Medical Management of the Pediatric Spinal Fusion Patient

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Objectives

- Explain the role of the pediatric hospitalist in co-managing spinal fusion patients.
- Describe three common medical complications following spinal fusion surgery.
- Discuss two approaches to prevent respiratory and gastrointestinal complications in the postoperative period.
Pediatric Co-management of the Spinal Fusion Patient

1. Active management of chronic co-morbidities

2. Anticipatory role in management of medical complications
   - Prevention
   - Surveillance
   - Mitigation
Common Medical Complications of Spinal Fusion Surgery

- CNS – Pain
- CV – Hemodynamic changes
- Respiratory – Atelectasis
- FEN – Electrolyte disturbance, fluid shifts
- GI – Constipation, dysmotility
- Heme – Anemia
- ID – Postoperative fever, infection
- Endocrine – Syndrome of Inappropriate ADH secretion
Case Presentation

Anne is a 16-year-old female with idiopathic scoliosis. She has just undergone posterior spinal fusion and is recovering in the PACU. Anesthesia has initiated a morphine PCA for pain control.

What other types of pain medication should you consider?
Case Presentation

What other types of pain medication should you consider?

A. Intravenous ketorolac
B. Intravenous acetaminophen
C. Intravenous diazepam
D. Holistic / integrative health consultation
E. All of the above
Pain

- **Treatment**
  - Effective treatment allows for earlier mobilization and overall better outcomes.

- **Opioids are mainstay, but have several common adverse effects**¹
  - Respiratory depression
  - Sedation
  - Nausea, vomiting
  - Pruritus
  - Urinary retention
  - Ileus
  - Constipation

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Multimodal Pain Management

- Multimodal therapy is recommended.
  - Advantage: reduces opioid reliance and decreases opioid side effects
  - Includes adjunctive therapies
    – Integrative health
    – Emotional support
  - Includes non-opioid pain medications
    – Must consider adverse effects of each medication class

Non-Opioid IV Pain Medications

- **Anti-inflammatory (NSAIDs)**
  - Ketorolac

- **“Weak analgesic”**
  - Acetaminophen

- **Muscle relaxant**
  - Diazepam


Case Presentation

- On postoperative day 1, the bedside nurse calls you because Anne has a heart rate of 130.
- Afebrile (36.5°C), blood pressure 95/65
- Appears calm, pain is currently a 3/10
- Review of urine output shows that patient has had <0.5mL/kg/hr of urine over the last shift.
- JP drain has had minimal serosanguineous drainage.
Tachycardia

- Symptom of a problem
  - Pain
  - Anxiety
  - Fever / Infection
  - Anemia
  - Hypovolemia
  - Medication effect
Case

Anne’s labs

- WBC 8 K/mcL
- Hgb 8.2 gm/dL (previous postop value 9.1)
- Plts 250 K/mCL
- Na 138 mmol/L
- BUN 40 mg/dL
- Cr 0.8 mg/dL
Anemia

- Significant blood loss is common in posterior spinal fusions.
- Surgeon should be included in discussions regarding postoperative transfusion.
- Evidence\(^1\) supports transfusion when Hgb is <7g/dL, assuming there is no uncontrolled ongoing blood loss.

Tachycardia

- Symptom of a problem
  - Pain
  - Anxiety
  - Fever / Infection
  - Anemia
    - Hypovolemia
  - Medication effect
Fluid Shifts

- Multiple factors in fluid status of PSF patients
  - Under (or over) resuscitation in operating room
  - Third spacing of fluid following surgery
  - Anti-diuretic hormone surge
  - Syndrome of Inappropriate Anti-Diuretic Hormone secretion (SIADH)
SIADH

- A majority of spinal fusion patients have a surge of ADH in the early postoperative period.\(^1,2\)
  - Clinically, this causes a decrease in urine output.

- A minority develop clinical SIADH\(^1\), defined as the following:
  - Decrease in urine output <1mL/kg/hr
  - Serum osm <280 mOsm/L
  - Urine osm >249 mOsm/L
  - Hyponatremia (serum Na <131 mEq/L)

In children with SIADH, volume expansion may exacerbate the condition.


Case

- You order a 10 ml/kg normal saline bolus for Anne.
- Her heart rate decreases to 110 following the intervention.
Case Presentation

- It is postoperative day 3.
  - Overnight, Anne developed an oxygen requirement of 1 liter via nasal cannula. Chest X-ray shows some streaky atelectasis but is otherwise normal.
  - In addition, Anne complains of abdominal discomfort. You notice she has not stooled since she came to the hospital.

Could these outcomes have been prevented?
Postoperative Atelectasis

**Prevention**

- Mobilization\(^1,^2\)
- Early respiratory therapies\(^2\): Incentive spirometry\(^1\), breath-stacking\(^3\)
- Effective pain control (avoid splinting)
- Avoid over-sedation

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Constipation / Dysmotility

- **Constipation** is common in the postoperative period, related to opioid use, poor mobilization
  - *Prevention*: Early mobilization, laxatives, spare opioids

- **Ileus** occurs in 5-10% of patients
  - Distention
  - No flatus or bowel movement
  - Pain
  - Nausea, vomiting

- **Rare, serious** GI complications:
  - Ogilvie syndrome (colonic pseudo-obstruction)
  - Superior mesenteric artery (SMA) syndrome

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Summary

- Pediatric medical co-management of spinal fusion patients involves
  - Prevention, surveillance, and mitigation of postoperative complications
- Adjunctive pain medications can decrease opioid-related adverse effects.
- SIADH, if unrecognized, can be a life-threatening complication of spine surgery.
- Postoperative atelectasis and constipation are common and preventable.
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