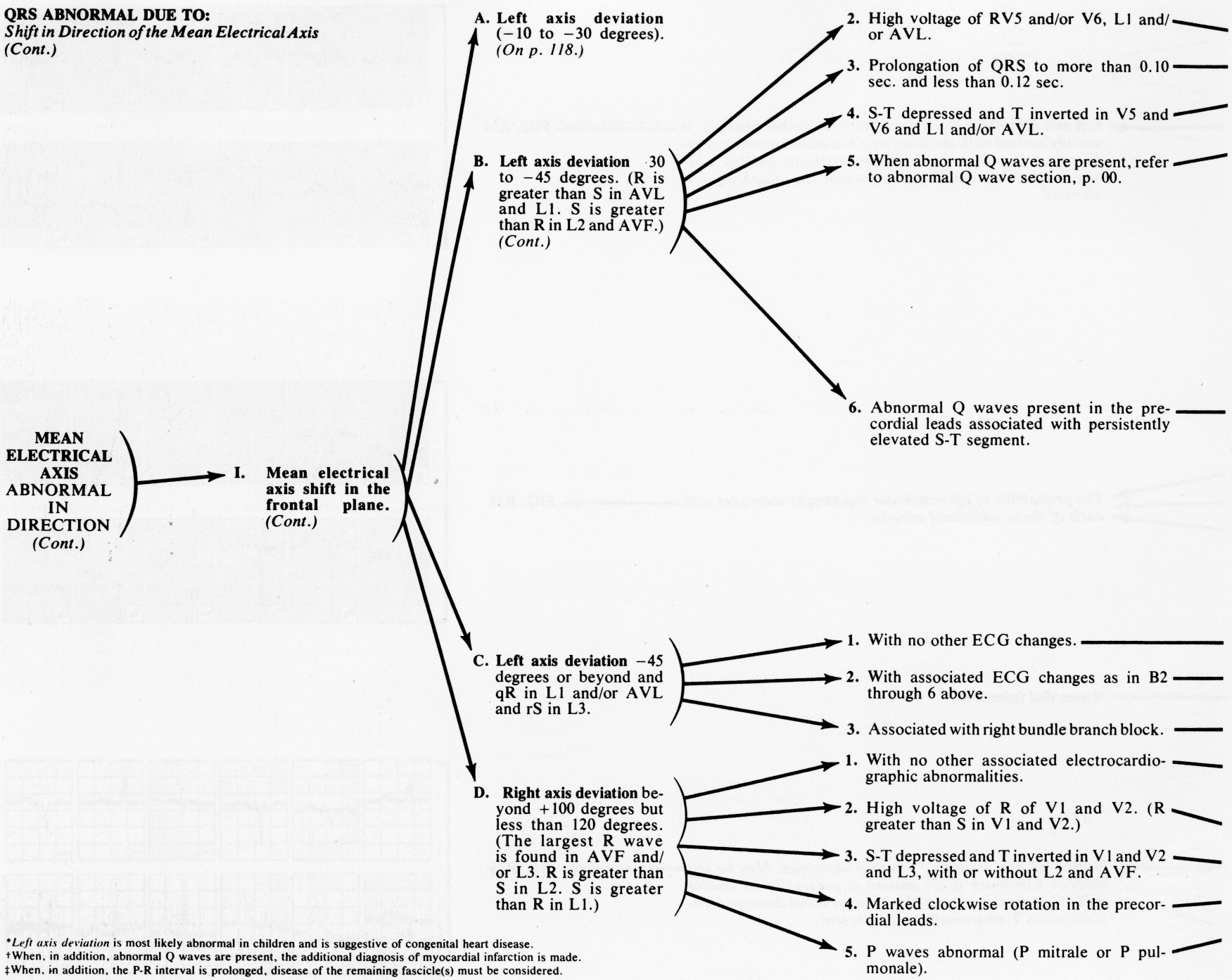
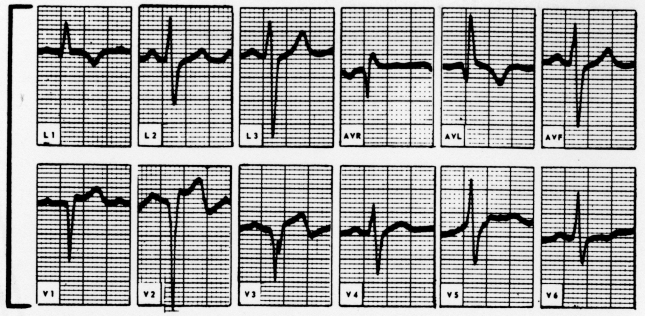
QRS ABNORMAL DUE TO:
Shift in Direction of the Mean Electrical Axis
(Cont.)



