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Enhanced Recovery after Cesarean Delivery

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Abstract

Enhanced Recovery after Surgery (ERAS) is a concept emerging in the 1990s, initially as a protocol for rapid recovery after colon surgery. Currently, the term "Enhanced Surgical Recovery (ESR)" is used as part of Perioperative Medicine, which is one of the medical subspecialties. ESR has many advantages: Fewer readmissions for the same disease, optimized management of complex conditions, reduced nurse workload, improved patient and staff satisfaction, minimized opioid use through multi-modal analgesia and patient education, faster recovery from surgery, reduced length of hospital stay, cost, and perioperative complications.

Since 2012, obstetric surgery has also begun its own ESR program, Enhanced Recovery after Cesarean (ERAC). Evidence suggests that standardized ERAC improves maternal and fetal clinical outcomes. The American Society for Obstetric Anesthesia and Perinatology (SOAP) has formulated an expert consensus (Consensus Statement and Recommendations for Enhanced Recovery after Cesarean, ERAC) published in November 2020 [5]. This consensus put forward 25 specific recommendations for elective cesarean delivery.

Implementation of an optimal ERAC should be a continuum of comprehensive management prior admission and before, during, and after surgery. This article summarizes the implementation of ERAC from six aspects: Antepartum Clinic Visit, Admission to Labor and Delivery Unit, Intraoperative Management, PACU Care, Postoperative Care, and Post Discharge Follow-up.

ERAC optimizes the management of the entire pregnancy and perinatal period. It improves maternal, fetal, and neonatal safety, reduces complications, and enhances multidisciplinary collaboration.

Keywords

Cesarean delivery, Obstetric anesthesia, Anesthetic management, Perioperative management, ERAC

Introduction

Efforts for optimal perioperative management have been consistent among all care providers. Anesthesiologists are vital to patient safety and outcomes perioperatively. Fast-Track Surgery (FTS), Multimodal Rehabilitation after Surgery (MRAS), Surgical House (SH), and Enhanced Recovery after Surgery (ERAS) have been simultaneously used in the past. Currently, the term "Enhanced Surgical Recovery (ESR)" is used by many institutes in the United States and is part of Perioperative Medicine, which is now one of the medical subspecialties.

ERAS/ESR is a concept emerging in the 1990s, initially as a protocol for rapid recovery after colon surgery [1]. ESR has many advantages: Fewer readmissions for the same disease, optimized management of complex conditions, reduced nurse workload, improved patient and staff satisfaction, minimized opioid use through multi-modal analgesia and patient education, faster recovery from surgery, reduced length of hospital stay, reduced cost, and reduced perioperative complications [2].

The standardization of ESR has enabled its widespread and successful use in perioperative management for various surgical procedures. Since 2012, obstetric surgery has also begun its own ESR program, Enhanced Recovery after Cesarean (ERAC). Evidence suggests that standardized ERAC improves maternal and fetal clinical outcomes [3]. Cesarean delivery is the most common surgery in the United States [4]. The American Society for Obstetric Anesthesia and Perinatology (SOAP) has formulated an expert consensus (Consensus Statement and Recommendations for Enhanced Recovery after Cesarean, ERAC) published in November 2020 [5]. This consensus put forward 25 specific recommendations for elective cesarean delivery.

Implementation of an optimal ERAC should be a continuum of comprehensive management prior to admission, and before, during, and after surgery. ERAC is evidence-based and patient-centered. It improves the clinical outcomes of mothers and babies. The connotation of ERAC is different from other surgical protocols; in addition to surgical recovery, it is closely related to the newborn's health status and the breastfeeding success rate [5].

At the Ohio State University Wexner Medical Center (OSUWMC), we developed ERAC for scheduled cesarean delivery based on SOAP, MFM, ACOG, and ASA recommendations. The following are the details of ERAC at the OSUWMC.

Antepartum Clinic Visit

Our ERAC starts at antepartum clinic visits. It includes completing H&P, obtaining signed consent,

and checking the ESR flag. We also perform medication reconciliation and adjustment, update the information on allergies, place pre-operative orders for the day of surgery, implement smoking and alcohol cessation, lactation preparation and support, identify and treat anemia, and assess potential needs for social and home support postpartum.

Patient education is the focus of the antepartum clinic visit, introducing the mothers to the medical process and ERAC plan, encouraging patients' participation in their medical care, and providing dedicated preoperative counseling materials in the patient's native language no later than 35-36 weeks gestation. The visit also involves setting expectations regarding pain and nausea/vomit management, emphasizing strategies and goals of enhanced recovery to improve patient experience, and educating on NPO guidelines. Lactation education should start early by providing a handout with information on normal breastfeeding answering common related questions/concerns, and making resources available.

Admission to Labor and Delivery Unit

The first action is to limit the fasting time. The fasting time before the operation is 6 hours for a small amount of low-fat food and milk, 8 hours for high-fat food and meat, and 2 hours for clear liquid. For patients without risk of aspiration and who are non-diabetic, drinking carbohydrate-free beverages can prevent hypoglycemia, reduce catabolic stress and ketosis, and maintain maternal body temperature [6].

After admission to the Preoperative Holding suite, infection prevention management should be implemented, applying SAGE cloth to the surgical site and administering pre-op antibiotics per OSUWMC Prevention of Surgical Site Infections (SSIs) and Antimicrobial Prophylaxis Clinical Practice. Pain management and glycemic control should start as well.

Intraoperative Management

After a patient comes to the operating room, acknowledge the patient's assignment to ERAC protocol during the anesthesia sign-in. Sequential compression devices are placed for venous thromboembolism (VTE) prevention.

