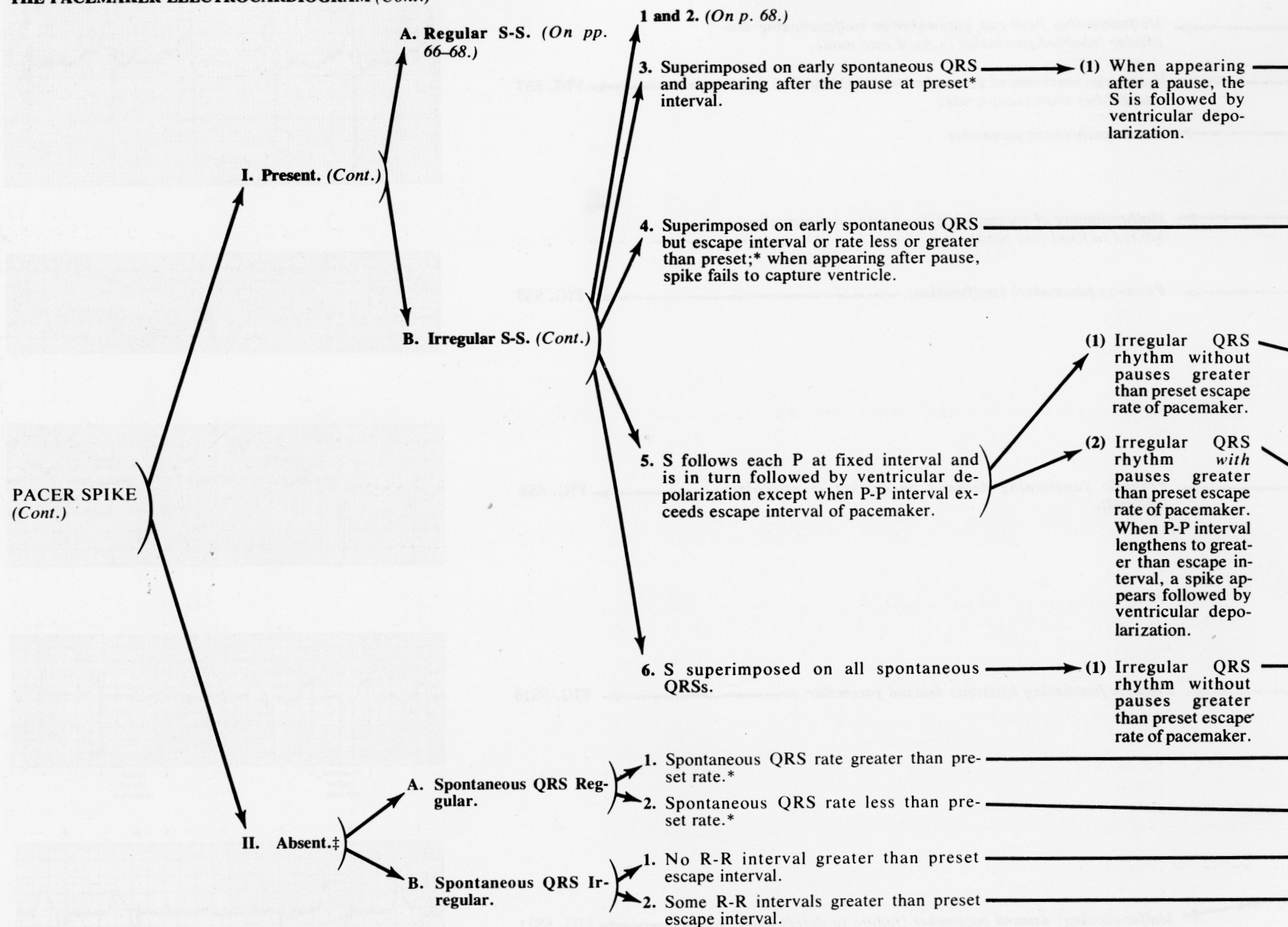


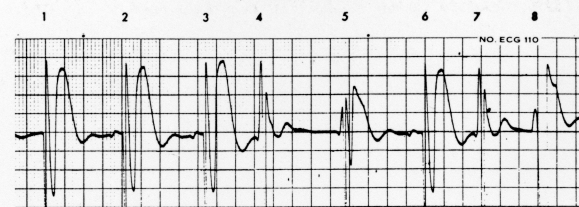


*The specific escape interval, refractory period, and preset fixed rate of the individual pacemaker must be known to interpret proper function.

