ABDOMINAL COMPARTMENT SYNDROME by Mark Ramzy DO & Nick Mark MD

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DEFINITIONS:

Intra-Abdominal Pressure (IAP) is the pressure within the abdomen, reflecting the outward pressure of abdominal contents & inward pressure of the abdominal wall
Intra-Abdominal Hypertension (IAH) is IAP (>12 mmHg) due to underlying pathology
Abdominal Compartment Syndrome (ACS): is the physiologic consequence of an IAP >20 mmHg causing **organ dysfunction**; it also compromises venous return to the heart (reduced CO) and impedes lung expansion. ACS can be divided into **Primary** (due to organ edema, pancreatitis, accumulation of intrabdominal or retroperitoneal fluid, etc), **Secondary** (due to sepsis, excessive fluid resuscitation, circumferential abdomen burns, etc), **Chronic** (due to long standing ascites, mass, Meig's syndrome, peritoneal dialysis, etc), & **Recurrent** (development of ACS after previous treatment)

Indirect measurements of IAP include measuring IVC, intragastric or intrauterine pressure. **Intra-vesicular pressure** is the most straightforward & minimally invasive method though it does slightly overestimate true intra-abdominal pressure.

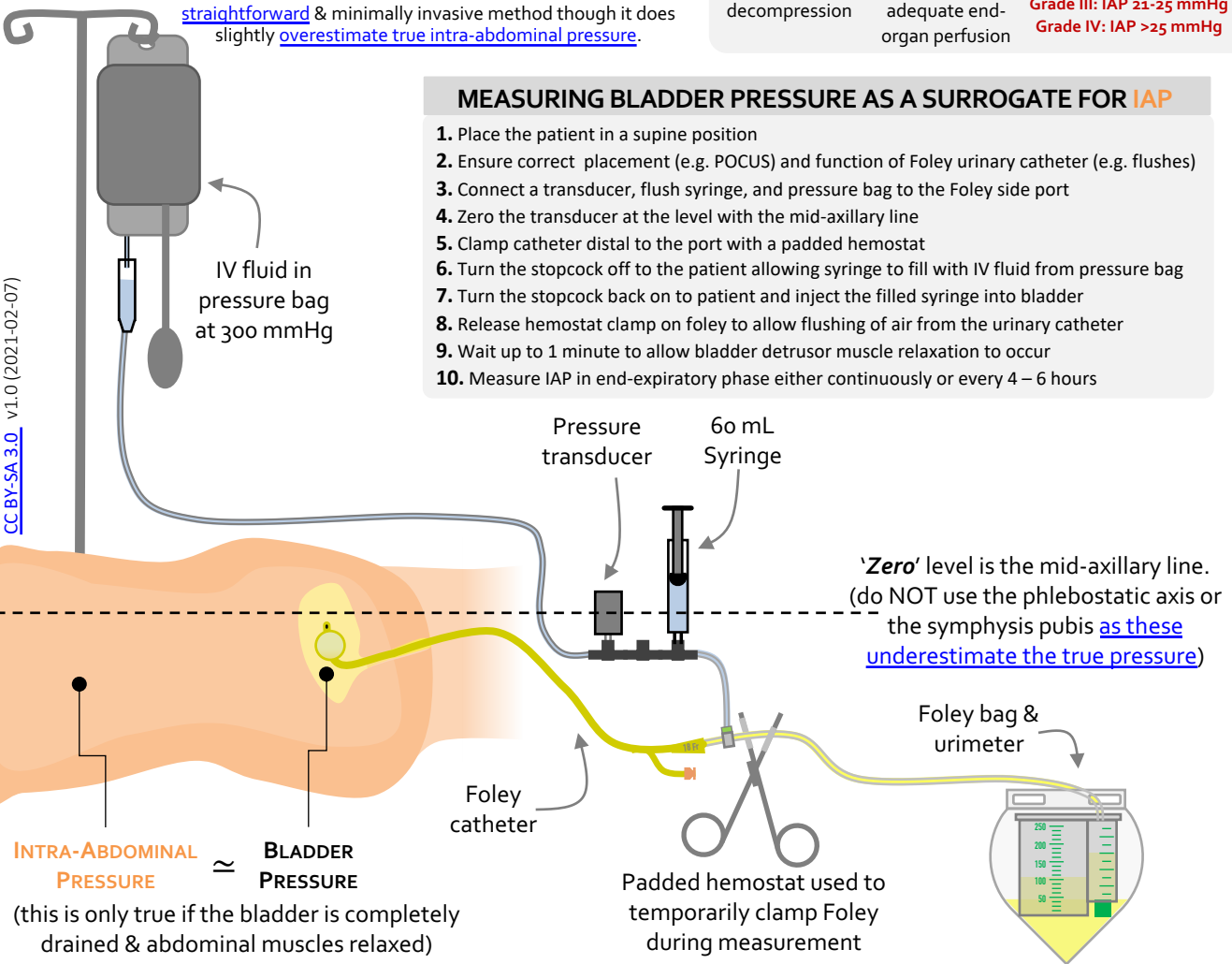
ABDOMINAL PERFUSION:

