



Multidisciplinary approach toward enhanced recovery after surgery for total knee arthroplasty improves outcomes

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Abstract

Knee osteoarthritis is a degenerative disorder of the knee, which leads to joint pain, stiffness, and inactivity and significantly affects the quality of life. With an increased prevalence of obesity and greater life expectancies, total knee arthroplasty (TKA) is now one of the major arthroplasty surgeries performed for knee osteoarthritis. When enhanced recovery after surgery (ERAS) was introduced in TKA, clinical outcomes were enhanced and the economic burden on the healthcare system was reduced. ERAS is an evidence-based scientific protocol aimed at ameliorating the surgical stress response. ERAS aims to enhance the recovery phase, which encompasses multidisciplinary strategies at every step of perioperative care, including the rehabilitation phase. Implementation of ERAS in TKA aids in reducing the length of hospital stay, improving pain management, reducing perioperative complications, and enhancing patient satisfaction. Multidisciplinary collaboration, integrating the expertise of anesthesiologists, orthopedic surgeons, nursing personnel, and other healthcare professionals, is the cornerstone of ERAS in patients undergoing TKA.

Key Words: Arthroplasty; Replacement; Knee; Recovery of function; Anesthesia; Care; Nursing

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Core Tip: Current evidence shows that a protocolized approach toward enhanced recovery after surgery with multidisciplinary collaboration improves outcomes following total knee arthroplasty (TKA). As healthcare professionals continue to refine and evolve enhanced recovery after surgery (ERAS) protocols in patients undergoing TKA, the integration of multidisciplinary teams in ERAS implementation is critical to achieving optimal patient outcomes.

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INTRODUCTION

Knee osteoarthritis is a degenerative disease affecting older adults with a significant effect on quality of life[1]. There is progressive articular cartilage loss that leads to debilitating pain with impairment of mobility. Increasing rates of obesity and longevity have indicated that knee osteoarthritis has resulted in public health crisis proportions[2].

Total knee arthroplasty (TKA) is a major surgical intervention that is effective in treating knee osteoarthritis and enhancing the quality of life for individuals with debilitating knee joint disorders[3]. Increased life expectancies and a rapidly growing geriatric population have indicated that a high number of people undergoing TKA have a strong need for an early return to daily activities[4].

The concept of enhanced recovery after surgery (ERAS) protocols was first proposed by Kehlet *et al*[5] in 1997 in colorectal surgery. The surgical stress response, which caused a multitude of systemic effects and resulted in increased convalescence time was targeted to enhance outcomes using this approach. The ERAS approach, with its significant advantages on health economics and improved patient outcomes, has been adopted and shown to be useful in diverse groups of surgical patient populations[6].

The ERAS approach necessitated a multidisciplinary (anesthetists, surgeons, nurses, and physiotherapists) collaboration to achieve early autonomy in the postoperative recovery period, resulting in a lower length of stay[7]. Multidisciplinary collaboration is the main goal of ERAS, integrating the expertise of surgeons, anesthetists, nurses, and various other healthcare professionals. This collaborative effort is crucial for evidence-based practice implementation and patient care optimization throughout the perioperative period. The synergy among team members contributes to a comprehensive and patient-centered approach, which aligns with ERAS principles[8,9].

The increased propagation of the ERAS approach has also included patients posted for orthopedic joint (hip and knee) replacements. The reasons for the increased use of ERAS in patients undergoing TKA are diverse-ranging from the increasing number of elderly people requiring knee surgery to the increased benefits of shorter hospital stays in such patients[10].

ERAS IN TKA PATIENTS

Similar to other surgical specialties, ERAS protocols for the TKA patient must be targeted to decrease the surgical stress response, which can be broadly divided into preoperative, intraoperative, and postoperative periods[11,12]. Various components during the perioperative period of implementation of ERAS protocols in patients undergoing TKA exist, which have been now summarized in recent consensus statements by the ERAS Society (Tables 1 and 2)[13,14].

