Abdominal compartment syndrome

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Compartment syndrome:

Increased pressure in a fixed compartment resulting in tissue ischaemia and organ dysfunction

Abdominal pressures (mmHg)

Normal	0-5
Critically ill patients	5-10
Intra-abdominal hypertension (IAH)	>12
Abdominal compartment syndrom (ACS)	>20

Correlate with clinical picture

Causes

Primary: intraabdominal

Retroperitoneal: bleed, pancreatitis, ruptured AAA, abscess

Intraperitoneal: bleed, perforation, obstruction, massive hernia reduction, abdo wall eschar or closure under tension

Secondary: extraabdominal

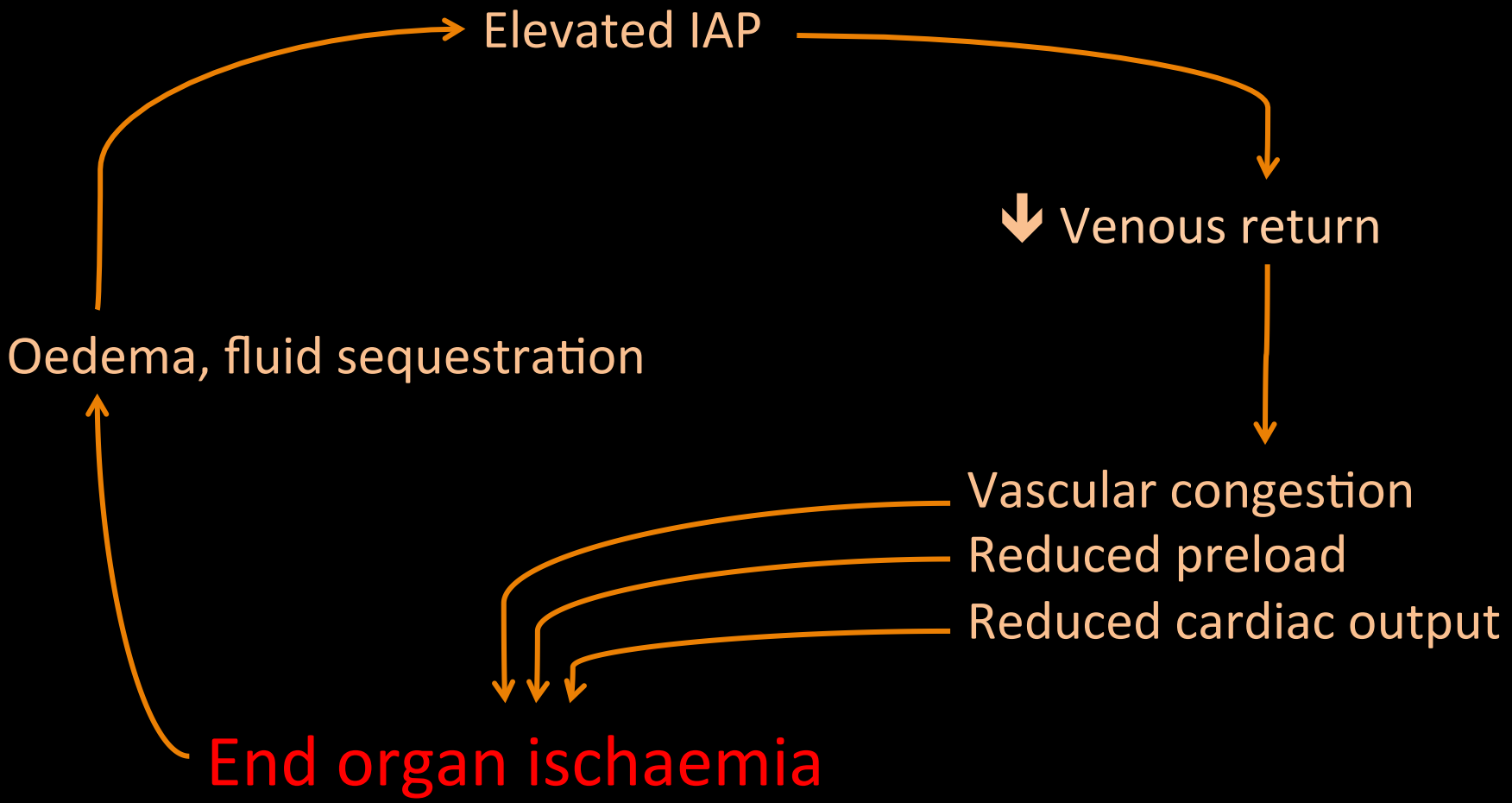
Sepsis/SIRS – bowel wall oedema/fluid sequestration

