**Indication for thoracotomy GSW to the chest (Penetrating trauma)**

Thoracic injuries account for 25% of all trauma deaths annually. Immediate deaths involve disruption of the heart or great vessel injury. Early deaths (those occurring within 30mins to 3 hours) are due to cardiac tamponade, tension pneumothorax, aspiration, or airway obstruction. Pulmonary sepsis and missed injuries account of the late deaths.

ER department thoracotomy is indicated in:

**? Patients with a penetrating thoracotomy wound who have acute deterioration (vital signs remain or become unstable (severe shock SBP<50). If patient is in mild or moderate shock (SBP 50-90mmHg) and shock persists or rapidly recurs after 2-3 liters of balanced electrolyte solution is infused in 10 mins, then er thoractomy is indicated.**

**? Patients with uncontrollable hemorrhage (initial chest tube output is higher than 20ml/kg(1500-2000ml) or subsequent output is is >200ml/hr for 4 consecutive hours or longer**

**? Cardiac tamponade**

**? Patients experiencing cardiac arrest**

**? Patients with suspicion of a major thoracic vascular injury at the thoracic inlet with hemodynamic instability**

**? Traumatic thoracotomy (chest wall disruption)**

**? Massive air leak from the chest tube**

**? Patients with clinical evidence of an air embolism due to lung parenchymal or hilar injuries.**

**? Impalement wounds to the chest**

**? Bullet embolism to heart or pulmonary artery**

**? Radiographic evidence of great vessel injury**

With blunt injuries, thoracotomy is indicated if the patient has vital signs at the scene and upon arrival in the trauma room the patient develops cardiac arrest. Any patient who arrives in the ER with a flat-line ECG and no history of signs of life is dead and emergency department thoracotomy is not appropriate in this setting.

References:

3. 
**Diagnosis of duodenal tumors**

Small bowel tumors are uncommon when compared to other neoplasms of the GI tract. It is the site of only 2% of GI malignancies. Benign tumors are found with approximately the same frequency as malignant tumors, except that adenocarcinomas are more common in the proximal portion of the small intestine, whereas other malignancies and benign tumors are found with a slight predominance in the distal portion of the small intestine.

**Symptoms**
Tumors of small bowels presents with vague nonspecific symptoms:

<table>
<thead>
<tr>
<th>BENIGN Symptoms</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>25</td>
</tr>
<tr>
<td>Obstructions</td>
<td>20</td>
</tr>
<tr>
<td>Bleeding</td>
<td>10-20</td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>&gt; 50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MALIGNANT Symptoms</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weightloss</td>
<td>90-100</td>
</tr>
<tr>
<td>Abdominal Pain</td>
<td>80</td>
</tr>
<tr>
<td>Obstruction</td>
<td>30</td>
</tr>
<tr>
<td>Abdominal Mass</td>
<td>15</td>
</tr>
<tr>
<td>Perforation</td>
<td>10</td>
</tr>
<tr>
<td>Bleeding</td>
<td>10</td>
</tr>
<tr>
<td>Jaundice</td>
<td>2</td>
</tr>
</tbody>
</table>

**Diagnosis**
Barium contrast studies of the small bowel is the procedure of choice in diagnosing duodenal tumors. An enteroclysis study or small bowel enema is preferred over the standard UGI series with small bowel follow through. CT scan of the abdomen with oral contrast is valuable in demonstrating the primary lesion, defining extraluminal extent and nodal or liver metastases.

Upper endoscopy is useful for direct visualization and biopsies can be obtained. Endoscopic ultrasound can be useful in staging periampullary tumors.

Lesions bleeding at the time of investigation can be identified by arteriography if blood loss is greater than 1-2 ml/minute. Laparotomy often becomes the diagnostic technique of choice for bleeding lesions.

**Management**
Most small bowel tumors are treated with resection and end to end anastamosis. The surgical treatment of duodenal carcinoma is essentially that of carcinoma of the head of the pancreas: Whipple procedure

**References:**
**Treatment of Familial Adenomatous Polyposis (FAP) Coli**

-Familial Adenomatous Polyposis (FAP) Coli is characterized by hundreds of polyps in the UGI tract mostly in the large intestine
-can be sessile or pedunculated
-adenomatous in nature and if left untreated will develop into adenocarcinomas
-transmitted by an abnormal gene (APC) on chromosome 5, not sex linked
-the abnormal gene is dominant and penetrance is high

**INDICATIONS FOR SURGERY:**
because of the high risk of developing cancer, surgery is always advised when polyps are discovered.