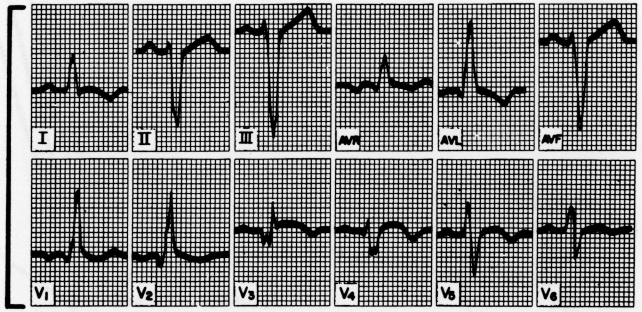
**Left axis deviation* is most likely abnormal in children and is suggestive of congenital heart disease.
†When, in addition, abnormal Q waves are present, the additional diagnosis of myocardial infarction is made.
‡When, in addition, the P-R interval is prolonged, disease of the remaining fascicle(s) must be considered.

Left ventricular hypertrophy *associated with left axis deviation and possibly left anterior hemiblock.*

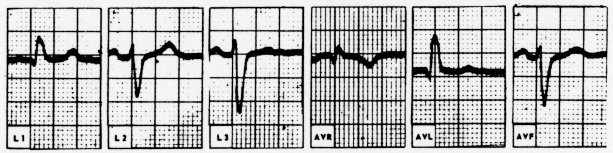
Myocardial infarction *with left axis deviation and possibly left anterior hemiblock.* → **FIG. R37**



