has beneficially revolutionized perioperative care, but it should not be forcefully implemented in the immediate postoperative phase when patients are generally anorectic and in patients who do not do well after surgery, unless this period is prolonged. Views on immediate postoperative nutritional support, pain relief, and insulin resistance need to be rethought.

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