

A NARRATIVE REVIEW OF IMPROVED RECUPERATION ROUTES IN ORTHOPAEDIC SURGERY.

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ABSTRACT

Enhanced Recovery After Surgery (ERAS), also known as "fast track," "accelerated," or "Rapid Recovery" surgery, was introduced in 1997 to address delayed postoperative recovery, particularly the physiological stress and organ dysfunction induced by surgical procedures. ERAS employs evidence-based interventions within a coordinated clinical care pathway to mitigate complications, reduce hospitalization duration, enhance patient satisfaction, and expedite recovery. While initially designed for abdominal and colorectal surgery, ERAS protocols have expanded to various medical specialties, including orthopedic surgery, specifically elective hip and knee arthroplasty. This narrative review covers ERAS protocols in orthopedic surgery, emphasizing on recovery-optimizing components. It reviews the evidence on ERAS interventions and their effects on hospitalization duration, readmission rates, and functional recovery after orthopedic surgery. The narrative review explores the implementation of ERAS in orthopedic surgery, emphasizing its impact on patient outcomes. ERAS interventions encompass the preoperative, intraoperative, and postoperative phases of care. Studies have shown that ERAS protocols in orthopedic surgery are associated with reduced hospitalization duration, lower readmission rates, and improved functional recovery. These interventions include patient education, multimodal pain management, early mobilization, and nutritional optimization. Future research in the field of ERAS should focus on refining and customizing protocols for specific orthopedic procedures, patient populations, and comorbidities. Additionally, investigating the long-term outcomes and cost-effectiveness of ERAS in orthopedic surgery is essential. Comparative studies assessing ERAS versus traditional care can provide valuable insights. Orthopedic surgery can benefit from ERAS protocols' efficiency and patient-centeredness. For elective hip and knee arthroplasty, hospitals should apply ERAS principles to reduce hospital stays, improve patient satisfaction, and improve surgical outcomes. Policymakers may also consider incentives or guidelines to encourage ERAS use in orthopedic surgery, which could enhance resource utilization and cost savings.

Keywords: Nutrition, Enhanced recovery after surgery, postoperative care, orthopedic surgery, preoperative care

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INTRODUCTION

Enhanced Recovery After Surgery (ERAS) was first introduced by Danish surgeon Henrik Kehlet in 1997 with the aim of reducing postoperative stress, speeding up recovery, and lowering overall costs [1]. A study by Bardram on colorectal surgeries paved the way for fast-track recovery programs. The study encompassed various interventions, such as the utilization of epidural analgesia, early mobilization, and early initiation of oral nutrition. These interventions collectively led to a significantly reduced hospitalization period of two days, while concurrently mitigating the occurrence of adverse effects such as nausea, vomiting, and ileus. Additionally, it exhibited efficacy in mitigating postoperative fatigue and functional impairment, thereby highlighting the potential advantages of implementing intensive perioperative management in the context of colonic surgery for elderly patients at high risk [2].

Orthopedic surgery, including total joint replacements, has become increasingly common due to an aging population. The cost of these surgeries is expected to rise, and hospital

stay duration significantly impacts healthcare costs. ERAS programs have been adopted by institutions to improve patient outcomes, reduce costs, and lower readmission rates. Numerous establishments endeavor to formulate their ERAS protocols in accordance with the fiscal implications linked to particular surgical procedures [3].

ERAS has been investigated in orthopedic surgery, showing a decrease in hospital stay from 4-12 days to 1-3 days without a significant increase in readmissions. Evidence supports the effectiveness of ERAS protocols in improving hospital and patient outcomes, but there's room for streamlining these processes for easier implementation [4]. This article aims to elucidate the fundamental components of an ERAS protocol specifically tailored for orthopedic surgical procedures. The discussed elements encompass preoperative evaluation, fasting guidelines, bowel preparation techniques, anesthesia administration, thrombosis prophylaxis, postoperative management, nutritional considerations, and fluid therapy strategies.

