Is this a case of subacute bacterial endocarditis?

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GP Emergency Management articles use cases to illustrate the emergency management of patients presenting in general practice with cardiac problems. It is inspired by, but is not based on, a real patient situation.

George is well known to you and lives with his eldest daughter. He is 86 years old and has had type 2 diabetes for 12 years controlled by long-acting metformin 1000 mg daily. He has had mitral valve regurgitation of moderate severity diagnosed at age 81 years. This has not progressed over the past five years and is being managed conservatively. He also had an uncomplicated myocardial infarction at age 77 years.
He has hypertension controlled with candesartan 8 mg daily. He is also taking simvastatin, 40 mg daily, aspirin 100 mg daily and vitamin D 3000 IU daily. He has good renal function for his age.

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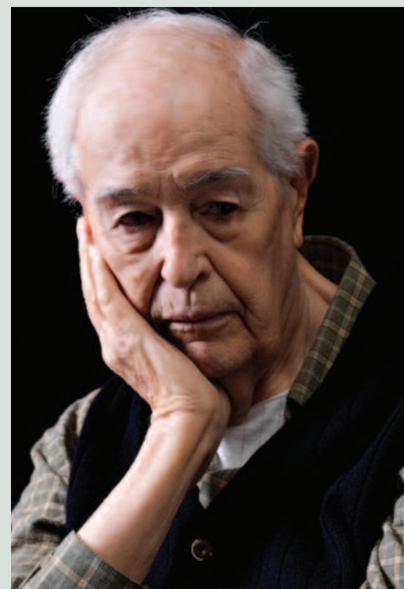
Today, George tells you he has been off his food for a few weeks but is still trying to eat normally. He has felt much more fatigued over this time and has taken to going back to bed at mid-morning for a few hours so he can stay awake late in the afternoon. He has no specific symptoms but has felt intermittently very sweaty although he hasn't taken his temperature. He has lost some weight and feels more frail and physically tired with exertion.

What specific questions would you ask George at this point?
Answer: *Has he had a cough, shortness of breath, palpitations, chest pain or vomiting? Has he experienced any problems when passing urine (such as pain, bleeding or frequency), a change in bowel habit, abdominal pain or bleeding when passing motion? How much weight does he think he has lost? Does he test his capillary blood glucose levels?*

George says he thinks he has lost about 3 kg. He has no specific symptoms other than those already mentioned but has noted some frequency with urination. He doesn't test his blood glucose levels himself, but his HbA_{1c} is 7.5%. What are the broad differential diagnoses at this point?
Answer: *Broadly, this presentation could be due to malignancy, depression, acute or chronic infection, organ failure, endocrinological disease, chronic pain or a side effect of medication (both medically prescribed and unprescribed).*

As George has diabetes and moderate mitral valve regurgitation you are particularly aware of the risk of



bacterial endocarditis. What signs would you look for on examination?
Answer: *Signs to look for are: low-grade fever, poor dental hygiene, pallor, clinical anaemia, subungual splinter haemorrhages, petchiae on conjunctiva and mucous membranes, Roth spots, Osler's nodes, Janeway lesions, clubbing, splenomegaly, tachycardia, worsening or changed heart murmur or signs of cardiac failure (apex displaced to the left, tachycardia, raised jugulovenous pressure, crepitations, peripheral oedema). A dry cough may be present. Urinalysis should also be carried out because a urinary tract infection is a differential diagnosis, as well as a possible cause of bacteraemia.*

What are Roth spots, Osler's nodes and Janeway lesions?
Answer: *These signs are all rare and their absence does not exclude endocarditis. Roth spots are retinal haemorrhages with central pallor (due to ischaemia from microemboli). They are not specific to bacterial endocarditis and may also be present in people with leukaemia or diabetes.*

Osler's nodes are painful, raised, purplish erythematous lesions with a pale centre. They

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are found on the fingers and toes in patients with subacute bacterial endocarditis and last for hours to days. It is thought that they are due to septic emboli that rapidly become sterile, creating a hypersensitivity vasculitis. They are not specific to endocarditis and can occur in people with other disseminated bacterial infections (classically gonorrhoea) and those with systemic lupus erythematosus.

Janeway lesions are painless haemorrhagic nodules on the palms and soles, especially the thenar and hypothenar eminences. They develop from septic microemboli and take several weeks to resolve. They are common in people with acute bacterial endocarditis and are due especially to Staphylococcus aureus *infection.*

What are the complications of untreated subacute bacterial endocarditis?

