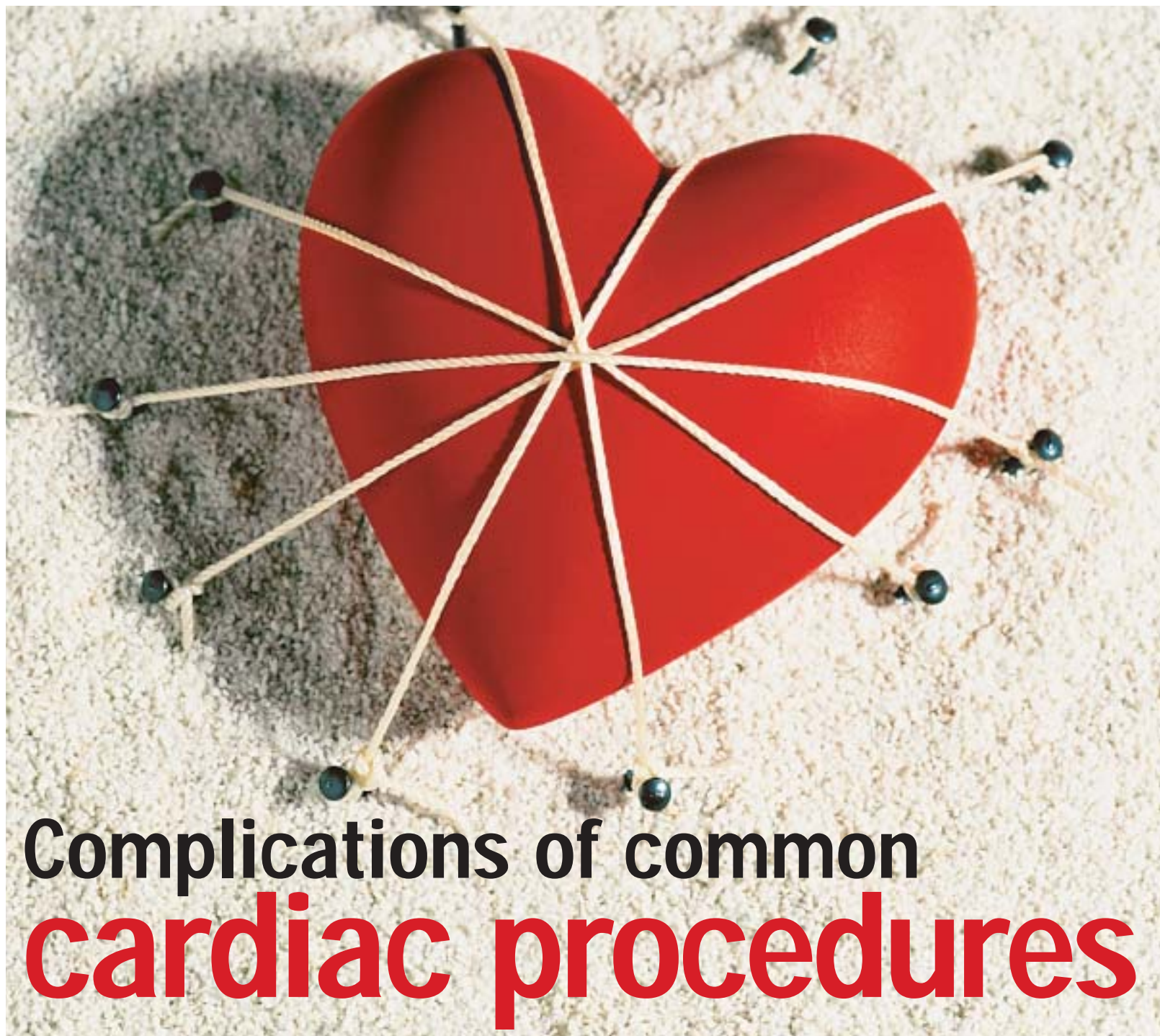


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Complications of common cardiac procedures

Background

CARDIOVASCULAR disease in general and coronary artery disease in particular are major causes of morbidity, mortality and disability in Australia.

In recent years there have been several changes in the investigative and treatment strategies for these conditions. For example, use of diagnostic coronary angiography has increased by 50% in the last decade, resulting in a twofold increase in the

frequency of coronary revascularisation procedures.

About 24,000 angioplasties were performed in 2002-2003, 91% of which involved stent implantation. Concomitantly there has been a modest 15% decline in the number of CABG procedures in the last decade, with 16,000 performed in the same year.

The last decade has also seen significant developments in pacemaker

and automatic internal cardioverter defibrillator (AICD) technology. Greater functionality and broader indications for insertion mean that more patients are leaving coronary units with these devices implanted.

At the same time there has been tremendous pressure on public hospitals to remain cost effective, resulting in shorter cardiac admissions. The average length of stay for cardiovascular disease declined from 7.3 days

in 1993-1994 to 5.6 days in 1998-1999. This obviously has an impact on GPs in terms of follow-up and monitoring for complications in patients who have been recently discharged after cardiac procedures.

This article provides an overview of the more common invasive investigations and therapies offered to cardiac patients, with an emphasis on the short-term consequences and complications of these procedures.

inside

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Acute coronary syndromes

ACUTE coronary syndromes are the most frequent reason for admission to a coronary care unit. These syndromes fall into three broad categories, differentiated by ECG and enzyme findings.

