Perspective

Enhanced Recovery after Surgery: Perspective in Elder Women

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Abstract

Enhanced recovery after surgery (ERAS) is a multimodal convention first reported for colorectal and gynecologic procedures. The main benefits have been a shorter length of stay and reduced complications, leading to improved clinical outcomes and cost savings substantially. With increase in life expectancy, recent years has shown a significant rise in advanced age population, and similarly, a rise in age-related disorders requiring surgical management. Due to pathophysiological and metabolic changes in geriatric age group with increased incidence of medical comorbidities, there is higher risk of enhanced surgical stress response with undesirable postoperative morbidity, complications, prolonged immobility, and extended convalescence. The feasibility and effectiveness of ERAS protocols have been well researched and documented among all age groups, including the geriatric high-risk population.[1] Adhering to ERAS protocols after colorectal surgery showed no significant difference in postoperative complications, hospital stay, or readmission rate among various age groups.[2] A recent report mentions the safety and benefits following ERAS guidelines with reduced length of stay in elderly patients with short-level lumbar fusion surgery.[3] The concept of prehabilitation has evolved as an integral part of ERAS to build up physiological reserve, especially in geriatric high-risk group, and to adapt better to surgical stress.[4] High levels of compliance with ERAS interventions combined with prehabilitation can be achieved when a dedicated multidisciplinary team is involved in care of these high-risk patients.

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Introduction

Enhanced recovery after surgery (ERAS) protocols have been developed for various surgical specialties. These protocols were first reported almost two decades ago for colorectal and gynecological oncology surgeries.[5,6] The ERAS study group was initially formed by a group of surgeons in Europe in 2001 and has now been adapted by various surgical disciplines including pancreatic, gastric, and esophageal surgeries, thoracic surgeries, obstetric and gynecologic surgeries, major urologic surgeries, and anesthesia and orthopedic surgeries.[7-14] ERAS protocols have also been followed in the field of obstetric practice, especially with cesarean sections.[15]

The protocols have been shown to be safe and reliable after total pelvic floor reconstruction surgery.[16] Nemirovsky *et al*. have described the development of a modified ERAS protocol for abdominal sacrocolpopexy to include elements specific to the surgery.[17] Despite medical comorbidities such as diabetes, malignancies, and cardiac and respiratory diseases, ERAS protocols have shown equal effectiveness, complication rates, and hospital stay in geriatric patients.[1]

The main focus of the protocol is to consider optimized perioperative patient care with a view to allow for surgical intervention in an ambulatory setting. Input from a multidisciplinary team of experienced surgeons, anesthesiologists, geriatricians, an ERAS coordinator

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or surgical/anesthetic nurse, postoperative recuperation staff, dieticians, general practitioners, social workers, and other allied health is required. ERAS is an evidence based protocol that relies on preoperative patient optimization by a carbohydrate rich drink, appropriate fluid management, neuraxial/local anaesthetic blocks, minimally invasive surgery, optimized postoperative pain management, early ambulation and rapid resumption of oral diet.[18] Emphasis is placed on patient selection, lifestyle factors modification (such as smoking and obesity), anesthetic preassessment, intravenous fluid therapy while fasting, appropriate anesthesia, effective perioperative analgesia, surgeon experience, early mobilization, early feeding, criteria-led discharge, and postoperative follow-up. ERAS protocols allow for patients to undergo surgical procedures and discharge on the same day, thus minimizing the impact on the quality of life and vocations.[19]

Elderly patients have variable physiological reserve with reduced physical and mental ability and frailty, the factors that define the increased risk of postoperative morbidity and mortality.[20,21] Almost 40% of patients can develop postoperative complications, and 45% of these will be major complications.[22] Therefore, it is of vital importance for this group of patients to have appropriate preoperative evaluation of cardiopulmonary status to ensure optimum physical and cognitive health.