Antimicrobial prophylaxis is performed after monitors are placed on the patient, using cefazolin 2 g IV (3 g cefazolin for patient body weight more than 120 Kg) as the first-line antibiotic. Azithromycin is added if the woman has a ruptured membrane. Prophylactic antibiotics should be administered between 15-60 minutes before surgical incision.

A combination of at least two prophylactic antiemetics with different mechanisms of action is administrated before neuraxial anesthesia.

Use prophylactic vasopressor administration plus fluid co-load if neuraxial anesthesia is administered, to prevent and treat neuraxial anesthesia-induced hypotension, improve the maternal cesarean section and newborn prognosis, and avoid intraoperative nausea/vomiting and other complications [7].

Adding lipophilic opioids (such as fentanyl or sufentanil) to neuraxial anesthesia can enhance the effect of intraoperative anesthesia and reduce the total dose of local anesthetics, thereby reducing neuraxial anesthesia induced hypotension, as well as improving analgesic quality, and reducing intraoperative nausea and vomiting.

The patient is placed in the left uterine displacement (LUD) position. Continue glycemic control if the patient has diabetes. Maintaining normothermia has benefits for the perioperative mothers and newborns, which include patient comfort, reduced chills and shaking, reduced tension, reduced risk of surgical site infection, shortened hospital stay, and improved neonatal umbilical artery pH and Apgar score [8]. Reverse the LUD position after the newborn is transferred to the baby warmer.

Delaying umbilical cord clamping for 60 seconds can improve full-term newborn hemoglobin levels, increase iron stores, promote neonatal neurodevelopment, reduce the risk of blood transfusion, and reduce the risk of necrotizing enterocolitis and cerebral hemorrhage [9].

Avoiding intraperitoneal saline irrigation and extra-abdominal uterine suturing can reduce nausea and vomiting during cesarean delivery.

Start oxytocin IV drip once the newborn's umbilical cord is clamped to achieve adequate uterine tone. Use Goal-Directed Fluid Therapy and limit crystalloid fluid to less than 3 liters for routine cases.

Be vigilant of hemorrhage. Prevent and treat postpartum hemorrhage (PPH). If postpartum hemorrhage occurs, the postpartum hemorrhage treatment regimen should be used. When necessary, start a massive blood transfusion protocol.

For pain management, intrathecal morphine 100 mcg or epidural morphine 1-2 mg are used during neuraxial anesthesia. Ketorolac 15-30 mg IVP is used when closing fascia, if not contraindicated. Consider local anesthetic wound infiltration per surgeon or transverse abdominus plane (TAP) block or quadratus lumborum block (QLB) in patients at high risk of postoperative pain.

Maternal-infant bonding: Skin-to-skin contact between mother and infant should occur as soon as possible in the operating room as appropriate.

PACU Care

After an effective handoff in the post-anesthesia

care unit (PACU) closely monitor the patient's vitals, maintain hemodynamic stability, and treat nausea/vomiting and pain until the patient fulfills the discharge criteria from the PACU.

Gradually start fluid intake within 60 minutes of arrival to PACU.

Postoperative Care

If the mother can tolerate it, gradually transition from a small amount of soft food to a regular diet within 4 hours. Early eating after a cesarean section can accelerate the recovery of intestinal function, reduce postoperative catabolism, accelerate physical healing, improve insulin sensitivity, reduce surgical stress response, and reduce hospital stay [10].

Begin breastfeeding within the first hour after fetus delivery. Adjust medical and nursing services to limit unnecessary interruptions of patient resting, neonatal feeding, and exercise.

Remove barriers to early mobilization, including IV lines, urinary catheters, sedation, pain, and nausea/vomiting. Ambulation should occur shortly after the return of motor function, 0-8 hours post-op: Sit on the edge of the bed, out of bed to chair, ambulate as able; 8-24 hours post-op: Ambulate as tolerated, aim to walk 1-2 times in hallway; 24-48 hours post-op: Walk 3-4 times in the hallway, out of bed for eight hours [5].

Consider Urinary Catheter Removal within 6-12 hours postpartum, stop IV fluids when tolerating a regular diet, identify and treat anemia, and treat pain. Continue VTE prevention. Continue glucose control for diabetic patients.

Enhance gastrointestinal function: provide adequate hydration, encourage activity, minimize opioid consumption, consider chewing gum, and prevent and treat constipation and flatulence.

Facilitate early discharge planning on post-op day one, including continued patient education, post-operative pain management, pediatric care, lactation, and contraception planning. Provide education on clinic contact information and provider notification parameters in case of questions or emergencies. Confirm the initial post-op visit scheduled within 14 days of surgery. Schedule primary care physician appointments as needed.

Post Discharge Follow-up

Complete post-discharge follow-up call by clinic within two business days of discharge. Complete OB Quality Recovery Score Survey. Schedule a 6-week postpartum follow-up visit.

Summary

ERAC optimizes the management of the entire pregnancy and perinatal period and accelerates recovery to fulfill the discharge standard. It can also improve maternal, fetal, and neonatal safety, reduce complications, improve clinical outcomes for mothers and babies, enhance multidisciplinary collaboration, conduct experimental research, and evaluate and improve ESR programs [5].

Finally, it must be emphasized that ERAC does not imply that post-cesarean recovery is superior to vaginal postpartum recovery. Vaginal delivery is the first choice for a quick recovery after childbirth.

Conflicts of Interest

The authors have no conflict of interest.

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