Cardiology Investigations

Disclaimer

This pathway is about alternative investigations available to investigate and diagnose cardiac symptoms.

Contents

Clinical Editor's Note

From 1st August 2020, changes to cardiac diagnostic services will change general practitioners' ability to request rebatable cardiac investigations for exercise stress echocardiograph (ESE) and transthoracic echocardiography (TTE).

Functional Tests (imaging the heart under haemodynamic stress)

1. ***Exercise stress test (ECG)*** – suitable for patients with normal ECG who can exercise.
    - *Imaging: ECG, Stress: exercise (treadmill)*
    - *Indications:*
        - *Confirm or exclude coronary ischaemia*
        - *Assess efficacy of treatment in someone known to have ischaemic heart disease*
        - *Best for exercise induced symptoms, including exercise induced palpitations*
        - *For prognosis or diagnosis*
    - *Criteria:*
        - *Normal ECG without left bundle branch block (LBBB), no ST changes e.g., depression > 1 mm at rest, no ventricular paced rhythm*
        - *Patients need to be able to exercise on a treadmill up to 85% of maximum predicted heart rate. Exclude those limited by significant arthritis, deconditioning, limiting lung disease, leg claudication, or similar.*
        - *Low pretest probability*
        - *Not young female aged < 60 years, as unreliable in this group*
    - *Instruction:*
        - *Withhold all heart-rate-slowing medications for 24 hours, including beta blockers, diltiazem, verapamil, digoxin, and amiodarone*
        - *Bring comfortable clothes to walk in, and good enclosed shoes e.g., sports shoes*
    - *Pros:*
        - *Low cost*
        - *Short wait times*
        - *No radiation*
        - *Gives exercise capacity, which has strong prognostic value*
    - *Cons:*
        - *Lower sensitivity and specificity*
        - *Inaccurate in those who can't exercise*

    See Exercise Stress Test (EST) or Exercise ECG.

2. ***Stress echocardiography (Echo)*** – all-round best test for patients with good Echo images.
    - *Imaging: Echocardiography, Stress: Exercise on treadmill, or IV dobutamine if patient can't exercise*
    - *Indications:*
        - *Demonstrate coronary ischaemia e.g., make a diagnosis of ischaemic heart disease (IHD)*
        - *Assess efficacy of treatment in someone known to have IHD*
    - *Criteria: Patients need to be able to exercise. If unable, consider dobutamine stress Echo and discuss with cardiologist.*
    - *Instructions: Withhold all heart-rate-slowing medications for 24 hours*
    - *Pros:*
        - *No radiation*
        - *Gives extra information – left ventricular (LV) function, pulmonary artery (PA) pressure*

    - *Higher sensitivity and specificity, especially in women*
    - *Gives exercise capacity, unless using dobutamine*
  - *Cons: Needs reasonable Echo images, thus some groups unsuitable e.g., very obese, severe COPD*

  See Stress Echocardiography.

3. ***Myocardial perfusion scan (nuclear medicine)*** – can be used for patients who can't exercise or with a bundle branch block.
  - *Imaging: Gamma camera, Stress: IV dipyridamole with or without exercise (stationary bike)*
  - *Indications:*
    - *Demonstrate coronary ischaemia e.g., make a diagnosis of ischaemic heart disease (IHD)*
    - *Assess degree of IHD*
    - *Patients who can't exercise or those with a left bundle branch block*
    - *Provides accurate assessment of left ventricular (LV) systolic function*
  - *Instructions: Patients must avoid any caffeine on the day before and on the day of the test*
  - *Pros:*
    - *Can image obese patients*
    - *Assess degree of ischaemic heart disease*
    - *Provides accurate assessment of LV systolic function*
    - *Readily available through medical imaging providers*
  - Cons:
    - *Cost*
    - *Radiation exposure*
    - *Little exercise information obtained*

  See Myocardial Perfusion Scan.

Anatomical tests (looking for atherosclerosis)

1. ***Computer tomography coronary angiogram (CTCA)*** – good test for patient with no known coronary disease, but involves radiation.
  - *Indications: Detecting coronary disease in a symptomatic individual with no history of coronary atherosclerosis*
  - *Instructions: Needs a heart rate of 60 beats per minute, so beta blockers are given to all patients for 1 to 2 days before the test*
  - *Interpretation of results:*
    - *If normal, no treatment*
    - *If < 50% stenosis, treatment for atherosclerosis*
    - *If > 50%, coronary angiography*
  - *Pros:*
    - *Very high negative predictive value*
    - *Detects asymptomatic levels of coronary atherosclerosis, which can assist with risk stratification*
  - *Cons:*
    - *Involves radiation*
    - *Out-of-pocket expense if referred by general practitioner*

  See CT Cardiac Angiogram.