$$APP = MAP - IAP$$

- ***APP*** — ***Abdominal perfusion pressure***: Normal APP ≥ 60 mmHg. LESS than 60 predicts need for surgical decompression
- ***MAP*** — ***Mean arterial pressure***: Maintaining a MAP ≥ 65mmHg normally ensures adequate end-organ perfusion
- ***IAP*** — ***Intra-abdominal pressure***: Normal = 0 – 5 mmHg; ICU pts = 5 – 7 mmHg; IAH ≥ 12 mmHg
  - Grade I: IAP 12-15 mmHg
  - Grade II: IAP 16-20 mmHg
  - Grade III: IAP 21-25 mmHg
  - Grade IV: IAP >25 mmHg

MEASURING BLADDER PRESSURE AS A SURROGATE FOR IAP

1. Place the patient in a supine position
2. Ensure correct placement (e.g. POCUS) and function of Foley urinary catheter (e.g. flushes)
3. Connect a transducer, flush syringe, and pressure bag to the Foley side port
4. Zero the transducer at the level with the mid-axillary line
5. Clamp catheter distal to the port with a padded hemostat
6. Turn the stopcock off to the patient allowing syringe to fill with IV fluid from pressure bag
7. Turn the stopcock back on to patient and inject the filled syringe into bladder
8. Release hemostat clamp on foley to allow flushing of air from the urinary catheter
9. Wait up to 1 minute to allow bladder detrusor muscle relaxation to occur
10. Measure IAP in end-expiratory phase either continuously or every 4 – 6 hours



DIAGNOSIS

- May present with **low cardiac output**, **oliguria**, & **acidosis**
- ACS is often overlooked. Diagnosis requires a high index of suspicion in patients who are at risk due to underlying disease (bowel ischemia) or who require extensive fluid resuscitation (e.g. severe pancreatitis, sepsis, major burns, etc)
- Unfortunately, physical exam is **insensitive** for ACS
- Imaging is poorly sensitive for ACS, though it may disclose the **underlying cause** (edema, ascites) or **consequences** of ACS (elevated diaphragm, flattened IVC, bowel enhancement)

MANAGEMENT

See WSACS guidelines for more

Evacuate Intraluminal Content

Removal of content from the gut reduces IAP; Gastroparesis, ileus, and colonic-pseudo-obstruction are common causes, especially in patients who are post-op.
- Place a **gastric tube** to decompress stomach
- Stop enteral feeds if ongoing
- Consider **prokinetic agents** (e.g. Metoclopramide), **administration of enemas**, and **endoscopic decompression**

Evacuate Intrabdominal Space-Occupying Lesions

Removal of intra-abdominal fluid can also reduce IAP
- Look for contributing ascites, blood and abscesses
- Consider ultrasound-guided bedside drainage
- Large, complex, or loculated may require IR/surgical drainage

Improve Abdominal Wall Compliance

Abdominal wall compliance is often increased due to increased muscle tone, often due to pain or anxiety
- Ensure adequate sedation and analgesia
- Avoid abdominal binders or restrictive bandages
- Place in Reverse Trendelenburg if able
- Consider neuromuscular blockade

Optimize Fluid Status

Volume overload exacerbates gut and abdominal wall edema and may cause intra-abdominal fluid accumulation.
- Minimize IVF, stop MIVF, avoid aggressive fluid resuscitation,
- Aggressively diuresis if needed and able to tolerate
- Goal is net even to negative fluid balance
- RRT (Ultrafiltration) may be required

*See **Achieving a Negative Fluid Balance** OnePager for more*

Surgical Decompression

Severe cases require surgical decompression
- Full midline laparotomy from xiphoid to pubis is common
- Earlier intervention shown to improve outcomes
- Even with an open abdomen, ACP can recur; watch for severe fluid loss & use goal-directed fluid resuscitation & monitor hemodynamics to maintain MAP & APP