**CHOICES OF SURGERY:**
Many choices of surgery for these patients. Each has its strengths and weaknesses

Procotocolectomy and brooke ileostomy or continent ileostomy (Koch pouch)
-considered when invasive cancers are present in the distal rectum, when the anal sphincter is incompetent and in the elderly who manifest decreased strength of the anal sphincter
-not done much today due to undesirable loss of transanal defecation and the creation of either an incontinent stoma with the Brooke ileostomy or a continent stoma with the Kock pouch.

Colectomy and ileorectostomy
-excises most of the cancer prone large intestinal mucosa, preserving anal sphincter
-little perirectal dissection so damage to innervation of bladder and genetalia is minimized
-disadvantage-rectum left in place therefore propensity to form polyps and cancer
-should perform biopsy of rectal mucosa - if biopsy shows microadenomatous changes(early premalignant lesion) rectal resection is indicated even though no gross polyps are present

Proctocolectomy with ileal pouch-distal rectal anastamosis
- presumed ability to provide better continence after surgery than proctocolectomy with ileal-pouch-anal canal anastamosis
-however patients at high risk for recurrent polyps or new polyps and the development of cancer in the retained mucosa of the proximal anal canal

Proctocolectomy with ileal pouch-anal canal anastamosis*
-operation of choice for FAP as you remove all the cancer prone large intestinal mucosa while preserving the anal sphicter and transanal defecation. New rectum is constructed from the ileum which provides a reservoir for fecal storage.
-avoids a permanet ileostomy
-Postoperative urinary and sexual function is unusual because removal of the diseased anal mucosa and distal rectal mucosa is performed from within the lumen of the anal canal so the pelvic nerves to the bladder and genitalia are not disturbed.

**REFERENCES:**
List the treatment of carcinoid tumor of the rectum

Carcinoid tumors are neuroendocrine tumors that originate from enterochromaffin (Kulchitsky) cells (aka argentaffin cells due to staining with silver compounds) and secrete vasoactive substances including serotonin, 5-HTP, substance P, histamine, and kallibrein. Carcinoids occur most commonly in the appendix (40%), small bowel (30%, esp. ileum), rectum (15%), and bronchus. Midgut tumors are argentaffin (+) and small bowel tumors more readily metastasize and cause carcinoid syndrome. Hindgut tumors are argentaffin (-) and tend to be asymptomatic.

Carcinoids are slow growing with variable malignant potential and may metastasize to regional lymph nodes, liver, and lungs. Rates of metastases are <1 cm tumors= 2%, 1-2 cm= 50%, and >2 cm = 90%. Malignant carcinoid syndrome is rare (5-10% of patients) and is marked by flushing, diarrhea, right-sided valvular heart disease (late manifestation), and bronchial asthma. These symptoms occur when vasoactive products bypass the portal circulation and gain access to the systemic circulation, i.e. liver metastases or primary ovarian, bronchial, or retroperitoneal tumors. Serotonin is metabolized in the liver and lung to the pharmacologically inactive 5-hydroxy indoleacetic acid (5-HIAA). Elevated urinary 5-HIAA is highly specific.

Specifically for the appendix:
1. < 1 cm and not involving the base, then appendectomy is generally curative.
2. > 1 cm or involving the base or lymph nodes, then right hemicolectomy is indicated.

Specifically for the rectum:
1. < 1 cm, then wide local excision is generally curative.
2. > 1 cm, local recurrence, or tumor fixed to surrounding tissue, then APR is indicated.

In cases of advanced carcinoid, including distant metastases, medical treatment and debulking surgery is indicted for relief of symptoms. Wedge resection, lobectomy, or selective embolization is performed for liver metastases. Octreotide, a somatostatin analog, may be dosed 150 mcg sc TID to alleviate the majority of flushing and diarrhea symptoms. Use of alpha-interferon and serotonin receptor antagonists, including methysergide (no longer used due to retroperitoneal fibrosis) and cyproheptadine, have been reported. Chemotherapy with 5-FU and streptozotocin has been reported with poor response rates.

Carcinoid crisis is rare but may be induced by stressful stimuli, causing arrhythmias, hypertension, or severe hypotension. IV octreotide should be readily available for patients undergoing surgery or other procedures.