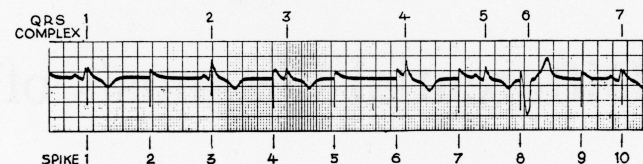
†Test by shutting off standby mode with magnet and forcing pacemaker to act in a fixed rate mode (Fig. SS X).

‡If pacemaker is a fixed rate model, the absence of a spike always indicates malfunction.

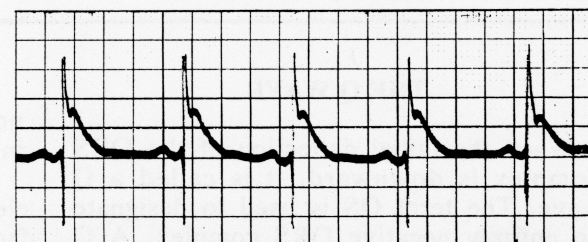
→ Properly functioning ventricular synchronous pacemaker. → FIG. SS12



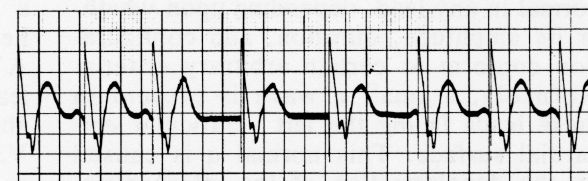
→ Malfunctioning ventricular synchronous pacemaker. → FIG. SS13



→ Atrial synchronous pacemaker with sinus arrhythmia. → FIG. SS14

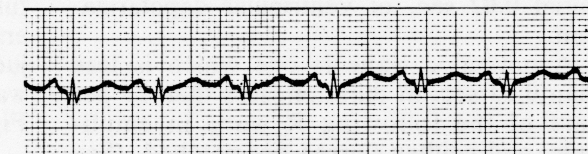


→ Atrial synchronous pacemaker, properly functioning. → FIG. SS15



→ Ventricular synchronous pacemaker with irregular ventricular rhythm. →

→ Ventricular inhibited pacemaker in standby mode† or nonfunctioning fixed rate pacemaker. → FIG. SS16

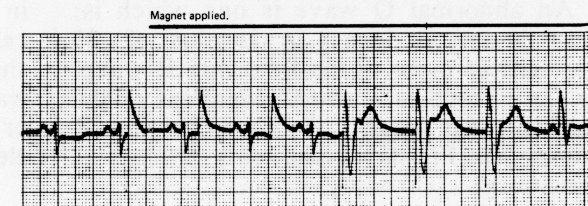


→ Malfunctioning pacemaker. →

→ Demand or ventricular inhibited pacemaker in standby mode.† →

→ Demand pacemaker malfunctioning. →

→ FIG. SSX



CHAPTER 4

Differential Diagnosis of the Q Wave

THE Q WAVE

When the initial deflection of the QRS complex is downward, it is called a Q wave. The term QS is used to designate an entirely negative QRS complex. A Q wave may be normal, borderline, or abnormal in any lead, depending upon whether its amplitude, duration, and configuration conform to certain arbitrary criteria. Normally, a small q wave is present in those leads facing the left ventricular epicardial surface. This normal q is caused by the depolarization of the interventricular septum from left to right during the initial 0.02 sec. of ventricular depolarization.

A normal q wave is one which is less than 0.03 sec. in duration, less than 25 per cent of the following R wave in amplitude, and neither slurred nor notched. (See Fig. Q5, lead I.)

An abnormal Q wave is one which is: (1) 0.04 sec. or longer in duration; (2) 25 per cent or more of the following R wave; or (3) notched or slurred, regardless of the lead or the height of the following R wave. (See Fig. Q53, lead V6.)

The borderline Q is more likely to be normal if: (1) it is less than 0.04 sec. in duration, even though it is more than

These criteria apply specifically to leads electrically facing the left epicardial surface, V4 to V6 and usually standard lead I. They also apply to any lead in which a prominent R wave, 6 to 8 mm. in height, is present. They do not apply to AVR. They may or may not apply to lead 3, AVF, and AVL. The criteria for abnormality of a Q wave in leads V1 to V3 differ somewhat from these and are considered in more detail in Volume II.