This narrative review covers the major components of orthopedic surgery-specific Enhanced Recovery After

Surgery (ERAS) regimens. We aim to answer important issues about ERAS interventions in orthopedic surgery. First, the review carefully evaluate the key features of an optimal ERAS procedure for orthopedic patients. Second, we examine the plethora of data on how ERAS interventions affect hospitalization duration, readmission rates, and orthopedic surgery patient outcomes. Finally, it examines the obstacles and potential of ERAS deployment in orthopedic settings, focusing on shortening protocols to improve uptake and patient and healthcare institution benefits. It is anticipated that this thorough study will inform clinical practice, policy formulation, and orthopedic surgery patient outcomes and experiences.

METHODOLOGY

This narrative study examined orthopedic surgery Enhanced Recovery After Surgery (ERAS) methods. Scholarly articles on ERAS's primary components and effects in orthopedic surgery were searched. The literature search focused on 2015–2023 articles. This timeline includes current ERAS protocol improvements. Scientific papers are usually written in English, thus the search included these. Publication Peer-reviewed journal papers, gray literature, conference proceedings, and guidelines were considered for a full review. In this narrative study of ERAS in orthopedic surgery, randomized controlled trials, observational studies, systematic reviews, and expert guidelines were evaluated. Multiple study designs were utilized to understand ERAS implementation. This literature search used PubMed, a reliable and public biological and healthcare database. Google Scholar and research institute websites were searched for grey literature and other sources. Terms like "Enhanced Recovery After Surgery," "ERAS in orthopedic surgery," "ERAS components," "ERAS impact," and "orthopedic surgical procedures" were searched. Boolean operators increased search relevance. Searching involved entering keywords and search terms into databases, applying publication date and language filters, and evaluating search results for relevance. First, orthopedic surgery literature was searched for ERAS across the range. Article topic relevance was assessed using titles and abstracts. The selected studies' full-text publications were examined for ERAS and orthopedic surgery information. The articles focused on preoperative, intraoperative, and postoperative ERAS protocols in orthopedic surgery and their influence on patient outcomes, hospitalization duration, and complications. The narrative review uncovered ideal orthopedic surgery recovery regimens from chosen literature. A comprehensive review incorporated evidence-based research and expert guidelines from various study formats and sources.

ELEMENTS OF OPTIMIZED RECUPERATION FOLLOWING ORTHOPEDIC SURGERY

Preoperative assessment – Similar to any surgical intervention, the preoperative evaluation and optimization of the patient's condition are of utmost importance before undertaking an elective procedure. Preceding the surgical intervention, patients are afforded the opportunity to partake in distinct consultations with the medical and anesthesia teams, wherein they can discuss and elucidate their individual expectations. Furthermore, active engagement of the patient in preoperative educational sessions aimed at addressing frequently raised inquiries and providing comprehensive information regarding the procedures can prove advantageous for both the patient and the healthcare personnel [4].

PREOPERATIVE PHASE

Preoperative Evaluation and Optimization of Organ Function

Preexisting medical conditions, including hypertension, coronary artery disease, diabetes, organ dysfunction, and chronic obstructive pulmonary disease, have been found to exert a substantial influence on the incidence of postoperative complications and the length of hospital stay [5]. Preoperative consultations with patients, conducted several weeks prior to the scheduled surgical intervention, are of paramount importance. The utilization of this approach enables the preoperative team to effectively optimize organ function, proactively address potential risks, and efficiently manage preoperative anemia. Additionally, this presents an opportune moment to commence interventions for alcohol and tobacco cessation, should such measures be deemed necessary.

Preoperative Education

The primary objective of preoperative education should be to emphasize attainable objectives pertaining to the management of postoperative pain, implementation of physiotherapy, and facilitation of mobilization. The existing literature on preoperative education has consistently demonstrated a noteworthy decrease in patient anxiety and emotional distress, resulting in enhanced patient assurance and contentment [6]. Nevertheless, the available evidence regarding the impact of structured preoperative education on the reduction of complications, pain, or duration of hospital stay is limited. Preoperative education confers notable advantages for patients presenting with comorbid depression, unrealistic expectations, or insufficient social support. It is imperative to effectively address and regulate patients' anticipations regarding discomfort experienced in the immediate postoperative phase, irrespective of the analgesic modality employed.