Fluid resus with +ve fluid balance

Chronic:

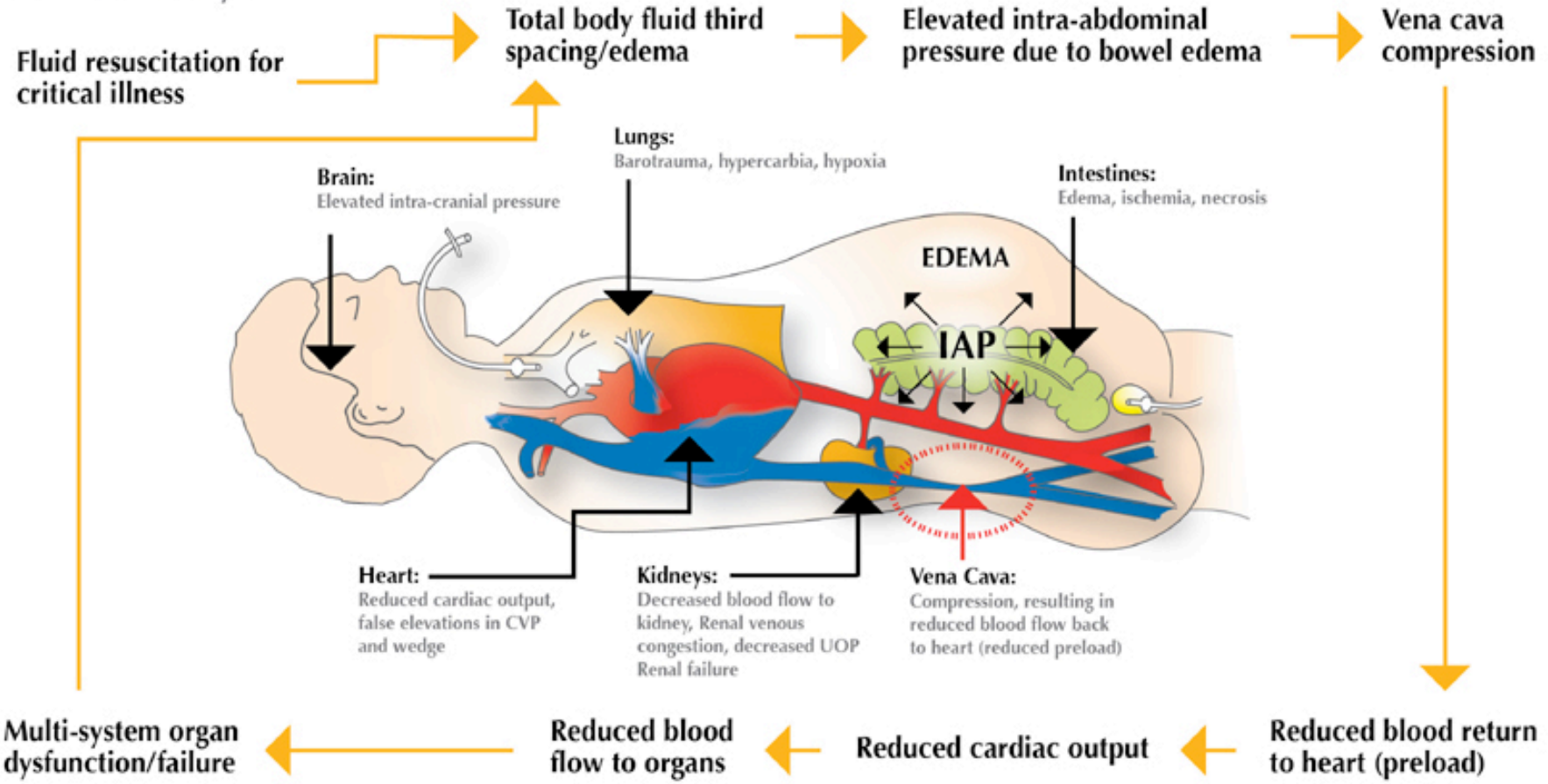
Ascites/peritoneal dialysis, abdominal mass lesion

Pathogenesis



What Happens to the Body's Organs?