History

The concept of "fast track" was published in 1994 projecting improved clinical outcomes following cardiac surgeries.[23] The focus of the concept was on quality rather than speed of recovery that was based on modifying the metabolic response to surgical demands. Following this, multiple case series were reported in the literature documenting faster recovery following the multimodal approach of ERAS.[24,25] The ERAS Society that was formed in 2010 published a series of guidelines with procedure-specific recommendations. A multinational, multicenter ERAS audit on colorectal surgeries with more than 2000 patients reported fewer complications, shorter length of stay, and fewer readmissions.[26,27] The safety of ERAS in geriatric patients has been extensively reviewed in recent studies.[1,28] The European Society of Anesthesiology recommends the use of ERAS surgery as an adjunct in the prevention of postoperative delirium in high-risk patients.[29]

Concept of Enhanced Recovery After Surgery

A surgical patient goes through a long journey beginning from the outpatient clinics to the ward via preoperative rooms, operation theaters, and postoperative recovery rooms. This involves apart from the primary surgeon, meeting various new faces including anesthetists, nurses, and other allied health staff. The usual focus of the staff is to manage the immediate clinical needs rather than the holistic picture. ERAS guides the coordination of these encounters through comprehensive multimodal and multidisciplinary team approach. Table 1 depicts ERAS protocols to be followed sequentially at various levels as performed by different healthcare members throughout the patient's journey. It is of vital importance for the multimodalities to be operated synergistically and sequentially by the multidisciplinary team for improved recovery and successful clinical outcome. The ERAS coordinator, either surgical or anesthetic nurse, has a key role to play in coordinating and providing optimum care to the patients. To improve outcomes, it is important to be compliant with 70%–80% or more of the elements of the ERAS protocol.[30]

ERAS program has several elements that can be broadly categorized into preoperative and postoperative phases. The preoperative phase can be further subdivided into preadmission and postadmission components. The emphasis of all elements is to optimize the response to surgical stress.

The preadmission phase includes appropriate patient selection, optimization of comorbidities, dietary supplementation as needed, and smoking cessation, and restraining from unnecessary alcohol utilization.[31] Optimization of medical comorbidities and prehabilitation is an important aspect with ERAS, more so in geriatric cohort. Prehabilitation program includes interventions such as nutritional supplements, weight optimization by exercise or physical training, and optimization of medications with social, psychological, and emotional counseling.

The preoperative phase includes surgical counseling around willingness to follow ERAS protocols. Immunomodulation and anti-inflammatory effects of high protein and omega-3 fatty acid nutrition in the preoperative phase are well established. The catabolic effect of prolonged fasting has been reduced by oral nutrition as long as 2 h before surgical procedure without increased risk of aspiration and maintaining postoperative euglycemia.[18,32] The synergistic effect of preoperative carbohydrate-rich drink diminishes gastrointestinal distress and reduces postoperative nausea, vomiting, and hence utilization of antiemetics.[33] Antibiotics and thromboprophylaxis are other important aspects considered for successful ERAS outcomes.[31]

The main focus of intraoperative phase relies on substantially reducing the surgical stress by adapting

Table 1: Enhanced recovery after surgery protocols

Preadmission	Preoperative	Intraoperative	Postoperative
Medical optimization of chronic diseases	Surgical counseling	Neuraxial anesthesia/ anatomical blocks	Early mobilization
Nutritional screening and supplementation	Carbohydrate treatment	Minimal invasive incisions	Physical therapy
Cessation of smoking	Nausea prophylaxis	Avoiding long-acting opioids	Immediate oral nutrition/energy rich nutritional supplements
Cessation of excess alcohol	Prophylactic antibiotics	Avoiding hyperthermia	Nausea prophylaxis
Minimized narcotics	Thromboprophylaxis	Fluid euvolemia	Multimodal pain control (minimize narcotics)
	Limited fasting	Strict glycaemia control	Early removal of catheters
		Avoiding or early removal of drains/tubes	Social work
			Criteria-led early discharge
			Audit for compliance and outcomes

neuraxial/anatomical blocks over general anesthesia and using minimally invasive techniques avoiding larger incisions. Literature review revealed the efficacy and reduced postoperative side effects of low-dose neuraxial anesthesia in geriatric patients undergoing gynecological surgeries.[34] A smoother and quicker recovery is achieved by maintaining intraoperative euthermia, euglycemia, and euvolemia as well as avoiding or early removal of tubes and drains. The overall effect is reduced postoperative pain and opioid use.[35]

Early ambulation and physical therapy is the mainstay of postoperative phase of ERAS. This is based on the concept of early oral nutrition, nausea and vomiting prophylaxis, and minimal use of opioids.[36] In patients undergoing mastectomy, a multimodal, narcotic-sparing ERAS protocol has shown to fundamentally reduce the amount of opiate use in the postoperative phase.[37] The end result is not only reduced complications and faster recovery but also early discharge and back to work.[38]

The advantages of an ERAS program include faster recovery, decreased length of hospital stay, lower complications, decreased opioid utilization, and thereby, reduced cost of healthcare and improved patient satisfaction.[39]

The utilization of ERAS protocols has had a slower uptake due to concerns about the possible risks and/or lack of benefit in the elderly and high-risk group of patients. However, there have been adequate data to prove the contrary. The concept of prehabilitation has become an integral part of ERAS program, and if applied together, it could also benefit elderly, frail, and high-risk patients and should be recommended in this group of population.[40]

What is Already Known on this Subject?

