



University of
Ottawa Heart Institute

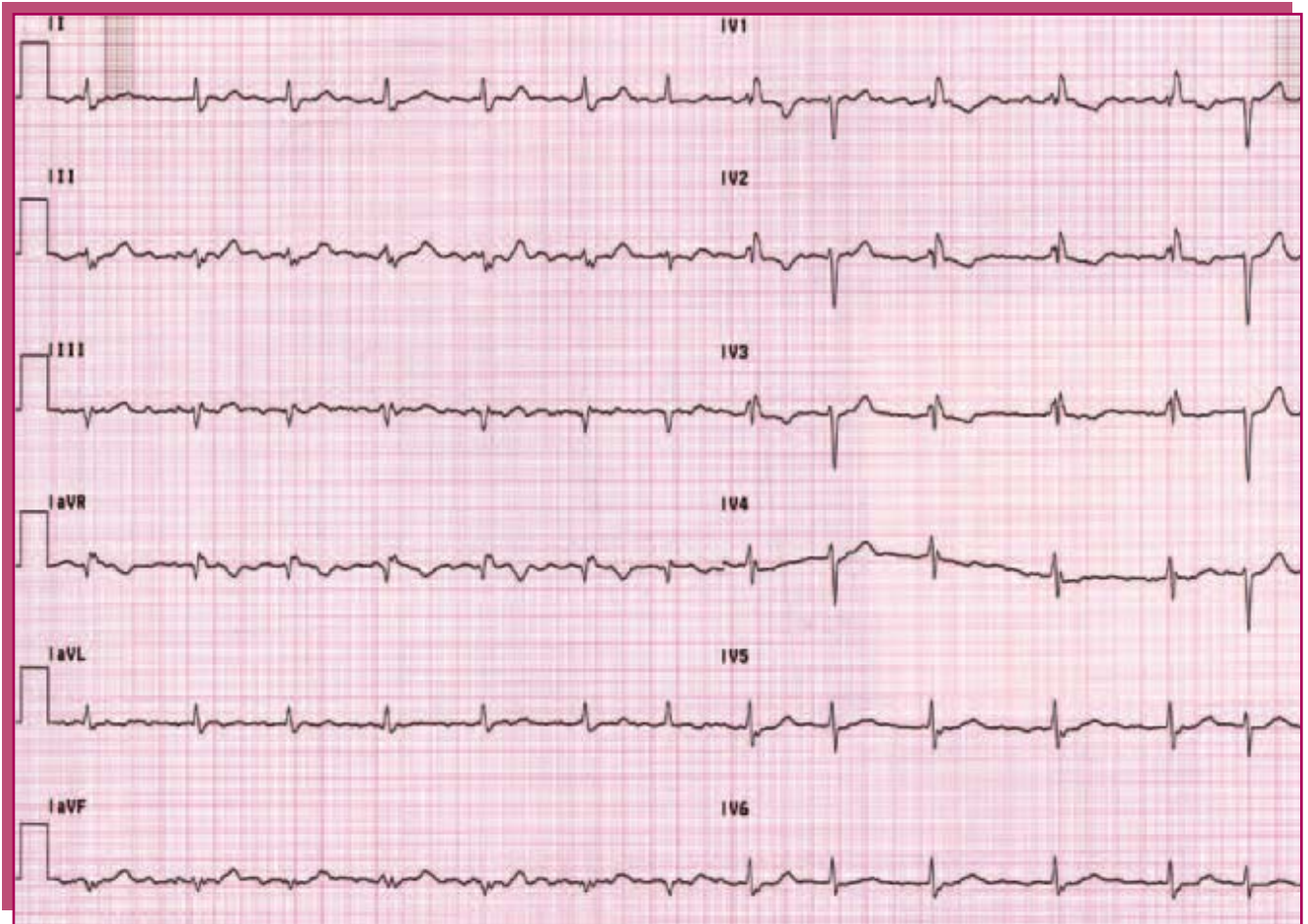
ECG of the Month

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An Unusual Case

This is the ECG of a 75-year-old woman who had a routine ECG performed prior to an elective cholecystectomy.

What is the diagnosis? _____





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ECG of the Month

This Month's ECG Diagnosis

The ECG lacks regular atrial activity and has irregular QRS complexes of two distinct morphologies — one narrow (occurring as beats 7, 9, 13) and one broad. The average ventricular rate is 84 bpm. The narrow QRS beats occur with the shortest coupling intervals.

The ECG shows atrial fibrillation with a controlled ventricular rate. The narrow QRS morphology appears to represent normal ventricular activation, and the broadened QRS complex is of right-bundle-branch-block (RBBB) morphology.

Let us assume the RBBB is her “usual” QRS morphology. The RBBB morphology QRS reflects initial activation of the left ventricular, with delayed activation of the right ventricle. A “narrow” QRS complex occurs when both ventricles are depolarized at, or near, the same time.

Atrial fibrillation results in high numbers of chaotic atrial signals bombarding the AV node. If an atrial impulse were to penetrate the AV node and result in conduction delay in the left bundle, slow conduction would occur over both the left bundle and the “blocked” right bundle. This would lead to near simultaneous activation of both ventricles and a normal QRS appearance on the ECG. In this instance, the right bundle branch “block” is not an absolute anatomic block, but a conduction delay. This is favoured by the fact

that the narrow complex occurs following the shortest RR intervals, as the shortest coupling is most likely to result in conduction delay in the left bundle.

Similarly, a ventricular ectopic from the right ventricle, occurring at the same time as an impulse conducted down the left bundle, would result in near simultaneous activation of both ventricles and a shortened QRS. This would appear to be a less likely explanation, as the ectopics would have to come from the same site, at the same moment, to account for the same narrow QRS complex in beats 7, 9 and 13.

Another possibility is the QRS morphology is narrow at baseline, and the patient demonstrates pause-dependent (“bradycardic”) increased refractoriness of the right bundle. This manifests as RBBB morphology QRS complexes when the RR interval is longest. This is less likely, as these RR intervals are not particularly long in comparison to preceding beats 7, 9 and 13. Review of previous ECGs would be helpful.

If this patient is not on medication to control her ventricular rate, then the presence of a ventricular rate of 84 bpm (with bundle-branch-block in the setting of atrial fibrillation) reflects a degree of conduction disease. 