Several orthopedic centers offer preoperative educational sessions in which a multidisciplinary team, including nurses, physiotherapists, occupational therapists, as well as care

coordinators, explains the care plan and addresses patients' social, physical, and psychological needs before surgery.

Preoperative fasting and nutrition

The traditional approach of abstaining from food intake starting at midnight before elective surgical interventions has faced resistance from ERAS initiatives. The ERAS protocol permits the consumption of clear fluids up to 2 hours prior to the initiation of anesthesia, while solid food intake is allowed up to 6 hours before anesthesia induction. There is a mounting body of evidence that indicates the absence of any discernible patient safety advantage associated with the practice of prolonged fasting. Prolonged periods of fasting have been observed to elicit a catabolic state, thereby augmenting the physiological stress response to surgical procedures. This, in turn, may lead to the development of insulin resistance, hyperglycemia, and a protracted recuperation period [7]. Nevertheless, it is advised to adopt a more prudent fasting strategy for individuals who are classified as morbidly obese or those who have inadequately managed diabetes mellitus.

The evaluation of nutritional status holds paramount importance within the context of ERAS protocols and should be an integral component of the preoperative assessment process. The observed association between the presence of malnutrition and the heightened probability of infection of the wound, delayed healing of wounds, sepsis, and an escalated risk of mortality has been established. The ERAS protocol additionally advises the implementation of carbohydrate loading, wherein a transparent carbohydrate-based beverage is consumed 2-3 hours prior to the surgical procedure. The objective of this approach is to adequately prime patients for surgical intervention by ensuring they are in a metabolically nourished state. This strategy serves to minimize the extent of protein loss following the operation and safeguard the integrity of muscle mass. Insufficient data exists regarding the nutritional status of patients undergoing orthopedic surgery within the ERAS framework. However, certain ERAS protocols have demonstrated that the administration of a clear carbohydrate drink for carbohydrate loading, specifically 2 hours prior to the surgical procedure, may yield favorable outcomes. These include a reduction in insulin resistance, as well as alleviation of thirst, hunger, and anxiety experienced by patients [8].

Preoperative anesthetics and analgesics

The current epidemic of opioid misuse and addiction has necessitated the implementation of a comprehensive multimodal pain management strategy throughout the entire surgical process, encompassing the preoperative, perioperative, and postoperative phases. Nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, preoperative bupivacaine, adenosine, magnesium

clonidine, and venlafaxine have demonstrated efficacy as analgesic agents in patients undergoing breast surgery [9]. Optimal preoperative counseling has been demonstrated to effectively mitigate the necessity for sedatives and anxiolytics. Additionally, patients with abbreviated fasting intervals may benefit from the administration of histamine H2 blockers and proton pump inhibitors [10].

Prophylaxis for the Prevention of Thromboembolism

The standard practice for venous thromboembolism (VTE) prophylaxis in hospital settings commonly entails the administration of unfractionated and low molecular weight heparin. Multiple surgical societies have formulated guidelines pertaining to venous thromboembolism (VTE) prophylaxis, exhibiting divergent perspectives regarding the optimal duration of such interventions. There exists a distinct emphasis on the discrete matters of pulmonary embolism (PE) and deep vein thrombosis (DVT). Careful consideration is warranted when employing neuraxial catheters for epidural procedures, necessitating adherence to specific guidelines pertaining to venous thromboembolism (VTE) prophylaxis in relation to catheter insertion or removal [11]. It is imperative to duly consider these recommendations in conjunction with any Enhanced Recovery After Surgery (ERAS) protocol.

INTRAOPERATIVE PHASE

During surgical procedures, the primary objective is to mitigate physical stress and its subsequent effects on the body's physiological response. In order to accomplish this objective:

Minimally invasive surgical techniques are employed in the medical intervention.

Neuraxial anesthesia is the preferred choice over general anesthesia in ERAS protocols owing to its capacity to effectively inhibit the sympathetic response, mitigate the secretion of stress hormones, and restrict postoperative insulin release. The aforementioned condition is correlated with reduced duration of hospitalization and a decreased incidence of complications [12].