ERAS protocols are being increasingly used in surgical practices. The main objective of the protocol has been on reducing postoperative morbidity and stay. The commonly practiced protocol includes a high protein intake diet and a glucose drink before surgery.

Our Experience

Pelvic organ prolapse and urinary incontinence are debilitating conditions impacting the quality of life of patients, especially the elder population. Current procedures for these conditions are increasingly performed using minimally invasive methods, thus making it possible for them to be performed in an ambulatory setting. Urogynecology day-procedures have been offered at our private surgical service for more than 15 years. In 2008, an audit of day surgeries performed over a 22-month period at this service was published by Kannan *et al*., showing a 1.6% re-admission rate within 72 h postoperatively. This study established the viability of providing surgeries for pelvic organ prolapse in an ambulatory setting. A precursor model of ERAS was used for patient selection, perioperative care, and postoperative follow-up.[41] Literature published since has shown that adopting urogynecology-specific ERAS protocols is associated with significant reduction in length of hospital admission, increased same-day discharges, and overall improved patient satisfaction.[19,42]

A retrospective audit was conducted of all patients who underwent ambulatory pelvic organ prolapse surgery at the Townsville day surgery between January 2008 and June 2019. Following the publication of a former audit, a modified ERAS protocol was adopted at our practice. We omitted a carbohydrate-rich fluid intake before surgery in our local protocol. Data were collected and analyzed for patient demographics, procedures conducted, postoperative complications, and readmissions. Details of unexpected re-admissions within a 48-h period and planned admissions for the management of identified complications were recorded.

Patient selection was based on controlled comorbidities (American Society of Anesthesiologists 1 and 2), assessment of the patient's ability to follow the modified ERAS protocol, and feasibility of re-present to the emergency department for any complications. The standard preoperative workup included a detailed preoperative nursing review for patient education on the ERAS protocol. All surgeries were performed by a single consultant urogynecologist. Over the study period of 11.5 years, a total of 1381 women underwent 1937 procedures. The average age was 53.4 years (23–79 years). At the beginning of treatment, more than 500 patients (approximately 40%) were either 60 years of age or older. Interestingly, the average age of patients increased by approximately 0.5 year/year, with a line of best fit gradient of +0.5175 calculated by the least squared method. Selected elderly age group patients with the evidence of vaginal atrophy were treated with estrogen and Vitamin C therapy. A transvaginal mesh was the most common procedure (55.8%), followed by a posterior repair (23.9%).

Ninety-five patients (4.4%) had various complications, with a failed trial of void as the most common complication (87 patients). An increased proportion of patients being discharged with an indwelling catheter (IDC) when ERAS protocols are in place have been reported by a similar study published by Carter-Brooks *et al*.[42] Only 8 patients (0.4%) required an unplanned admission after their procedures. Out of the eight patients who did not meet the criteria for same-day discharge, three patients had inadequate pain control, two patients had a continuing vaginal blood loss, one patient had ongoing symptoms of preexisting paroxysmal vertigo, one patient required a hematoma evacuation, and one patient had a deferral of the procedure due to anesthetic complications.

All patients were followed up at 24–48 h postdischarge with a standardized phone interview by an urogynecology nurse. Patients with voiding difficulty were recalled as needed. A further review of all 1381 patients was conducted by an urogynecologist at 6 weeks to 3 months after discharge. The complication rate in our cohort (6.88%) was comparable to the rates reported in this study (6.7%) in the ERAS group by Carter-Brooks *et al*., 2018.[42]

Of the 1381 patients treated, no patients who had criteria led-discharges were found to re-present with complications from home. By that definition, the unexpected re-admission rate after discharge to home was 0%.

