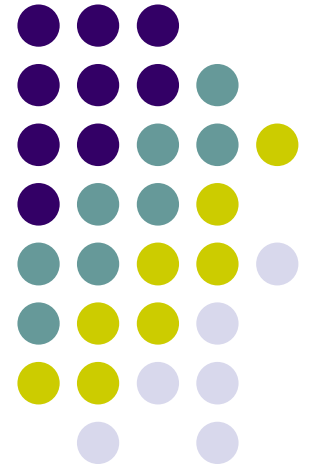


ERAS

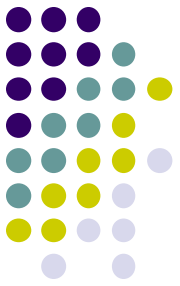
Enhanced Recovery After Surgery

Fatih Durmuşođlu,MD

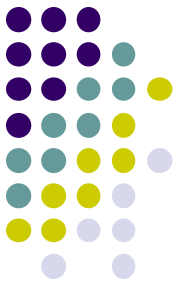
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Introduction

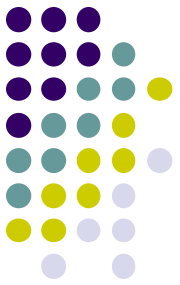


- Pain
- GI problems
- Immobility



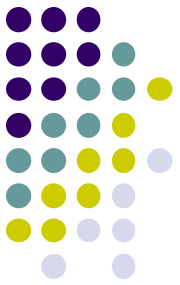
The costs of surgical care are generated at 3 main points

- 1) intraoperatively
- 2) postoperative hospitalization
- 3) during home recovery.



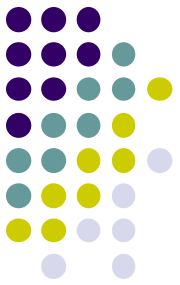
Intraoperative costs

- hospital overhead,
- support staff,
- anesthesia fees,
- surgeon fees,
- equipment/medications



Surgical Advances

- Great surgical advances have been made in recent decades with the development of minimally invasive approaches to surgery,
- These changes have resulted in shorter surgical time, faster recovery, decreased blood loss, and lower infection rates



Outdated Practices

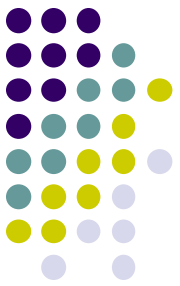
- Routine bowel preparation,
- Caloric restriction and prolonged fasting, liberal fluid administration, slow refeeding, prolonged use of drains and tubes,
- Excess opioid administration, and prolonged immobilization

All shown to negatively impact postoperative outcomes



What Is ERAS?

- ERAS as a term was coined in the 1990s by a Kehlet, a colorectal surgeon.
- ERAS which represents a multimodal approach to improving outcomes surrounding perioperative care



ERAS Pathway

Preoperative patient education

Multimodal anesthesia and limited opioids

Decreased preoperative fasting

Omission of bowel preparation

Perioperative normovolemia

Limited use of NG tubes/drains

Removal of Foley catheters

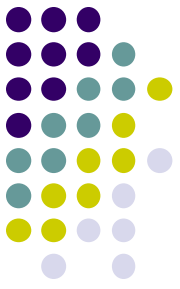
Control of postoperative nausea and vomiting

Early mobilization

Prokinetics for GI motility

Early enteral nutrition

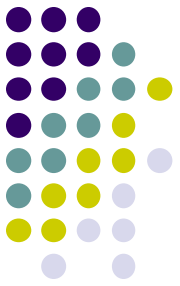
GI, gastrointestinal; NG, nasogastric.



In theory

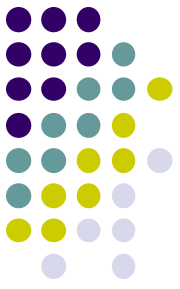
- ERAS works by reducing physiologic stress surrounding surgery.
- Hypothermia,
- Decreased perfusion of peripheral organs, fluid and electrolyte imbalances,
- Insulin resistance all can lead to the release of counterregulatory hormones, including cortisol, growth hormone, glucagon, and catecholamines.
- These hormones trigger the release of inflammatory cytokines and produce adverse downstream effects.

