



ERAS PROTOCOL FOR TOTAL JOINTS

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ERAS-Enhanced Recovery After Surgery

- First described by a Danish surgeon Henrik Kehlet in 1997 as an effort to improve recovery after colorectal surgery
- Idea was to reduce postoperative physical and psychological stress and thereby decreasing recovery time and financial burden.
- ERAS concept also referred to as
 - A. fast track
 - B. accelerated
 - C. Rapid recovery

ERAS-Enhanced Recovery after Surgery

ERAS

"Evidence based protocols that standardize care to minimize surgical stress response and postoperative pain, reduce complications, improve outcomes, decrease hospital length of stay and expedite recovery following elective procedures."

ERAS Benefits

- 1. Minimize surgical stress and postoperative pain
- 2. Reduce complications
- 3. Improve outcomes
- 4. Decrease hospital stay
- 5. Expedite recovery
- 6. Reduction in rates of morbidity



ERAS SOCIETY ERASSOCIETY.ORG

- First published ERAS protocol for colonic surgery in 2005
- Overall principles of perioperative care for major surgical procedures particularly preoperative and intraoperative management remain the same with a few procedure-specific variations



ERAS Protocols (23)

- 1. Anesthesia
- 2. Bariatric
- 3. Breast
- 4. Cardiac
- 5. Colorectal
- 6. Liver
- 7. Head & Neck
- 8. Liver Tx
- 9. Obstetrics
- 10. Vascular
- 11. Urology
- 12. Thoracic
- 13. Lumbar Spinal Fusion
- 14. Orthopedic

ERAS

- ERAS Society
 - Roughly twenty components of care that influence stress response and enhance recovery.
 - Not all ERAS elements are equally weighted for influence on postoperative complications and recovery.
 - These components span many disciplines
 - ERAS team-comprised of multidisciplinary specialties
 - Surgery
 - Anesthesia
 - Nursing
 - Physical Therapy
 - Nutrition

ERAS

His
way

My
way

Her
way

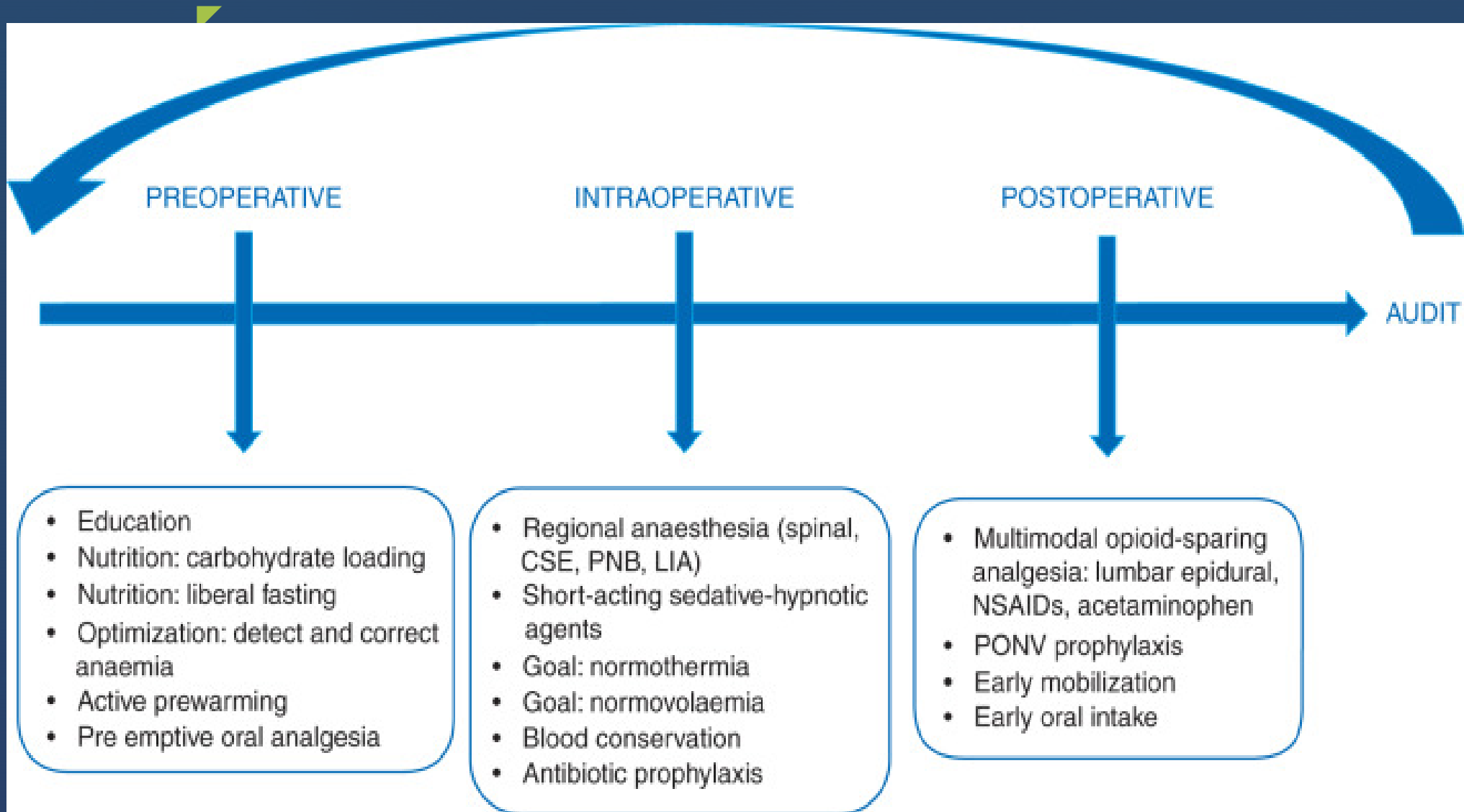


Consensus statement for perioperative care in total hip replacement and total knee replacement: Enhanced Recovery after Surgery (ERAS) society recommendations