ST-segment-elevation MI

Symptoms associated with significant ST-segment elevation on ECG (ST-segment-elevation MI [STEMI]) are most commonly caused by the complete occlusion of a major epicardial artery.

Patency of the occluded artery can be restored using thrombolytic agents, such as streptokinase, or derivatives of tissue plasminogen activator (tPA), such as tenecteplase (Metalyse) or reteplase (Rapilysin), or by revascularisation.

Randomised trials have suggested percutaneous reperfusion to be more effective than fibrinolysis if the procedure can be performed promptly. Therefore centres with catheterisation laboratories and experienced personnel increasingly treat these patients with immediate (primary) angioplasty.

Figure 1: A coronary artery stent. These can be coated with drug (sirolimus or paclitaxel) embedded in a polymer matrix. Gradual elution of the drug prevents smooth muscle proliferation and restenosis.



Adjunctive antiplatelet medications such as aspirin, clopidogrel (Iscover, Plavix), glycoprotein IIb/IIIa inhibitors and anti-thrombins such as heparin or low molecular weight heparin are often used in the management of these patients. Bleeding complications are therefore encountered frequently.

Non-ST-segment-elevation MI

Cases in which patients have chest pain and detectable troponin in the absence of ST-segment elevation are categorised as non-ST-segment-elevation MI, or non-STEMI.

Detectable troponin after an acute coronary syndrome represents some degree of myocardial necrosis and marks a group of patients with increased morbidity and mortality.

These patients may or may not have ECG changes; however, the presence of ST-segment deviation is an additional marker for adverse cardiovascular outcomes in the short and medium term.

Unstable angina

Cases in which patients have chest

pain in the absence of elevated troponin levels are classified as unstable angina.

Certain features, such as an accelerating tempo of angina, a prolonged episode of pain, the presence of diabetes or the development of heart failure or arrhythmias, indicate a higher-risk group within this cohort.

It is important to recognise these higher-risk patients because it is believed they benefit from an early invasive management strategy, involving early diagnostic angiogram (generally within 24-48 hours of presentation if available) and, when possible, revascularisation.

Increasingly, the early invasive approach is being applied to lower-risk patients as well. This strategy allows rapid identification of patients who will benefit prognostically from revascularisation, avoids unnecessary medication and allows early discharge for those who have no obstructive coronary disease.

From assessment to intervention

After coronary angiography about 35% of patients with an acute coro-

nary syndrome will undergo percutaneous coronary intervention. Selection for this procedure is based primarily on anatomical criteria, with most of these patients having single-vessel disease or discrete lesions in multiple vessels.

One recent exciting technical advance is the development of drug-eluting stents (figure 1). At the time of writing, the two varieties available are coated with either sirolimus (Cypher stents) or paclitaxel (Taxus stents), which prevent smooth muscle cell ingrowth into the stent, drastically reducing the likelihood of in-stent restenosis.

Patients have now been followed for 2-5 years after placement of these stents, confirming the long-term safety and efficacy of the drug coating. This means that we can be relatively certain that, once a segment of artery is stented, it will remain patent in the long term.

For this reason, cardiologists are increasingly applying this treatment to more complex anatomical subsets. In general, patients with left main disease or narrowing in all three major epicardial vessels still undergo CABG.

Care after coronary angiography or percutaneous coronary intervention

Local (vascular access) complications

CORONARY angiography is most commonly performed via the right femoral artery. A sheath about 2mm in diameter is placed into the vessel percutaneously and a dose of heparin is administered during the procedure to guard against thrombus formation.

The sheath is removed immediately after a diagnostic procedure, or several hours later after a coronary intervention. Haemostasis is attained either by digital pressure or by a biodegradable closure device, followed by several hours of bed rest and relative immobilisation.

There is almost always a small amount of bruising visible at the access site, which may become prominent over the next few days. This may track down the inner thigh to the knee and may involve the scrotum in men.

The bruising is generally of no concern unless it is accompanied by persisting pain or development of a pulsatile (>2cm) or painful swelling near the region of the access site.

The most common local complications that GPs may encounter after diagnostic or therapeutic cardiac catheterisations include femoral access site haematoma (figure 2), pseudoaneurysm, arteriovenous fistula formation and late retroperitoneal or rectus sheath haematoma.

Femoral artery pseudoaneurysm

A femoral artery pseudoaneurysm is defined as a collection of blood in continuity with the arterial system but not enclosed by a proper arterial wall.

It is an uncommon but important complication that occurs in about 0.6% of patients after diagnostic angiograms and in up to 5% after coronary interventions.

Risk factors for the development of femoral pseudoaneurysm include advanced age, use of aggressive anticoagulation and obesity.

Symptoms usually develop within a few hours after the procedure although they may become apparent as long as four weeks later. Patients usually complain of persistent discomfort, swelling and bruising over the puncture site.

Examination may show a pulsatile mass and an audible bruit. Doppler ultrasound or CT scan usually confirms the diagnosis.