Patient Education and ERAS

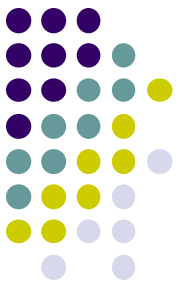


Method	Description	Example
Procedural information	Describes the surgical process to the patient (steps, logistical information)	Handout outlining surgical process and steps from check-in to recovery on the postoperative floor with timing and location
Sensory information	Describes the experiential aspects of the surgical process (temperature, pain)	Describing the operating room (cold room, bright lights) or postoperative period (sharp pain in incision, dull pain in abdomen, will see a large bandage surgical site)
Behavioral instruction	Describes actions patients can take to cope with perioperative experience	Teaching a patient how to take pain medication to relieve symptoms
Cognitive/emotional interventions	Changes negative perceptions into positive thoughts through reframing, distraction, and self-reflection	Helping a patient to focus on postoperative milestones accomplished rather than setbacks; encouraging a patient to focus on visitors rather than pain
Relaxation techniques	Helps the patient cope with stress by creating a sense of calm	Reviewing deep breathing to cope with perioperative anxiety

Preoperative Patient Preparation



- Preoperative alcohol abuse is associated with an increased risk of postoperative morbidity. This morbidity is secondary to alcohol-induced immunosuppression as well as cardiac dysfunction
- Abstinence from alcohol and smoking for a month leading up to surgery reduces postoperative morbidity
- Current smokers experience impaired wound healing and pulmonary complications.
- Nutrition should be optimized because an albumin of greater than 3.5 g/dL is associated with improved postoperative outcomes
- Minimizing Surgical Insult
- Normothermia . Preventing hypothermia (<36 C) is a very important part of decreasing postoperative morbidity.
- Hypothermic patients do have higher rates of wound infections, more cardiac problems and higher rates of coagulopathy which may end up in excess bleeding.



. Preoperative diet

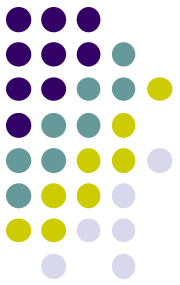
- Evening before surgery: carbohydrate loading drink; may eat until midnight
- May ingest fluids up to 4 h before procedure
- Eliminate use of mechanical bowel preparation; rectal enemas still performed

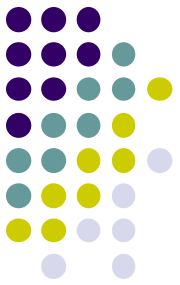
Gatorade

20 oz=591 ml

2hrs before

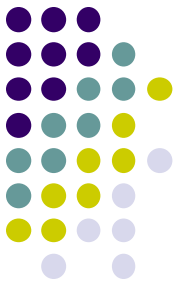
Anesthesia induction





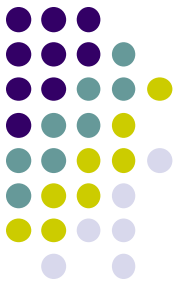
Intraoperative

Antibiotics

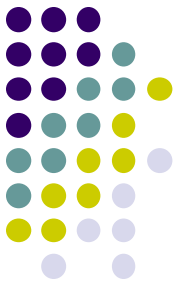


- Antibiotics Intraoperative Patient receives cefazolin (1 g or 2 g IV) before skin incision

Venous thromboembolism

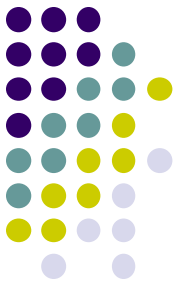


- Intraoperative Full pathway only: unfractionated heparin 5,000 units SQ with sequential compression devices
- Light pathway only: enoxaparin 40 mg SQ with sequential compression devices
- Postoperative Enoxaparin 40 mg SQ with sequential compression devices