Myocardial infarction *with ventricular aneurysm.* → **FIG. R38**



Left anterior hemiblock.‡ → **FIG. R39**

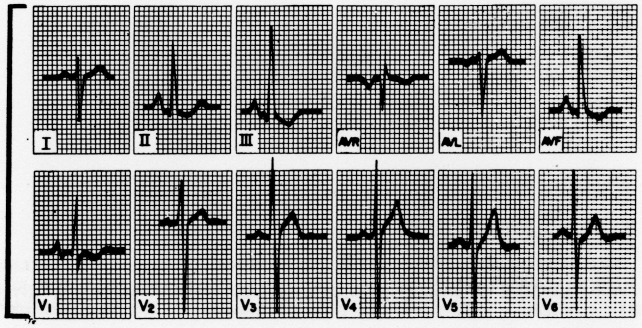


Left anterior hemiblock‡ *with additional diagnosis based on these changes.*

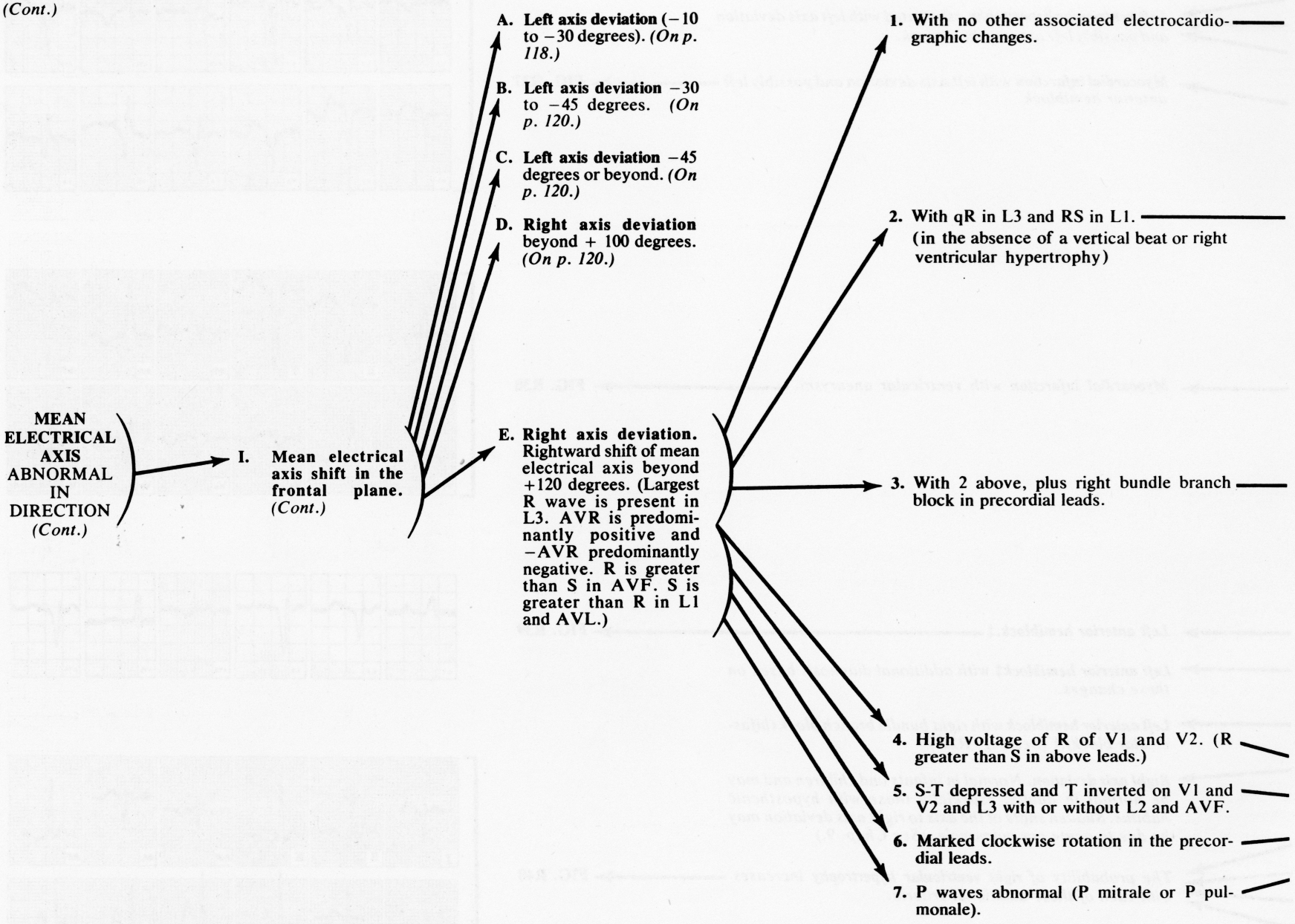
Left anterior hemiblock *with right bundle branch block (bifascicular block).† (See Fig. R20.)*

Right axis deviation. *Normal in infants and children and may be normal in adults, especially those with hyposthenic habitus. Sudden shifts of the axis to right axis deviation may be due to acute cor pulmonale. (See Chap. 9.)*

The probability of ***right ventricular hypertrophy*** *increases with each of these additional criteria.* → **FIG. R40**



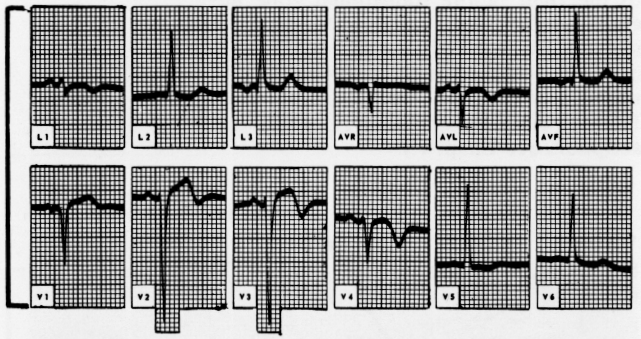
QRS ABNORMAL DUE TO:
Shift in Direction of the Mean Electrical Axis (Cont.)