A borderline Q wave is one that does not fulfill all of the criteria for abnormality. Several factors may influence the physician's judgment as to whether or not a borderline Q wave is indicative of underlying disease. (See Fig. Q1, lead I.)

The borderline Q wave is more likely to be abnormal if: (1) it is 0.04 sec. or more in duration, even though less than 25 per cent of the following R; (2) it is notched or slurred; (3) it is followed by an inverted T wave; (4) the following R wave is notched or markedly slurred; (5) the S-T segment is elevated in the same lead.

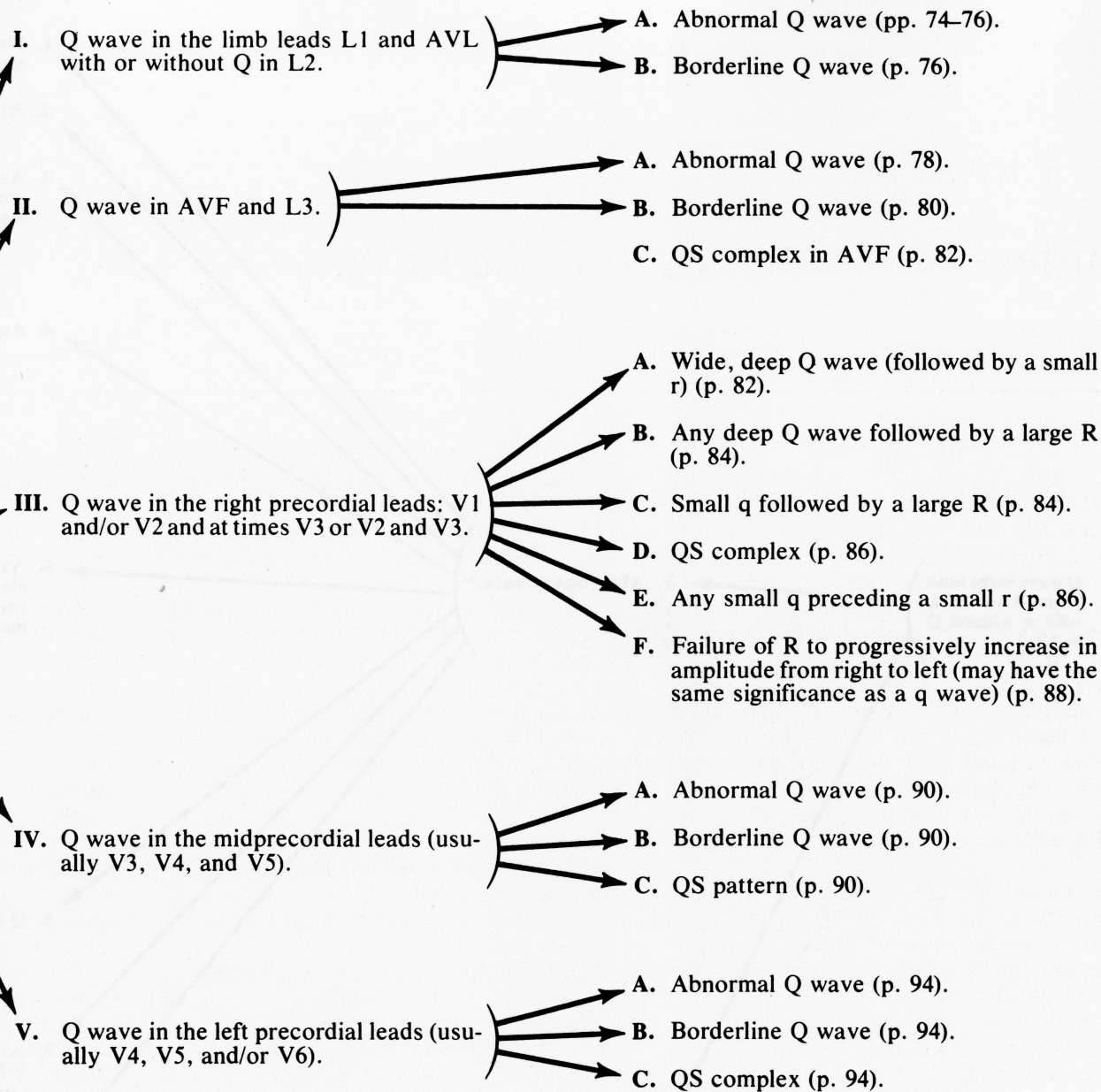
25 per cent of the following R wave; (2) it is smooth and sharp; (3) the following T wave is upright.