Local infiltration analgesia (LIA) is a therapeutic technique employed in surgical procedures, particularly total knee arthroplasty, wherein analgesic substances are administered in the vicinity of the joint. The analgesic properties of this treatment modality have been observed to be efficacious in mitigating postoperative pain following knee surgery. However, its effectiveness in alleviating discomfort subsequent to hip arthroplasty has not been substantiated.

The maintenance of a physiological body temperature within the normal range, known as normothermia, is of utmost importance in the medical context. This practice plays a vital role in mitigating the risk of infections, coagulation abnormalities, the need for blood transfusions,

as well as cardiovascular complications. Forced air warming has been established as the optimal technique for mitigating heat loss.

- The maintenance of an optimal fluid balance is of utmost importance during surgical procedures in order to uphold adequate tissue oxygenation and promote the healing of wounds.
- Blood conservation strategies encompass various approaches aimed at minimizing blood loss and optimizing patient outcomes [13]. These strategies encompass preoperative correction of anemia, utilization of hypotensive anesthesia to mitigate blood loss, implementation of blood salvage techniques, and administration of tranexamic acid to effectively diminish blood loss.
- Regional anesthesia, specifically neuraxial anesthesia, is commonly preferred due to its advantageous physiological effects, which encompass a sympathetic block and a reduction in stress hormone levels. The intervention has been observed to result in reduced duration of hospitalization and a decreased incidence of post-procedural complications.
- The management of fluids during the perioperative period adheres to a goal-directed methodology, which holds significant importance within the context of ERAS protocols [14]. The intervention has been observed to exhibit a notable reduction in the incidence of postoperative infections, as well as a decrease in the occurrence of organ dysfunction and the necessity for blood transfusions. Patients enrolled in ERAS protocols commonly exhibit reduced fluid deficits as a result of abbreviated fasting and bowel preparation durations. The cessation of intravenous fluids occurs promptly upon the attainment of adequate oral fluid consumption.

POSTOPERATIVE PHASE

The postoperative phase encompasses two primary facets: enhancing patient comfort and optimizing postoperative care.

Pain Management

Multimodal opioid-sparing analgesia encompasses the integration of diverse pain alleviation modalities and pharmacological agents, such as epidural analgesia, nerve blocks, acetaminophen, NSAIDs, gabapentin, and ketamine. Optimal pain management holds paramount significance within the ERAS framework; however, the primary objective lies in mitigating discomfort rather than achieving absolute pain eradication. The advantages of pain mitigation ought to be carefully weighed against the potential adverse effects and impediments to mobility resulting from specific pain alleviation methodologies [15].

Nausea and vomiting prevention strategies

The risk factors implicated in the manifestation of postoperative nausea and vomiting (PONV) comprise the female gender, non-smoking status, prior experience with PONV, vulnerability to motion sickness, and the utilization of postoperative opioids [16]. To effectively manage the incidence of PONV, it is recommended to implement therapeutic approaches focused on minimizing the administration of general anesthesia and opioids. The application of total intravenous anesthesia (TIVA) has demonstrated efficacy in reducing the use of volatile anesthetics while simultaneously optimizing the utilization of regional and neuraxial techniques, thereby presenting potential advantages. Patients presenting with specific risk factors should be administered appropriate pharmacological interventions, such as dexamethasone or serotonin receptor antagonists, in order to mitigate potential adverse outcomes. Individualized assessments for insulin requirements may be necessary in patients with diabetes.

Early mobilization and rehabilitation

The potential for postoperative complications, including but not limited to thromboembolic events, respiratory impairments, insulin resistance, and impaired wound healing, is heightened by an extended period of immobilization following surgical intervention. The ERAS protocols place significant emphasis on the implementation of early mobilization and physical therapy interventions. Preoperative assessments play a crucial role in establishing patient expectations and formulating rehabilitation goals. Commencement of physical therapy ought to be initiated on the day of the surgical procedure or promptly upon the patient's physiological state permitting, usually within a time frame of 2 to 6 hours following the operation. The implementation of a multimodal approach to pain management is crucial in facilitating successful and minimally distressing early ambulation.

