

Clinical Guidelines

Protocol for the Management of Hemodynamic Abnormalities Consistent with Tamponade

Background: Tamponade occurs in a small percentage of patients after cardiothoracic surgery. Causes generally include a mechanical bleed (rare) and persistent coagulopathy related to patient characteristics, preoperative medications (antiplatelet such as aspirin, Ecotrin, clopidogrel [Plavix], failed angioplasty with ReoPro-like agents on board, anticoagulants such as heparin and coumadin, thrombolytics) and intraoperative conditions (prolonged pump time, heparin rebound, idiopathic coagulopathy).

In all cases of unexplained hypotension, or low-cardiac output after an initial warm-up period (after cardiopulmonary bypass), tamponade should be considered the first diagnosis of exclusion. Because of its potentially lethal consequences, tamponade needs to be considered at any time during the hospitalization and even within the first few weeks after discharge.

Characteristics: The following are typical characteristics of tamponade in the postoperative cardiac surgery patient:

1. Hypotension, with low pulse pressure (always compare to preoperative blood pressure)
2. Low cardiac index (usually less than 2.0 L/min/m²)
3. Tachycardia (often not seen because of inherent electrical system disease, beta blockade and amiodarone)
4. Pulsus paradoxus (by BP cuff or by watching the arterial tracing)
5. Elevated RA, PAD, PCW to approximately 20 mmHg with diastolic equalization
6. "Damped" RA tracing with absent y descent
7. Widened mediastinum on chest radiograph (above the usual magnitude)
8. Moderate to large pericardial effusion on echo
9. Moderate to large pericardial effusion on echo with evidence of various chamber diastolic collapse

Though these characteristics are considered classic, they certainly will never all be present (x).

Approach to Diagnosis: When tamponade is considered, it must be excluded by any number of techniques. Though many diagnostic strategies have been used in the past, the most common include hemodynamic observations with a Swan-Ganz catheter and echocardiography.

Swan-Ganz Catheter: Tamponade is a hemodynamic diagnosis in which there is a low cardiac output and/or hypotension, in association with elevated diastolic filling pressures (). Diastolic filling pressures will range between 18-30 mmHg and often there will be an absent "y" descent on the RA tracing. Based on recent policy changes within the Division, right-heart catheterization is not routinely performed, and therefore this modality may not be readily available in certain cases. Insertion of a Swan-Ganz catheter should be considered in cases of severe hemodynamic

abnormalities after going through the appropriate chain of command. Catheters will only be placed by physicians credentialed to do so by their respective departments.

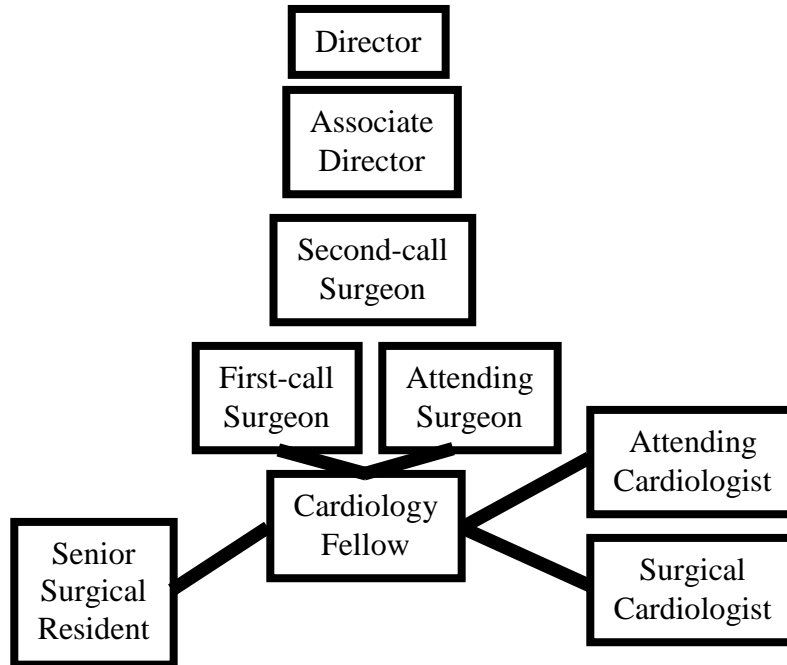
Echocardiography: Echocardiography can be helpful in confirming the diagnosis in cases with hemodynamic evidence of tamponade, but keep in mind that echocardiography is not 100% sensitive nor 100% specific based on the literature and by seminal studies performed in this Division (,). In cases of hypotension and low cardiac output – EVEN WITH AN NEGATIVE ECHOCARDIOGRAM -- tamponade should still be considered. All fellows are trained to recognize pericardial effusion with bedside echocardiography in the first few days of entering fellowship. If there is any question regarding the use of the echocardiographic device (large portable or hand-held) or its interpretation, the attending echocardiographer should be called at any time of the day or night. All echocardiographic studies require documentation either with hard copy or video tape. When using hand-held devices, some type of documentation should be obtained subsequently if clinical conditions permit.

Special considerations: Occasional patients will present with a localized in the pericardium that is restricting inflow to the right side. This has been described as “isolated right atrial tamponade” or “localized tamponade” and will not present as classic tamponade, thus the importance of considering tamponade in any case of hemodynamic compromise.

Therapy: Therapy is based on the relative stability of the patient, but the steps below should be followed based on the clinical assessment.

1. Initiate chain of command by contacting a responsible cardiac surgeon: During regular working hours immediately call (1) the primary surgeon on the case, (2) the surgeon to whom the case was signed-out and/or (3) the first call surgeon. During evenings, weekends or holidays call (1) the first-call surgeon and/or (2) the primary surgeon on the case. If there is no response, immediately call the Director or Associate Director of Cardiothoracic Surgery. All phone and beeper numbers are posted in the CSICU.
2. In cases of extreme hemodynamic instability, the chest must be opened as soon as possible. The steps include:
 - A. Call for the thoracotomy tray
 - B. Call for the senior general surgery resident on-call
 - C. Remove sternal skin staples or cut the sutures with a scalpel
 - D. Use the wire-cutters to cut the sternal wires
 - E. Open up the inferior portion of the sternum with a retractor
 - F. Use the Yankauer suction to remove fluid and clot – being careful to not damage any bypass grafts
 - G. If necessary, perform open-chested cardiac massage being careful to not damage any bypass grafts
3. In cases where there is still an acceptable blood pressure or cardiac output, and general supportive measures can temporize until the arrival of the surgeon, the patient should be given large volumes of colloid and/or crystalloid and pressors.

Chain of Command



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