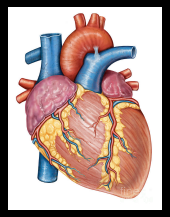
A Vicious Cycle



Sequelae

NEURO:

↑ thoracic pressure and ↑ CVP, ↑ ICP, ↓ CPP, brain oedema & injury



CARDIAC:

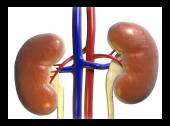
IVC compression, reduced ventricular filling, reduced CO, ↑ cardiac workload, ↓ tissue perfusion, arrest

RESPIRATORY:

Splinted diaphragm, ↓ lung volumes, ↑ thoracic pressure ↑ cardiac strain, barotrauma, ARDS

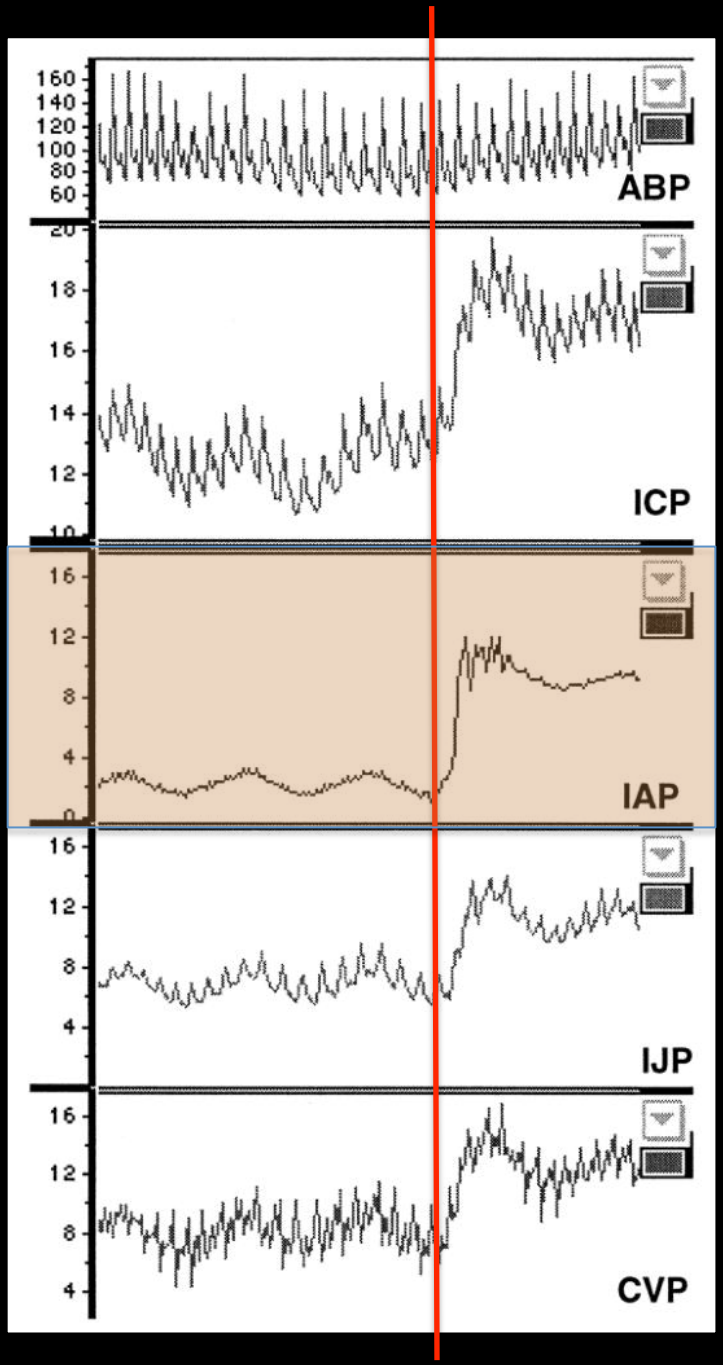
GI:

