PROCEDURE CHECKLIST

Ultrasound: focused cardiac scan in shock and arrest

A limited bedside echocardiogram to answer specific questions in shock and cardiac arrest: pericardial effusion and tamponade, gross left ventricular function, right ventricular dilatation, cardiac standstill and the size of the inferior vena cava.

EM Orbit

Patient reference | Date | Time | Completed by

Equipment ready

- [ ] Ultrasound machine with a cardiac preset
- [ ] Phased-array (cardiac) probe; a curvilinear probe is an alternative if no phased-array probe is available
- [ ] Ultrasound gel and a sterile probe cover if a procedure follows
- [ ] ECG leads connected, if the machine can display them
- [ ] Image storage and clip recording facility
- [ ] Probe cleaning wipes per manufacturer and local policy

Before · Preparation

- [ ] State the clinical question: tamponade? gross left ventricular function? right ventricle dilated? cardiac standstill? fluid filling?
- [ ] Ensure that resuscitation continues as normal; the scan is added to care, not substituted for it.
- [ ] Enter the patient's details on the machine and select the cardiac preset.
- [ ] Check the orientation convention of the machine (the screen marker and the probe marker) so that the left ventricle and right ventricle are correctly identified.
- [ ] Position the patient supine. If the patient is awake and stable, the left lateral position can improve the parasternal and apical views.
- [ ] In arrest, agree who scans, who is the timekeeper, and that the probe will be placed and the image recorded before the rhythm check begins.

During · Subxiphoid view

- [ ] Place the probe under the xiphisternum, flat on the skin, with the marker to the patient's right and the beam directed towards the left shoulder.
- [ ] Press gently, keep the probe flat, and use the liver as a window. Identify the four chambers, the pericardium and the right ventricle nearest the probe.
- [ ] Look for a pericardial effusion (an anechoic stripe between the heart and the bright pericardium) and for movement of the heart walls.
- [ ] Turn the probe to view the inferior vena cava longitudinally: find it entering the right atrium, and measure its diameter about 2 cm from the right atrium.
- [ ] Note the size of the inferior vena cava and whether it collapses with a sniff or with breathing.

During · Parasternal long axis

- [ ] Place the probe in the third or fourth intercostal space at the left sternal edge, with the marker pointing to the patient's right shoulder.
- [ ] Identify the right ventricle (near the probe), the aortic root, the left atrium and the left ventricle, with the mitral valve.
- [ ] Look at the movement of the left ventricular walls and of the mitral valve leaflet, which should open widely and approach the septum in diastole.
- [ ] Look for pericardial fluid in front of the right ventricle and behind the left ventricle (a pericardial effusion tracks in front of the descending aorta; a pleural effusion lies behind it).
- [ ] Compare the size of the right ventricle with the left ventricle.

During · Parasternal short axis

- [ ] From the long-axis view, rotate the probe a quarter turn clockwise so that the marker points to the patient's left shoulder.
- [ ] Find the circular left ventricle at the level of the papillary muscles.
- [ ] Look for symmetrical inward movement and thickening of the whole wall in systole: gross left ventricular function.
- [ ] Look for flattening of the septum (the D-shaped left ventricle) as a sign of right ventricular pressure overload.
- [ ] Look for fluid all around the heart.

During · Apical four-chamber view

- [ ] Find the apex beat (the point of maximum impulse) and place the probe there with the marker towards the patient's left, aiming at the right shoulder.
- [ ] Check that the four chambers can be seen, with the ventricles at the top of the image and the septum vertical.
- [ ] Compare the size of the right ventricle with the left ventricle: a right ventricle as large as, or larger than, the left ventricle is dilated.
- [ ] Look at the movement of the left ventricular walls and of the mitral and tricuspid valves, and at the collapse of the right atrium or right ventricle in tamponade.

During · Interpretation in shock

- [ ] Pericardial effusion with right ventricular or right atrial diastolic collapse and a plethoric inferior vena cava in a shocked patient indicates tamponade: arrange urgent pericardiocentesis or surgical drainage.
- [ ] A small, vigorous, empty left ventricle with a collapsing inferior vena cava indicates hypovolaemia.
- [ ] A dilated, poorly contracting left ventricle indicates severe left ventricular failure or cardiogenic shock.
- [ ] A dilated right ventricle with a flattened septum and a plethoric inferior vena cava suggests pulmonary embolism or other right ventricular pressure overload.
- [ ] Record each answer as normal, abnormal or non-diagnostic, and reassess if the patient's condition changes.

During · Use in cardiac arrest

- [ ] Place the probe and prepare the image (subxiphoid view) while compressions continue, and scan only during the rhythm check or pulse check pause.
- [ ] **Keep the pause to 10 seconds or less: record a clip of the heart during the pause, and resume compressions immediately.**
- [ ] Interpret the recorded clip while compressions continue.
- [ ] Look for a pericardial effusion or tamponade, a dilated right ventricle, and cardiac activity.
- [ ] If there is organised cardiac movement without a pulse, treat as pulseless electrical activity (pseudo-pulseless electrical activity) and look for a cause such as hypovolaemia or tamponade.
- [ ] **Do not stop compressions or delay a shock or adrenaline to obtain or interpret an image.**
- [ ] **Do not use cardiac standstill on ultrasound as the sole reason to stop resuscitation; combine it with the clinical picture, rhythm, end-tidal carbon dioxide and the senior clinician's decision.**

After · Act on the findings

- [ ] State what you found in each view and communicate it to the team leader at once.
- [ ] If tamponade is suspected: arrange urgent pericardiocentesis or surgical drainage, using ultrasound to guide a safe route.
- [ ] If right ventricular dilatation is present: consider massive pulmonary embolism and urgent reperfusion per protocol, with the clinical context.
- [ ] A normal focused scan does not exclude disease: follow the clinical picture and arrange a formal echocardiogram when appropriate.

After · Documentation and cleaning

- [ ] Save representative clips from each view and the inferior vena cava measurement.
- [ ] Document the indication, views obtained, findings, limitations and actions.
- [ ] Clean the probe according to the manufacturer and local policy.
- [ ] Arrange a formal echocardiogram for patients with abnormal or unclear findings, or with an ongoing clinical question.

A procedure checklist. Perform procedures only within your training, competence and local policy. It does not replace your clinical judgement.
EM Orbit · Emergency medicine, in one orbit · proc-pocus-cardiac · red rows are the steps that must not be missed