Supplementary Material

Supplementary Table 1. Therapeutic options in patients with fluid accumulation syndrome (FAS). From Cure to care and prevention.

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| Treatment options | Description |
| 1. Monitoring (Prevention) | * Basic monitoring with arterial and central venous line in case of shock * Perform baseline transthoracic (or transesophageal) echocardiography * Obtain laboratory results, urea and electrolytes, and blood gas analysis with base excess and lactate * Assess fluid responsiveness with functional hemodynamics (PPV or SVV) and perform passive leg raising test or end-expiratory occlusion test * Obtain baseline body weight * Monitor for risk for fluid accumulation (FA): daily body weight, daily and cumulative fluid balance, BIA or BIVA * Assess for impact of FA on end-organ function: IAP, APP, PF ratio, EVLWI, PVPI, daily SOFA (see Figure 1, Panel A) |
| 2. Metabolic optimization (Prevention) | * Limit fluid intake (eg de-escalation of IV fluids when oral intake is possible, use concentrated enteral formula’s with 2 Kcal per ml instead of 1 Kcal/ml) * Limit sodium intake * KDIGO-derived kidney care and treatment bundle |
| 3. Vasodilators (calcium antagonists, ACE-I)(Care) | * Increase renal blood flow * Reduce filtration fraction * Reduce lymph flow * Improve LV function |
| 4. Inotropes (Care) | * Dobutamine * Milrinone (especially when right heart pressures increased) |
| 5. Lower IAP (Care) | * Improve abdominal wall compliance * Reduce intraluminal volume (ileus) * Reduce intra-abdominal volume (ascites) * Optimize fluid administration * Optimize systemic regional perfusion |
| 6. Increase APP (Care) | * APP = MAP – IAP * Vasopressors when needed, low-dose terlipressin, vasopressin or norepinephrine |
| 7. Combination therapy of diuretics (Cure) | * Loop diuretic (furosemide, bumetanide): high dose and continuous furosemide or bumetanide * Carbonic Anhydrase Inhibitors (Acetazolemide): inhibition of Na reabsorption in proximal tubule in case of metabolic alkalosis * Thiazide (Indapamide): inhibition of Na reabsorption in distal tubule in case of hypernatremia * Potassium sparing (Spironolactone): aldosterone receptor antagonist, reduction of Na reabsorption at the collector duct (ENaC channel)  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | Na+ | K+ | pH | Ca2+ | Mg2+ | | Loop diuretic | ↑↓ | ↓ | ↑ | ↓ | ↓ | | Carbonic Anhydrase Inhibitors | - | ↓ | ↓ | - | - | | Thiazide | ↓ | ↓ | ↑ | ↑ | ↓ | | Potassium sparing | - | ↑ | ↓ | - | ↑ | |
| 8. Active de-resuscitation (Cure) | * Combination therapy diuretics * Application of PEEP * Albumin 20% + diuretics * PAL treatment: PEEP (=IAP) + albumin 20% + Lasix * SLEDD with UF or SCUF * CVVH with UF |

This table presents some suggestions for prevention and treatment of fluid accumulation based on personal experience of the co-authors. It does not aim to provide an exhaustive, graded and concise overview of the literature as current evidence is mostly limited to observational, retrospective or small clinical studies, and more randomized trials are needed to better establish a personalized approach to fluid management. For more information we refer the reader to some recent review papers on this topic (2, 20).

Table legend:

ACE: angiotensin converting enzyme

APP: abdominal perfusion pressure

BIA: bio-electrical impedance analysis

BIVA: bio-electrical impedance vector analysis

CVVH: continuous veno-venous hemofiltration

EVLWI : extra-vascular lung water

FA : fluid accumulation

IAP: intra-abdominal pressure

LV: left ventricle

MAP: mean arterial pressure

PAL: PEEP Albumin Lasix

PEEP: positive end-expiratory pressure

PF: PaO2 over FiO2 ratio

PPV: pulse pressure variation

PVPI: pulmonary vascular permeability index

SCUF: slow continuous ultrafiltration

SLEDD: slow extended dialysis

SVV: stroke volume variation

UF: ultrafiltration