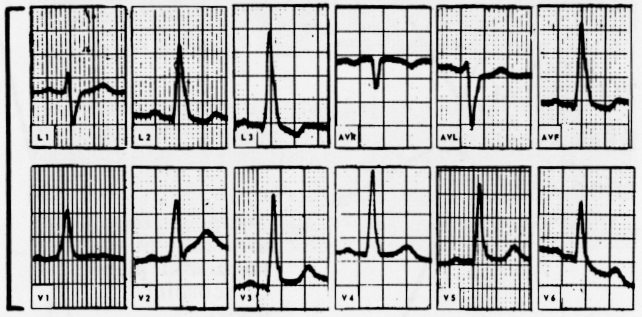
†When, in addition, abnormal Q waves are present, the additional diagnosis of myocardial infarction is made.
‡When, in addition, the P-R interval is prolonged, disease of the remaining fascicle(s) must be considered.

*Marked **right axis deviation**. Usually abnormal and due to right ventricular hypertrophy.* — **FIG. R41**

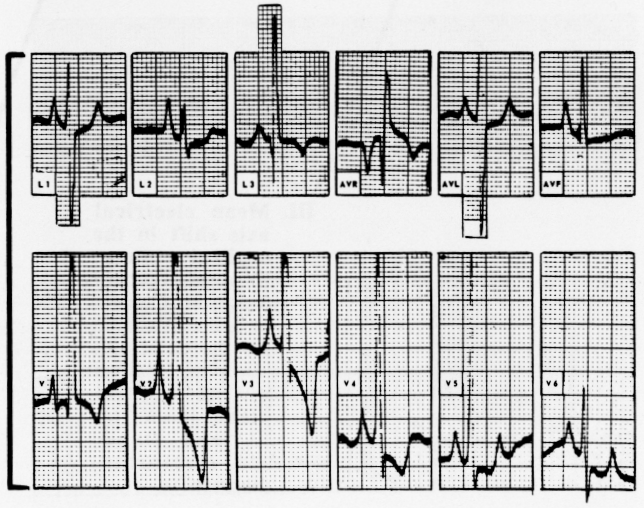
Left posterior hemiblock.†‡ — **FIG. R42**



