Multifocal atrial tachycardia and asymptomatic AF

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Articles in this section are inspired by, but not based on, real cases to illustrate the importance of knowledge about ECGs in relation to clinical situations in general practice. Management is not discussed in detail.

Fred is a 75-year-old man who was physically very active with no medical problems or medications until he had an ischaemic frontal lobe stroke (1 cm diameter) about three months ago. Since then he has continued to exercise daily despite residual but improving mild left hemiplegia. His short-term memory is mildly affected but he can still function as a horse trainer. The stroke was fully investigated. Results of heart rate monitoring while in hospital and of blood tests, carotid Doppler ultrasound examination and cardiac echocardiography around that time were all normal. Fred was treated with atorvastatin and clopidogrel and told his blood pressure was normal but to see his GP periodically to check this.

When Fred attends your surgery, he tells you that for some time he has felt intermittently short of breath for a few minutes, sometimes longer, for no reason, but that this was investigated thoroughly a couple of years ago. His records confirm that he had normal results on a low-dose chest CT scan, lung function testing and stress echocardiography 18 months ago. At that time, the cardiologist noted that Fred's symptoms had been occurring intermittently for two years. Although the shortness of breath was more likely if Fred exercised, it was only noted about once a week despite his exercising daily.

An ECG shows several multifocal atrial ectopic beats but is otherwise normal. You organise 24-hour Holter monitoring, during which Fred is instructed to exercise.

Q1. What does the Holter monitor strip show?

The Holter monitor strip shows a multifocal atrial tachycardia with a rapid irregular rhythm of more than 100 beats per minute (Figure 1). There are at least three distinctive P-wave morphologies.

The report of Fred's 24-hour Holter monitoring states that there are several very short runs of multifocal atrial tachycardia (five to 10 beats) and more than 1000 multifocal atrial ectopic beats, and comments that episodic atrial fibrillation (AF) cannot be excluded. Fred did not notice any symptoms during the monitoring period.

Q2. What is multifocal atrial tachycardia?

Multifocal atrial tachycardia is a paroxysmal rapid atrial rhythm diagnosed when there are at least three different P-wave morphologies (frequent premature atrial complexes arising from different atrial structures) during the tachycardia. The heart rate is typically between 100 and 150 beats per minute, usually with an irregular P–P interval. The underlying rhythm is sinus (excluding an intermittent supraventricular tachycardia such as atrial flutter) with no dominant single atrial morphology (excluding sinus rhythm with a single focal tachycardia). Multiple atrial tachycardia occurs typically in older patients, with the peak age being in the seventh decade. It is associated with multiple medical problems, especially significant cardiac and respiratory disease and structural heart disease.

Q3. What is the significance of multifocal atrial tachycardia?

Multifocal atrial tachycardia is associated with an increased risk of AF. The tachycardia may be a transitional phase between frequent

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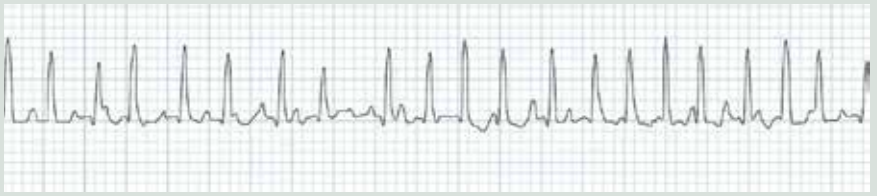

Figure 1. Holter monitor strip showing multifocal atrial tachycardia.
Image courtesy of Dr Ed Burns and Life in the Fast Lane. http://lifeinthefastlane.com

premature atrial complexes and atrial flutter or fibrillation. The risk of atrial flutter and fibrillation is further increased in elderly people and those who have cardiac failure or severe chronic lung disease. Multifocal atrial tachycardia typically occurs in patients with multiple significant medical problems. Hence, this arrhythmia is generally a marker for increased mortality, as opposed to a direct cause.

Q4. What is the significance of the more than 1000 multifocal atrial ectopic beats documented in this report?

