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Enhanced recovery for gynaecological surgery: a review

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We review various aspects of enhanced recovery after surgery for gynaecological patients, including patient education and counselling, preoperative assessment and optimisation, preoperative fasting and nutrition, bowel preparation, thromboembolism prophylaxis, perioperative analgesia, peritoneal drains and urinary catheters, postoperative nausea and vomiting, hypothermia prevention, early feeding and early mobilisation, and implementation of enhanced recovery after surgery.

Keywords: Convalescence; Gynecologic surgical procedures

Introduction

Enhanced recovery after surgery (ERAS) is a multimodal, multidisciplinary, evidence-based approach to the care of patients undergoing surgery. It was developed by a group of surgeons and anaesthesiologists in Europe (mostly from Scandinavia, the Netherlands, and the United Kingdom) in the early 1990s. A Danish surgeon, Henrik Kehlet, introduced ERAS to wider recognition and broader application. In 1995, Kehlet and colleagues reported that hospital stay was reduced to 2 days in a group of elderly high-risk patients undergoing laparoscopic colonic surgery by early aggressive perioperative care such as early oral nutrition and mobilisation[1]. ERAS for patients with colorectal surgery results in improved patient satisfaction, less variation in the patient care, reduced postoperative complication rates, earlier mobilisation and resumption of normal diet, shorter length of stay in hospital, reduced readmission rates, while ensuring patient safety and cost-effectiveness[2-4]. ERAS has been used for many major operations across specialties including gastric/oesophageal, orthopaedics, urology, thoracic, etc. There is evidence that ERAS can be applied to gynaecological patients and lead to less postoperative nausea and vomiting (PONV), reduced length of hospital stay, shortened stay in postoperative ward, and hence reduced hospital costs[5,6].

Elements of ERAS

Surgery induces stress responses that can be immunological, endocrine, neural, and psychological[7]. ERAS can improve patient outcomes by reducing surgical stress responses and mitigating the potential associated negative consequences so as to expedite restoration of normal body functions[8,9]. ERAS interventions can be divided to preoperative, intraoperative, and postoperative interventions. Preoperative interventions include preoperative patient education and counselling, early optimisation of comorbidities, minimising preoperative fasting, avoiding mechanical bowel preparation and dehydration, and use of preemptive analgesia. Intraoperative interventions include the use of short acting anaesthetic agents and regional anaesthesia, prevention of PONV, goal directed fluid management, and maintenance of normothermia. Postoperative interventions include multimodal analgesia, avoidance of unnecessary drains and nasogastric tubes, early catheter removal, thromboembolic prophylaxis, early oral intake, and mobilisation.

ERAS is drastically different from traditional care pathways. A multimodal, evidence-based, protocol-driven approach should be adopted to achieve ERAS goals. A successful programme requires active engagement of all involved parties contributing to different elements of ERAS. Usually, a multidisciplinary team consists of surgeons, anaesthesiologists, nursing staff, allied health professionals such as physiotherapists, occupational therapists, and dietitians. They contribute to patient care as a team rather than segregations of input and expertise. ERAS care pathway entails a lot of interventions from various specialties. To assure quality and compliance, continuous auditing of the care pathway and patient outcomes is necessary[10].

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Patient education and counselling

An important principle of ERAS is to engage the patient as early as possible by providing education and counselling when surgery is planned. Patients should be informed about the care plan and pathway and the concepts of ERAS, for example perioperative pain management, PONV prophylaxis, early feeding, and mobilisation, as well as the rationale behind the practices and concepts. For example, pre-emptive analgesia and use of multimodal analgesic agents enable better pain control postoperatively so that one can mobilise earlier to achieve better outcomes. Earlier oral intake enables earlier return of bowel function and shorter hospital length of stay and thus reduced risks of developing associated complications. It is not uncommon that patients hesitate to mobilise because of pain and fear of wound disruption. Extended perioperative counselling allows patients to comply with the elements of ERAS and reduces the length of hospital stay[11]. Thus, a concise and clear approach is needed for patients of different age groups and backgrounds. It should also be patient-centred. Patients' own initiative and adherence to interventions such as oral carbohydrate loading, analgesics as premedication, and early mobilisation should be particularly focused upon. In addition, the rehabilitation protocols should encompass the journey from diagnosis to recovery at home. A Canadian study in 2017 reported that most patients, once understood the ERAS programme, wanted to take on an active, collaborative role throughout their surgical journey and were more likely to follow the expected protocols[12].

