PROCEDURE CHECKLIST

Temporary transvenous pacing

Placement of a balloon-tipped pacing wire through a central vein into the right ventricle to provide reliable temporary pacing when drugs and transcutaneous pacing have failed or are not sufficient.

EM Orbit

Patient reference | Date | Time | Completed by

Equipment ready

- [ ] Defibrillator with transcutaneous pacing, running or immediately available as a bridge
- [ ] Ultrasound machine with a linear probe for vein cannulation and a phased-array probe for cardiac views, with a sterile probe cover
- [ ] Introducer sheath and central venous access set, with the sheath size specified by the pacing wire manufacturer
- [ ] Balloon-tipped bipolar pacing wire with a protective sleeve, matched to the sheath
- [ ] External temporary pacing generator with new batteries and its connecting cable, plus a spare generator
- [ ] Syringe for inflating the balloon and 12-lead ECG, with an alligator-clip connection for the intracardiac ECG
- [ ] Sterile gown, gloves, drapes and chlorhexidine skin preparation; local anaesthetic
- [ ] Suture and an adhesive dressing for securing the sheath and wire
- [ ] Resuscitation drugs and equipment, and pericardiocentesis equipment available
- [ ] Chest X-ray facility

Before · Confirm the need

- [ ] Assess the patient: airway, breathing, circulation, and the adverse features of bradycardia (shock, syncope, myocardial ischaemia, heart failure).
- [ ] Record a 12-lead ECG and treat reversible causes (hyperkalaemia, hypoxia, drug effects, hypothermia, myocardial infarction).
- [ ] Give the drugs for bradycardia per the advanced life support algorithm (atropine first, then second-line drugs per local protocol), and start transcutaneous pacing if there is no response, as a bridge.
- [ ] Decide with a senior colleague to proceed to transvenous pacing, and call cardiology and critical care early.
- [ ] **Do not delay transcutaneous pacing or other life-saving treatment while preparing for transvenous pacing.**

Before · Preparation

- [ ] Obtain consent, or record the best-interests decision when the patient lacks capacity and the need is urgent.
- [ ] Position the patient flat, with the head slightly down for internal jugular access, if tolerated; ensure continuous ECG, blood pressure and oxygen saturation monitoring.
- [ ] Check the pacing generator, battery, cables and the wire and balloon (test the balloon with the recommended volume and then deflate) before starting.
- [ ] Choose the site: the right internal jugular vein is preferred as the straightest route to the right ventricle; the left subclavian vein is the usual alternative. Femoral access is less stable and is for when other sites are not possible.
- [ ] Use ultrasound to identify the vein and check that it is patent.
- [ ] Use full aseptic technique: hand hygiene, sterile gown and gloves, skin preparation and large sterile drape.

Before · Safety

- [ ] Keep the patient's hands and the exposed end of the pacing wire insulated; handle the terminal pin and connectors only with dry gloves.
- [ ] Assign roles: operator, assistant who handles the wire and generator, a monitor of ECG and rhythm, and a person who can continue transcutaneous pacing or resuscitation.

During · Venous access

- [ ] Infiltrate local anaesthetic at the site (maximum dose of lidocaine per kilogram applies).
- [ ] Cannulate the chosen vein under real-time ultrasound guidance with the needle tip in view throughout.
- [ ] Pass the guidewire, confirming its position in the vein (ultrasound, and ECG for ectopy), nick the skin, dilate the track and insert the introducer sheath over the guidewire.
- [ ] Aspirate and flush the sheath, secure it, and check that the side port is closed.
- [ ] **Do not advance a dilator or sheath if the guidewire is not moving freely or its position in the vein is uncertain.**

During · Advancing the pacing wire

- [ ] Slide the wire through the sleeve and the sheath, with the balloon deflated, to a depth just beyond the tip of the sheath.
- [ ] Connect the distal electrode to the V1 lead of the ECG with an alligator clip and monitor the intracardiac ECG, or choose ultrasound guidance in a subxiphoid or apical four-chamber view.
- [ ] Inflate the balloon with the volume stated on the catheter, as soon as the wire is beyond the sheath tip and within the superior vena cava or right atrium.
- [ ] Advance the wire with the balloon inflated, following the flow of blood, through the right atrium, across the tricuspid valve and into the right ventricle (large QRS complex on the intracardiac ECG, or the wire visible in the ventricle on ultrasound).
- [ ] Advance until the tip is in the right ventricular apex, aiming for firm contact with the endocardium (ST elevation on the ECG) or, on ultrasound, the tip in the apex pointing inferiorly and to the left.
- [ ] **Never advance the wire against resistance. If it does not pass, withdraw it with the balloon deflated, and try again.**
- [ ] Deflate the balloon once the tip is in the right ventricle and in contact with the wall.

During · Pacing and thresholds

- [ ] Remove the alligator clip, connect the wire to the generator with the correct polarity (distal to the negative terminal, proximal to the positive terminal), and set the mode to demand pacing.
- [ ] Set a pacing rate above the patient's own rate (usually between 60 and 80 beats per minute), and set the output high to ensure capture.
- [ ] Check for capture: a pacing spike followed by a broad QRS complex, usually with a left bundle branch block pattern, with a palpable pulse or an arterial trace for each paced beat.
- [ ] Find the threshold: reduce the output slowly until capture is lost, and note the lowest output that gives capture on each beat.
- [ ] Set the output at a margin above the threshold: two to three times the threshold figure, per local protocol and the manufacturer's instructions.
- [ ] Set sensitivity per the generator manufacturer's instructions and check sensing by temporarily reducing the pacing rate below the patient's own rate (if there is one) to see that the pacing inhibits.
- [ ] Check capture again when the patient breathes deeply and changes position, and run a 12-lead ECG.
- [ ] Once transvenous capture is stable and reliable, stop transcutaneous pacing but leave the pads in place connected as a back-up until the position is confirmed.

After · Secure and confirm

- [ ] Secure the wire to the sheath with its locking device, suture the sheath to the skin and apply a sterile dressing.
- [ ] Record the depth at the sheath, the settings, the threshold, the output and the time.
- [ ] Arrange a chest X-ray to confirm the position of the tip (right ventricle, towards the apex) and exclude pneumothorax, and review the 12-lead ECG.

- [ ] Perform a bedside echocardiogram if there is hypotension or new symptoms, to look for pericardial effusion.
- [ ] Protect the generator from knocks and from being removed, and place it where it is easy to read.

After · Ongoing care

- [ ] Admit to a monitored area (cardiology, coronary care or intensive care), with continuous ECG monitoring and a defibrillator beside the patient.
- [ ] Check the threshold at least daily and whenever capture is lost, per local protocol; keep a spare generator and battery at the bedside.
- [ ] Keep the patient on bed rest with limited movement of the neck and arm on the side of the wire.
- [ ] Treat the cause of the bradycardia and plan a permanent pacemaker if needed.
- [ ] If capture is lost: check connections and battery, increase the output, change the polarity, reposition the patient, and resume transcutaneous pacing while the wire is repositioned.

After · Removal and complications

- [ ] **Deflate the balloon before withdrawing or repositioning the wire.**
- [ ] If cardiac tamponade is suspected (new hypotension, falling pulse pressure, pericardial effusion on ultrasound), call for urgent pericardiocentesis and cardiothoracic help.

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-transvenous-pacing · red rows are the steps that must not be missed