In spite of these stated criteria, experience has shown that it is impossible to absolutely define an abnormal Q wave. Various competent observers have offered markedly different criteria for the abnormality of the Q wave. A wave of a certain depth, width, and configuration that is normal in one lead may be abnormal in another. The use of a fixed percentage ratio of Q to R is arbitrary and empiric and open to frequent error.

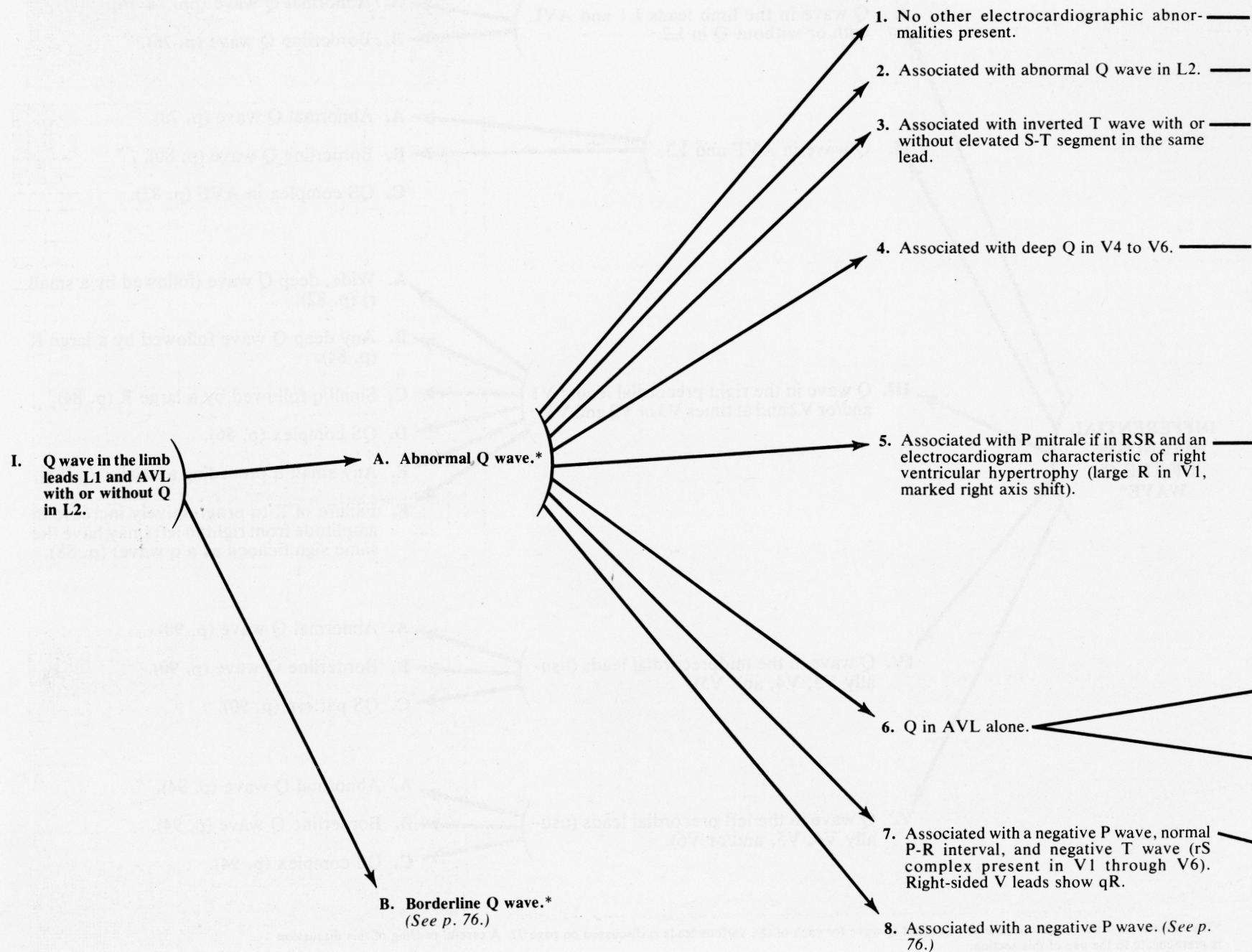
When the distinction between a normal and an abnormal Q wave is not clear, the electrocardiogram should be reported as borderline. Serial tracings and careful clinical evaluation may aid in the differential diagnosis.