Surgery is a stressful experience; stressors can be emotional, psychological, and social. In gynaecological surgery, especially hysterectomy, it is not simply removal of an organ to treat a condition, but also a loss of fertility. Some women believe that uterus is important for sexuality and femininity, and hysterectomy may lead to negative body image and low self-esteem. Patients' expectations, fears, worries about surgery should be addressed because concerns or doubts with their postoperative care and condition may cause anxiety and impede recovery. Preoperative counselling helps to set expectations about the surgery and anaesthesia. Education materials such as pamphlets or audio-visual information containing description of the interventions and expected results should be provided. Occasionally, patients also require personalised care and appropriate adaptations within the standardised pathway.

Preoperative assessment and optimisation

ERAS emphasises early assessment and optimisation of chronic illness. Patients should have haemoglobin concentration measured before major elective surgery, and patients who are anaemic should be treated appropriately as preoperative anaemia is associated with postoperative morbidity and mortality[13]. Lower preoperative haemoglobin level is associated with longer hospital stay and a higher rate of allogeneic blood transfusion, which is associated with an increased risk of adverse effects[14]. The risks are increased with severity of anaemia[15]. Patient blood management is a multidisciplinary, evidence-based approach to optimise patient red cell mass and to improve clinical outcomes by avoiding unnecessary allogeneic blood transfusions. It should be an integral part of ERAS programme for patients undergoing major gynaecological surgery, because correcting even mild anaemia significantly reduces the need for transfusion and the resultant morbidity and mortality. Oral iron therapy is the first-line therapy for iron deficiency anaemia, and low-dose alternate-day oral iron therapy together with vitamin C optimises iron absorption. Intravenous iron therapy can be considered when oral therapy fails or intolerable, or when near the time of operation. The newer generation of intravenous iron preparations has fewer severe adverse events and allows a larger dose of iron in a shorter infusion time[16].

In Hong Kong, the prevalence of diabetes has increased significantly in both sexes and across all age groups. The overall prevalence of diabetes was 10.29% and that of pre-diabetes was 8.90%[17]. Elevated preoperative and perioperative glucose and glycated haemoglobin levels are associated with poor surgical outcomes; adverse outcomes include a >50% increase in mortality, a 2.4-fold increase in the incidence of postoperative respiratory infections, a threefold increase in postoperative urinary tract infections, a twofold increase of surgical site infections, a doubling in the incidence of myocardial infarction, and an almost twofold increase in acute kidney injury[18]. It is therefore important to ensure good glycemia control before proceeding to operation. Smoking and use of alcohol are associated with higher risks of perioperative complications and should be assessed routinely preoperatively.

Preoperative fasting and nutrition

Conventionally, fasting after midnight is adopted for elective surgery to avoid risks of aspiration and related problems. However, prolonged fasting can be associated with dehydration, patient discomfort and anxiety, caloric restriction, and metabolic changes such as impairment of glucose metabolism and increased insulin

resistance. Evidence has shown that intake of clear fluids 2 hours before surgery does not increase gastric content, reduce gastric fluid pH, or increase complication rates[19]. Minimising fasting times and maintaining nutrition reduce postoperative pain, nausea, perioperative insulin resistance, and muscle catabolism. Patients without conditions associated with delayed gastric emptying should be encouraged to drink clear fluids up to 2 hours before elective surgery; solid food should be avoided for at least 6 hours before elective surgery[20]. Carbohydrate loading before surgery is increasingly advocated to mitigate perioperative increase in insulin resistance and associated adverse effects and to improve perioperative wellbeing. In addition, it is associated with a small reduction in the length of hospital stay when compared with placebo or fasting in patients undergoing elective surgery but not associated with postoperative complication rates[21].

Bowel preparation

Mechanical bowel preparation was thought to reduce anastomotic breakdown in cases with bowel repair or resection. However, it is associated with discomfort and adverse effects such as dehydration and electrolyte imbalance, especially in elderly people with medical comorbidities. Moreover, there is no good evidence to support the routine use of mechanical bowel preparation. A Cochrane review of 18 randomised controlled trials reported that patients undergoing elective colorectal surgery did not show any significant benefit from mechanical bowel preparation or rectal enemas[22]. A systemic review of five randomised controlled trials for gynaecological surgery also did not show any benefits but reported an unpleasant patient experience. Its use in gynaecological laparoscopic surgery did not improve operative time or surgical field visualisation[23].

Thromboembolism prophylaxis

Prevention of venous thromboembolism is important in pelvic surgery especially for oncology patients. The risk of venous thromboembolism should be stratified according to individual risk factors. Hormone replacement therapy is a risk factor for venous thromboembolism, and the risk is higher for oral than transdermal preparations. Combined oral hormonal contraception is a common risk factor in gynaecological patients. The NICE guideline advised to consider stopping oestrogen-containing oral contraceptives or hormone replacement therapy 4 weeks before elective surgery. Medical prophylaxis should be commenced before operation in high risk cases, together with mechanical method such as pneumatic compression stockings during operation[24-26].