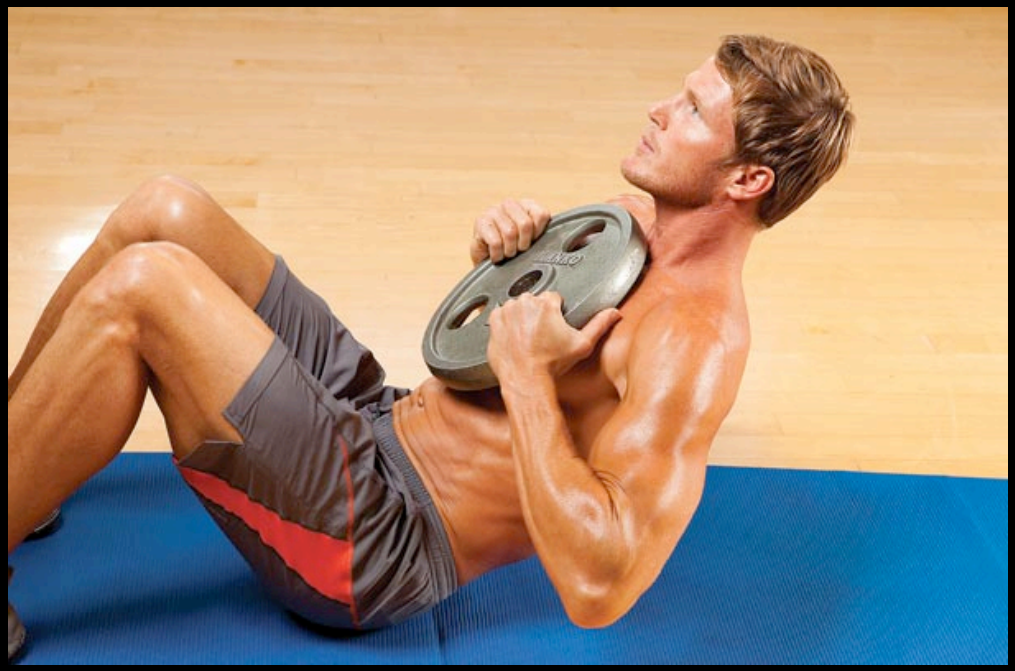
gut ischaemia, oedema, bacterial translocation



RENAL:

↓ renal flow, ↓ GFR, ATN, ARF





Induced abdominal compartment syndrome increases intracranial pressure in neurotrauma patients: A prospective study

Citerio, Giuseppe; Vascotto, Ettore; Villa, Federico; Celotti, Simona; Pesenti, Antonio

Critical Care Medicine. 29(7):1466-1471, July 2001.

Prognosis

- Increased severity of multi-organ dysfunction
- Prolonged ICU stay
- IAH and ACS independently associated with increased mortality (after adjustment for APACHE II score), compared with pts without IAH or ACS

Patients at risk

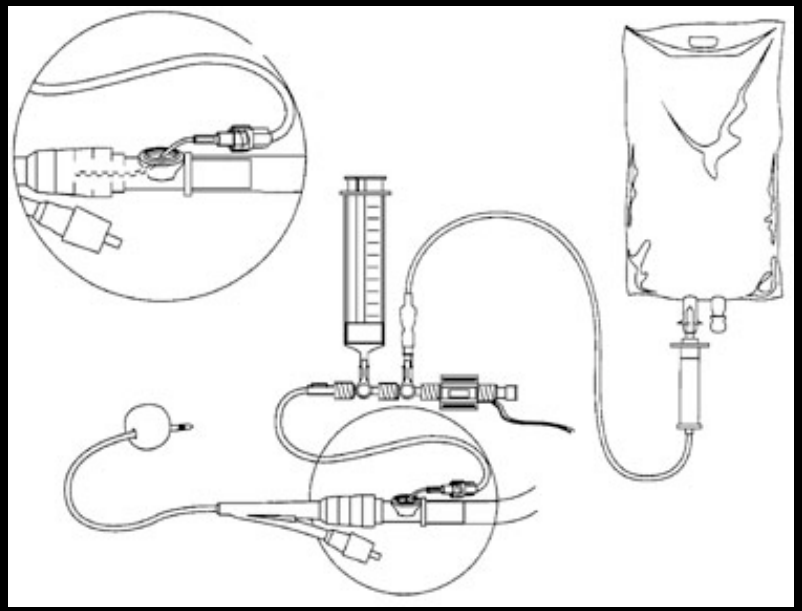
- Trauma: damage control laparotomy
- Trauma: extraabdominal with massive fluid resus
- Intestinal obstruction
- Severe pancreatitis
- Severe sepsis with large fluid shifts