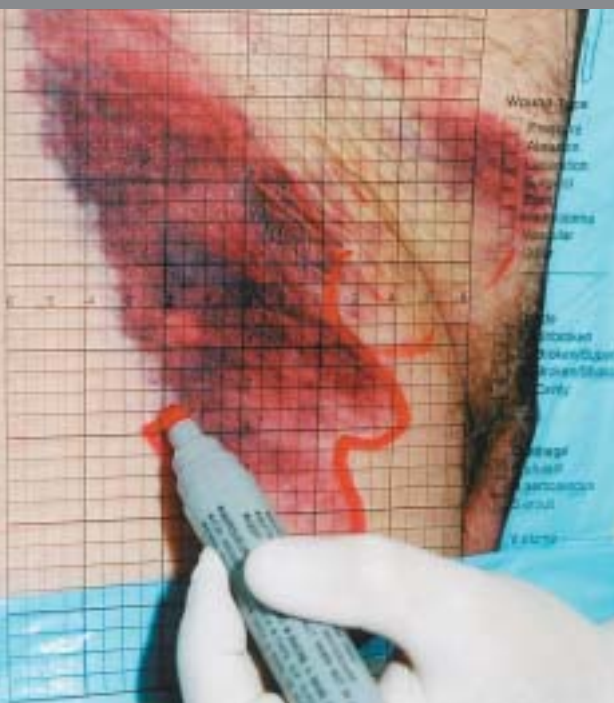
A femoral pseudoaneurysm is usually treated with ultrasound-guided compression. This involves identifying the neck of the pseudoaneurysm with colour Doppler ultrasound (figure 3, see next page) then applying pressure via the ultrasound probe until the flow into the pseudoaneurysm stops, while maintaining flow in the femoral artery.

The pressure is usually maintained for 10 minutes and repeated after a 10-20-minute interval if necessary. Overall, treatment can take up to 90 minutes.

The most common side effects are patient and sonographer discomfort, and vasovagal responses (bradycardia and hypotension) requiring atropine and IV fluid.

The success rate is about 90% and in trained hands the risk

Figure 2: Femoral access site haematoma. The size of the bruise can be determined by referring to the measuring grid placed over it.



of femoral artery occlusion is very low.

Thrombin injection into the false aneurysm is an alternative form of treatment but requires technical expertise and should only be performed in dedicated vascular laboratories.

Since the introduction of these treatments, the requirement for surgical repair of femoral pseudoaneurysm is rare.

Arteriovenous fistula formation

An AV fistula is an abnormal communication between the femoral artery and the femoral vein.

In contrast to a femoral pseudoaneurysm, an AV fistula may take some days to develop but is usually clinically apparent within a week

of the procedure. Signs include a thrill or an audible bruit over the artery as well as swelling of the leg although it can be clinically silent and found incidentally on ultrasound.

Small AV fistulae can sometimes be followed clinically, but if treatment is required, ultrasound-guided compression is usually successful.

Other treatment options are surgical repair or insertion of covered stents. These devices consist of a polyethylene tube 'sandwiched' between two stents, which is placed into the artery and deployed across the fistula to seal off the connection between the femoral artery and vein.

Retroperitoneal or rectal sheath haematoma

A retroperitoneal haematoma is a potentially serious complication that usually occurs within hours of the procedure but occasionally becomes manifest later, especially if anticoagulation with heparin or warfarin is reintroduced.

Patients generally complain of lower abdominal, flank or low back pain that can be severe and require opioid analgesia. Examination may reveal localised tenderness and firmness in the flank and lower back, at the site of the pain.

If significant bleeding has occurred, there may be postural hypotension and a resting tachycardia. If such haemodynamic signs are present, the patient should be referred to an emergency department.

The diagnosis is usually

confirmed with a CT scan of the abdomen. Treatment is usually supportive, as bleeding is generally self-limiting and settles with medical management.

A rectus sheath haematoma (bleeding into the anterior abdominal wall) usually occurs spontaneously during aggressive anticoagulation. It can also be caused by femoral artery puncture itself, especially if the puncture site is above the inguinal ligament.

The patient presents with abdominal pain, which can be mistaken for a symptom of intra-abdominal pathology. In general a CT scan of the abdomen makes the diagnosis, and treatment is usually conservative.

Anticoagulation or antiplatelet therapy may need to be suspended, but this should only be done after consultation with the treating cardiologist, particularly if a stent has been implanted during the coronary intervention.

Coronary complications

Stent thrombosis

Stent thrombosis is the most serious complication of percutaneous coronary stent implantation. It is characterised by acute formation of a thrombus within the stent, leading to acute vessel closure and STEMI.

Stent thrombosis occurs in about 1% of cases, most often within the first 24-48 hours. However, it can occur in the first month when conventional stents are used and as late as 12 months after placement of a drug-eluting stent.

Thrombosis of the stent
cont'd next page

from previous page

accompanied by signs of STEMI represents a medical emergency requiring thrombolytic therapy or urgent repeat coronary intervention.

The likelihood of stent thrombosis is minimised by dual antiplatelet therapy (aspirin and clopidogrel) for at least one month after conventional stent placement and 12 months after placement of a drug-eluting stent.

Restenosis

Stent restenosis is a late complication of coronary intervention and an important cause of return of anginal pain within six months of stent implantation.

It is caused by growth of smooth muscle and endothelial cells within the lumen of the stent, causing luminal narrowing.

Diabetes, long lesions and narrow-calibre vessels are factors that predispose to the development of in-stent restenosis.