- Multidisciplinary consensus review summarizing literature and proposing recommendations for perioperative care of patients undergoing total hip and total knee replacements
- Studies included meta-analyses, randomized controlled trials, and large prospective cohort studies

Orthopedic ERAS

- (17) Recommendations can be divided into 4 stages
 - 1. Preadmission
 - 2. Preoperative
 - 3. Intraoperative
 - 4. Postoperative



▶ Preadmission (PAT/Joint class)

- **1. Preoperative information education and counselling**
 - Found to reduce preoperative **anxiety** and emotional stress
- 2. Preoperative education leads to
 - Higher patient confidence
 - Greater patient satisfaction
 - Early recovery and discharge
- 3. PAT/Joint class

Preadmission

- 2. Preadmission patient optimization (PAT)
 - Optimize risk factors (can lessen complications and reduce LOS)
 - Smoking
 - Alcohol consumption
 - Anemia
 - Nutritional and metabolic status
 - low physical activity
 - D.M.

Preadmission



▶ Preadmission

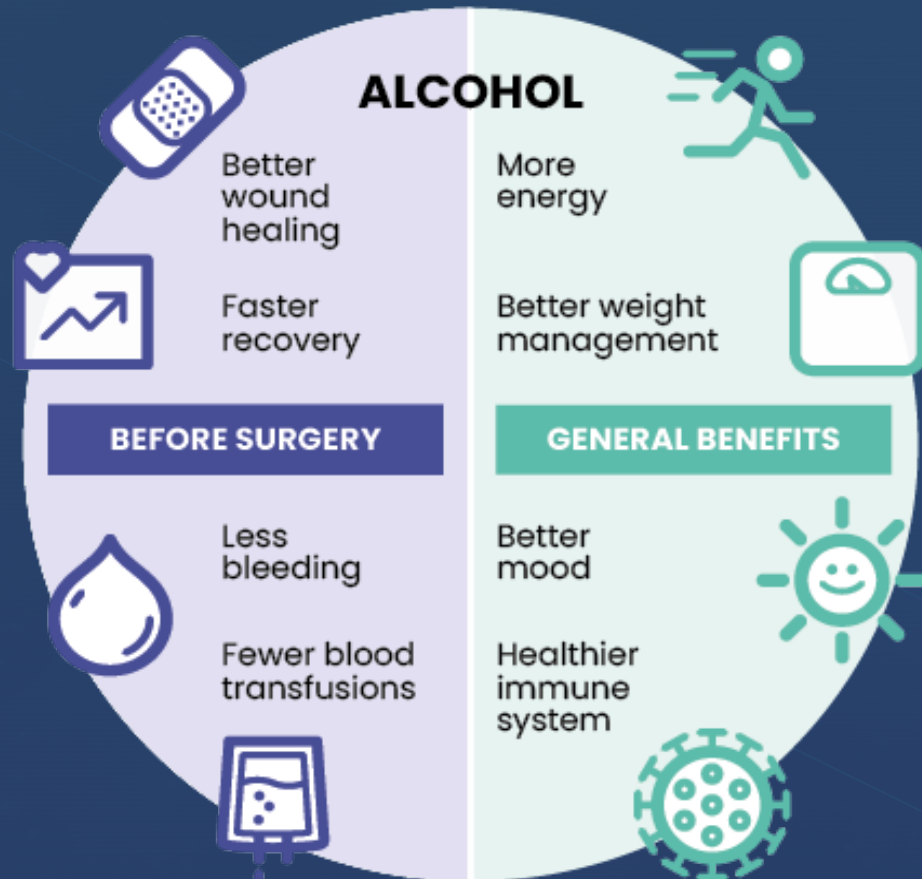
- Smoking cessation
 - Recommendation-4 weeks or more smoking cessation prior to hip or knee replacement
 - 4-8 weeks of abstinence appears necessary to reduce respiratory and wound healing complications



▶ Preadmission

- Alcohol
 - Alcohol cessation programs are recommended before hip and knee replacement
 - PAT screening tool

ALCOHOL



▶ Preadmission

- Anemia
 - Preoperative anemia is associated with
 - 1. increased risk of transfusion
 - 2. increased LOS
 - 3. Infection
 - 4. Morbidity
 - 5. Readmission rates

▶ Preadmission

- Preoperative anemia should be identified, investigated and corrected prior to hip and knee replacement
 - Preoperative iron or erythropoietin therapy
 - Postoperative transfusion of cell-saver

Preoperative

- 3. Preoperative fasting
 - Clear liquids until 2 hours prior to surgery does not cause
 - A. increase in gastric content
 - B. reduce gastric fluid pH
 - C. increase complication rates.
 - Growing evidence suggest there is no patient safety benefit associated with prolonged fasting.
 - Fasting for long periods of time can induce a catabolic state, which can increase the stress response to surgery, resulting in insulin resistance and hyperglycemia, thereby prolonging the recovery period.