Signs – may be subtle

- Dyspnoea
- Ventilated pts: increased airway pressures, difficulty ventilating
- New or progressive renal impairment
- Oliguria
- Tight or distended abdomen
- Evolving acidosis
- Organ dysfunction refractory to medical management

Measurement

- IAP is transmitted via bladder
- Ensure bladder is empty
- Clamp off drainage bag high
- Connect aspiration port of catheter bag (for 2-way IDC) or irrigation port of 3-way IDC to 60ml syringe & transducer
- Instill 25ml water into bladder
- Read pressure



Caution: false readings

- Ideally have pt supine or keep positioning constant
- Transducer should be zero-ed at mid-axillary line
- Measure at end expiration without muscle contractions
- Instill 25ml water prior to measurement

Management: medical

Fluid management:

Too little = hypoperfusion, too much = hypoperfusion (oedema, sequestration, ACS)

Therefore use goal-directed fluid resus

Give IV colloid

Consider cautious diuretic therapy

Consider haemofiltration to mobilise fluids

Decompress:

NGT, perc. drainage of ascites, cathartics, colonoscopic decompression

Manage the abdo wall

Good analgesia

Remove constrictive devices

Consider Trendelenberg

Consider sedation and neuromuscular blockade

Management: surgical

Decompressive laparotomy

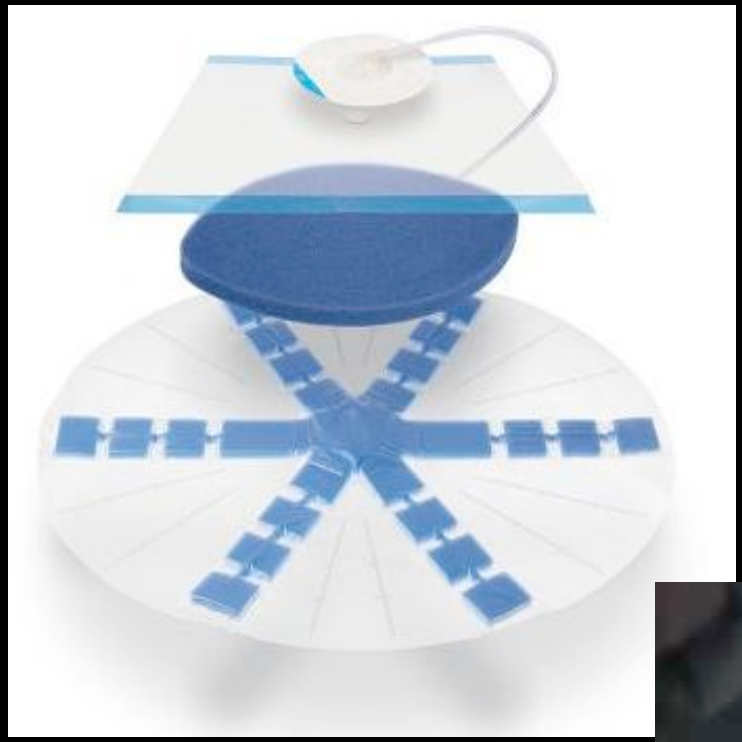
Leave abdomen open

Do not use mesh in contaminated environment

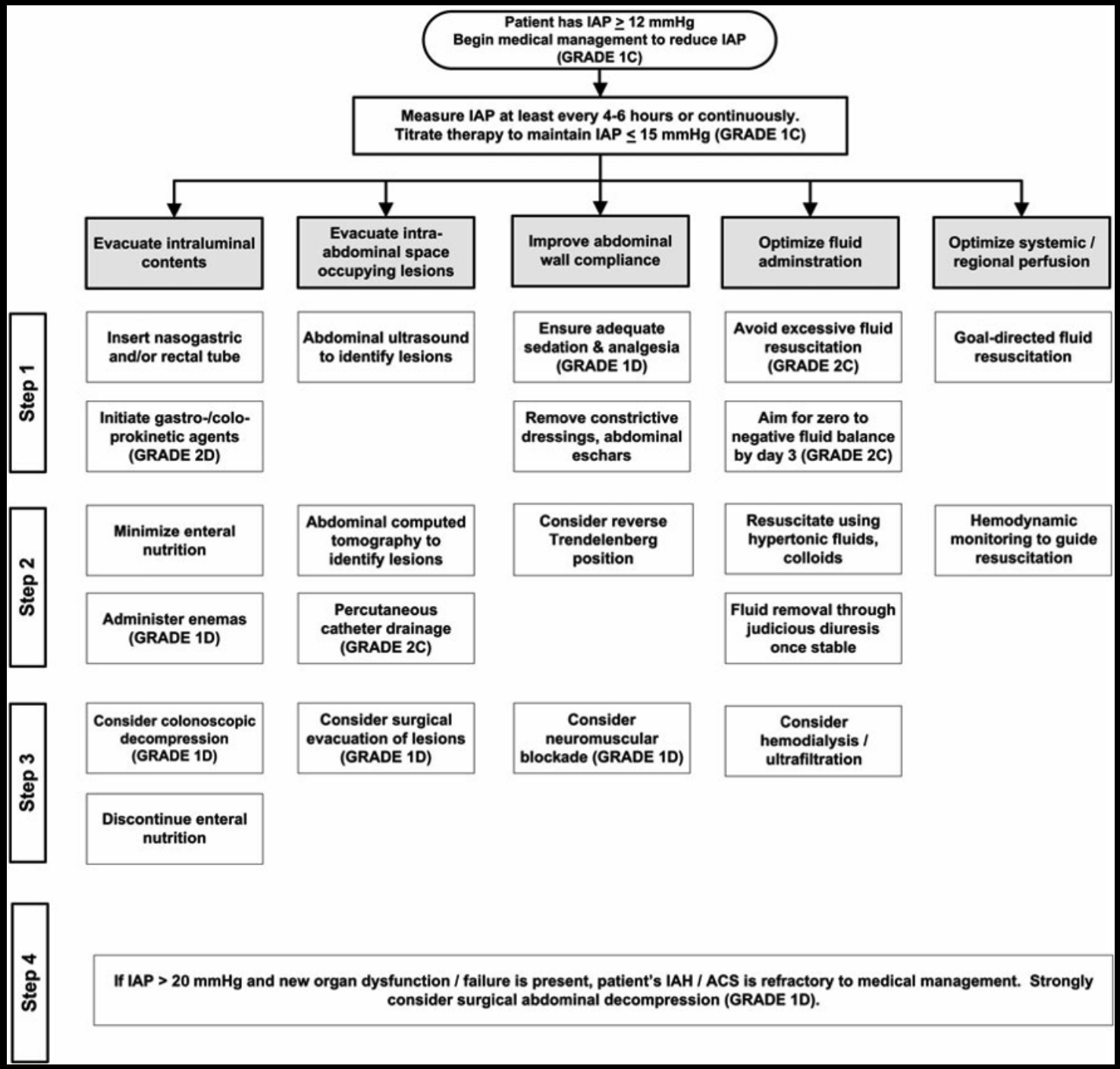
Employ negative pressure abdo closure eg. Abthera