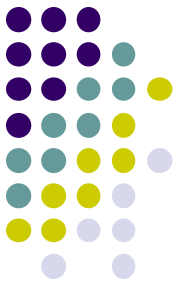


Minimal Surgical Trauma

Minimizing Surgical Insult



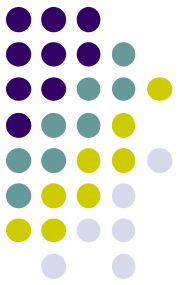
- Incisions lead to pain, an inflammatory response, and catabolism.
- Thus, efforts should be made to minimize surgical trauma by using the smallest incision possible,
- Making a transverse incision in place of a midline vertical incision.
- Vaginal surgery, laparoscopy and robotic surgery are the preferred routes of minimal invasive surgery



Normothermia

- Preventing hypothermia (<36 C) is very important part of decreasing postoperative morbidity.
- Hypothermic patients do have higher rates of wound infections, more cardiac problems and higher rates coagulopathy which may end up in excess bleeding

Perioperative Pain Management



Preoperative

Analgesia before operative room entry with all of the following:

Celecoxib 400 mg orally once

Acetaminophen 1000 mg orally once

Gabapentin 600 mg orally once

Intraoperative

Analgesia

Opioids IV at discretion of anesthesiologist supplemented with ketamine, ketorolac, or both

After incision closure: injection of bupivacaine at abdominal incision site

Anesthesia in pelvic organ prolapse surgery

Subarachnoid block containing bupivacaine and hydromorphone (40–100 μ g)

Sedation vs “light” general anesthetic at the discretion of the anesthesiologist

Ketorolac 15 mg IV at the end of the procedure for those who can tolerate it

No wound infiltration with bupivacaine in this cohort

Postoperative

Analgesia; goal: no IV patient-controlled analgesia

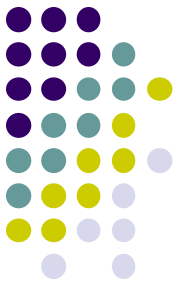
Oral opioids

Scheduled acetaminophen

Scheduled nonsteroidal anti-inflammatory drugs

*Modified from “Enhanced Recovery Pathway.”¹³

Perioperative Pain Management



Preoperative

Analgesia before operative room entry with all of the following:

Celecoxib 400 mg orally once

These medications can be given orally 2 hours before surgery in patients with no obvious contraindications.

Anesthesia in peivic organ proiapse surgery

Subarachnoid block containing bupivacaine and hydromorphone (40–100 µg)

Sedation vs “light” general anesthetic at the discretion of the anesthesiologist

Ketorolac 15 mg IV at the end of the procedure for those who can tolerate it

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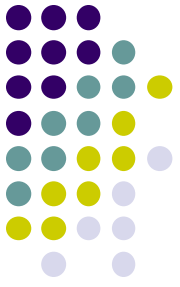
*Modified from “Enhanced Recovery Pathway”¹³

Perioperative Pain Management

Preoperative

Analgesia before operative room entry with all of the following:

Celecoxib 400 mg orally once



Celecoxib

- Prostaglandinlerin üretimini azaltarak ve bu şekilde ağrı ve iltihabın da azalmasını sağlayarak etki gösterir.
- Ciddi kalp damar sistemi trombotik olay, miyokard enfarktüsü ve inme riskini arttırabilir ve bunlar ölümcül olabilir. Tüm iltihaba etkili ilaçlar (NSAİİ) için risk benzerdir.
- Koroner by-pass geçirmiş hastalarda perioperatif dönemde kontrendikedir (bkz. bölüm
- Ağrı, ateş ve iltihaba etkili ilaçlar (NSAİİ) ile tedavi edilen hastalarda herhangi bir zamanda, uyarıcı belirtiler eşliğinde ya da böyle belirtiler olmaksızın, kanama, ülserleşme ve mide, ince ya da kalın barsakta delinme gibi ölümcül olabilen ciddi mide-barsak olayları görülebilir.