Perioperative analgesia

Multimodal analgesia (ie, administration of two or more drugs that act by different mechanisms for providing analgesia through additive or synergistic effects) is advocated in ERAS care plan, as poor pain control can impede postoperative rehabilitation, delay patient recovery, and affect patient outcomes. Long-acting opioids, particularly morphine, is traditionally used in perioperative pain control after major gynaecological surgery. However, adverse effects of opioids are common, including nausea and vomiting, sedation, pruritus, urinary retention, and respiratory suppression. These opioid-related adverse effects may lead to increased duration of immobilisation and length of hospital stay, total hospital costs, and rates of readmission[27]. A large cohort study in 2013 reported that patients with opioid-related adverse drug events had a 55% longer length of stay, 47% higher costs of care, 36% increased risk of readmission, and 3.4 times higher risk of inpatient mortality than those without[28]. High doses of opioids can induce hyperalgesia and acute tolerance. Thus, ERAS care pathway emphasises multimodal opioid-sparing analgesia to achieve earlier mobilisation and resumption of normal diet while maintaining effective pain control. Paracetamol is an effective analgesic agent and is commonly used perioperatively due to wide availability and accessibility of the intravenous form. When paracetamol is used as an adjunct to opioid analgesia, opioid requirements are reduced by 26% over 4 hours and by 16% over 6 hours[29]. Non-steroidal anti-inflammatory drugs (NSAIDs) are effective in reducing pain and inflammation and are an integral component in multimodal analgesia[30]. A combination of paracetamol and NSAIDs offers superior analgesia than either paracetamol or NSAID alone, and should be administered to all patients unless contraindicated[31]. Gabapentinoid group such as gabapentin and pregabalin are commonly used. Preemptive administration of gabapentin or pregabalin can reduce postoperative pain score, opioid consumption, and rate of PONV[32,33].

Epidural analgesia is not a routine practice in gynaecological surgery, as the evidence is conflicting and controversial. Although epidural analgesia is superior to parenteral opioids such as intravenous patient-controlled analgesia in terms of pain control in patients undergoing major open gynaecological surgery, there is no significant difference in terms of return of bowel function or time to discharge[34]. Patient-controlled epidural analgesia provides good perioperative pain control but does not improve pain management in women undergoing gynaecological oncology surgery. In an Australian study of the effect

of epidural analgesia in patients undergoing abdominal hysterectomy, epidural analgesia was associated with an increase in postoperative complications and length of hospital stay[35]. A Cochrane review comparing epidural analgesia with patient-controlled intravenous analgesia following intra-abdominal surgery in adults reported that epidural analgesia provides better pain relief, but the benefit is small and may not be clinically important[36]. Problems associated with epidural analgesia include higher chance of failure to provide analgesia, increased likelihood of hypotension requiring intervention, and pruritus. It is important to balance the risks and benefits of epidural analgesia for postoperative pain control. Truncal blocks particularly transversus abdominis plane block are efficacious in terms of reduction in pain and opioid requirement up to 24 hours postoperatively for patients undergoing hysterectomy[37]. Wound infiltration using local anaesthetics is easy to perform and carries fewer complication risks. However, the pain efficacy is short-lived, limited, or even no opioid-sparing effect at all. There is no clinically significant difference between continuous wound infusion and intermittent epidural analgesia for postoperative analgesia in hysterectomy and myomectomy[38].

Peritoneal drains and urinary catheters

Peritoneal drains are used to prevent postoperative fluid or blood collection, and to help early detection of bleeding and anastomotic bowel leakage. In gynaecological oncology surgeries, drains are inserted to prevent formation of lymphocysts after lymphadenectomy. A Cochrane review of four randomised controlled trials concluded that placement of retroperitoneal drains is not effective in preventing lymphocysts[39]. There is no evidence that peritoneal drainage improves outcomes after gynaecological surgery, and therefore it is not recommended routinely after gynaecologic / oncology surgery including lymphadenectomy or bowel operation[40]. Nonetheless, its use can be considered in cases with increased risk of pelvic collection and bleeding, or very low anterior resection without concurrent temporary bowel diversion[41]. Urinary catheters are used to prevent urinary retention and to monitor urine output. In some urogynaecology or gynaeoncology cases, longer catheterisation is required due to higher bladder-related morbidity. For uncomplicated cases, urinary catheter should be used for a short period only, preferably <24 hours. Monitoring of voiding after catheter removal helps to detect voiding problems and prevent over distension of the bladder[40].

