Surgical Complications

Part II

Postoperative

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Objectives

• Recognition and management of common postoperative complications.
  • Postoperative Bleeding
  • Oliguria
  • Respiratory Compromise
  • Ileus and/or bowel obstruction
  • Fistula, urinary tract or GI tract injury
Postoperative Bleeding

• **Symptoms**
  • Increasing abdominal pain
  • Syncope and altered mental status

• **Signs**
  • Decreasing hemoglobin
  • Hypotension
  • Tachycardia
  • Oliguria
Postoperative Bleeding

• Fluid resuscitation with lactated Ringers rather than NS to avoid hyperchloremic acidosis.
• Large bore venous access
• Rapid, hands on evaluation
• Define the extent of blood loss
  • Stat CBC, CMP, Cross match, and coagulation studies if indicated
• Frequent lab testing to assess extent of ongoing bleeding
• Determine if return to the OR is indicated.
Signs and Symptoms of Acute Blood Loss

Hemoglobin and Vital Signs Stable
Continue Supportive Care

Resuscitate

Hemoglobin & Vital Signs Unstable
Return to OR
Postoperative Oliguria

Etiology?

• 1
• 2
• 3
Postoperative Oliguria
Etiology

• Pre-renal
  • Hypovolemia, hypotension (blood loss, sepsis, under estimated blood loss, CHF, hypoproteinemia)

• Renal
  • Intrinsic renal disease or injury (Pre-existing or New)
    • Inadequate fluid resuscitation, medications, diabetic nephropathy, IV contrast, infection

• Post-renal
  • Obstruction
    • Ureteral injury/obstruction, bladder trauma, urinary retention, obstructed Foley
Postoperative Oliguria
Evaluation

• Laboratory
  • CBC, CMP, urine sodium and urine creatinine, Urine Specific Gravity
  • FeNa: \((UNa \times SCr/SNa \times UCr) \times 100\%\)
    • FeNa < 1% & Urine Spec. Grav. > 1.025 = Prerenal Etiology
    • FeNa > 4% & Urine Spec. Grav. < 1.01 = Renal Ischemia
    • FeNa will not be accurate if diuretic, mannitol, or IV contrast has been given
  • Renal sonogram if indicated

• Flush the Foley
Postoperative Oliguria
Management

• Prerenal/Renal Etiologies
  • Correct volume status (crystalloid/blood products)
  • Correct hypotension
  • Eliminate offending drugs
  • Restrict potassium
  • Nephrology Consult for intrinsic renal disease
Postoperative Oliguria
Management

• Postrenal Etiologies
  • Renal sonogram to assess for hydronephrosis
  • If serum creatinine is normal, CT could assess urine leak in the peritoneal cavity
  • Cystoscopy with retrograde pyelogram could assess bladder trauma, assess patency of both ureters, and place stents if the ureters were kinked, but not occluded.
  • If ureteral or bladder trauma, defect, transection or ligation are diagnosed, surgical intervention is needed.
  • Percutaneous nephrostomy may be needed if the patient is too unstable.
Postoperative Respiratory Compromise

• Nurse: “Mrs. Marlboro in 3-436 has a respiratory rate of 28/min. and O2 saturation of 82%.”
• Doctor: ???
Postoperative Respiratory Compromise

- **Atelectasis**
  - Decreased inspiratory effort leading to dyspnea, tachycardia and fever.
  - Confirmed with CXR and managed with incentive spirometry

- **Pneumonia**
  - Decreased $O_2$ saturation, dyspnea, tachycardia, fever.
  - Infiltrate/consolidation on CXR
  - Managed with pulmonary toilet, IS, and antibiotics (Community vs. Hospital Acquired)

- **Respiratory Failure**
Postoperative Respiratory Compromise

• Respiratory Failure
  • Altered pulmonary function resulting in hypercarbia, acidemia, and hypoxia.
  • Decreased respiratory drive, airway obstruction, decreased pulmonary function (COPR or Asthma), pulmonary edema, CHF, ARDS, infectious, pneumothorax, pleural effusion, metastatic disease, profound anemia, pulmonary embolism

• Evaluation/Diagnosis
  • Exam, CXR, oxygen saturation monitoring, ABG, CBC, CMP
  • CT angiogram or echo cardiogram as indicated.
Postoperative Respiratory Compromise Management

• Oxygen supplementation
  • Nasal O$_2$/rebreather mask, non-rebreather mask, CPAP, BiPAP, intubation
  • Assess need for intubation. Pa O$_2$ < 60 mm Hg, PaCO$_2$ > 60 mm Hg, Resp Rate > 30/min, inability to maintain the work of breathing.

• Treat etiology ie., cardiac, pulmonary edema, pneumonia, sepsis.

