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Enhanced recovery after surgery in microvascular breast reconstruction☆

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Summary *Background:* Enhanced recovery after surgery (ERAS) pathways have been shown in multiple surgical specialties to decrease hospital length of stay (LOS) after surgery, but they have not been described for patients undergoing microvascular breast reconstruction.
Study design: A standardized ERAS pathway was developed through multidisciplinary collaboration which addressed all phases of surgical care for patients undergoing free-flap breast reconstruction using an abdominal donor site. Two surgeons used the ERAS pathway, and results were compared with a historical cohort of the same 2 surgeons' patients treated by traditional care after surgery (TRAS). All patients underwent surgery between September 2010 and September 2013. The primary outcome measure was hospital LOS.
Results: A total of 100 patients were analyzed: 49 in the ERAS cohort, and 51 in the TRAS cohort, with a total of 181 flaps. Mean hospital LOS was shorter with ERAS than TRAS (3.9 vs 5.5 days; $P < 0.001$). Total inpatient postoperative opioid usage for the first 3 days, in oral morphine equivalents, was less for ERAS than TRAS (167.3 vs 574.3 mg; $P < 0.001$), a decrease of 71%, with similar pain scores for the 2 groups. Overall 30-day major complication rates were not significantly different between the groups ($P = 0.21$).

Abbreviations: BMI, body mass index; DIEP, deep inferior epigastric artery perforator; ERAS, enhanced recovery after surgery; LOS, length of stay; POD, postoperative day; TRAM, transverse rectus abdominis myocutaneous; TRAS, traditional recovery after surgery.

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Conclusions: The initiation of an ERAS pathway significantly decreased hospital LOS in our study. The pathway also significantly decreased the amount of opioids used postoperatively by 71%, without a consequent increase in patient-reported pain.

Introduction

In the current health care environment, hospitals must achieve a delicate balance between limiting expenses and delivering high-quality care. Multimodal perioperative care pathways, also known as enhanced recovery or fast-track surgery protocols, have been introduced recently to achieve early recovery for patients undergoing major surgery, thus allowing for a decrease in hospital length of stay (LOS). Since their introduction by Dr. Henrik Kehlet in Denmark in 1997, enhanced recovery after surgery (ERAS) protocols have gained broad acceptance in many surgical disciplines.[1–5] ERAS protocols represent a paradigm shift in patient care, providing a comprehensive approach to postoperative recovery.[1,2]

According to the ERAS Society, the central elements of ERAS pathways address the key factors that keep patients hospitalized after surgery: need for extra hydration, need for parenteral analgesia, and decreased mobility. ERAS pathways have successfully decreased hospital LOS, decreased postoperative recovery, and possibly decreased surgical morbidity by reducing the physiologic alterations caused by the surgical procedure and postoperative care. In the current environment, ERAS pathways may provide the added benefit of decreasing health care expenditures[1,3] while improving quality of care and patient satisfaction. Benefits of ERAS protocols have been published, predominantly in colorectal surgery,[4–6] but also in vascular,[7] hepatobiliary,[8,9] bariatric,[10] esophageal,[11] orthopedic,[12,13] and gynecologic surgery.[14]

To our knowledge, outcomes of implementing ERAS pathways in patients undergoing plastic and reconstructive surgery have not been evaluated. The purpose of this study was to investigate the feasibility and safety of a procedure-specific ERAS pathway uniquely designed for women undergoing microsurgical breast reconstruction.

Materials and methods

Development and core elements of ERAS pathway

A multidisciplinary team consisting of plastic surgeons, pharmacists, nursing staff, and anesthesiologists developed an ERAS pathway for women undergoing abdominally-based, microsurgical, free-flap breast reconstruction (Box). All patients arrived at the hospital on the morning of surgery. Once in the preoperative holding area, patients were preemptively given acetaminophen, celecoxib, and gabapentin for acute pain management. Upon induction of anesthesia, patients were treated with antiemetics. Administration of intravenous fluids and intraoperative narcotics was at the discretion of the anesthesiologist, but the goal was to maintain euvolemia rather than fluid overload, as has been standard practice historically for free flaps, and which has been reported to result in more complications.[15] Intraoperative local anesthesia was administered in the form of liposomal bupivacaine (Exparel; Pacira Pharmaceuticals, Inc), for its effect lasting between 48 and 72 h. This was administered, following dilution with normal saline, as a subfascial transversus abdominis plane block, into the rectus sheath(s), and into the subcutaneous tissues at the lower abdominal incision (see Video; technique for liposomal bupivacaine injection).

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In some patients in the historical (non-ERAS) cohort, a local anesthetic pain pump (ON-Q, I-Flow, LLC) was used; in the ERAS cohort, however, we wanted to decrease the number of drains and other intravenous lines and catheters used, to promote increased postoperative mobility. In some ERAS protocols in other surgical subspecialties, epidural catheters or intrathecal blocks are used to decrease postoperative narcotic use. However, these regimens predictably induce hypotension and almost always require vasopressor agents to maintain normotension intraoperatively, which we wanted to avoid during microvascular flap operations. Progressive tension sutures were used at the discretion of the surgeon to decrease the need for abdominal drains.

Postoperatively, patients recovered in the post-anesthesia care unit and were transferred to the care of a plastic surgery floor nurse specially trained in flap monitoring. This was a significant change from our historical practice of sending patients to the intensive care unit for postoperative flap monitoring. As soon as patients were admitted to the hospital floor, scheduled administration of acetaminophen and celecoxib began, with oral opioids available as necessary for breakthrough pain, with addition of parenteral agents as a last resort. Patients were also immediately started on an unrestricted diet and encouraged to walk as soon as they were able. Intravenous fluids were begun at a rate of 125 mL/h, and were decreased to 75 mL/h by 8 AM the next morning, postoperative day (POD) 1, at which time the urinary catheter was also removed. Intravenous fluids were discontinued as soon as patients had taken 600 mL of liquids by mouth, or by 8 AM on POD 2, whichever came first. Discharge planning was begun the day after surgery, along with education on how to care for their drains. Patients were discharged on POD 3 or 4, depending on their progress.