References:
**Describe Doppler signals during graft thrombosis**

A continuous-wave Doppler ultrasound probe emits 2-10 MHz waves that are reflected by flowing red blood cells and detected by a receiving crystal. The frequency shift between the transmitting and the receiving crystals is proportional to the velocity of the moving particles (Doppler shift principle) and provides a qualitative assessment of the degree of stenosis.

The normal peripheral Doppler signal is triphasic – representing the forward flow of systole, reversal of the arterial velocity waveform against the relatively high-resistance vascular bed in early diastole, then resumption of forward flow in late diastole.

![Doppler signal](image1)

The pulse volume loses kinetic energy crossing an area of stenosis and does not have enough energy to recoil against the vascular bed. As a result, Doppler waveforms distal to the stenosis will show loss of flow reversal and become biphasic. As the stenosis worsens, velocity will be lower and the waveform becomes progressively more rounded and flattened.

![Doppler signal](image2)

With severe stenosis there is blunting of the systolic upstroke and increased flow during diastole resulting in a monophasic waveform.

![Doppler signal](image3)

During graft thrombosis, physical examination may reveal loss of thrill or bruit and a water-hammer pulse. A change in the Doppler waveform from triphasic or biphasic to monophasic, or peak velocities below 45 cm/sec, or a drop in peak velocity of 30 cm/sec indicates impending graft thrombosis. Once there is an indication of a graft problem, a more complete evaluation can be obtained with a duplex scan (combination of real time B mode ultrasound with pulsed Doppler ultrasonography, some add color) of its entire length to locate the site of stenosis or occlusion.

References:

Discuss the management of traumatic brain injury

In the US, 500,000 cases of head injury occur each year of which 10% die prior to reaching the hospital. Classification of head injury based on the Glasgow Coma Scale (GCS) is mild 14-15, moderate 9-13, and severe 3-8. Coma is defined as the inability to obey commands, utter words, and open the eyes and a GCS of 8 or less has become the accepted definition.

Normal intracranial pressure is 10 mmHg. Cerebral blood flow (CBF) is 50mL/100 gm of brain/min. Autoregulation keeps CBF fairly constant between mean arterial pressures (MAP) 50-160 mmHg. Below 50 mmHg the CBF declines sharply and above 160 mmHg there is passive dilatation of the cerebral vessels with an increase in CBF. Once compensatory mechanisms are exhausted and there is an increase in ICP, brain perfusion is compromised.

Cerebral perfusion pressure (CPP= MAP–ICP) <70 mmHg is generally associated with a poor outcome. In severe head injury patients, hypotension is associated with double the mortality (60% vs 27%). Hypoxia in addition to hypotension is associated with a mortality rate of 75%. Rapid cardiopulmonary stabilization is imperative as prevention of secondary brain injury is the goal of management. ATLS protocol in the severe brain injured patient:

A) Airway with cervical spine protection: early endotracheal intubation
B) Breathing: ventilation to normocapnia. Hyperventilation may be used cautiously in patients with worsening GCS or papillary dilatation (pCO2 30-35 mmHg).
C) Circulation with hemorrhage control: DPL or FAST must be used in the hypotensive patient because a clinical examination is unreliable.
D) Disability (neurologic status): obtain a reliable neurologic exam prior to sedation or paralysis. The best motor response elicited is a more accurate prognostic indicator.
E) Exposure/Environmental control: completely uncover but prevent hypothermia.

A CT scan should be obtained in all head-injury patients, i.e. more than a momentary loss of consciousness, amnesia, or severe headaches. CT scans should be repeated whenever there is a change in the patient’s clinical status. Blood loss from scalp wounds can be extensive and should be controlled quickly. As a general guideline, skull fractures depressed more than the thickness of the skull require surgical elevation. Intracranial lesions (e.g. epidural or subdural hematomas) with an actual shift of 5 mm or greater are considered to be significant and usually indicates that neurosurgical decompression is needed.

During resuscitation, hypotonic fluids and dextrose should be avoided and serum sodium levels must be monitored. Dilantin is loaded as soon as head injury is identified (shown to reduce the incidence of seizures in the first week post injury). Therapy for increased ICP includes short-term hyperventilation (pCO2 30-35 mmHg), mannitol 1 gm/kg IV bolus, and phenobarbitol if ICP is refractory to other measures. ICP monitoring via ventricular catheter or intraparenchymal device is used if a reliable neurological exam cannot be obtained.

References: