Editorial

Enhanced recovery after surgery (ERAS): philosophy, theory and practice

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The enhanced recovery after surgery (ERAS) pathway is a multimodal program of perioperative care designed to optimize preoperative patient functional status, reduce postoperative morbidity and enhance patient functional recovery (1-3). These goals are accomplished by the introduction of several pre-, peri- and post-operative individual interventions from patient referral to discharge. Since its first introduction in colorectal surgery in the early 2000s, the ERAS program became widely accepted and implemented in various surgical specialties (bariatric, breast, cardiac, gastrointestinal, gynecologic, head and neck, orthopedic, urologic, thoracic) (1,2). In thoracic surgery, several studies demonstrated the positive impact on postoperative outcomes including reduction of postoperative complications, length of hospital stay and overall costs (4-9). A recent meta-analysis including 6,480 patients with non-small cell lung cancer (NSCLC) undergoing anatomical pulmonary resection demonstrated a significant reduction of the postoperative complication rate [risk ratio (RR) =0.64; 95% confidence interval (CI): 0.52 to 0.78], of the postoperative length of stay [standardized mean difference (SMD) =–1.58; 95% CI: –2.38 to –0.79] and hospitalization costs in patient included in an ERAS program (6). Other outcomes like reduction of pain and of opioid consumption (9,10) or improved compliance to adjuvant treatment (11) have also been reported. On the other hand, another study including 600 video-assisted thoracoscopic (VATS) lobectomies and segmentectomies did not evidence any difference in postoperative complication rates, mortality, length of stay and readmission rates before and after the introduction of an ERAS program (12). However, in this latter study, the routine care for patients undergoing VATS anatomical resections was already quite similar to an ERAS pathway prior to its implementation, thus reducing the observed positive impact of this program (12).

Upon analyzing these different studies, it appears that little is known about compliance to the ERAS program, a state of affairs that can induce a certain bias in interpreting the results. Indeed, it has been shown that an elevated compliance to the different items of an ERAS program is associated with better postoperative outcomes (13). We previously demonstrated that a high compliance rate (>75%) with the ERAS program was associated with a lower rate of postoperative complications (18% *vs.* 48%, P<0.0001) and a lower rate of delayed discharge (37% *vs.* 60%, P=0.0013) (14). This shows clearly that even though the various intervention items of the program may seem irrelevant, the sum thereof is significant and produce a synergistic effect. This is a key concept of the ERAS philosophy.

In spite of these positive impacts, the implementation of an ERAS program remains challenging. Indeed, developing an ERAS culture takes more effort than just creating a protocol or following guidelines. Amending a work practice routine might meet several obstacles. These obstacles can be related to the patient, hospital staff, cultural background or human and physical resources (15). They should be assessed before starting the implementation in order to facilitate the procedure from initial set-up to the rollout of

the program. Some implementation facilitators have been identified as key elements to achieve success (15). First, it is obvious that financial support is necessary to develop the protocol, access new material and secure the involvement of a multidisciplinary team (3). To overcome this potential obstacle, hospital administration must be convinced of the need for an ERAS pathway. Since it is known that ERAS programs allow a reduction of overall costs, the investment is worth it, as was demonstrated by recent publications (4,6,8). Moreover, previous existing ERAS pathways in other surgical specialties might help implementation, budget evaluation and outcomes identification.

To ensure a good acceptability and sustainability of the program, a leader has to be identified. This "champion" will represent the face of the clinical pathway and will promote, motivate and remind all staff involved in the program. A multidisciplinary team composed of thoracic surgeons, anesthesiologists, dedicated clinical nurses, dieticians and physical therapists is necessary to support the leader (15,16). By virtue of being experts of their specific area, each of them will be able to educate their colleagues on the ERAS pathway and guarantee clear understanding and application of the various elements of the protocol. All of these stakeholders should have sufficient time to invest in the development and follow-up of the program. Regular meetings and audits including all team members should be organized to continually assess potential obstacles and find clues to improve compliance to the ERAS pathway. Because of their high implication in the ERAS program, the dedicated clinical nurses are one of the essential keys to a successful program. They secure successful completion of many tasks, such as the database management, program application follow-up, education of ward nurses and surgical residents and adequate specialized consultation with patients. Most importantly, in close collaboration with the leader, they guarantee the continuity and sustainability of the program. This might be especially complicated in hospitals where the turnover of care providers is frequent, thence continual education is essential. However, it is common knowledge that in spite of high motivation and implication of the multidisciplinary team, resistance to change by the working staff is pervasive and represents a major barrier. It is therefore of utmost importance to keep good communication channels between the team members, the care providers and the hospital administration (16,17).

Another barrier to ERAS implementation raised by several studies is the cultural context (16-19). Not all elements of the program might be applicable to all care centers or all patients. Flexibility and individual local adaptations are essential when creating the care pathway. Similarly, it is important to identify the targeted surgical procedures that may benefit from an ERAS program.

In our opinion, in their detailed description of the entire ERAS program implementation, Dyas and colleagues provide a good overview of barriers and facilitators that one can encounter when developing this project (18). They implemented this program in various healthcare systems, which was not an easy task because of the differing traditional backgrounds of the centers, and could serve as a blueprint for similar ERAS introductions into hospitals of varying backgrounds. They raise the importance of focus groups, engagement of a multi-disciplinary team and unfaltering support of the management to identify a driver and implementation strategy for change in care practice, as well as facilitators and barriers before the implementation process begins. They also point out the duration (13 months in total in their experience from design to roll-out) of this implementation, which, by their own admission, would have been impacted by the COVID pandemic. Perhaps more importantly, they describe a step-by-step approach to prepare the full roll-out of the new system. This helped them developing their implementation strategy, which had to account for local differences, including in surgical and medical practice. However, an interesting point not described by the authors is the situation of peri-operative care in the various hospitals before ERAS protocol implementation. As mentioned above, the impact of ERAS program tends to be more impressive in circumstances in which pre-ERAS patient care routine was significantly different from the ERAS program itself. By analyzing pre-ERAS situations, implementation strategies can be individually tailored to each healthcare system with focus on changes that might be more difficult to introduce. Dyas and colleagues also emphasized the need to continue their research by evaluating protocol compliance and identifying methods to improve compliance (18). Indeed, measuring compliance is essential to analyze the success of an ERAS program implementation in daily practice. With the help of a prospective database, data can be easily extracted to be analyzed and presented during regular audits and feedbacks in order to improve compliance and eventually adapt the protocol. Finally, these authors make it clear that communication with patients' representatives might be one more item to optimize the program.

With a strongly anchored philosophy of care in the background, the ERAS program in continually evolving.

Regular updates of the guidelines are planned with a view of constant improvement and adjustment to newly published outcomes or technologies. Moreover, a specific attention to patient-reported personal experience and quality of life will help optimize some elements of the program.

In conclusion, the implementation of an ERAS program in thoracic surgery is a real challenge and is met with several obstacles including poor communication, lack of financial or policy support and resistance to change. The creation of a united, involved and open-minded multidisciplinary team helps overcome these obstacles to improve quality of care for patients and compliance to the program. Finally, we can conclude that the key idea behind a successful ERAS program is a comprehensive philosophy of care, not just a new protocol to implement.

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