


Right Ventricular Infarction Management

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- Right ventricular (RV) infarction rarely occurs in isolation, with approximately between one-third and half of the patients with inferior-wall myocardial infarction (IWMI) having some RV involvement.
- RV infarction can be defined
 - Pathologically
 - Haemodynamically
 - Echocardiographically
 - Electrocardiographically
 - Cardiac magnetic resonance (CMR).



Incidence and diagnosis

Physical examination

- Hypotension
- Clear lung fields
- Elevated jugular venous pressure
- Kussmaul's venous sign (distension of the jugular vein on inspiration)
- Electrocardiography and other non-invasive imaging modalities continue to be the cornerstones of the diagnosis of RV infarction



Electrocardiography

- An ST-segment elevation of >1 mm in lead V_4R is considered significant and correlates closely with other noninvasive evidences of RV dysfunction.
- This ECG finding is a strong independent predictor of major complications and in-hospital mortality.
- This ST-segment elevation is thought to represent an ischaemic injury of the posterobasal septum.



Echocardiography

- RV involvement may be present in as much as 59% of the patients with IWMI at the initial presentation.
- Evaluation of the size and function of the RV.
- However, echocardiographic imaging of the RV has technical challenges due to the chamber's complex shape
- The RV cannot be completely visualized in any single two-dimensional (2D) echocardiographic view.



Echocardiography

- Echocardiographic abnormalities can be temporary and resolve within a few hours..
- Three-dimensional (3D) echocardiography are probably more accurate than 2D echocardiographic volumes.



Cardiac magnetic resonance

- CMR using late gadolinium enhancement imaging enables the accurate characterization of ischaemic myocardial injury.
- CMR studies have indicated that RV infarction occurs in a high number of cases in patients with IWMI (47–57%) and that some patients with anterior MI (11–65%) also have RV involvement to some extent.
- CMR may contribute to understanding the pathology as well as providing a more accurate diagnosis of RV infarction



Associated findings

- Atrial infarction (PR segment displacement, elevation or depression in leads II, III and aVF)
- Sinus bradycardia
- Atrioventricular node block and AF.
- Hemodynamic effects of right ventricular dysfunction may include failure of the right ventricle to pump sufficient blood through the pulmonary circuit to the left ventricle, with consequent systemic hypotension.



Pathophysiologically, RV ischemia ultimately leads to decreased cardiac output from the left ventricle.

Systolic RV dysfunction ⇒

↓ RV CO ⇒ ↓ LV CO

RV dilatation

↑ RV volume ⇒ septal shift

Diastolic RV dysfunction ⇒ ↓ compliance ⇒

↑ RVDP ⇒ septal shift ⇒

↓ LVDP ⇒ ↓ LV CO

↑ RAP ⇒ ↓ septal shift

⇒ ↓ LAP ⇒ ↓ LV CO



Short-term prognosis

- Patients with acute IWMI have a substantially increased risk of death during hospitalization if RV involvement is present.
- In a meta-analysis from the fibrinolytic era, the mortality rate was noted to be higher in the presence of RV infarction (17%) than in its absence (6.3%)
- The worse outcome is mainly attributable to the high incidence of refractory cardiogenic shock.



Long-term prognosis

- The prognosis associated with RV infarction is worse in the short term, but those patients who survive hospitalization have a relatively good long-term prognosis.



Therapy:

Volume replacement

- The initial therapy for hypotension in patients with RV infarction without pulmonary congestion has traditionally been volume expansion, ideally with the aid of invasive monitoring.
- However, fluid replacement can be challenging in some patients with RV infarction, particularly in the presence of severe RV dysfunction.



- The typical regimen consisted of normal saline (40 ml/min, intravenously), while maintaining the right atrial pressure (RAP) at <18 mmHg to prevent volume overload.
- However, later clinical studies reported variable responses to aggressive fluid therapy with a target pulmonary wedge pressure (PWP) of 18–24 mmHg



Early revascularization

- RCA occlusion compromises right atrial and RV branch perfusion, resulting in RV ischaemic dysfunction related to the loss of the critical compensatory contribution of augmented right atrial contraction.
- Patients with proximal RCA culprit lesions have worse baseline characteristics, less spontaneous recanalization, and a greater clot burden than those without.
- successful mechanical reperfusion has improved the absolute clinical outcome as a whole, in relation to RV infarction



- A shorter time taken to reperfusion and complete revascularization of the affected vessels, play an important role in the recovery of RV function.
- Early revascularization leads to an immediate recovery of RV function,
- Late revascularization is associated with higher RV dysfunction and complications.



Other treatment modalities

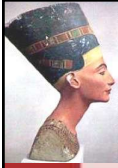
- Inotropic agents: Inotropes that can be used in right ventricular failure are
 - Dobutamine Milrinone
 - Norepinephrine
- And, possibly, low-dose vasopressin.
- Avoid dopamine and phenylephrine.
- Intra-aortic balloon pump counterpulsation



- Intensive mechanical support, including an emergent cardiopulmonary bypass and use of a ventricular assist device (VAD)
- The newly developing modalities for patients with RV shock
 - (1) Electrical stabilization device
 - (2) Percutaneous implantable VAD
 - (3) Percutaneous cardiopulmonary support



- An adequate heart rate and the maintenance of atrioventricular synchrony can play an important role in sustaining a sufficient cardiac output.
- Atrioventricular sequential pacing in patients with a complete AV block associated with RV infarction leads to a significant improvement in the cardiac output and recovery from shock when ventricular pacing alone has no benefit.



- Tandem-Heart is a temporary, external, continuous-flow, centrifugal pump that is placed nonsurgically in the catheterization laboratory through the femoral vein; it was originally intended for stabilizing critically ill patients who require short-term left heart support.



- PCPS has also been used successfully to provide support for patients with refractory RV failure secondary to RV infarction.
- A PCPS is a compact, portable heart-lung machine that can be quickly installed using a thin-walled cannula inserted via the femoral vessels.



Valve Replacement and Repair

- Valve replacement or repair with angioplasty rings
- Atrial septal defect–occluding device if a patient develop arterial hypoxemia secondary to right-to-left shunting at the atrial level.
- Inhaled nitric oxide can decrease the right-to-left shunting and increase systemic oxygenation



Thank You