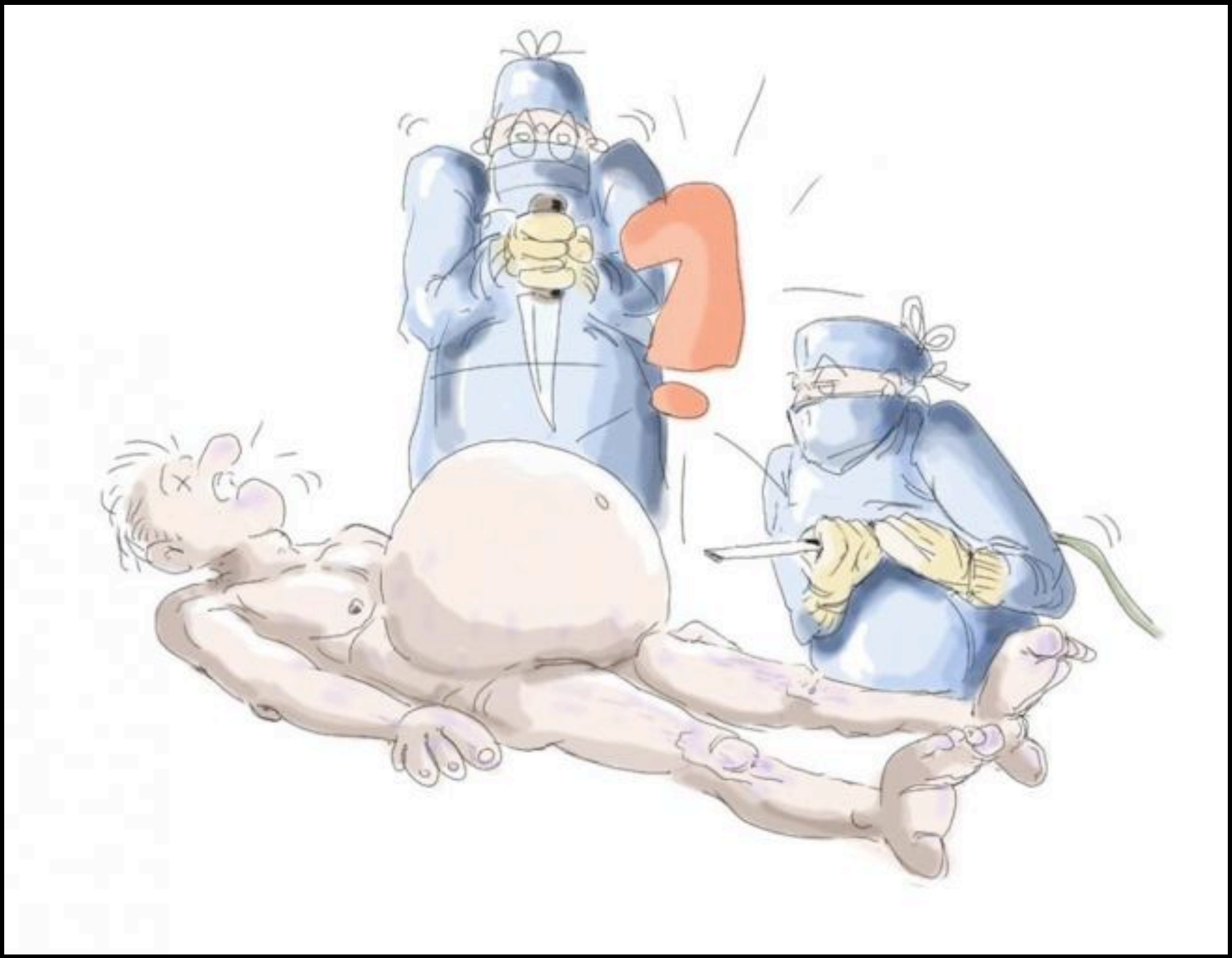
Role of component separation closure unknown

Consider prophylactic use of open abdomen after laparotomy in high risk groups




The goal is to ensure full coverage of all viscera.


Patient has IAP ≥ 12 mmHg
Begin medical management to reduce IAP (GRADE 1C)
Measure IAP at least every 4-6 hours or continuously. Titrate therapy to maintain IAP ≤ 15 mmHg (GRADE 1C)
Evacuate intraluminal contents
Evacuate intra-abdominal space occupying lesions
Improve abdominal wall compliance
Optimize fluid adminstration
Optimize systemic / regional perfusion
Step 1
Insert nasogastric and/or rectal tube
Abdominal ultrasound to identify lesions
Ensure adequate sedation & analgesia (GRADE 1D)
Avoid excessive fluid resuscitation (GRADE 2C)
Goal-directed fluid resuscitation
Initiate gastro-/colo-prokinetic agents (GRADE 2D)
Remove constrictive dressings, abdominal eschars
Aim for zero to negative fluid balance by day 3 (GRADE 2C)
Step 2
Minimize enteral nutrition
Abdominal computed tomography to identify lesions
Consider reverse Trendelenberg position
Resuscitate using hypertonic fluids, colloids
Hemodynamic monitoring to guide resuscitation
Administer enemas (GRADE 1D)
Percutaneous catheter drainage (GRADE 2C)
Fluid removal through judicious diuresis once stable
Step 3
Consider colonoscopic decompression (GRADE 1D)
Consider surgical evacuation of lesions (GRADE 1D)
Consider neuromuscular blockade (GRADE 1D)
Consider hemodialysis / ultrafiltration
Discontinue enteral nutrition
Step 4
If IAP > 20 mmHg and new organ dysfunction / failure is present, patient's IAH / ACS is refractory to medical management. Strongly consider surgical abdominal decompression (GRADE 1D).



IAH grading

Grade I	IAP 12-15 mmHg
Grade II	IAP 16-20 mmHg
Grade III	IAP 21-25 mmHg
Grade IV	IAP > 25 mmHg