Certain pertinent points of ERAS implementation in patients with TKA, which is specific to these patients, are as follows: (1) Preoperative education and physical therapy decrease anxiety and the cost of treatment[15,16]; (2) Anesthesia techniques must aim to use neuraxial/peripheral nerve block/local anesthesia infiltration techniques with the use of multimodal opioid-sparing regimens and hypobaric intrathecal solutions to promote early mobilization with adequate pain control[17-21]; (3) Urinary catheter placement and postoperative urinary retention: Spinal anesthesia and prostatism are contributory factors. Opioid-sparing spinal anesthetic is regarded to be the best choice[22,23]; (4) Use of tranexamic acid in the intraoperative period reduces blood loss and blood component therapy[24]; (5) Early mobilization should be encouraged[25]; and (6) Orthostatic intolerance is a notorious cause of failure of ERAS protocols in patients undergoing TKA and is frequently multifactorial[26].

ADVANTAGES OF ERAS IN TKA

Reduced length of hospital stay

Studies have consistently demonstrated that the implementation of ERAS protocols in TKA results in a significant reduction in the length of hospital stays. The study by Khan *et al*[27] highlighted the impact of ERAS on patient outcomes, indicating a shorter duration of hospitalization, which not only reduces healthcare costs but also facilitates a quicker return to normal activities.

Table 1 GRADE system for rating strength of recommendations and rating quality of evidence (Guyatt *et al*[15], 2008)

Recommendation strength	Definition
Strong	Desirable effects of intervention clearly outweigh the undesirable effects, or clearly do not
Weak	When trade-offs are less certain—either because of low-quality evidence or because evidence suggests desirable and undesirable effects are closely balanced
Evidence level	Definition
High quality	Further research unlikely to change confidence in estimate of effect
Moderate quality	Further research likely to have important impact on confidence in estimate of effect and may change the estimate
Low quality	Further research very likely to have important impact on confidence in estimate of effect and likely to change the estimate
Very low quality	Any estimate of effect is very uncertain

Improved pain management

Effective pain management is a fundamental component of ERAS, and its impact on nursing outcomes is shown by Urban *et al*[28] and Wei *et al*[29]. These authors validated the importance of multimodal analgesia and patient engagement in pain control strategies, resulting in improved postoperative pain management and enhanced patient comfort during the recovery phase.

Enhanced patient satisfaction

The patient experience is a vital aspect of healthcare, and ERAS, through its patient-centric approach, significantly influences patient satisfaction. Research by Aasvang *et al*[30] demonstrated that informed patients actively participating in their care decisions and early mobilization contribute to higher levels of satisfaction and overall positive experiences.

Early mobilization and functional recovery

Nurses play a pivotal role in encouraging early mobilization, which is a key component of ERAS associated with faster functional recovery. Riga *et al*[31] emphasized the importance of nursing interventions in facilitating early ambulation, resulting in improved joint function and overall recovery.

Reduced complications

ERAS implementation has been associated with a reduction in postoperative complications. Artz *et al*[32] highlighted the impact of ERAS concerning physiotherapy and exercise on minimizing complications and better functional outcomes. Nursing vigilance and prompt intervention play a crucial role in the identification and management of potential issues.

CONCLUSION

ERAS protocols are currently based on scientific evidence of a combination of multidisciplinary protocols to enhance outcomes, hasten recovery, and reduce costs during the perioperative period[33]. Even though ERAS has now scientifically established itself as the standard of care, future studies that focus on compliance with ERAS protocols would validate its utility and relationship with outcomes[34]. ERAS protocols continue to evolve as our learning in identifying therapeutic interventions targeting “modifiable risk factors” by modulating surgical stressors and ensuring perioperative homeostasis ensures improved outcomes[35].

Although ERAS protocols have been shown to decrease mortality, need for blood and blood component transfusion, complication rate, and length of stay, studies have identified at least 17 specific elements, and optimizing their usage in clinical scenarios would be guided by future studies[36]. These elements comprise preoperative components of (1) “preoperative information, education and counseling”; (2) “preoperative optimization of smoking, alcohol consumption and anemia”; and (3) optimum preoperative fasting[36]. The intraoperative components include: (1) A standardized anesthesia protocol; (2) local anesthetic infiltration and specific nerve blocks; (3) prevention of postoperative nausea and vomiting; (4) reducing perioperative blood loss with use of tranexamic acid; (5) perioperative analgesia including use of paracetamol; (6) ensuring normothermia; (7) optimum antibiotic prophylaxis; (8) perioperative fluid management; and (9) modulating surgical factors[36]. The postoperative interventions include: (1) Thromboprophylaxis; (2) postoperative nutrition; (3) early mobilization; (4) criteria-based discharge; and (5) continuous audit and improvement[36]. Recent studies also reveal the importance of a multidisciplinary approach in enhancing nursing outcomes[9].