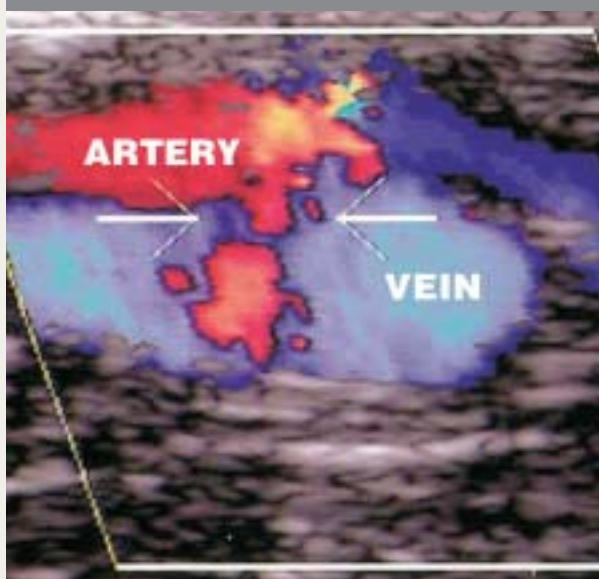
The incidence of clinically important restenosis varies but is usually around 10-25%.

Drug-eluting stents have been shown to significantly reduce the incidence of in-stent restenosis and, as discussed previously, represent a major breakthrough in the practice of percutaneous coronary intervention.

However, these devices are expensive and for this reason availability is restricted in public health systems in most states.

Return of anginal pain after coronary intervention can also be due to progression of atherosclerosis in an unstented segment of coronary artery, which underscores the importance of secondary preventive strategies.

Figure 3: Femoral pseudoaneurysm identified by colour Doppler ultrasound.



Care after coronary bypass surgery

ABOUT 10% of patients undergoing coronary angiography for an acute coronary syndrome are referred for CABG, either as a semi-urgent or an elective procedure.

Patients with ongoing pain despite medical therapy or with significant left main coronary artery disease are generally not discharged from hospital until they have been revascularised.

Patients with stable symptoms and non-critical multi-vessel coronary disease may be discharged with arrangements for elective CABG. Any escalation in symptoms while awaiting the procedure should prompt the patient to seek urgent medical attention, as this is generally an indication for readmission and expedited revascularisation.

Compared with several decades ago, the average length of stay in hospital after CABG has fallen significantly. Patients are generally discharged on day 5-7 and are not seen by the surgeon or cardiologist until the sixth postoperative week.

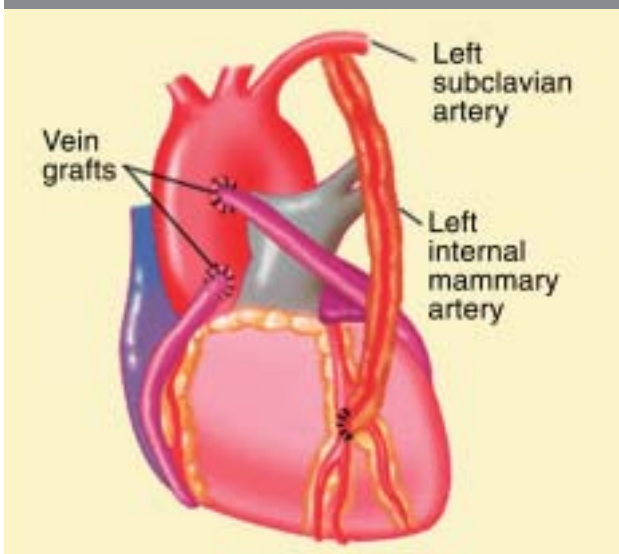
Problems, which are not uncommon during the intervening period, thus come to the GP.

Chest pain and dyspnoea

All patients returning home after CABG experience some degree of chest discomfort, most often related to the sternotomy or harvesting of the internal mammary artery.

Other less common causes of chest pain after CABG include pericarditis, pulmonary embolus and, occasionally, recurrence of cardiac ischaemia due to graft failure.

Figure 4: Left internal mammary artery grafted to the left anterior descending coronary artery. Vein grafts to circumflex and right coronary arteries are also shown.



The post-CABG chest X-ray

The chest X-ray is always abnormal after CABG for several weeks. The most common findings are atelectasis in the basal lung fields and small pleural effusions.

A left-sided pleural effusion is common after left internal mammary artery harvesting. Larger pleural effusions may be related to the post-cardiotomy syndrome (see below).

Sternotomy-related chest pain

During the 1990s CABG was sometimes done with small chest-wall incisions, to avoid the trauma of splitting the sternum. However, it is now believed that this limited exposure of the operative field compromises graft patency, so most CABG procedures are performed with the sternum open and the heart fully exposed.

Sternotomy-related chest

pain is usually localised to the anterior chest wall and is worse on deep breathing, coughing and movement. Usually it is self-limiting and responds to simple analgesia.

Pain from mammary grafts

If possible the left internal mammary artery is grafted to the left anterior descending coronary artery during CABG (figure 4).

Some surgeons will also mobilise the right internal mammary and graft it to the distal right or branches of the circumflex coronary artery.

With mammary grafts the patient is almost always aware of a loss of sensation over the breast region.

Not uncommonly, the disturbed innervation of the chest wall is associated with localised pain that does not respond to nitroglycerin and is not accompanied by ECG changes.

Treatment is usually con-

servative with simple analgesia, which may be required for a few weeks. Occasionally, the pain can be particularly troublesome and persist for years.

Pericarditis and the postcardiotomy syndrome

After bypass surgery, left sided, localised pleuritic chest pain, worse lying flat and relieved by sitting forward, may be due to pericarditis; constitutional symptoms such as fever, myalgia and fatigue may also be present.