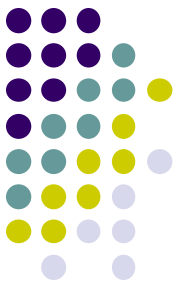
Perioperative Pain Management

Preoperative

Gabapentin [1-, sikloheksanasetik asit; patent adı: Neurontin®], epilepsi tedavisinde GABA molekülünün taklidi olarak kullanılan bileşiktir.

Analgesic in pelvic organ prolapse surgery

A systematic review in 2005 found that patients given a cyclooxygenase (COX) II inhibitor reported significantly lower pain scores during their postoperative period compared with placebo.²⁸



Perioperative Pain Management

- ❖ Close cooperation with the anesthesiologist to maximize pain control and minimize oversedation, which could lead to prolonged recovery.

Acetaminophen 1000 mg orally once

- ❖ Opioids IV at discretion of anesthesiologist supplemented with ketamine, ketorolac, or both

analgesia

- ❖ After incision closure: injection of bupivacaine at abdominal incision site

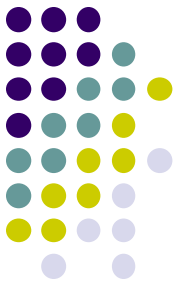
incision site

- ❖ Epidural anesthesia is recommended for open and laparoscopic-assisted cases in colonic surgery to provide better postoperative pain relief and has been demonstrated to provide superior analgesia to systemic opioids

Ketorolac 15 mg IV at the end of the procedure for those who can tolerate it

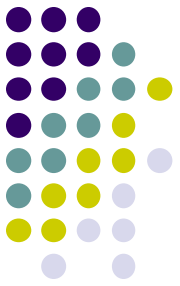
- ❖ Ketorolac 15 mg IV at the end of the procedure for those who can tolerate it (etki mekanizması, prostaglandin biyosentezinin engellenmesi, ile sonuçlanan, esas olarak periferik dokularda COX enzim aktivitesi ve COX-1-2 seçici olmayan inhibisyonunun ile ilgilidir)

Scheduled nonsteroidal anti-inflammatory drugs



Postoperative

Drains and Catheters



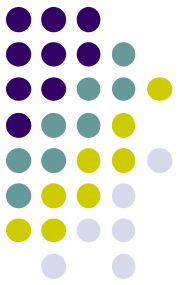
- Peritoneal drains also impede mobilization, which is crucial for the success of Pooled data have shown that only 1 in 20 patients with a clinical bowel leak will actually have enteric contents in their drain. (Urbach DR, Kennedy ED, Cohen MM. Colon and rectal anastomoses do not require routine drainage: a systematic review and meta-analysis. Ann Surg. 1999;229:174–180.)
- Prolonged catheter use is associated with an increased rate of urinary tract infection. In an RCT that examined early removal (1 day) compared with standard removal (approximately 4 days)



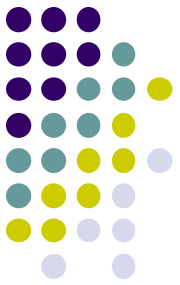
Activity

- Evening of surgery: out of bed greater than 2 h, including one or more walks and sitting in chair
- Day after surgery and until discharge: out of bed greater than 8 h including four or more walks and sitting in chair
- Patient up in chair for all meals

Diet



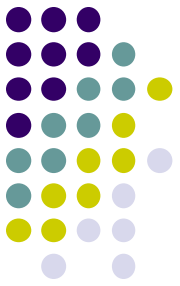
- No nasogastric tube; if nasogastric tube used intraoperatively, remove at extubation
- Patient encouraged to start low residual diet 4 h after procedure
- Day of surgery: one box of liquid nutritional supplement; encourage oral intake of at least 800 mL of fluid, but no more than 2,000 mL by midnight
- Day after surgery until discharge: two boxes of liquid nutritional supplement; encourage daily oral intake of 1,500–2,500 mL of fluids Osmotic diarrhetics: senna and docusate sodium; magnesium oxide; magnesium hydroxide as needed