Answer: *Complications are: heart failure; glomerulonephritis; transient ischaemic attacks; cerebral, renal, splenic, pulmonary, hepatic infarction; meningitis; encephalitis; mycotic aneurysms; and abscesses.*

George has an essentially normal physical examination and average dental hygiene and his urine looks clear and has no abnormality on urine dipstick findings. When you listen to George's heart, his murmur seems very obvious and prolonged, his apex is displaced to the left and he is tachycardic (90 beats per minute, regular). His jugulovenous pressure is 2 cm at 45 degrees. His blood pressure is 95/60 mmHg and his oral temperature is 37.3°C. What investigations would you suggest now?

Answer: *George could certainly have subacute bacterial endocarditis and this must be promptly investigated and presumptively treated pending results. Ideally, George should be promptly hospitalised at this stage for ease of investigation at his age. Blood tests (electrolyte, urea, creatinine levels; liver function tests; full blood count; C-reactive protein level; erythrocyte sedimentation rate; thyroid-stimulating hormone level; iron studies; vitamin* B_{12} *and red cell folate levels) should be arranged urgently. A midstream urine specimen sent for microscopy, culture and sensitivity, and at least three blood cultures (ideally over 24 hours from a large vein and carried out using strict aseptic technique, before antibiotic treatment is commenced) should be carried out.*

George also needs a chest x-ray, ECG and urgent cardiac echocardiogram (transoesophageal echocardiography should also be performed). There is a very high chance a vegetation will be seen on the cardiac echocardiogram, especially on a transoesophageal echocardiogram. An antistreptococcal antibody titre, C3 level (which is often reduced in this condition) and rheumatoid factor (which is often positive) to confirm circulating immune complexes are all rarely requested as they are nonspecific.

What predisposes a person to subacute bacterial endocarditis?

Answer: *From a cardiac point of view, people with prosthetic valves or rheumatic heart disease are at the highest risk of developing subacute bacterial endocarditis, as are those who have had endocarditis before. Those with significant mitral valve regurgitation are also at increased risk. Congenital heart disease is a risk factor, in particular unrepaired cyanotic defects, defects repaired with prosthetic material (especially in the first six months before endothelialisation is complete), and incompletely repaired defects with prostheses. Calcific aortic stenosis, asymmetrical septal hypertrophy and Marfan's syndrome are less common predispositions to subacute bacterial endocarditis.*

From a general medical point of view, subacute bacterial endocarditis is more likely in the elderly and those who have poor dental health (subacute bacterial endocarditis is commonly caused by Streptococcus viridans*); have diabetes; are immunosuppressed or malnourished; require indwelling catheters (it is also commonly caused by* Enterococcus*); have frequent or chronic urinary tract, skin or other infections (especially with abscesses); or require frequent surgical procedures that increase the risk of bacteraemia. Infected intravenous lines or drug addiction may lead to tricuspid valve infection. The onset of subacute bacterial endocarditis symptoms is typically one to two weeks (this timing may be related retrospectively to an invasive surgical procedure).*

What can you recommend to help prevent subacute bacterial endocarditis in high-risk patients?

Answer: *Good dental hygiene and regular dental reviews are vital in the prevention of endocarditis. Antibiotic prophylaxis is needed for high-risk patients in cases of deep, dirty or infected wounds and before certain dental or surgical procedures. If there is any doubt, it is wise to ask the treating cardiologist what prophylaxis (if any) is necessary and to communicate this to the patient and the dentist or surgeon.*

Outcome

You discussed your concerns with George and also the admitting officer at the local hospital where he was admitted that day. His transthoracic cardiac echocardiogram showed his mitral valvular regurgitation had progressed significantly, there were probable vegetations on the mitral valve and he had developed left ventricular failure (ejection fraction of 35%). George refused transoesophageal echocardiography and was treated with intravenous ceftriaxone and vancomycin until the culture results were available. The blood tests supported a diagnosis of subacute bacterial endocarditis and one of four blood cultures grew S. viridans*. George is very reluctant to have mitral valve surgery and, as his ejection fraction improved with treatment of the infection, this will be reconsidered at a later date.* **CT**

Key points

- **If subacute endocarditis is suspected, at least three blood cultures should be arranged urgently.**
- **The most common bacteria responsible for subacute endocarditis are *Streptococcus viridans* and *Enterococcus* species.**
- **From a cardiac point of view, people with prosthetic valves or rheumatic heart disease are at highest risk of subacute bacterial endocarditis, as are those who have had it before.**
- **Good dental hygiene and regular dental reviews are vital in the prevention of endocarditis.**

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