Fluid Balance in an Enhanced Recovery Pathway

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No Disclosures
Introduction

• The optimal intravenous fluid regimen for patients undergoing major abdominal surgery is unclear.
• Perioperative fluid management is controversial, with a large variability in daily practice
• Main goal of intraoperative fluid therapy is to maintain tissue perfusion by optimizing intravascular volume status and stroke volume

Enhanced Recovery After Surgery

• ERAS, also known as “fast track” programs, are evidence-based protocols designed to:
  – reduce surgical trauma and postoperative stress
  – minimizing pain
  – reducing complications
  – standardize medical care
  – improve outcomes
  – lower health care costs and LOS
Avoidance of salt and water overload

Preadmission counseling
- Fluid and carbohydrate loading
- No prolonged fasting
- No/selective bowel preparation
- Antibiotic prophylaxis
- Thromboprophylaxis
- No premedication

Postoperative
- Short-acting anesthetic agents
- Mid-thoracic epidural anesthesia/analgesia
- No drains
- Avoidance of salt and water overload

Intraoperative
- Maintenance of normothermia (body warmer/warm intravenous fluids)

Preoperative
Enhanced Recovery After Surgery

• What is the most important component of the ERAS pathway?
  – No prolonged fasting
  – Carbohydrate loading
  – Pain control
  – Fluid administration
  – Early feeding
Fluid Administration

- Standard or “liberal”
- Restrictive
- Goal directed therapy

- Fluid management within ERAS should be viewed as a continuum through the preoperative, intraoperative, and postoperative phases
Fluid Administration

• Hypovolemia leads to low cardiac output and decreased tissue perfusion
• Hypervolemia associated with increases in morbidity, length of intensive care unit stay, and postoperative mortality
Effect on GI Tract

- In cardiac surgery patients, plasma volume expansion to achieve maximal ventricular stroke volume, assessed by oesophageal Doppler, led to significantly better perfusion of the gastrointestinal mucosa and a significant decrease in major postoperative complications.

- In contrast, in 57 patients undergoing bowel surgery, no differences in postoperative ileus and hospital stay were found in the intervention group receiving goal-directed fluid therapy compared with standard fluid infusions.

Hypovolemia

- Leads to decrease in tissue perfusion →
  1. Acute kidney injury
  2. Splanchnic vasoconstriction

Acute Kidney Injury

• Major concern is that oliguria is a sign of developing renal failure
• As a result, surgeons and anesthesiologists strive to maintain UOP most commonly with boluses of intravenous fluid.
• Intraoperative UOP may not reflect fluid status or predict renal failure
• Within an ERAS protocol, postoperative hypotension and low UOP are common within the first 24 hr, whereas renal dysfunction is extremely rare

Hypervolemia

• Increased extracellular fluid in the bowel can lead sequentially to gastrointestinal edema, decreased gastrointestinal motility, and ileus
• In addition, for patients undergoing bowel surgery, intestinal edema can increase tension at bowel anastomoses and may contribute to anastomotic dehiscence

Hypervolemia

Colon & Rectal Surgery

• Increased duration of ileus, postoperative complications, and hospital stay after major abdominal surgery

• Delayed gastric emptying and ileus

• Difficulty of adequately assessing normovolemia

So, what should we do?
A randomised controlled trial of fluid restriction compared to oesophageal Doppler-guided goal-directed fluid therapy in elective major colorectal surgery within an Enhanced Recovery After Surgery program

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• Many studies examined fluid administration, but few in the context of an ERAS pathway
• 100 patients total
• GDT mean of 2,115 mL
• Restrictive arm 1500 mL
Retrospective review of Premier database
84,722 colon, 22,178 rectal, and 548,526 primary hip or knee replacement surgical patients
High fluid volume significantly associated with increased length of stay and total costs
High fluid utilization associated with increased presence of post-op ileus
Worse outcomes are seen in the extremes of fluid administration
Protocoled approach toward optimal fluid management may improve outcomes
• Clearance of fluids during general anesthesia is only a small fraction of that observed when awake
• Positive fluid balance has been shown to be associated with increased incidence of acute kidney injury (AKI) after major surgery
• Laparoscopic surgery

• No literature comparing goal-directed therapy or restrictive to standard therapy in an enhanced recovery protocol

• When both the perioperative surgeon-driven elements and the intraoperative pain and fluid management anesthesia-driven elements are combined, the benefits of enhanced recovery are maximized

Outcomes

• A multicenter randomized trial including 156 patients found that patients in the fast-track program had significantly decreased median LOS and fewer postoperative complications (5 versus 9 days, and 21 versus 49 percent, respectively).

• In one retrospective study, 541 consecutive procedures reviewed. Median LOS was 3 days, >25% discharged within 48 hrs.

• Factors associated with discharge in 48 hrs:
  • Full compliance with ERAS pathway
  • Low oral opiate intake
  • High surgeon volume


Thank You!
Questions?