DISCUSSION

The implementation of ERAS protocols, originally formulated to tackle the obstacles encountered during the postoperative recuperation period, has had a profound influence on the field of orthopedic surgery. The aforementioned protocols encompass a comprehensive array of evidence-based interventions, spanning from meticulous preoperative assessments and informative educational sessions to meticulous intraoperative techniques and diligent postoperative care. The primary objective is to mitigate complications, decrease the length of hospital stays, and enhance patient outcomes. Preoperative assessments are of paramount importance in the optimization of patient conditions, the management of comorbidities, and the initiation of interventions aimed at addressing factors such as smoking cessation and nutrition. ERAS protocols have emerged as a paradigm shift in surgical care, challenging

conventional fasting practices. These protocols now allow for the consumption of clear fluids up to 2 hours prior to the surgical procedure, thereby deviating from the traditional fasting guidelines. Additionally, ERAS protocols advocate for the practice of carbohydrate loading, which further distinguishes them from the established norms in surgical management. The utilization of non-opioid analgesics has become increasingly prominent in the implementation of multimodal pain management strategies, as a response to the opioid epidemic. Following the surgical procedure, there is a strong emphasis on postoperative early mobilization and rehabilitation in order to mitigate the potential complications that may arise from extended periods of immobility. In general, the implementation of ERAS protocols within the field of orthopedic surgery holds promise in improving patient experiences and outcomes, while concurrently mitigating healthcare expenditures.

CONCLUSION

ERAS, also known as Enhanced Recovery After Surgery, is a patient-centric methodology and evidence-driven intervention designed to enhance both the patient encounter and medical outcomes. Following its successful implementation in colonic surgery, the ERAS protocol was subsequently embraced in the realm of orthopedic surgery, specifically for elective hip and knee arthroplasty procedures. The ERAS pathway encompasses a carefully chosen array of interventions, categorized into preoperative, intraoperative, and postoperative phases. The combined implementation of these interventions exhibited a more favorable effect on patient outcomes. The implementation of the ERAS pathway has been shown to yield favorable outcomes and result in a reduction in the duration of hospitalization. Notwithstanding the substantial advancements in the implementation of ERAS in recent years, its extensive adoption remains constrained, necessitating further diligent efforts and comprehensive research.

Limitations

This article discusses Enhanced Recovery After Surgery (ERAS) protocols in orthopedic surgery, specifically elective hip and knee arthroplasty. The evaluation does not cover other surgical specialties or techniques, limiting its applicability. Institutions and orthopedic surgical teams may use different procedures. The variety of protocol components and implementation methodologies makes it difficult to assess intervention efficacy. ERAS research and inventions are constantly evolving. This review may not include the latest ERAS practices because it is based on current material.

Interpretation

Enhanced Recovery After Surgery (ERAS) improves orthopedic surgery results with patient-centered, evidence-based care. ERAS protocol components and patient care are discussed in the narrative review. The review found that preoperative screening, education, and organ function optimization prepare patients for surgery. Traditional fasting should be replaced with evidence-based dietary methods like carbohydrate loading. In addition, multimodal analgesia and nausea and vomiting prevention can improve patient satisfaction. Recovery is faster with early mobilization and therapy following surgery. These approaches complement ERAS, which reduces hospital stays and improves outcomes. Healthcare providers should incorporate these ERAS elements into orthopedic surgical protocols. Shorter hospital stays and decreased readmission rates are cost-saving benefits of ERAS deployment for healthcare organizations and governments. Standardizing ERAS for orthopedic surgery and other specialties improves resource allocation and healthcare efficiency. ERAS may improve patient care, but the narrative review suggests more research. Future study should improve ERAS methodologies, analyze long-term patient outcomes, and resolve implementation challenges. Politicians require cost-effectiveness research on ERAS projects in diverse healthcare settings.

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List of abbreviations

ERAS- Enhanced Recovery After Surgery
NSAIDs- Nonsteroidal anti-inflammatory drugs
VTE- Venous thromboembolism
PE- Pulmonary embolism
DVT- Deep vein thrombosis
LIA- Local infiltration analgesia
PONV- Post-operative nausea and vomiting
TIVA- Total intravenous anesthesia

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