More than 30 premature atrial complexes per hour may define 'excessive supraventricular ectopic activity' but may also have no clinical significance.[1] Such a frequency of multiple ectopic beats is also associated with an increased risk of AF. Excessive multiple ventricular ectopic beats and/or atrial ectopic beats are associated with the development of dilated cardiomyopathy and warrant periodic follow up with cardiac echocardiography. In Fred's case, his recent ECG was normal.

Q5. What medical conditions are associated with multifocal atrial tachycardia?

Conditions associated with multifocal atrial tachycardia include:

- severe chronic lung disease
- coronary artery disease
- heart failure
- valvular heart disease
- thyrotoxicosis
- longstanding diabetes mellitus
- hypokalaemia and hypomagnesaemia
- azotaemia
- postoperative state
- pulmonary embolism
- pneumonia
- severe sepsis
- theophylline and caffeine toxicity.

Q6. What is the practical significance for Fred of this Holter monitor report?

Fred's recent blood test results should be reviewed to ensure that no conditions that could be contributing to the multifocal atrial tachycardia have been missed (e.g. diabetes or electrolyte disturbances). Episodes of asymptomatic AF cannot be excluded, and failing to manage the risk of this would be inappropriate. Fred has already had one ischaemic stroke, and AF is a preventable cause of future stroke. He needs more appropriate anticoagulation with warfarin or a novel oral anticoagulant, and clopidogrel should be ceased. He should have a further cardiological review regarding cardiac rate and rhythm management. If he has no contraindications to beta blockers then metoprolol would be the drug of choice to reduce the multifocal atrial ectopic beats and runs of tachycardia.

Q7. What are the contraindications to beta blockers?

The most important contraindications to beta blocker therapy arise from the risks of causing severe bradycardia and hypotension and of precipitating acute asthma in patients with chronic obstructive pulmonary disease. Patients with chronic bronchitis and emphysema can tolerate beta blockers as long as there is no reversibility of lung function on formal testing pre- and post-salbutamol. Beta blockers should also not be used in patients with severe peripheral vascular disease or peripheral vascular disease with non-healing leg ulcers. Beta blockers mask some symptoms of hypoglycaemia (e.g. tremulousness and tachycardia), but this is usually only an issue for patients with long-term or unstable diabetes (taking multiple hypoglycaemic medications and/or insulin), in whom hypoglycaemia may persist unrecognised or become dangerously severe. In addition, beta blockers can worsen pre-existing urinary retention. Other potential contraindications to beta blocker use include insomnia, depression and impotence, as these medications worsen all these conditions.

Key points

- **Multifocal atrial tachycardia is a paroxysmal rapid atrial rhythm with at least three different P-wave morphologies (frequent premature atrial complexes) and an irregular P–P interval.**
- **Multifocal atrial tachycardia occurs in older patients with multiple medical problems, especially significant cardiac and respiratory disease, and confers an increased risk of AF.**
- **More than 30 premature atrial complexes an hour ('excessive supraventricular ectopic activity') are also associated with an increased risk of AF.**
- **Asymptomatic AF must be actively managed to prevent stroke, and this requires appropriate anticoagulation with either warfarin or a novel oral anticoagulant.**
- **The most important contraindications to use of beta blockers are severe bradycardia and hypotension and acute asthma; other risks include exacerbating peripheral vascular disease and masking severe hypoglycaemia in patients with unstable diabetes.**

Outcome: Fred is not happy at the suggestion of further medication, especially more potent anticoagulation, but he accepts it. He is reviewed by the cardiologist but does not need beta blocker therapy as he is asymptomatic. If he were to require treatment, sotalol 40 mg twice daily would be used as this has been proven to prevent AF. CT

Reference

1. Binici Z, Intzilakis T, Nielsen OW, Kober L, Sajadieh A. Excessive supraventricular ectopic activity and increased risk of atrial fibrillation and stroke. Circulation 2010; 121: 1904-1911.

COMPETING INTERESTS: None.