

(1) OVERVIEW OF THE ECG

The ECG shows an irregular wide QRS rhythm at 76/minute. There appear to be P-waves before each QRS and the QRS pattern resembles right bundle branch block (RBBB). There is left axis deviation.

MORE DETAILED ANALYSIS OF THE ECG

The **P-waves** vary in morphology, axis and rate. It is difficult to be sure whether any of them arise in the sinus node, but some, such as the first P-wave, probably do. The rhythm accelerates for 5 beats and then slows again – probably an ectopic atrial focus.

The **PR intervals** vary from 220 to 240ms, but all are prolonged.

The **QRS complexes** are wide, about 150ms. The pattern in V1 suggests complete RBBB, but there is an initial small Q-wave – also present in V2 and V3. The R-waves in V4-6 are small, with deep, broad S-waves. While atypical, this pattern is compatible with RBBB. The initial Q-waves suggest old septal myocardial infarction. There is marked left axis deviation, about -80° . There is poor R-wave progression in the chest leads.

There is some **ST segment** elevation in the inferior leads, probably secondary to the delayed depolarisation.

The **T-wave** inversion in aVL and V1 and 2 is also secondary to abnormal depolarisation.

The **QT interval** is not prolonged, considering the wide QRS.

INTERPRETATION

The marked left axis deviation is due to left anterior fascicular block (LAFB), as evidenced by small Q-waves in Lead I and aVL, together with small initial R-waves in the inferior leads. Pre-excitation is excluded by the long PR and the relatively rapid inscription of the initial part of the QRS. The LAFB may explain the poor R progression and deep S-waves in the lateral chest leads.

The clear coupling of the QRS complexes to the fluctuating PP interval excludes an accelerated idioventricular rhythm.

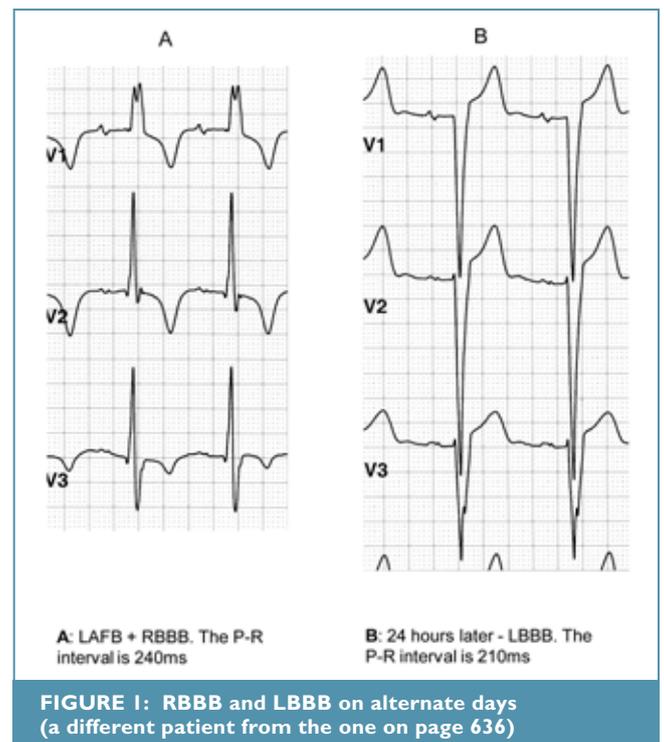
The small Q-waves in V1-3 are compatible with old septal infarction, rather than lateral, although there is no history of this.

The combination of bifascicular block (LAFB + RBBB) with a prolonged PR interval is commonly thought to indicate trifascicular block, the increased PR being due to first degree block in the remaining (posterior) fascicle. However, this diagnosis cannot be made from a single surface ECG. In at least 50% of such cases, the prolonged PR is due to delay in the AV node, rather than the posterior fascicle.⁽¹⁾ Trifascicular block can only be diagnosed from intracardiac recordings demonstrating a prolonged H-V interval, or if two ECGs from the same patient show anterior fascicular block in one and posterior fascicular block in the other within a short time, or RBBB on one tracing and LBBB on another (Figure 1 – a different patient from the one on page 636).

1. The best answer is therefore (c): **RBBB with left anterior fascicular block and prolonged PR interval.**

(2) WHAT ADVICE WOULD YOU GIVE?

Defer surgery and perform coronary angiography. There is little justification for this option. Despite the ECG suggestion of old septal infarction, the lady has no symptoms. Percutaneous



revascularisation would not improve her prognosis, nor would it improve her surgical risk. The discovery of coronary disease would probably serve to deny her an operation that would improve the quality of her life.

Defer surgery and implant a permanent pacemaker. Bifascicular block in the absence of symptoms is not an indication for permanent pacing.⁽²⁾ If she had a history of syncope, pacing could be considered if no alternative cause of syncope existed. As mentioned above, the likelihood of trifascicular block is only 50%. While there is some evidence that demonstration of an H-V interval of 100ms or more indicates a higher risk of developing complete heart block, pacing is not recommended for asymptomatic bifascicular block with a prolonged PR interval (Class III).⁽²⁾

Insert a temporary pacemaker and proceed with surgery thereafter. For years there has been concern about the potential risk of developing high grade AV block during surgery in patients with bifascicular block. Studies have shown, however, that the risk is low.^(3,4) On the occasions that it has occurred, the block is often vagally induced (e.g. during endotracheal intubation), accompanied

by sinus slowing and the Wenckebach phenomenon, rather than sudden Mobitz II block. Temporary pacing is not without hazard, with risk of lead displacement when the patient is moved. The consensus is that a temporary pacing lead should not be inserted,⁽²⁾ even in the presence of additional PR prolongation.