When the Q wave is borderline in suspected acute myocardial infarction, it may become more abnormal in serial tracings, thus helping to resolve the problem. In doubtful cases, serial S-T segment and T wave changes may occur which will provide additional help in establishing the diagnosis.

**DIFFERENTIAL
DIAGNOSIS
OF THE Q
WAVE***



*The criteria for a normal, borderline or abnormal Q wave for each of the various leads is discussed on page 72. A careful reading of this discussion is prerequisite to the use of this section.



→ Usually anterior wall myocardial infarction. → FIG. Q1

→ Anterior wall myocardial infarction.

→ Anterior wall myocardial infarction. → FIG. Q2

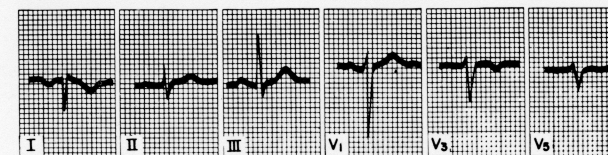
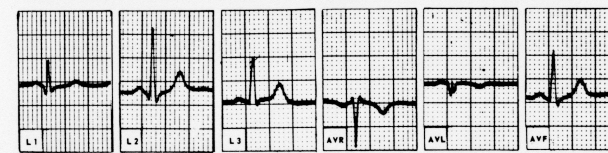
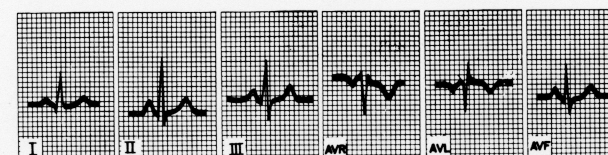
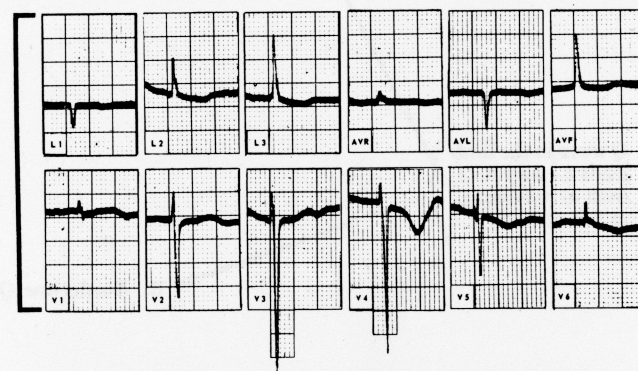
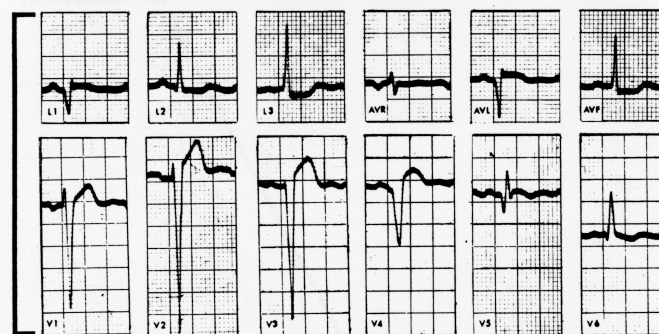
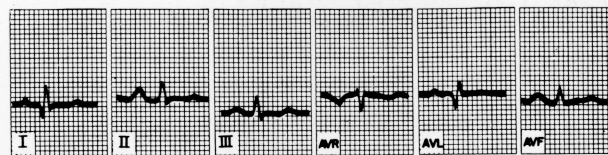
→ Additional evidence of anterior wall myocardial infarction. → FIG. Q3