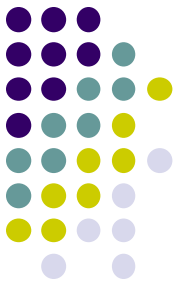
Pain management

Goal:

- No IV patient-controlled analgesia

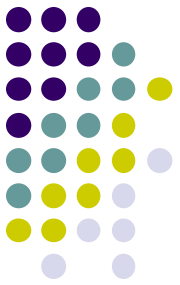


Oxycodone



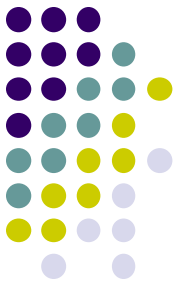
- Oxycodone hydrochloride belongs to a group of medicines called opioid analgesics. It is a depressant drug which means it slows down the messages travelling between the brain and the body. Depressant drugs do not necessarily make a person feel depressed
- 5–10 mg orally every 4 h as needed for pain rated 4 or greater or greater than patient stated comfort goal (5 mg for pain rated 4–6 or 10 mg for pain rated 7–10);

Analgesia



- Scheduled acetaminophen*

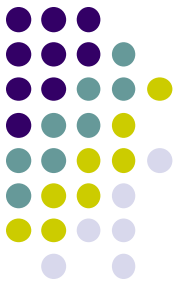
Acetaminophen 1,000 mg orally every 6 h for patients with no or mild hepatic disease; acetaminophen 1,000 mg orally twice daily for patients with moderate hepatic disease; maximum acetaminophen should not exceed 4,000 mg/24 h from all sources



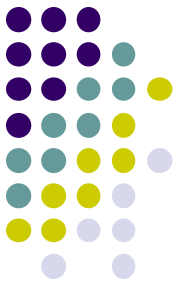
Scheduled NSAIDs

- Ketorolac 15 mg IV every 6 h for four doses (start no sooner than 6 h after last intraoperative dose); then, ibuprofen 800 mg orally every 6 h (start 6 h after last ketorolac dose administered)

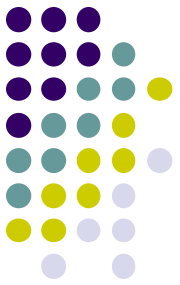
Patient unable to take NSAID



- Tramadol (opioid analgesics)
- 100 mg orally 4 times a day (start at 6:00 AM day after surgery) for patients younger than 65 years of age and no history of renal impairment or hepatic disease;

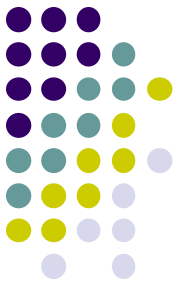


Fluid balance

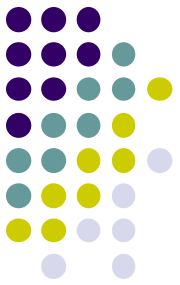


- Operating room fluids discontinued on arrival to floor
- Fluids at 40 mL/h until 8:00 AM on day after surgery and then discontinued
- Peripheral lock IV when patient had 600 mL orally intake or at 8:00 AM on day after surgery, whichever came first

Discharge criteria



- ❑ Postoperative Patient discharge criteria for ERAS protocol ;
 - tolerating diet,
 - ambulatory
 - pain well controlled on oral analgesia



Practice Pearls

Practice Pearls

- ERAS protocols improve perioperative outcomes and patient satisfaction while reducing costs.
- ERAS functions through marginal gains, with summative effects from bundled interventions before, during, and after surgery.
- Avoiding preoperative fasting, not performing bowel preparation, maintaining normothermia and normovolemia, and early mobilization are important for improved recovery.
- Patient education and preparation for surgery are important to improving physical and emotional perioperative outcomes.
- Preoperative counseling targeting expectations about surgical and anesthetic procedures may help diminish anxiety and enhance postoperative recovery and discharge.
- Preoperative management of pain control includes dedicated patient counseling and education of postoperative pain expectations.
- Multimodal analgesia using a combination of NSAIDs, acetaminophen, and opioids has been demonstrated more effective than use of opioids as single agents.