The evidence from these studies highlights the positive impact of ERAS with multidisciplinary collaboration on overall outcomes following TKA. As healthcare professionals continue to refine and implement ERAS protocols in patients undergoing TKA, the integration of multidisciplinary expertise in ERAS implementation remains central to achieving optimal outcomes and ensuring a smoother recovery for these patients.

Table 2 Summary of recommended interventions for the perioperative care of knee replacement

		Recommendation	Recommendation grade	Level of evidence
Preoperative	Preoperative information, education and counselling	Preoperative patient education recommended	Strong	Low
Preadmission patient optimization	Smoking	Smoking cessation for 4 wk or more recommended before surgery	Strong	High
	Alcohol	Alcohol cessation recommended before surgery	Strong	Low
	Anemia	Anemia should be identified, investigated, and corrected prior to surgery	Strong	High
	Preoperative physiotherapy	Not recommended as an essential intervention	Strong	Moderate (for not recommending)
Perioperative	Preoperative fasting	Intake of clear fluids until 2 h before the induction of anesthesia, and a 6-h fast for solid food is recommended	Strong	Moderate
	Preoperative carbohydrate treatment	Not currently recommended as an essential routine Intervention	Strong	Moderate (for not recommending)
	Pre-anesthetic medication	routine administration of sedatives to reduce anxiety preoperatively is not recommended	Strong	Low
Standardized anesthetic protocol	General versus central neuraxial anesthesia	Both may be used as part of multimodal anesthetic regimes	Strong	Moderate (for both)
	Spinal (intrathecal) opioids	Not recommended for routine use	Strong	Moderate
	Epidurals	Not recommended for routine use	Strong	High (analgesic efficacy), moderate (negative safety and side-effect profile)
	Use of local anesthetics for nerve blocks and infiltration analgesia	LIA recommended for knee replacement Nerve blocks are therefore not recommended as an essential ERAS component	Strong	High (LIA in knee replacement)
Postoperative	Nausea and vomiting	screening for and multimodal PONV prophylaxis and treatment	Strong	Moderate
	Prevention of perioperative blood loss- tranexamic acid	Recommended to reduce perioperative blood loss	Strong	High
Multimodal analgesia	Paracetamol	Recommended for routine use	Strong	Moderate
	Non-steroidal anti-inflammatory drugs (NSAIDs)	Routine use of NSAIDs recommended for patients without contraindications	Strong	High
	Gabapentinoids	Not recommended currently	Strong	Moderate (for not recommending)
	Supplemental opioid analgesia	ERAS programs seek to minimize the use of opioids. However, opioids such as oxycodone may be used when required as part of a multimodal approach	Strong	High
Perioperative factors	Maintaining normothermia	Normal body temperature should be maintained peri- and postoperatively through pre-warming and the active warming of patients intraoperatively	Strong	High
	Antimicrobial prophylaxis	Systemic antimicrobial prophylaxis recommended in accordance with local policy and availability	Strong	Moderate
	Antithrombotic prophylaxis treatment	Patients should be mobilized as soon as possible post-surgery and receive antithrombotic prophylaxis treatment in accordance with local policy	Strong	Moderate
Perioperative surgical factors	Surgical technique	No recommendation on surgical technique	Strong	High
	Use of tourniquet	Routine use not recommended	Strong	Moderate
	Surgical Drain	Routine use not recommended	Strong	Moderate

Fluid management	Intravenous fluids – judicious use	Strong	Moderate
	Postoperative intravenous fluids – discouraged in favor of early oral intake		
Urinary catheter	Routine use – not recommended	Strong	Moderate
	When used – should be removed as soon as the patient is able to void, ideally within 24 h of surgery		
	Recommended catheterization threshold – 800 mL		
Nutritional care	Early return to normal diet recommended	Strong	Low
Early mobilization	Patients should be mobilized as early as they are able to in order to facilitate early achievement of discharge criteria	Strong	Strong
Criteria-based discharge	Objective discharge criteria should be used to facilitate patient discharge directly to their home	Strong	Low
Continuous improvement and audit	Routine internal and/or external audit of process measures, clinical outcomes, cost effectiveness, patient satisfaction/experience, and changes to the pathway is recommended	Strong	Low

FOOTNOTES

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