This is called the postcardiotomy syndrome and is similar to Dressler's syndrome after MI. Symptoms usually develop between the first week and first month after surgery.

A pericardial rub may be noted on examination and the WCC and inflammatory markers may be elevated. NSAIDs can be used short term for symptom relief.

Postcardiotomy syndrome is also an important cause of pericardial effusion and occasionally cardiac tamponade. Symptoms are usually worsening dyspnoea, orthopnoea, oedema and fatigue. Anticoagulation can contribute to this condition.

Examination may reveal distended neck veins and low blood pressure. Pericardial tamponade is usually diagnosed by echocardiography and requires urgent pericardiocentesis.

Pleural effusion

Small, asymptomatic pleural effusions are common after CABG and are usually treated conservatively.

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They occur on the left side most often and can be due to internal mammary artery harvesting, atelectasis and postcardiotomy syndrome. Less often it can be a sign of worsening cardiac failure or pulmonary embolism.

Pleural effusions can be large enough to cause significant dyspnoea, requiring therapeutic drainage.

Pulmonary embolus

Pulmonary embolus is a relatively uncommon (about 3% incidence) but important cause of chest pain and dyspnoea after CABG.

New-onset pleuritic chest pain with dyspnoea, resting tachycardia and hypoxia, particularly in a patient with a relatively complicated hospital course, should be investigated promptly with a V/Q scan or CT pulmonary angiogram.

Ischaemic chest pain

Ischaemic chest pain shortly after CABG may result from a native coronary artery not bypassed (incomplete revascularisation) or

because of anatomical factors (calcified vessels or diffuse disease with distal vessels too small to support a bypass graft). It may also result from early graft failure. Closure of a saphenous vein conduit has been estimated to occur at a rate of 10-15% in the first month after CABG.

Chest pain with objective signs of ischaemia is usually investigated aggressively with cardiac catheterisation and may require percutaneous intervention or even repeat CABG. Hence these patients should be promptly referred to their primary cardiologist.

Fever and infection

Besides infection, recognised causes in this situation include phlebitis related to insertion of IV lines, DVT and post-pericardiotomy syndrome.

Any fever must be adequately investigated and treated if it is related to infection.

Superficial sternal wound infections

These infections do not pen-



etrate the subcutaneous tissue. They usually present with mild erythema and discharge and are often treated by opening the subcutaneous tissue layer and packing the wound.

Deep sternal wound infections

These infections (0.4-5% of cases) include acute mediastinitis, which involves sternal dehiscence and osteomyelitis of the sternum.

Presenting features include wound discharge, fever, sternal instability, increase in wound pain and elevated WCC. Patients with these symptoms should be referred immediately to the centre that performed their procedure, as the

wound may need to be reopened and debrided.

Vein-harvesting infections

Infections arising from harvesting the vein from the leg are more common than sternal infections and can usually be managed in an outpatient setting with oral antibiotics.

Unilateral leg oedema, which increases the chance of delayed wound healing, ulceration and infection, is common and should be treated with leg elevation and compression stockings.

Oedema

New bilateral leg oedema may signify impaired cardiac function, pericardial effusion or bilateral DVT. These patients should be sent to their cardiologist promptly for further investigation.

Arrhythmia

Atrial fibrillation is the most common arrhythmic complication of open cardiac surgery, with an incidence of 10-40%.

It usually occurs shortly

after operation, peaking at 48 hours. However, it can occur shortly after discharge and first come to the attention of the GP.

These patients should be referred to their cardiologist for consideration of anticoagulation and either cardioversion or control of their ventricular rate.

Mental health

Cognitive impairment

Up to 27% of patients complain of memory loss after CABG but about 50% show cognitive deficit on neuropsychological testing before discharge.

This early deficit has been shown to be a predictor of cognitive deterioration five years after CABG. Risk factors include preoperative peripheral and cerebrovascular disease as well as perioperative complications such as MI and hypotension.

Brain hypoperfusion during cardiopulmonary bypass and microemboli to the cerebral vasculature have been implicated as aetiological factors.

Depression

It is estimated that 20-25% of patients experience depression preoperatively.

Seventeen per cent of those who did not have depression preoperatively will have depressive symptoms after CABG. These newly diagnosed patients have been shown to have an adverse cardiovascular prognosis compared with those without depression. They will not necessarily have prominent affective features but may instead complain of functional loss and memory deficit. Hence there is significant overlap between a depressive disorder and cognitive decline after CABG.

Therapy for depression usually consists of CBT and some form of pharmacological therapy.

Antidepressants have been shown to improve quality of life. Long-term morbidity and mortality could also improve as a result of intervention. SSRIs are generally well tolerated and safe in patients after CABG.

Discharge medication and secondary preventive measures in patients with CAD

DISCHARGE medications typically include aspirin, clopidogrel (if stent implantation has occurred or the patient presented with an acute coronary syndrome), beta blockers, statins and ACE inhibitors.

These medications are usually started in hospital and are prognostically valuable, so it is important they are continued. If any of them are absent from the discharge medication list, the GP should actively investigate the reason, as

it may represent an omission rather than a conscious decision by the discharging doctor.

The mnemonic ABCDE (aspirin and antianginals; beta blockers and blood pressure; cholesterol and cigarettes; diet and diabetes; education and exercise) proposed by the American College of Cardiology may be useful in reminding practitioners of the important factors in the long-term management of patients with coronary artery disease.¹



In the context of symptomatic coronary disease, nitrates and calcium-channel blockers can be used for symptom relief. These medications are often stopped after a patient has undergone successful revascularisation.