Site-specific ERAS protocol is effective for providing standardized care in the surgical treatment of women with pelvic organ prolapse and urinary incontinence even in the elderly women in an outpatient setting. Complication rates are low and did not change with advanced age and reduce further with experience and familiarity with the protocol.

What Do the Results of this Study Add?

Our study utilizes a modified ERAS protocol of omitting the high protein diet and the glucose drink for the minimally invasive urogynecology procedures. The modified protocol is safe and associated with similar complications and readmission rates independent of age group. Another unique aspect of successful ERAS outcome in our study was to inculcate the services of a coordinator to confirm well-being of patients within the next 24–48 h of surgery along with 24-h hotline service provided to the patients for provision of home support.

What are the Implications of these Findings for Clinical Practice and/or Further Research?

The present study demonstrates the safety and effectiveness of our modified ERAS protocol that allows for patients to undergo surgical procedures and discharge on the same day, thus minimizing the impact on the quality of life and vocations. A multicenter randomized controlled trial will conclusively demonstrate a cause–effect relationship between early discharge and patient preparation with our modification of the ERAS protocol. Further research should also consider patient satisfaction as an additional outcome measure.

Compared to other urogynecology-specific protocols reported in the literature, a major difference in our local protocol was the omission of a carbohydrate-rich fluid intake before surgery. This was not considered to be necessary given that the preoperative fasting period was kept as close to 6 h as possible in all patients. Other protocols aim to avoid use of opioids perioperatively. Our protocol adopted a lower threshold for using opioid agents, where paracetamol and nonsteroidal anti-inflammatory drugs alone did not provide adequate analgesia. The modified protocol aims for early and adequate pain relief to enable same-day discharge of patients.

Discussion

The benefits of implementation of ERAS protocols are well documented in the literature. We developed our modified ERAS protocol to adapt to the increasing use of day surgery for urogynecology procedures.

Standardized postoperative checklists and criteria-led discharge allowed for recovery room nursing staff to become more proficient in identifying patients with immediate complications that needed appropriate escalation to the medical teams. The results of our study indicate the significant benefit of inculcating ERAS principles in the form of a standardized local protocol in urogynecology ambulatory surgery. Over the duration of the study, the complication rate was found to decrease and the need for inpatient admissions postoperatively was also reduced compared to figures reported previously by Kannan *et al*., 2008.[41] This is likely due to increasing experience with the ERAS protocol, leading to better patient selection and perioperative patient care.

Our retrospective audit assessed readmissions and complications from a single urogynecology unit with a single primary surgeon. Multicenter studies will also be required to establish general applicability of our modified ERAS protocol. There was no control group of patients who underwent these procedures without ERAS protocols being followed. We are therefore unable to directly draw conclusions about the effect applying ERAS protocols had on postoperative outcomes within the same period studied in the North Queensland setting. Another limitation of our study was due to variable patient satisfaction measurement tools used over the years we were unable to obtain statistically valid data on patient satisfaction over the long duration studied.

Conclusion

ERAS protocols have shown paradigm shift implemented for many different surgeries resulting in decreased length of stay, lower complications, improved health costs, and higher patient satisfaction. We have successfully used a modified ERAS protocol over 11 years for urogynecology procedures in an outpatient setting that allowed for majority of patients to go home the same day. Complication rates are shown to be low and comparable to other studies reported in the literature. Important factors that led to successful outcomes and to be considered were appropriate patient selection and counseling, an ERAS coordinator, conservative anesthesia, adequate pain control, 24-h helpline for follow-up, and audit.

ERAS protocols direct multimodal and multidisciplinary approach to upgrade healthcare in the preoperative, operative, and postoperative setting.

ERAS protocols are dynamically revised to enhance compliance and improve recovery metrics perioperatively. Ideally, this will improve clinical outcomes and optimize healthcare costs.

The most important factors for a successful implementation of an ERAS program include improved communication and collaboration between the perioperative team members. This needs to be supported by administrators and policymakers, implementing standardization of care pathways and challenges and the use of audit.[43,44]

To achieve the optimal management outcomes in surgical geriatric and high-risk group patients, it is vital to have the dedicated collaboration and coordination of primary care, geriatric medicine, social service, and other allied health services to adequately assess physical status, cognition, and frailty. A patient-centered multimodal and multidisciplinary model that includes a focused pathway of perioperative and postoperative management should be further investigated.

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Conflicts of interest

There are no conflicts of interest.

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