Abstract:

Cardio Vascular Challenges in ICU

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Acute or acute on chronic life threatening cardio vascular challenges that impair the ability of the heart to maintain the end organ perfusion are commonly treated in intensive care units.

We need to address these challenges as emergencies and prioritise them to improve the cardiac output first before asking questions like
HOW? and WHY ? .

Causes

Most common causes are MI or myocardial ischemia, acute myocarditis, endocarditis related cardiac and embolic complications, sustained arrhythmia with unstable hemodynamics, acute valvular catastrophies and decompensated end-stage cardiomyopathy or acute obstructive cardiomyopathy from multiple aetiologies.

Other common causes for low cardiac output states in ICU include hypovolaemia resulted in redistribution of circulatory volume, loss of blood volume either from trauma or from post operative medical or surgical bleeding.
Cardiac temponade, global cardiac depression due to endogenous or exogenous toxins (sepsis, SIRS, Drugs : b blockers, calcium channel blockers, tricyclic antidepressants).

Procedure related complications from the insertion of CVC, PA Cath, IABP and ECMO cath are not uncommon. They may result in major vascular injury, mechanical obstruction to forward flow from aorta, thrombus formation leading to total obstruct of distal flow and Ischaemia.

Diagnosis

The diagnosis of low output state can be made at the bedside by obtaining the history and by recognising clinical signs such as hypotension or poor tissue perfusion (which include oliguria, cyanosis, cool extremities, and altered mentation).

Many times clinicians can be caught between a rock and a hard place in assessing the significance of these symptoms and signs.
Investigation such as lactate and central venous oxygen saturation can be helpful.

Recent monitoring devices such as arterial line based cardiac output monitors; continuous central venous oxygen saturation monitor and echo

(TTE or TOE) are more commonly used to guide clinicians in attaining bed side diagnosis and guiding their approach of treatment.

Prevention or Early intervention

There is always a period of calm before an acute decompensation takes place.
It is always important to notice early warning signs before a big storm hits. Developing unit policy to recognise early warning signs or Medical Emergency Team (MET) or even Pre MET driven protocols is essential to avoid such acute unnoticed cardiac deterioration in patients.

Providing the treatment to the patient sticking to the first principles such as ABCD and constant and thorough review of patients in frequent intervals is essential in avoiding acute cardiac deterioration.

Concepts such as right ventricular dysfunction, diastolic dysfunction, broken heart syndrome (TakoTsubu cardiomyopathy) are new and evolving. Focus on teaching these concepts will help understanding the cardiac physiology globally.

Appropriate training, supervision and acquiring skills to use ultrasound for vascular procedures may improve and prevent procedure related complications.

Management

Simple measures like effective delivery oxygen, appropriate volume resuscitation , fixing the holes in major blood vessels, appropriate and timely postoperative re -exploration, correcting coagulapathy (including treating the hypothermia, acidosis), titrating the inotropes without precipitating drug induced dysrrhythmias and stiffness to the ventricle may shorten the time required to treat these challenges. Evidence based understanding of newer monitoring devices, drug therapies and mechanical treatment modalities such as ECMO, left and right ventricular assist devices is an important step forward to achieve positive outcomes.