• Transfer to the ICU

• Assess the likelihood of a pulmonary embolism.
  • Wells Score,
  • ?? D-dimer. Degradation product of fibrin. Has a high negative predictive value and low positive predictive value.
  • CT-pulmonary angiogram
Wells Score
Clinical Probability of a Pulmonary Embolism

<table>
<thead>
<tr>
<th>Clinical Features</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical signs and symptoms of DVT</td>
<td>3.0</td>
</tr>
<tr>
<td>PE likely or more likely than the alternative diagnosis</td>
<td>3.0</td>
</tr>
<tr>
<td>Heart Rate &gt; 100 bpm</td>
<td>1.5</td>
</tr>
<tr>
<td>Immobilization &gt; 3 days or surgery in previous 4 weeks</td>
<td>1.5</td>
</tr>
<tr>
<td>Previously objectively diagnosed PE or DVT</td>
<td>1.5</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>1.0</td>
</tr>
<tr>
<td>Cancer</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Probability: Low =<2, Moderate 2-6, High = >6

Pulmonary Embolism
Management

• Low molecular weight heparin, enoxaparin
  • Parenteral heparin for acute phase, followed by vitamin K antagonist
  • Heparin drip (Protocol) monitoring PTT, with transition to VKA, with three day overlap
  • Enoxaparin 1 mg/Kg BID, with transition to VKA, with three day overlap.

• Non-vitamin K oral anticoagulants
  • Rivaroxaban(Xarelto), apixaban (Eliquis)

• Consider the risk of postoperative bleeding and the need for reversal of anticoagulation
Pulmonary Embolism
Management

• Duration of therapy
  • Depends on the precipitating event (isolated vs. ongoing)
    • ie. First event following non-oncology surgery, estrogen use, mechanical cause, etc.
    • ie. Recurrent malignancy, thrombophilia, etc.
  • Previous history of DVT/PE
Postoperative ileus or bowel obstruction
Definition

• Ileus
  • Recurrent nausea/vomiting
  • Inability to tolerate oral intake
  • Absence of flatus/bowel function
  • Resolves over time with conservative measures

• Obstruction
  • All of the above without resolution following conservative measures
Postoperative ileus or bowel obstruction
Risk Factors

- Salt and water overload
- Excessive blood loss
- Extensive bowel dissection or handling
- Cumulative narcotic dose
Postoperative ileus or bowel obstruction

Diagnosis

• Examination: Abdominal distention, decreased/absent bowel sounds

• Evaluation:
  • Abdominal series- Flat plate, PA CXR, Upright or oblique view
  • CT Scan- assessing bowel diameter, possible identification of transition area
  • Gastrografin enema may assist in evaluation of lower colon.
Abdominal Series Flat Plate
Abdominal Series Upright
Postoperative ileus or bowel obstruction
Management

• Bowel rest
  • NG ??
• Fluid resuscitation
• Electrolyte replacement
• Colonoscopy for pseudo-obstruction (Ogilvie Syndrome)
• Surgery: Unresolved SBO or cecum dilation 10-12 cm.
Postoperative Bowel or Urinary Tract Trauma
Postoperative Urinary Tract Perforation
Etiology

• Urinary Tract trauma/defect
  • Unrecognized cystotomy
  • Bladder base trauma with subsequent ischemia and defect
    • Extensive dissection
    • Thermal injury
    • Incorporation of bladder base in vaginal cuff closure
  • Trocar injury; Laparoscopic or TVT
  • Ureteral defect
    • Transection
    • Ischemia
Postoperative Urinary Tract Perforation
Signs and Symptoms

- Decreased urinary output (bladder trauma and bilateral ureteral injury)
- Increasing abdominal pain
- Abdominal distention and ileus
- Flank pain and temperature elevation
- Elevated serum creatinine
- Urinary incontinence with increasing clear fluid per vagina
Postoperative Urinary Tract Perforation Evaluation

- **Ureteral Trauma**
  - Renal sonogram to assess renal pelvis, ureter and presence of increased peritoneal fluid.
  - Consider the impact of contrast media within the peritoneal cavity on further studies.
  - IVP if serum creatinine is normal.
  - Cystoscopy and retrograde pyelogram.

- **Bladder Trauma**
  - Concern for vesico-vaginal fistula; consider instilling methylene blue in the bladder and look for blue fluid in the vagina.
  - Concern for cystotomy;
    - Cystogram
    - Cystoscopy
Bladder Trauma
IVP with Ureteral Leak
Postoperative Urinary Tract Perforation Management

• Ureteral Trauma
  • Small defect/angulation: Cystoscopy and stent placement may be an option (usually not)
  • Everything else: Surgery with re-anastomosis or re-implantation

• Bladder Trauma
  • Small defect: Foley catheter for two weeks and reassess
  • Everything else: Surgery for cystotomy repair.
Postoperative Bowel Injury/Perforation
Etiology

- **Direct injury:**
  - Trocar injury or open, unrecognized colotomy or enterotomy
- **Indirect injury:**
  - Port site hernia and infarction
  - Thermal injury
  - Wall ischemia following extensive dissection
  - Incomplete wall injury worsened by postoperative bowel distention, ischemia and delayed perforation
  - Anterior rectum incorporated into vaginal cuff closure
Postoperative Bowel Injury/Perforation
Signs and Symptoms

- Increasing abdominal pain
- Decreased bowel sounds
- Temperature Elevation with Infection/sepsis
- Stool per vagina
Postoperative Bowel Injury/Perforation Evaluation

- Abdominal series with large volume free air
- CT scan showing increased free air, thick debris, with or without pneumatosis.
- Gastrografin enema to assess low rectal injury

Don’t let your hope that nothing is wrong impact the decision to evaluate
Dilated bowel and free air
Postoperative Bowel Injury/Perforation Management

• Laparotomy with bowel repair.
  • Extent of surgery is dependent on stability of patient
  • Damage control and diversion vs. primary repair.
Questions??