Sexual activity

Most doctors recommend waiting four weeks before resuming normal sexual activities. Gradual resumption, with suitable positioning and

undertaking a less active role in sexual intercourse, is advisable. Libido is commonly lost immediately after CABG but is usually recovered after a few weeks.

Return to work after a coronary event

The issue of returning to work after a cardiac event is a complex one that depends not only on the cardiovascular status but also on *cont'd next page*

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the patient's perception of their illness, their level of anxiety or depression, employer attitudes and the nature of the occupation.

For these reasons, all patients who have suffered AMI or undergone CABG should be encouraged to attend a cardiac rehabilitation program. Effective cardiac rehabilitation programs address the issue of returning to work, the psychological aspect of the patient's situation and the important lifestyle issues such as smoking, weight and cholesterol reduction.

Patients with small uncomplicated MIs who wish to return to deskwork can be expected to do so in the first few weeks after discharge. They should be encouraged to increase their physical activity slowly toward normality in the first six weeks after discharge.

On the other hand, patients who

have experienced large infarcts or infarcts complicated by congestive cardiac failure, cardiogenic shock or ventricular arrhythmias may well require permanent readjustment of their work expectations.

Patients contemplating returning to physically demanding work such as cleaning, lifting or operating heavy machinery usually require consultation with their treating cardiologist before returning to this level of activity.

Returning to work after coronary angioplasty

The timing of returning to work or resuming normal physical activity after percutaneous coronary intervention depends on the original indication for the procedure.

For example, patients with uncomplicated single-vessel angioplasty for chronic stable angina should avoid driving in the first two days, and

heavy lifting or straining in the first week. Otherwise it is reasonable for this group of patient to return to work within a few days of the procedure.

The ability of a middle-aged man who has undergone immediate (primary) angioplasty for AMI to return to work is dictated by the coronary event, not the angioplasty itself.

Returning to work after CABG

About 70-80% of patients undergoing CABG eventually return to their previous occupation. Factors including age, severity of the coronary syndrome before operation, other comorbidities as well as the perioperative course influence the timing of return to work.

Patients can usually restart work after two months although those who are involved with heavy manual work should probably wait at least three months to allow com-

plete union of the sternum. In these cases, allocation of lighter duties with a gradual return to the previous workload is generally advisable.

Fitness for driving after a coronary event or cardiac procedure

Assessing fitness to drive in a cardiac patient may require discussion with the treating cardiologist. The doctor needs to find a balance between protecting the safety of the community and avoiding unnecessary restrictions to their patient. To put things into perspective, one in 1000 reported road accidents are attributed to cardiac ischaemia.

The *Assessing Fitness for Driving* manual written by Austroads provides a comprehensive guideline for medical practitioners. This can be obtained at www.austroads.com.au/aftd/hp.html

The recommendations in this article reflect these guidelines and pertain to patients driving private vehicles only.

After an uncomplicated AMI, patients are usually advised not to drive for two weeks. Obviously patients who have recurrent ischaemia or who have experienced aborted sudden cardiac death do not fall into this category.

Patients who have undergone successful angioplasty without an MI before or after the procedure are allowed to drive after two days. Survivors of cardiac arrest are not allowed to drive for six months.

Patients with an automatic internal cardioverter and defibrillator implanted are generally allowed to drive after six months of clinical stability, ie, no defibrillator discharges. Those with a defibrillator inserted prophylactically can drive two weeks after implantation.

Pacemaker, implantable cardioverter defibrillator and cardiac resynchronisation therapies

THE rate of pacemaker and defibrillator implantation in Australia is increasing exponentially, due primarily to a relatively recent expansion of the indications for these devices.

An accumulating body of data suggests resynchronisation therapy, which involves pacing both the right and left ventricle for heart failure, improves symptoms and reduces mortality.

Similarly, defibrillators have been shown to reduce mortality in a wide spectrum of

patients with impaired left ventricular function, independent of the documentation of ventricular arrhythmias.

These devices are usually implanted with relative ease percutaneously, with thoracotomy for lead placement becoming a rare phenomenon.

Several potential complications may be encountered after implantation of these devices, including problems with software or complications related to device functioning.

These may manifest as

symptomatic palpitations, presyncope or syncope, or inappropriate discharges. Patients with any of these symptoms after device implantation should be referred promptly to their cardiologist.

Local complications of device implantation, such as haematoma and infection, are relatively common. 'Pocket haematoma' is an acute complication usually apparent before hospital discharge. The source of the bleeding may be the subcutaneous pocket itself or the venous lead entry site.

Treatment is usually conservative, with observation only. Haematomas that are increasing in size, tense or painful (about 1-2% of all pacemaker insertions) need to be evaluated by the operator who placed the device (either a cardiologist or cardiac surgeon).

Not surprisingly, anticoagulation in hospital after pacemaker insertion is a risk factor for haematoma formation.

Wound pain and infection

Some degree of wound dis-

comfort is to be expected after device implantation and this normally responds to simple analgesia. Worsening pain, or pain that improves but recurs, should raise the possibility of an infection, which may require surgical exploration or even lead extraction.

The incidence of pacemaker- and defibrillator-related systemic infection has been estimated at 1-7%. Symptoms usually involve increase in local warmth, erythema, swelling, oedema or discharge from the device pocket.