Suggest proceeding with surgery, with appropriate monitoring and precautions. This is the accepted recommendation. What "monitoring and precautions" are appropriate?

In addition to standard anaesthetic monitoring, including continuous ECG:

- External pacemaker, with electrodes on chest.
- Monitor particularly during vagal stimulation, such as intubation.
- Consider atropine, if bradyarrhythmia develops.

PATIENT NUMBER 2

A second patient was referred recently with a similar concern on the part of the anaesthetist. He was a 69-year-old man on no cardiac medication who was due to have a parathyroidectomy (ECG below). He denied dizziness or syncope.

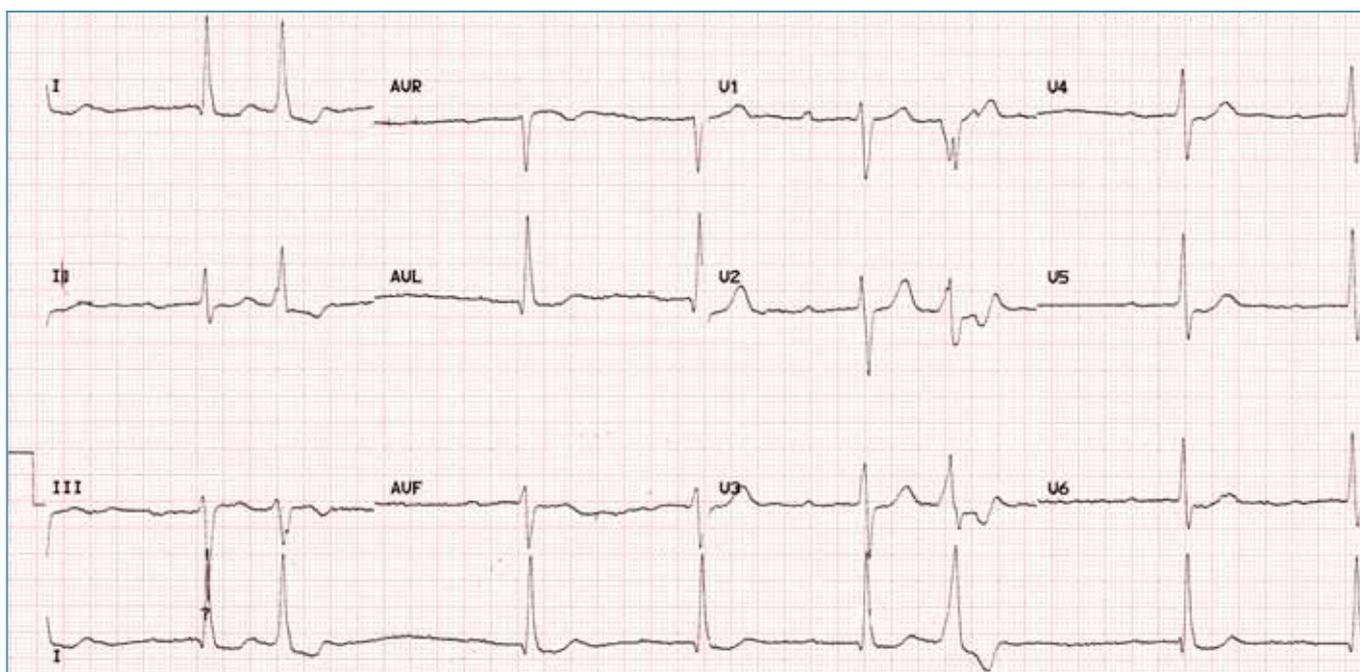


FIGURE 2: ECG of patient number 2

This ECG shows an irregular bradycardia at 48/minute. In addition to the two premature complexes arising in the ventricle, the QRS complexes are wide (about 150ms). Their pattern is not typical of either right or left bundle branch block. They are preceded by abnormal P-waves with slightly variable morphology. The PR interval is considerably prolonged at more than 400ms. The QRS axis is -20° .

In summary, he has atrial bradycardia, marked first degree AV block and nonspecific intraventricular conduction delay.

Does he require temporary pacing to cover anaesthesia and surgery?

The guidelines do not cover this particular problem. It is different from the first patient, in that there is evidence of sino-atrial dysfunction, together with marked first degree AV block (probably at AV nodal level), as well as His-Purkinje disease. It was decided to insert a temporary pacing lead to cover surgery in this case because of the likelihood of vagal stimulation aggravating the bradycardia and possibly causing complete heart block. The decision was influenced by the site of the surgery in the neck, which increased the chance of vagal stimulation.

LESSONS AND CONCLUSIONS

- Trifascicular block cannot be diagnosed from a single ECG showing bifascicular block with prolonged PR.
- The risk of AV block during anaesthesia and surgery is low.
- If AV block occurs, it is likely to be vagally induced (Wenckebach), rather than Mobitz II.
- The risk of a temporary pacemaker is not usually justified.
- Individual exceptions may be made in the light of special circumstances.

REFERENCES

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Conflict of interest: none declared.