



An older man with supraventricular tachycardia who has a cardiac arrest

VIVIENNE MILLER MB BS, FRACGP, DRACOG, DCH, MACPM, MWAME

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.

John, who is 78 years of age and is known to your solo practice, arrives for an 8 am appointment looking sweaty, grayish and agitated, and complaining of having had 'palpitations' since 5 am that morning. John is moderately overweight (body mass index, 29 kg/m²) and smokes 20 cigarettes a day. You have tried to get him to make lifestyle changes for several years, but he is not one for diet or exercise and he likes to drink red wine. He is usually hypertensive (165/102 mmHg) but he 'isn't good at taking the tablets' you have prescribed. His last blood test was carried out in 2008 (despite your best efforts to encourage him to attend more frequently) and showed hypercholesterolaemia, hypertriglyceridaemia, probable fatty liver and a high normal blood glucose level.

What are your first thoughts when you first see this patient?

Answer: You are thinking that John does not look at all well and the whole situation is most concerning. He looks as if he will need to go to hospital urgently by ambulance. He will need a rapid clinical assessment and oxygen, and an urgent ECG should be performed while you are waiting for the ambulance.

The practice nurse has not arrived yet. What do you do next?

Answer: You ask your receptionist to call 000 for an ambulance and tell her to let them know that it is needed immediately. You then take a brief history while you get John to lie down at 45°, put a pillow under his head and take his pulse, temperature, blood pressure, respiratory rate and oxygen saturation. You give him 300 mg of aspirin to chew with a little water (he has no contraindications to aspirin), give him oxygen via a mask at 10 L/min, look at his juguloenous pressure and listen to his chest and heart sounds to check for cardiac failure.

John's pulse rate is weak and rapid and unable to be reliably counted; his apex beat is approximately 140 beats per minute, although it is difficult to be sure. His temperature is 36.7°C. His blood pressure is 110/75 mmHg, his respiratory rate is laboured at 25

breaths per minute and his oxygen saturation is 95%. John tells you he has never felt this terrible but denies chest pain. He tells you he has had worsening indigestion since walking to the surgery just now and he now feels as if he can't get enough oxygen.

You perform an ECG urgently. What does it show?

Answer: The ECG (see Figure) shows a supraventricular tachycardia. The heart rate is 204 beats per minute, is regular and shows acute inferolateral ST depression. In addition, there is ST elevation in lead aVR. This is strongly suggestive of significant coronary ischaemia (likely three vessel or left main stem disease), which worsens his prognosis.

What do you do now?

Answer: John feels too unwell to attempt the valsalva manoeuvre so you firmly massage his carotid sinus on one side (bilaterally can precipitate cerebral ischaemia). This might increase parasympathetic tone and decrease conduction through the atrioventricular node. You put an 18-gauge cannula into his cubital fossa and repeat his blood pressure measurement.

What do you tell John?

Answer: You tell him that he has a very fast pulse rate that is causing his chest discomfort.



Figure. ECG showing AV-nodal re-entry tachycardia (or supraventricular tachycardia) with rate-related ST depression.

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Dr Miller is a GP in Sydney, NSW. She is also an editor, author and medical journalist and is the Medical Editor of *Cardiology Today*.



He needs to go to hospital and you have called an ambulance. You ask him if he would like to speak to his wife or if you should contact her for him. John feels too unwell to speak with anyone and his wife is not contactable.

What do you think is his provisional diagnosis and what is causing it?

Answer: John has a supraventricular tachycardia with significant coronary ischaemia and he may be having an acute myocardial infarction precipitated by the rapid heart rate (type 2 myocardial infarction). John now has relative hypotension and this is significant because his blood pressure untreated has always been raised.

What issues are you now most concerned about?