Postoperative nausea and vomiting

PONV is a common cause of patient dissatisfaction after surgery and anaesthesia. The average incidence of PONV is 30% in general post-surgical patients and up to 80% in high-risk groups[42]. Patients undergoing gynaecological surgery are among the high-risk populations. Female gender itself is a risk factor of PONV. Other risk factors include non-smoking status, history of motion sickness and/or PONV, use of opioids, and use of volatile anaesthetics or nitrous oxide. Gynaecological surgery is considered as a risk factor, but it remains controversial whether the increased risks are attributed to patient factors. A number of predictive risk scores are developed to stratify the risk of developing PONV. The Apfel simplified score is based on counting the number of risk factors that include female gender, non-smoking status, history of PONV and/or motion sickness, and use of opioids postoperatively[43]. When 0, 1, 2, 3, or 4 factors are present, the risk of PONV is 10%, 20%, 40%, 60%, or 80%, respectively. As most women in Hong Kong are nonsmokers (only 3.1% women smoke), they have at least two risk factors and the risk of PONV is at least 40%[44].

PONV prevention is an integral part of ERAS. PONV may lead to increased risk of aspiration, patient distress, unanticipated hospital admission, and increased hospital length of stay. High-risk patients should be identified by calculating their baseline risks; volatile agents and nitrous oxide should be avoided, and total intravenous anaesthesia should be used. Newer antiemetic agents have been developed, and costs of antiemetic agents have decreased substantially because of more generic versions available. Combination of antiemetics is more effective than single antiemetic and should be used for high-risk patients[45]. Other strategies include use of regional anaesthesia and reducing use of opioids and neostigmine perioperatively.

Hypothermia prevention

Hypothermia not only causes patient discomfort, dissatisfaction, and postoperative shivering, but also is associated with coagulopathy and increased risk of bleeding, myocardial ischaemia, and higher risks of postoperative infection[46-49]. Hypothermia is associated with prolonged stay in post-anaesthesia care unit, increased intensive care unit admissions, and longer length of hospital stay. These consequences as well as cardiovascular, haemorrhagic, and infectious complications increase the costs. To avoid hypothermia, patient risks should be assessed and interventions should be commenced preoperatively.

High-risk factors include major or intermediate surgery, combined general and regional anaesthesia, ASA (American Society of Anesthesiologists) Class 2 or above, preoperative hypothermia (<36°C), and risk of cardiovascular complications. Core temperature should be monitored intraoperatively by direct measurement. Active prewarming should be started in the ward or preoperative unit if the patient's temperature is <36°C. Active warming techniques such as forced air warming device or heating mattress should be used intraoperatively from induction of anaesthesia[50]. Irrigation fluids should be warmed. Fluid warmer should be used if intravenous fluid or blood products are given. These active warming techniques should be continued if patients' temperature is still <36°C postoperatively.

Early feeding and early mobilisation

Early feeding is defined as resumption of oral fluid or solid food intake within the first 24 hours after surgery regardless of signs that indicate the return of bowel function. Feeding is encouraged as tolerated, but not forced. Systemic review showed that early feeding is safe, despite association with increased nausea; there is no evidence of increase in postoperative ileus, vomiting, or abdominal distension, instead the length of hospital stay is shorter in major abdominal gynaecologic surgery[51,52].

Early mobilisation reduces postoperative pulmonary complications, thromboembolism, ileus, metabolic imbalance, and cardiovascular events. With prior counselling about the benefits, use of multimodal analgesia to achieve better pain control, and removal of unnecessary drains and catheters that hinders movement, the practice of early mobilisation is more acceptable to patients. Compliance to other elements of ERAS helps to engage patients and remove barriers in implementation[53,54].

Implementation of ERAS

ERAS is a multimodal, multidisciplinary, evidence-based approach. Its implementation and success require inputs from all stakeholders. The pace of adoption and development differs in different specialties. Studies of ERAS in gynaecological surgeries for both benign and malignant conditions have reported improvement in patient satisfaction, length of hospital stay, and cost, while no difference in morbidity, mortality, and readmission rates[55,56]. Quality and safety are key drivers for changes in clinical interventions and systems. ERAS includes various elements; healthcare managers and practitioners can adopt suitable and feasible elements with a locally agreed pathway and protocol. Education helps the team to understand the concept, current services, and potential improvements. Audit with measurement of impact, clinical data collection, and outcome evaluation are important in implementation. Finally, the patient plays a central role. Enhanced recovery is a partnership between healthcare providers and patients, different improvement elements are informed and shared decisions. Engagement of patients is the key to success[57,58].

Declaration

The authors have no conflict of interest to disclose.

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