Preoperative

- ERAS recommend a carbohydrate load with a clear carbohydrate drink (up to 300 ml) 2-3 hours before surgery
 - This allows patient to present to surgery in a metabolically fed state leading to less postoperative protein loss and preservation of muscle mass.
 - Decreases insulin resistance, thirst, hunger and anxiety

Preoperative

- Preoperative anxiety may increase perioperative analgesic requirements and postoperative complication rates.
- The American Geriatrics Society-benzodiazepines should be avoided in older patients where possible to offset the risk of cognitive impairment, delirium and falls
 - (small amount of Versed and Fentanyl are typically given for sedation during PNB)

Intraoperative

4. Standardized anesthetic protocol

- In general, large multi-center cohorts of ERAS hip and knee pathways favor neuraxial techniques over general anesthesia.
- Large epidemiology studies show that central neuraxial anesthesia is independently associated with better outcomes compared with general anesthesia.
- Spinal anesthesia has been associated with shortened LOS, reduction in pulmonary complications, kidney injury, blood transfusion and 30 day Mortality

Intraoperative

-Head to head study of modern general anesthetic was compared with traditional high dose of neuraxial anesthesia. Result did not show clinically significant difference in the following parameters.

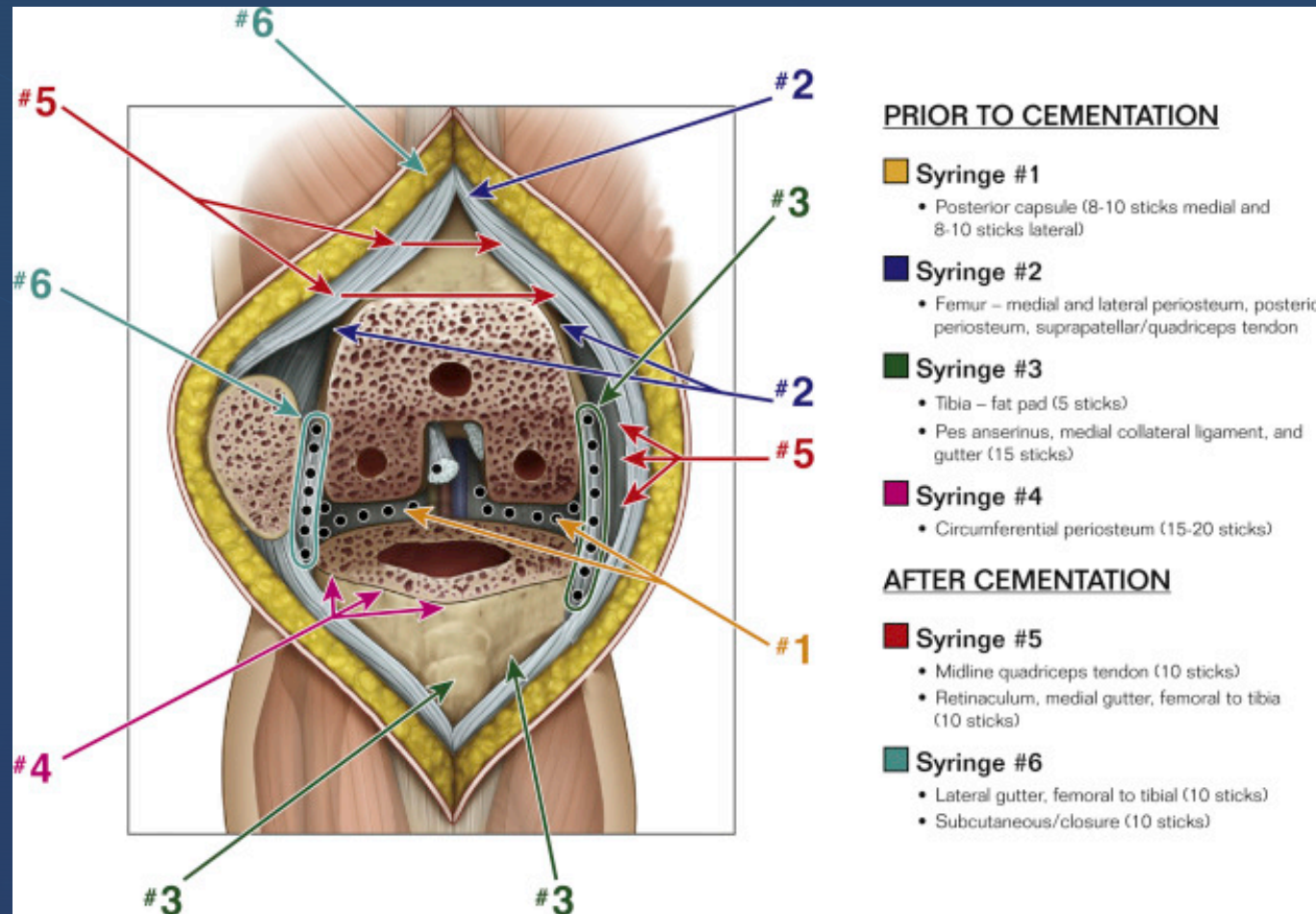
1. functional recovery
2. LOS
3. Urinary complications
4. mobilization

-Modern general anesthesia and neuraxial techniques may both be used as part of multimodal anesthetic regimes

■ Intraoperative

- 5. Use of local anesthetics for nerve blocks and infiltration analgesia
 - A. LIA-local infiltration analgesia
 - No motor blockade-early ambulation
 - Concerns of local anesthetic toxicity
 - Not recommended in hip replacement surgery