Answer: The concern is that John will proceed to cardiac arrest. He may develop worsening hypotension because of either the severity of the tachycardia or from ongoing ischaemia. Nitrolingual spray may not help and could even worsen his condition by dropping his blood pressure further, especially if he is dehydrated. Morphine could suppress his respiratory rate further and worsen the hypotension, but a small intravenous dose (e.g. 2.0 mg) over a couple of minutes, repeated after five to 10 minutes if the blood pressure does not drop, would be kind.

It is not safe to treat the tachycardia medically (beta blockers or verapamil should not be used in this situation) and defibrillation is not advised at present in the GP setting (patient is conscious, inadequate monitoring). Basically, he needs specialised care as soon as possible. He needs to be reverted back to sinus rhythm and this is most likely achieved by using intravenous adenosine (if his blood pressure is above 100 mm/Hg systolic) or by electrical cardioversion if he is hypotensive. You hope the intensive care ambulance is able to come rapidly and you ask your receptionist to phone 000 again to reiterate the urgency of the situation.

John's pulse remains at 200 beats per minute but his blood pressure has dropped to 95/45 mmHg. His oxygen saturation on 10 L/min oxygen is 92%.

His peripheral pulse is now faint and very fast. Could 10 L/min oxygen administered by a mask on someone who might have chronic obstructive airways disease from smoking suppress his central drive for respiration?

Answer: This would be unlikely in this situation in which it is used for a short period of time and is medically needed to maintain normal oxygen saturation in an emergency.

John arrests just as the ambulance arrives and you commence cardiopulmonary resuscitation (CPR). What now is the most important factor predicting whether John will survive this event or not?

Answer: The most important factor is whether or not John has a shockable rhythm on monitoring. A nonshockable rhythm (e.g. asystole) has a worse prognosis.

What do you do if John is in ventricular fibrillation or has some type of tachycardia on monitoring?

Answer: Ventricular fibrillation and ventricular tachycardia are shockable rhythms, so John needs to have rapid defibrillation. The chance of successful defibrillation decreases with time. The Australian Resuscitation Council Guidelines recommend two biphasic shocks of 150J, followed by two minutes of CPR, followed by adrenaline 1 mg intravenously and a further two minutes of CPR.

What do you do if John is in asystole?

Answer: If John is in asystole, defibrillation cannot be performed with any hope of success. The Australian Resuscitation Council Guidelines recommend continuation of CPR and the administration of 1 mg adrenaline intravenously every two minutes. CPR should be continued. If a shockable rhythm is obtained, defibrillation should be performed (as above).

When do you decide to cease CPR on John?

Answer: This can be a very personal issue for you, John and John's family. If John remains in prolonged asystole for 30 minutes, he is most unlikely to survive even if he is taken to

hospital, especially given his age and adverse medical factors. If you are satisfied there is no hope, you may pronounce John deceased. If a doctor does not pronounce life extinct, the paramedics will continue resuscitation while they transfer John to hospital. Consideration should be given to John's wishes and the wishes of his family, if these are known. Consideration should also be given to whether John is a registered organ donor and if this is still appropriate.

As John's last doctor's appointment was almost a year ago, and if he were to be pronounced deceased by you, would this be treated as a coroner's case?

Answer: No. John is known to you, the diagnosis is not suspicious and is well documented and, most importantly, you have seen him while he was still alive. This would be a coroner's case if John had arrested before you had seen him, if it was a sudden death of uncertain cause or if he had not seen a doctor in the past six months.

Outcome

John remained in asystole despite repeated adrenaline and CPR continuously. The high dependency ambulance arrived and John was transferred to hospital where he was declared deceased. **CT**

Key points

- **Defibrillation requires some sort of myocardial electrical activity to be successful.**
- **Adrenaline should be used before defibrillation in cases of asystole, or when defibrillation does not result in a regular rhythm with effective cardiac output.**
- **Asystole or a pulseless idioventricular rhythm has a worse prognosis.**
- **When a patient is declared deceased, always consider organ donation possibilities when appropriate and whether or not the death could be a coroner's case.**