2. ***Coronary angiography*** – gold standard test, but invasive.
  - Pros: Gold standard
  - *Cons:*

- *Radiation*
- *Small risk of procedural complications including stroke*
- *"Lumenography" – can miss minor coronary atherosclerosis.*

Which Test?

See RACGP for details of cost, sensitivity, specificity, advantages, and disadvantages of each test.

Presentation	Test	Preparation
New onset chest pain or equivalent	• Stress Echo • Exercise stress test • CT coronary angiogram	• Stop all heart rate-slowing drugs 24 hours prior to: ○ stress tests ○ stress Echo, and ○ myocardial perfusion scans unless checking for adequacy of treatment of ischaemic heart disease (IHD). • Patients often require oral beta blockade prior to CTCA, but the radiologist or cardiologist will organise this • Strongly consider starting aspirin while awaiting tests.
Chest pain in a patient with known IHD – possible ischaemia	• Stress Echo • Myocardial perfusion scan	
Worried but well – possible atherosclerosis	• Stress Echo • CT coronary angiogram	

Other Tests

- 24 hour ambulatory blood pressure monitor – useful in further investigating borderline or presumed white coat hypertension. There is no Medicare rebate for this test.

- ***Transthoracic echocardiogram (TTE)***
  - *Indications:*
    - *Assess structure and function of the heart, e.g., assess LV/RV function*
    - *Assess pulmonary pressure*
    - *Assess valvular function*
  - *Pros: Useful in dyspnoea, chest pain, palpitations, and heart failure symptoms*
    See Echocardiography (Echo).

- ***Transoesophageal echocardiogram (TOE)***
  - *Indication:*
    - *Further investigation of findings on a TTE*
    - *Requires cardiology assessment before the test*
  - *Pros: Greater detail*
  - *Cons:*
    - *Invasive*
    - *Sedation required*
    - *Requires probe to be passed into oesophagus under conscious sedation*

See Echocardiography (Echo).

- Holter monitoring – investigation of palpitations and syncope, or assessment of rate control in atrial fibrillation.
- Event monitor (7 days ambulatory cardiac monitoring) – investigation of infrequent palpitations or syncope/presyncope where the 24 hours of cardiac monitoring with a Holter has not provided a diagnosis.
- ***Checks of cardiac implantable devices*** (pacemakers, defibrillators, loop recorders)
  - *Indication:*
    - *Routinely checked 2 weeks post implantation and then every 3 to 12 months, but can be interrogated in the event of syncopal or presyncopal symptoms (most record tachycardic events including atrial fibrillation and ventricular tachycardia). Remote monitors may be used.*
    - *Check loop recorders soon after the patient experiences an event.*
  - *Patients will belong to a clinic or physician and can contact them to arrange check.*
    See Implantable Cardiac Device Check.

- Tilt table – specialist referral necessary. Rarely used in the investigation of syncope in the general practice setting.
- ***CT coronary calcium scoring***
  - *Indications:*
    - *Those at low risk and those at high risk would not benefit from the study.*
    - *In general, coronary artery calcium score CT scans are most useful in women aged 35 to 70 years and in men aged 40 to 60 years who are asymptomatic and at intermediate risk e.g., positive family history or borderline cholesterol.*
    - *Sometimes used to help make decisions on preventative therapy (aspirin or statin) when traditional risk factors are inconclusive.*
  - *Pros:*
    - *Non-invasive test that estimates the amount of plaque within an individuals coronary arteries using a high-resolution CT scanner.*
    - *A calcium score of 0 puts the patient at a very low risk of adverse cardiac events in the next 5 years*
    - *Fast examination, requires little preparation, does not require any injections of X-ray contrast.*
    - *Can be ordered alone or in combination with a CT coronary angiogram.*
  - *Cons:*
    - *Place in therapy not well established.*
    - *Results around the average calcium score for a persons age will not aid in decision-making.*
    - *There is no Medicare rebate.*

  See CT Calcium Scoring.

Information

For health professionals

Further information

- Australian Family Physician – Cardiac Stress Testing
- Alfred Hospital:
  - Ambulatory Blood Pressure Monitoring
  - Cardiac MRI
  - CT Angiogram
  - ECG
  - Echocardiogram
  - Holter Monitor
  - Stress Echocardiogram
  - Trans-oesophageal Echocardiogram

For patients

Heart Online – Patient Information

Disclaimer

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