LIA-Local infiltration analgesia



Intraoperative

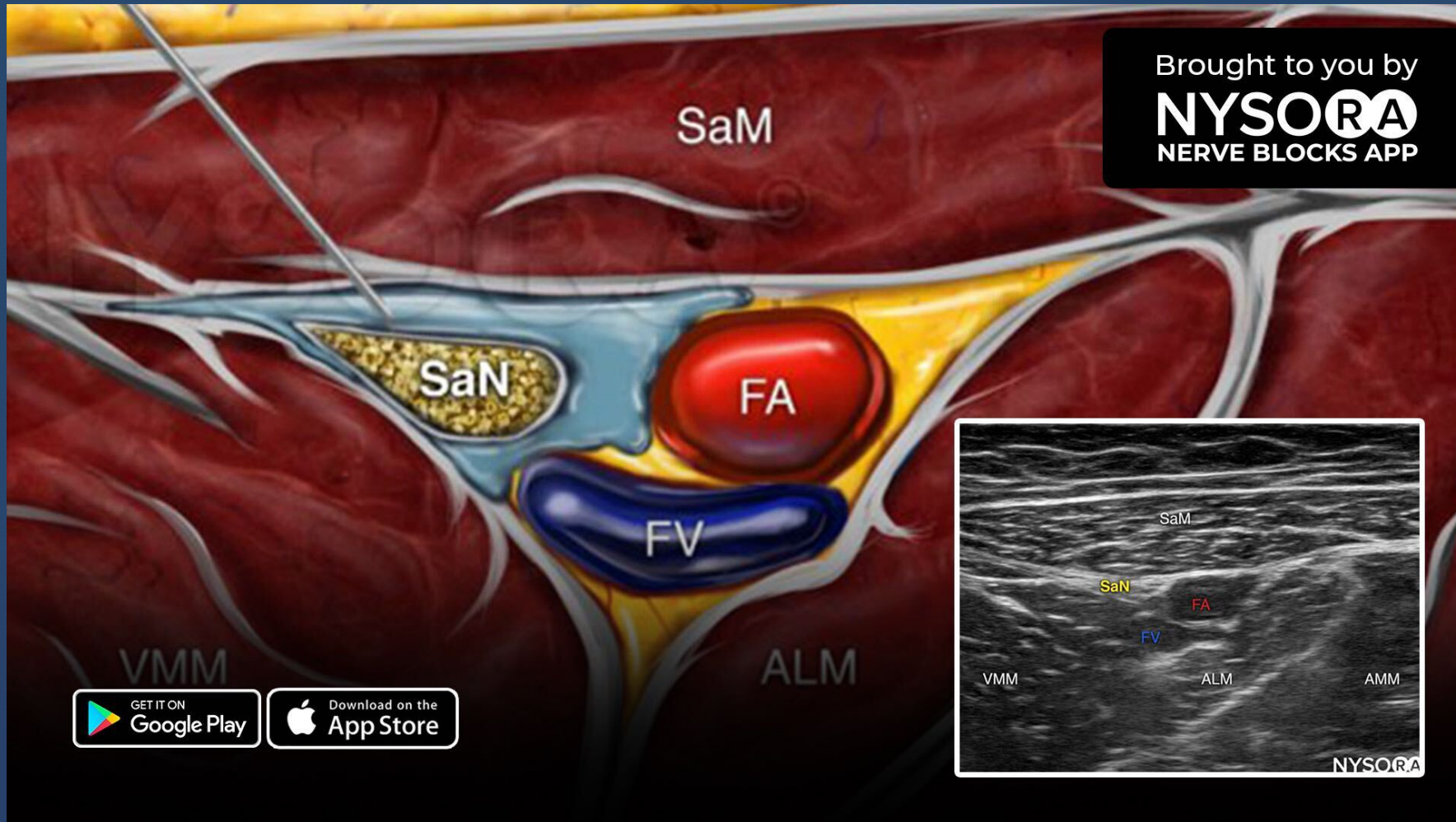
- Nerve blocks
 - Femoral Nerve block-best for pain, but weakens the quadriceps
 - Adductor canal block-adequate pain relief without muscle weakness
 - IPACK-interspace between the popliteal artery and the capsule of the the Knee

Table 2. Suggestions for Anesthesia and Analgesia to Optimize Outpatient Total Knee and Total Hip Arthroplasty