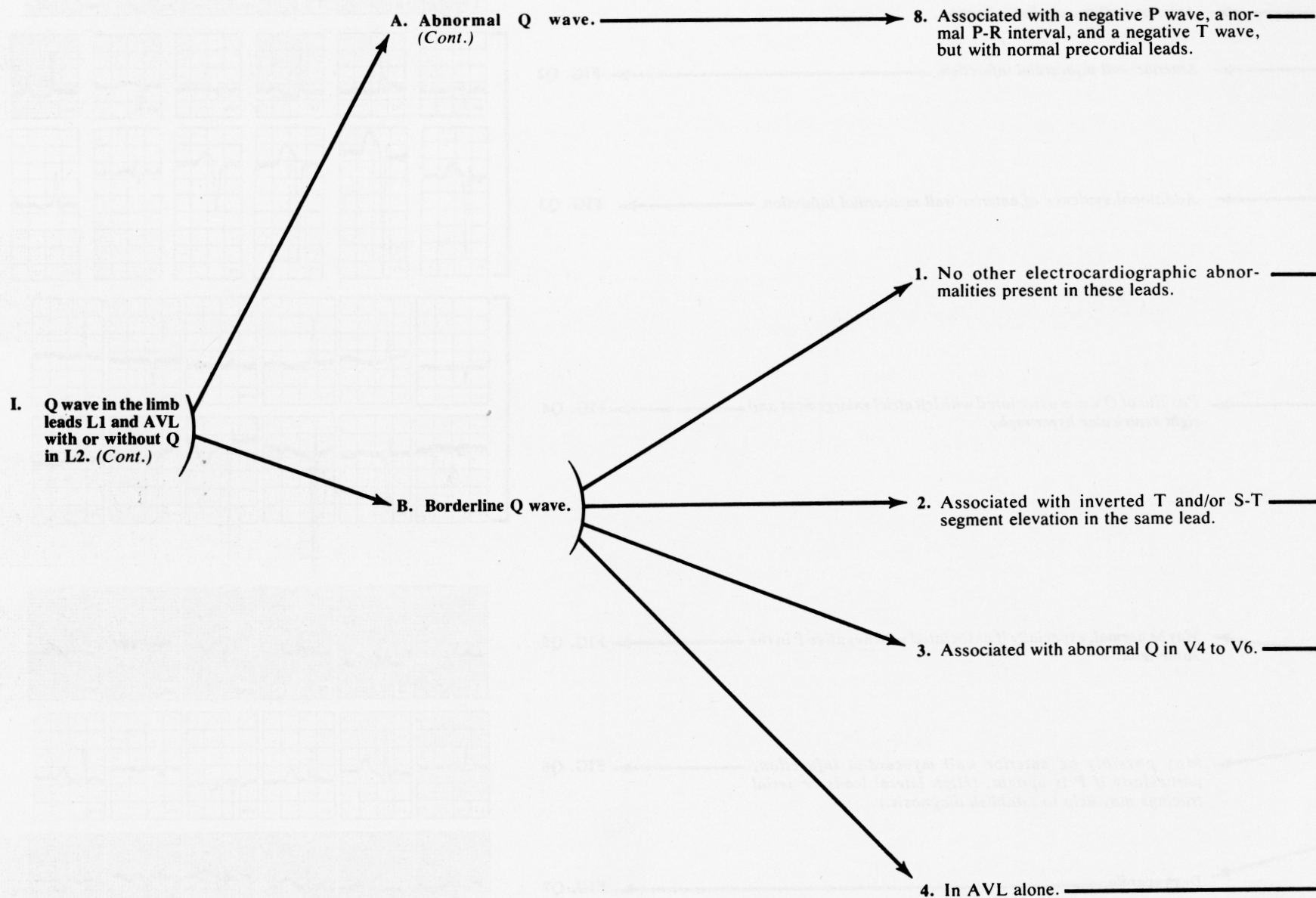
→ Positional Q wave associated with left atrial enlargement and right ventricular hypertrophy. → FIG. Q4

→ May be normal, especially if associated with negative P in the same lead. → FIG. Q5

→ May possibly be anterior wall myocardial infarction, particularly if P is upright. (High lateral leads or serial tracings may help to establish diagnosis.) → FIG. Q6

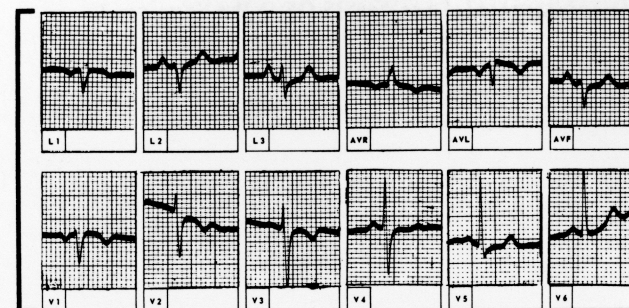
→ Dextrocardia. → FIG. Q7





Leads misplaced (*transposed RA and LA leads*).