Twenty five per cent of all pacemaker- and defibrillator-related infections tend to occur early (days 0-28), 33% occur late (days 29-364) and 42% are delayed (after 365 days). Late infection is usually more indolent and may only present with pain at the insertion site.

Significant infection with systemic involvement requires complete device and lead removal, followed by antimicrobial therapy and reimplantation at a later date.

Author's case study

MR AK, 44, has a history of type 2 diabetes, essential hypertension and long-term cigarette smoking.

He presented to a tertiary hospital emergency department at 2am with a four-hour history of severe chest pain and diaphoresis. His ECG showed 4mm of ST-segment elevation in the anterior leads (figure 5).

Mr AK was given aspirin 300mg, IV heparin 4000 U and clopidogrel 300mg. A decision was made to treat this acute anterior MI with immediate (primary) angioplasty.

The cardiac catheterisation team (consisting of the interventional cardiologist, catheter lab nurse, cardiac technician and cardiac nurse) was called in and the patient was taken to the cardiac catheterisation laboratory.

A diagnostic angiogram showed an occluded left anterior descending artery, which was subsequently opened and stented (figure 6).

Mr AK was then admitted to the coronary care unit and treated with aspirin, clopidogrel, abciximab (Reopro [12-hour infusion]) as well as a statin, ACE inhibitor and beta blocker.

His creatinine kinase level peaked at 4500U/L and echocardiography showed anterior hypokinesia with a left ventricular ejection fraction of 30%.

His hospital course was uncomplicated and he was discharged from hospital on day four after admission.

Four days later he presented to

Figure 5: ECG showing ST-segment elevation.



his local GP complaining of discomfort and persistent swelling and bruising in the right groin as well as easy bleeding, especially during shaving. He denied any symptoms of ischaemia or cardiac failure.

His medications at discharge were aspirin 150mg, clopidogrel 75mg, perindopril 4mg, simvastatin 40mg and atenolol 50mg, all taken once daily.

He had read the product information on clopidogrel and asked whether this could be stopped, as it might be contributing to his easy bleeding and the bruising in his groin.

Close examination of the groin showed bruising and a tender pulsatile mass. His pedal pulses were normal.

A semi-urgent Doppler ultrasound

confirmed a pseudoaneurysm of the right femoral artery, which was treated with ultrasound-guided compression.

Comment

Femoral pseudoaneurysm is more common with coronary intervention than with diagnostic angiogram. This is usually due to the need for larger vascular access as well as aggressive use of antiplatelet agents and anticoagulation (Mr AK had been treated with dual antiplatelet agents as well as abciximab during the acute admission).

However, he was counselled to continue both aspirin and clopidogrel, as this therapy is important to prevent stent thrombosis.

Three months later Mr AK presented to his local GP complaining of an episode of unprovoked syncope. Earlier in the day he was walking towards the kitchen when he collapsed on the floor with loss of consciousness. His wife noted he was pale and apnoeic for about 30 seconds. He recovered promptly.

On further questioning Mr AK recounted episodes of dizziness the week before at work, but no angina. His pulse rate was 70 bpm and blood pressure was 120/60mmHg, with no orthostatic hypotension.

Mr AK was referred to the emergency department for further evalu-

ation. Cardiac monitoring revealed brief episodes of non-sustained ventricular tachycardia.

His electrolyte levels were normal and a subsequent angiogram showed a patent left anterior descending artery stent and no significant obstructive coronary disease. He was referred for an electrophysiology study, which showed inducible monomorphic sustained ventricular tachycardia.

An AICD was implanted during the same admission and he was discharged.

Comment

Syncope and/or non-sustained ventricular tachycardia in a patient such as this, who has had MI causing moderately impaired left ventricular systolic function, indicate an increased risk for sudden cardiac death.

These patients may qualify for an AICD and should be evaluated by a cardiologist. AICD implantation in asymptomatic patients with impaired left ventricular function (ejection fraction <30-35%) is supported by recent clinical trials, but implantation is expensive and not widely practised.

Patients who survive cardiac arrest and those with documented ventricular tacharrhythmias or syncope represent a high-risk group who have the most to gain from AICD implantation.

GP's contribution



DR LIZ MARLES
Redfern, NSW

Case study

ROY, 45, is an Aboriginal man with a background of type 2 diabetes and a previous inferior MI at age 37. He has never drunk alcohol and gave up smoking eight years ago.

Although he was started on multiple medications at the time of his infarct, his compliance was poor for several years until he became increasingly breathless about 18 months ago, with occasional dizzy spells.

He was admitted and found to have poor left ventricular function (ejection fraction 37%) and dilated cardiomyopathy. His diabetes was poorly controlled, with an HbA_{1c} of 13.6% and total cholesterol of 6.8mmol/L.

Angiography showed two-vessel disease, with the circumflex artery completely blocked and the right coronary artery having a very long lesion.

As there was an area of reversibility on his sestamibi scan, Roy underwent bypass surgery 12 months later, after his diabetes had been treated and he had been started on a statin.

Nine days postoperatively Roy felt well but was experi-



encing sweats and was noted to have left basal atelectasis and a small left pleural effusion on CXR. He was afebrile but pale and his haemoglobin was 10.0mg/L.

His diabetic control had improved markedly, and he was now compliant with medications.

Two months postoperatively Roy presented for review, feeling much improved and now able to walk 1km along the flat with no shortness of breath or chest pain, but with recurrent episodes of dizziness.