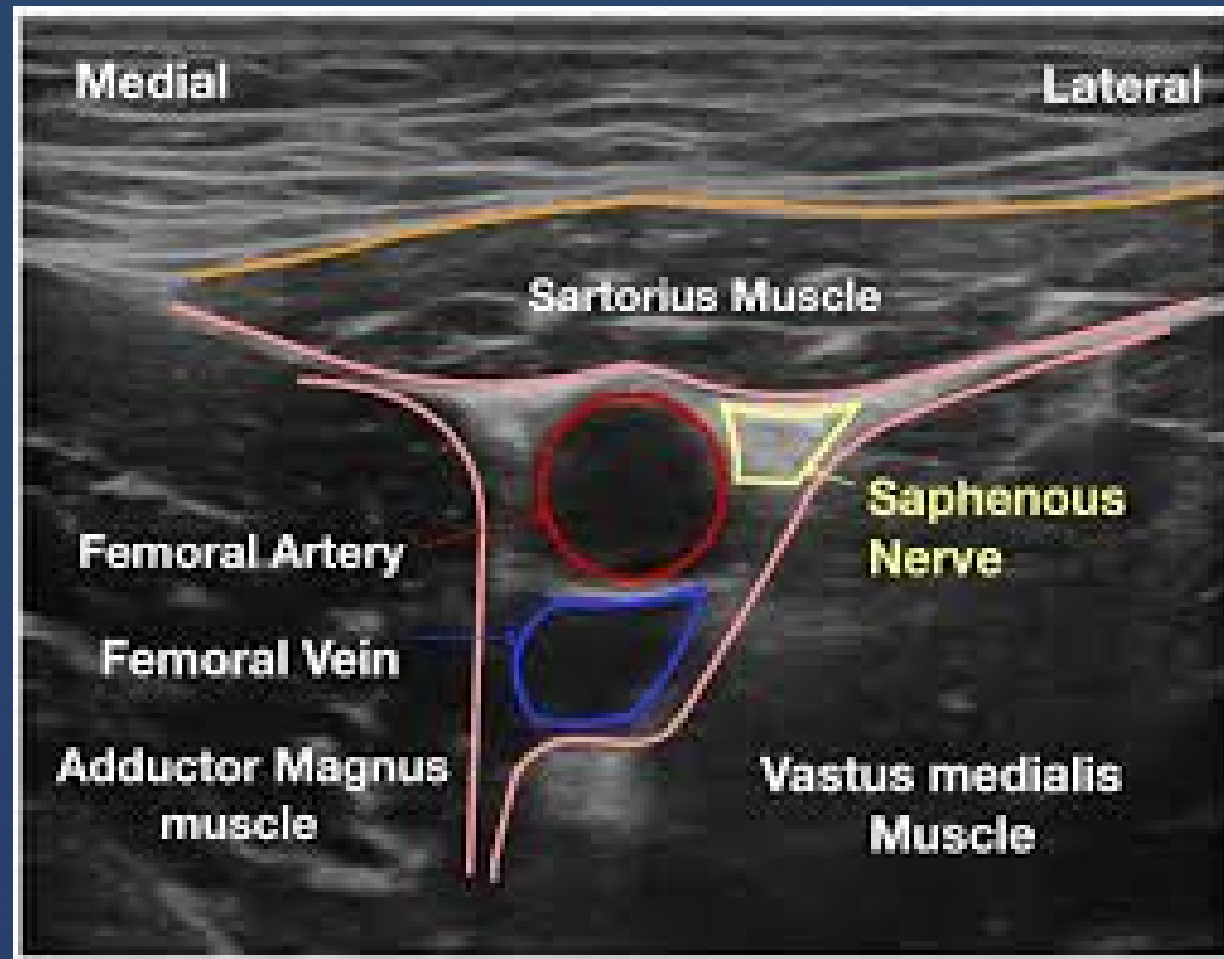
Medication or Technique	Comments
Total Knee Arthroplasty	
Adductor canal block (single shot or continuous)	Preserves quadriceps function better than femoral nerve block
iPACK block	Improves analgesia to posterior knee and overall; appears to not affect motor function
Local infiltration	Combination of adductor canal block, iPACK block and local infiltration may be better than individual techniques alone; total local anesthetic dose must be accounted for
Total Hip Arthroplasty	
Local Infiltration	Simple and unlikely to affect motor function
Peripheral nerve block	May produce slightly lower pain ratings than LIA but can cause motor weakness
Both	
Multimodal analgesia	Good evidence that each nonopioid component added improves analgesia after TJA; the "ideal" combination is not known
Mepivacaine spinal anesthesia	Evidence limited but may reduce time to ambulation and increase likelihood of same-day discharge; could decrease urinary retention vs. bupivacaine

iPACK, infiltration in the interspace between the popliteal artery and the capsule of the knee; **TJA**, total joint arthroplasty