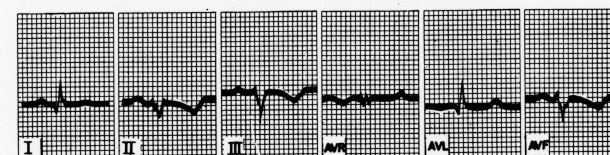
FIG. Q8



Borderline electrocardiogram.

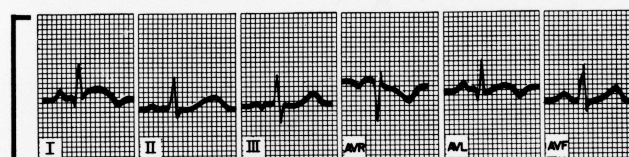
Clinical findings, serial tracings, and exploratory chest leads may aid in establishing the diagnosis.

FIG. Q9



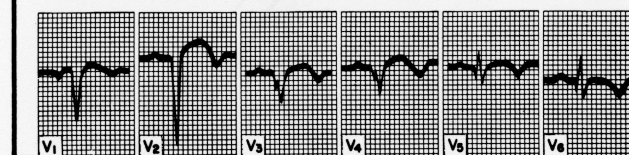
More likely *anterior wall myocardial infarction*.

FIG. Q10



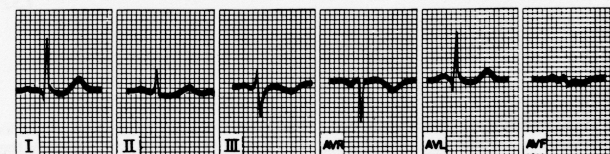
Anterior wall myocardial infarction.