His ECG showed atrial

flutter with 2:1 block, and heart rate of 150 bpm, so he was referred back to his cardiologist.

Questions for the authors
What is the likely significance of Roy's sweats, basal atelectasis and pleural effusion? Should he be treated for infection?

Symptoms of infection, including sweats in the presence of basal atelectasis, should be treated with antibiotics even in the absence of fever.

Are there any special considerations for postoperative care resulting from Roy's diabetes?

His diabetes places him at increased risk of wound infection, so close attention must be paid to ensure the wound is kept clean, and any suspicion of infection treated early. Tight glycaemic control may lessen the risk of infection and reduce progression of his coronary disease in the long term.

Is Roy a likely candidate for an AICD?

His left ventricular function should be assessed three months after his surgery to

determine whether there has been any recovery after revascularisation. If his ejection fraction is less than 30%, he would benefit from an AICD.

General questions for the authors
Are the risks associated with a pseudoaneurysm the same as those for an aneurysm? Do they heal without intervention?

Although they do present a small risk of continued expansion and rupture, a pseudoaneurysm usually comes to the attention of the patient before this occurs. Ultrasound studies performed soon after vascular intervention suggest they may be more common than we appreciate and that most resolve spontaneously within hours of the procedure.

What is the optimal time frame for reperfusion using a stent?

For ST-elevation MI, the earlier the artery is reopened the better. The trials that have been conducted suggest cardiac muscle is salvaged if the artery can be reopened by a stent within 24 hours of the onset of symptoms.

Reference

1. Gibbons RJ, et al. ACC/AHA/ACP-ASIM guidelines for the management of patients with chronic stable angina. *Journal of the American College of Cardiology* 1999; 33:2092-197.



How To Treat Quiz

Complications of common cardiac procedures — 11 March 2005

INSTRUCTIONS

Complete this quiz to earn 2 CPD points and/or 2 PDP points by marking the correct answer(s) with an X on this form. Fill in your contact details and return to us by fax or free post.

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1. In which TWO ways has the management of ischaemic heart disease changed over the last decade?

- a) 50% increase in diagnostic coronary angiograms
- b) Increased use of implantable defibrillators
- c) Stent implantation in 30% of angioplasties
- d) 50% reduction in frequency of CABG

2. Detectable troponin is not present in which ONE condition?

- a) Non-ST-segment-elevation MI (non-STEMI)
- b) Skeletal muscle damage
- c) Renal failure
- d) ST-elevation-MI (STEMI)

3. Ian, 65, has had four days of unstable angina. He takes no medication. After transfer to a coronary care unit, an angioplasty is performed and a stent inserted. Before discharge he complains of pain in his right groin. A femoral artery pseudoaneurysm is suspected. Which TWO physical signs may be present?

- a) Pulsatile mass
- b) Tenderness in the flank on that side

- c) Tenderness in the anterior abdominal wall
- d) Audible bruit

4. Which TWO investigations are most appropriate?

- a) MRI
- b) Doppler ultrasound
- c) CT scan
- d) Femoral angiogram

5. After discharge which ONE medication is unlikely to be prescribed?

- a) Aspirin
- b) An ACE inhibitor
- c) Clopidogrel
- d) A calcium-channel blocker

6. Peter, 50, survived a cardiac arrest that occurred during a hospital admission for STEMI. He is eight days post CABG. He complains of some dyspnoea. CXR demonstrates a left pleural effusion. Which is the least common cause of pleural effusion after CABG (choose ONE)?

- a) Left internal mammary artery harvesting
- b) Pulmonary embolus

- c) Postcardiotomy syndrome
- d) Atelectasis

7. Peter attends cardiac rehabilitation. Which ONE statement is not correct?

- a) He can expect to return to his work as an accountant after eight weeks
- b) He can gradually resume his normal sexual activities four weeks after surgery
- c) He will be able to drive in four weeks
- d) He may complain of memory loss and depression

8. Des, 60, had a large MI three years ago and has impaired left ventricular function. He asks about automatic implantable cardioverter defibrillators. Which TWO statements are correct?

- a) They are only indicated if ventricular arrhythmias have been demonstrated
- b) Thoracotomy is always required for lead placement
- c) They may improve life expectancy
- d) Systemic infection can occur after implantation

9. Angela, 55, has a coronary angiogram to assess atypical chest pain. She then has a successful angioplasty using a drug-eluting stent. She has no history of MI. Which information is correct in this situation (choose ONE)?

- a) Angela should not return to clerical work for two weeks
- b) She should not drive for two weeks
- c) The risk of in-stent restenosis is reduced because a drug-eluting stent has been used
- d) Dual antiplatelet therapy need only be used for one month after placement of a drug-eluting stent

10. Which TWO statements about stent restenosis are correct?

- a) It may present with gradual return of exertional angina
- b) It will most likely present as STEMI
- c) It usually occurs within the first 48 hours after stent implantation
- d) It may cause a decline in exercise tolerance

CONTACT DETAILS

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The mark required to obtain points is 80%. Please note that some questions have more than one correct answer. Your CPD activity will be updated on your RACGP records every January, April, July and October.

NEXT WEEK The next How to Treat examines the most common joint disease affecting humans — osteoarthritis. The author is Associate Professor Les Barnsley, head of the department of rheumatology, Concord Hospital, and the department of medicine, University of Sydney, NSW.

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