Adductor Canal Block



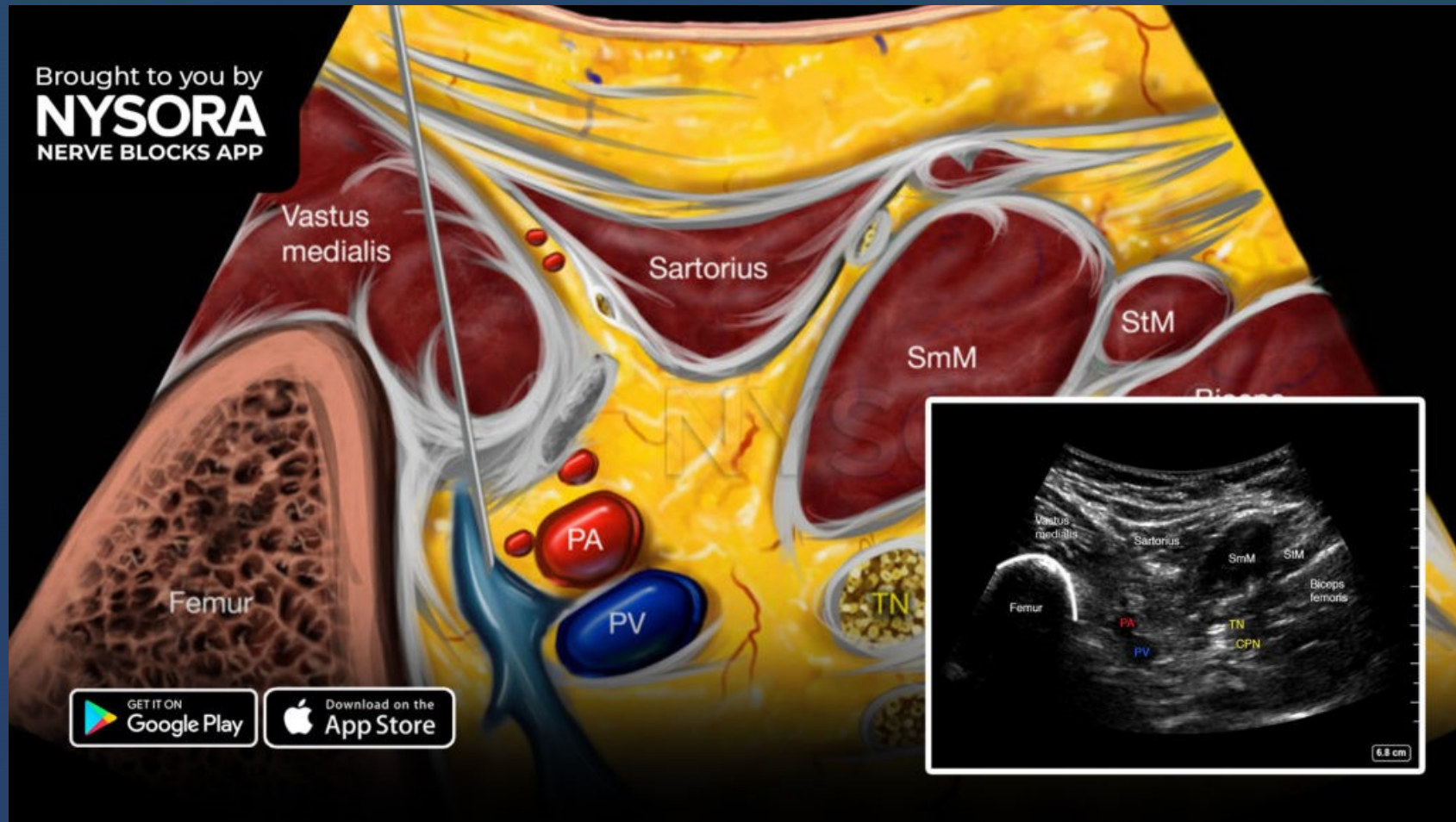
Adductor Canal Block

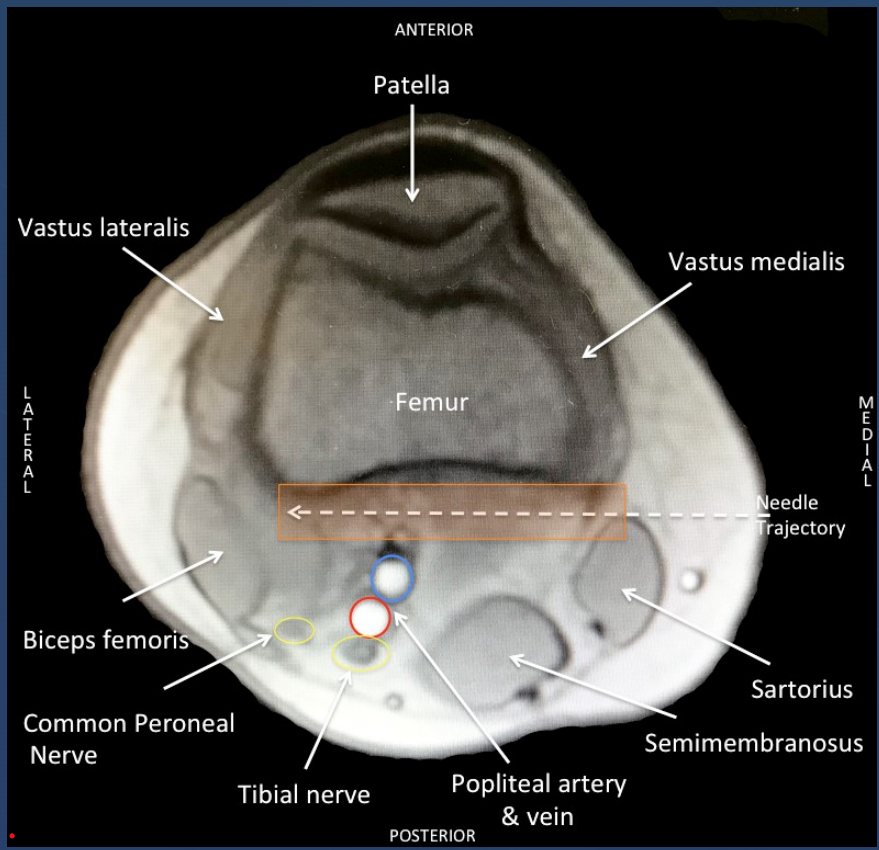


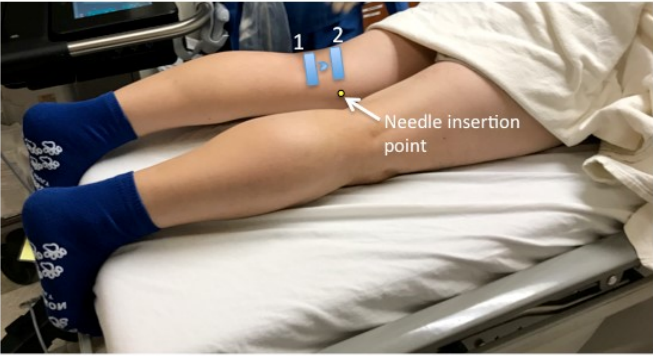
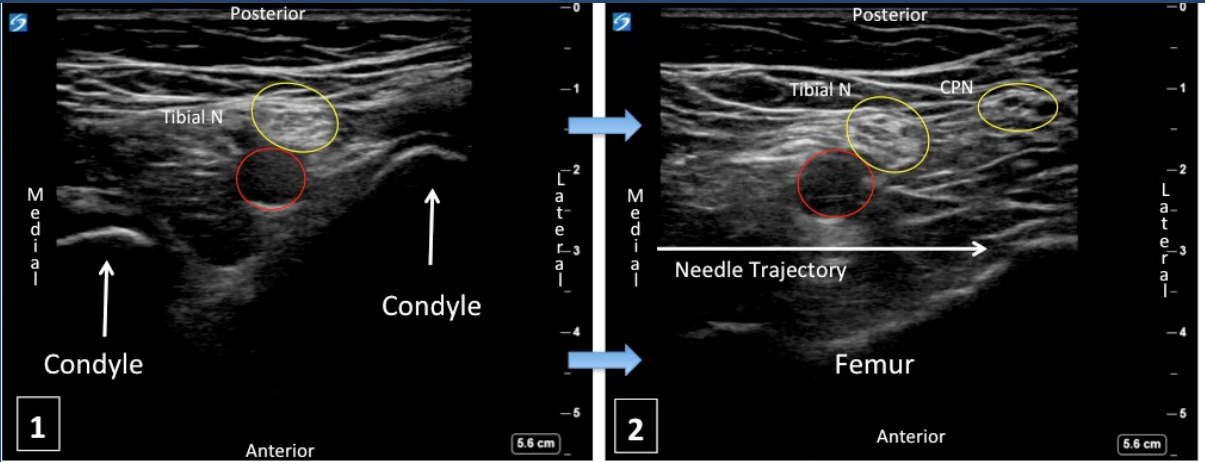
IPACK-interspace between the popliteal artery and the capsule of the knee

- **The goal of IPACK is to selectively block only the innervation of the posterior knee joint while sparing the main trunks of tibial and common peroneal nerves, thereby maintaining the sensorimotor function of the leg and foot.**

IPACK-Interspace between popliteal artery and the capsule of the knee







Intraoperative

- 6. Postoperative nausea and vomiting (PONV)
 - Risks
 - Female sex
 - Non-smoking status
 - History of motion sickness/previous PONV
 - Laparoscopic surgery
 - Gyn surgery

PONV

- Etiology
 - Multifactorial (3 categories)
 - 1. Patient related
 - Gender (female), hx of ponv/motion sickness, nonsmokers etc
 - 2. Anesthetic related (TIVA can mitigate in part)
 - Volatile anesthetics
 - Nitrous oxide
 - Liberal use of narcotics
 - 3. Surgery Related
 - Type and duration of the surgery

▶ PONV

- Prevention
 - 1. opioid sparing multimodal techniques
 - 2. carbohydrate loading
 - 3. antiemetic drugs

PONV

- 1st line drugs
 - Dopamine antagonists (droperidol)
 - Serotonin antagonists (ondansetron)
 - Corticosteroids (dexamethasone)
- 2nd line drugs
 - Antihistamines (promethazine)
 - Anticholinergics (scopolamine)
 - D2 antagonists (metoclopramide)