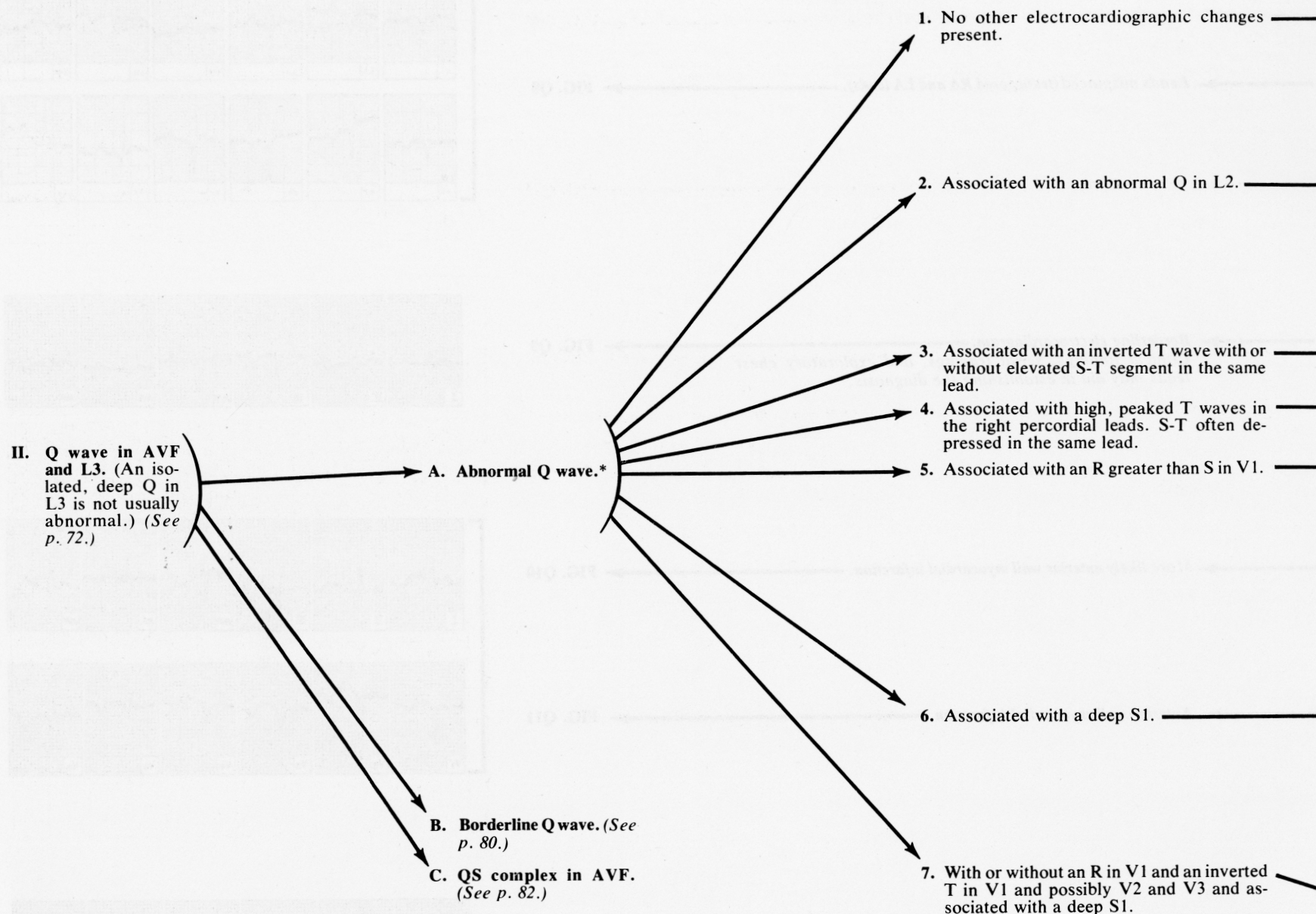
FIG. Q11



Probably *normal*.

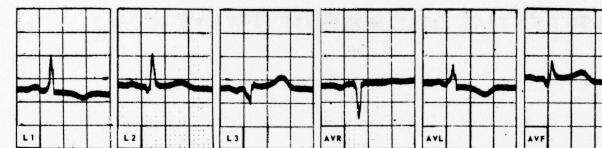
FIG. Q12



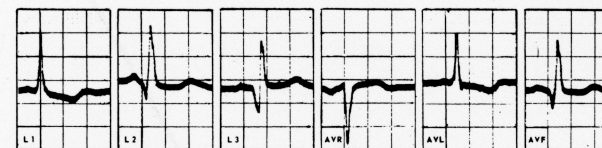


*The previously stated criteria for an abnormal Q do not apply in lead AVF unless the entire QRS in this lead is over 4 mm. in amplitude. When the QRS complex is less than 4 mm., the amplitude relation of Q and R is less important than is the width and the notching and slurring of the Q wave.

→ Probable inferior wall myocardial infarction. → FIG. Q13



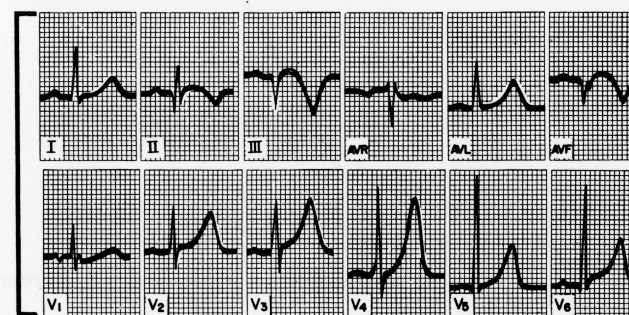
→ Inferior wall myocardial infarction. → FIG. Q14



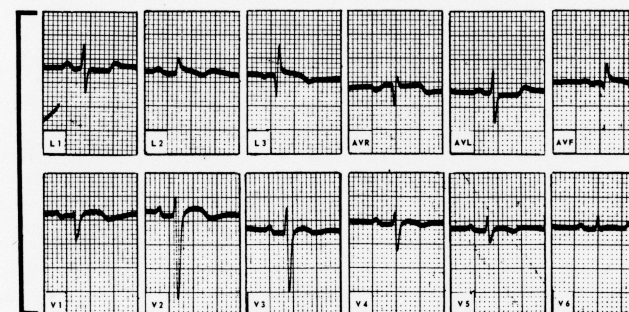
→ Inferior wall myocardial infarction. → FIG. Q15

→ Confirmatory evidence of inferior wall myocardial infarction.

→ Inferior wall myocardial infarction with posterior wall involvement. → FIG. Q16



→ May be normal or inferior wall myocardial infarction. → FIG. Q17



→ May be either acute or chronic cor pulmonale (RVH) and occasionally normal. → FIG. Q18