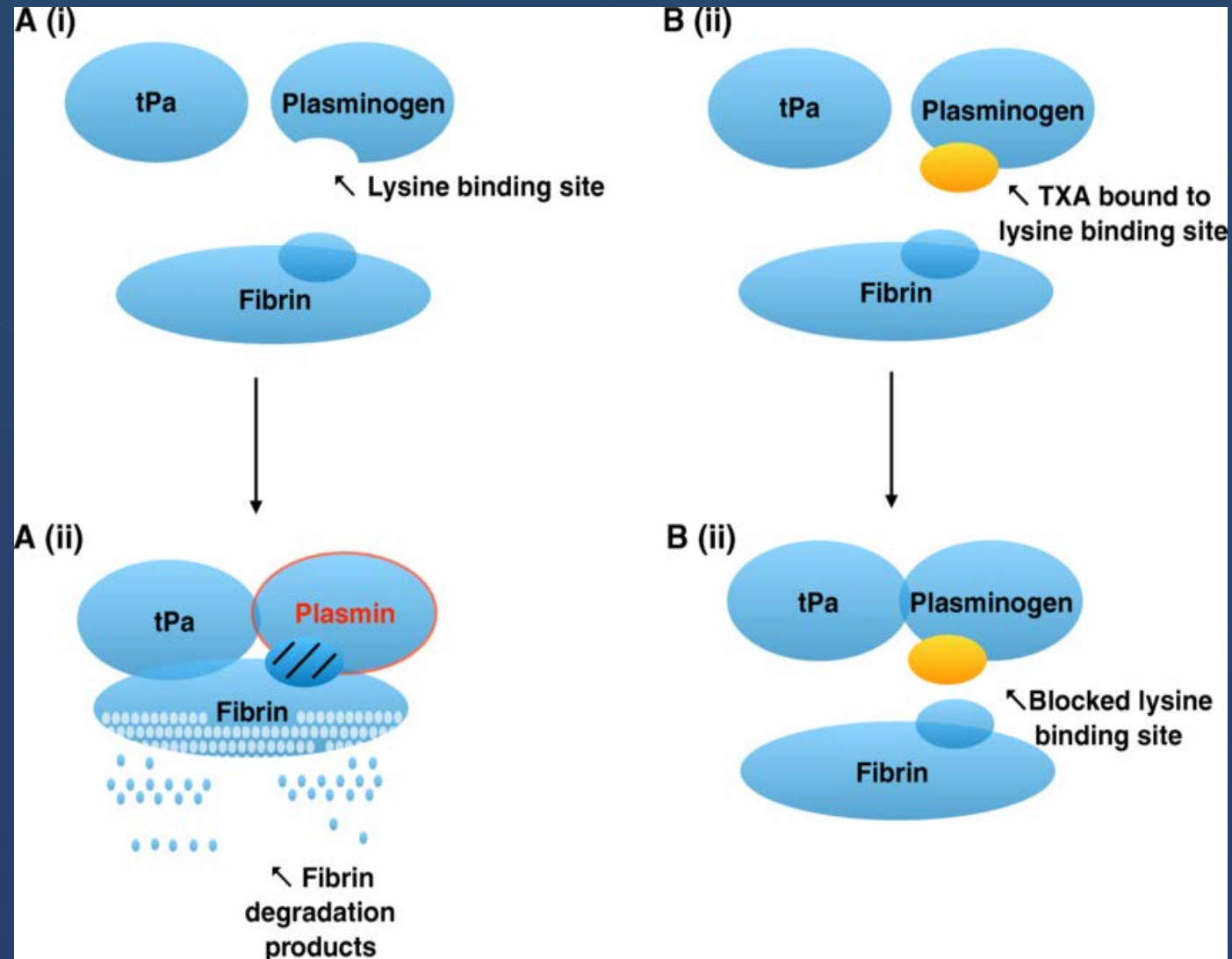
PONV

- Preoperative use of gabapentin or pregabalin has been shown to reduce nausea and vomiting
- Aprepitant (Emend) is a neurokinin 1 receptor antagonist which may be used in high risk patients.
- IV Tylenol given before the onset of pain has been shown to reduce PONV

Intraoperative

- 7. Prevention of perioperative blood loss
 - Tranexamic acid (TXA) is recommended to reduce perioperative blood loss and the requirement for postoperative allogenic blood transfusion
 - The benefits of TXA are achieved without significant increase in side effects (DVT, PE, CVA, MI)

Mechanism of tranexamic acid (TXA)



■ Intraoperative

- 8. Perioperative oral analgesia-
 - A. Tylenol
 - B. NSAIDS
 - C. Magnesium
 - D. Ketamine
 - E. Gabapentin
 - F. Opioids

Neuraxial

Intrathecal

Epidural

Peripheral Nerve Block

Peripheral Nerve Blocks

Transversus Abdominis Plane Block

Paravertebral Block

**Multimodal
Analgesia**

Local infiltration

Intra-articular

Incisional

Systemic

Acetaminophen; NSAIDS/COX2-Selective;
Gabapentinoids; Ketamine; Lidocaine;
 α 2 agonists; Magnesium; Dexamethasone;
Tramadol; Opioids

■ Intraoperative

- 9. **Maintaining normothermia**-maintaining normothermia and preventing intraoperative heat loss has been associated with
 - Reduced infections, coagulopathy, transfusion rate and CV complications

Intraoperative

- 10. Antimicrobial prophylaxis
 - Patients should receive systemic antimicrobial prophylaxis in accordance with local policy and availability
 - The Agency for Healthcare Research and Quality-recommended regimen for patients undergoing primary hip and knee arthroplasty is cefazolin
 - Clindamycin and vancomycin can be used as alternatives if there is a cephalosporin allergy.
 - Intranasal mupirocin is recommended for all patients with documented *S. aureus* colonization

Intraoperative

- 11. Antithrombotic prophylaxis treatment
 - Patients should be mobilized as soon as possible post-surgery and receive anti-thrombotic prophylaxis in accordance with local policy
 - The Academy of Orthopedic Surgeons (AAOS) recommends 10—14 days of prophylaxis

■ Intraoperative

- 12. Perioperative surgical factors
 - There is no conclusive evidence that choice of surgical approach accelerates the achievement of discharge criteria.
 - Routine use of a tourniquet is not recommended
 - Routine use of surgical drains are not recommended

Intraoperative

- 13. Perioperative fluid management
 - “Goal of fluid therapy is to maintain intravascular volume, cardiac output and tissue perfusion while avoiding salt and water overload”
 - Patients should reach operating room as close to a state of euvolemia as possible
 - It is recommended that IV fluids should be used judiciously and postoperative intravenous fluids discouraged in favor of early oral intake.
 - The routine use of urinary catheters are not recommended and when they are used they should be used as soon as possible ideally within 24 hours after surgery.

Postoperative

- Postoperative analgesia
 - LIA-(6-12 hrs)
 - PNB (12-24hr) single shot vs catheters
 - Oxycodone/Tylenol
 - Gabapentin
 - NSAIDS

Postoperative

- 14. Postoperative nutritional care
 - Early return to normal diet is recommended and should be encouraged

Postoperative

- 15. Early mobilization-
 - Patients should be mobilized as early as they are able in order to facilitate early discharge criteria
 - Poor mobilization associated with increased
 - Insulin resistance, myopathy, reduction of pulmonary function, impaired Tissue oxygenation, and thromboembolism
 - Physical therapy is recommended on POD 0 and as early as 2-6 hrs. postoperatively

Postoperative

15. Early mobilization benefits

- A. decreased LOA
- B. improved functional recovery
- C. decreased incidence of DVT

Postoperative

- 16. Criteria-based discharge
 - Team-based functional discharge criteria should be used to facilitate patient discharge directly to their home

Postoperative

- Continuous improvement and audit
 - Routine internal and or external audit of process measures, clinical outcomes, cost effectiveness, patient satisfaction/experience and changes to the pathway are recommended

THE END