***Left posterior hemiblock** with right bundle branch block (bifascicular block).*†‡ — **FIG. R43**

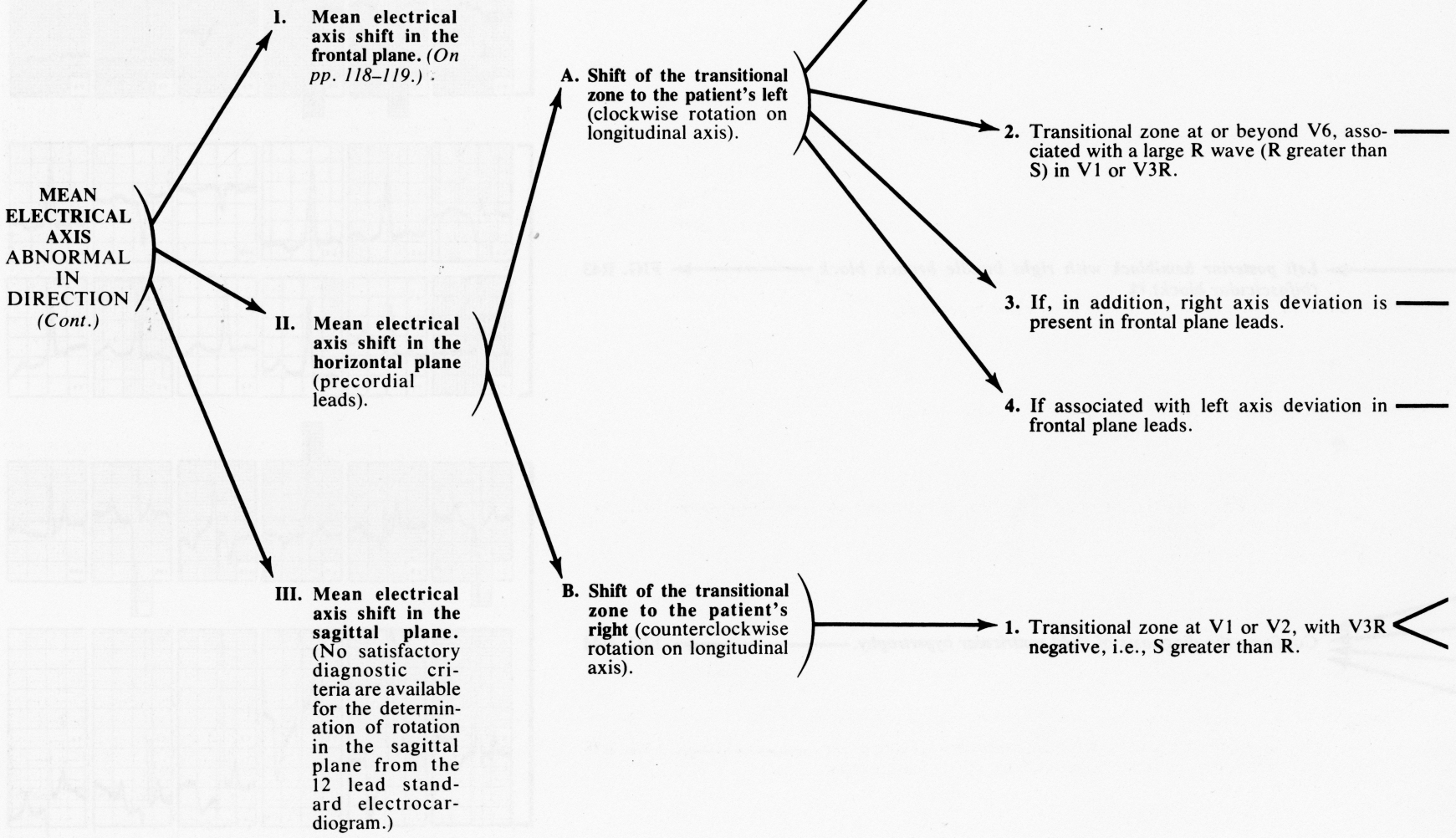


*Confirms the diagnosis of **right ventricular hypertrophy**.* — **FIG. R44**

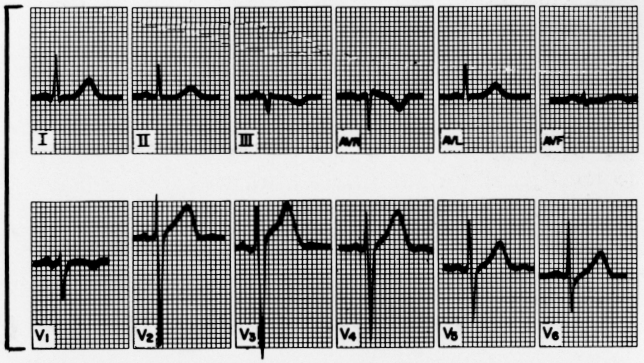


QRS ABNORMAL IN THE PRECORDIAL LEADS DUE TO: *Rotation of the Mean Electrial Axis*

(Rotation in the horizontal plane is best determined by the position of the transitional zone. The transitional zone is present in that lead position where R equals S. Leads to the right of the transitional zone have an S greater than R. Leads to the left of it have an R greater than S. When R is greater than S in V1, these criteria do not necessarily apply. (See High Voltage in Precordial Leads, pp. 98–103. For further description, see Chap. 1.)



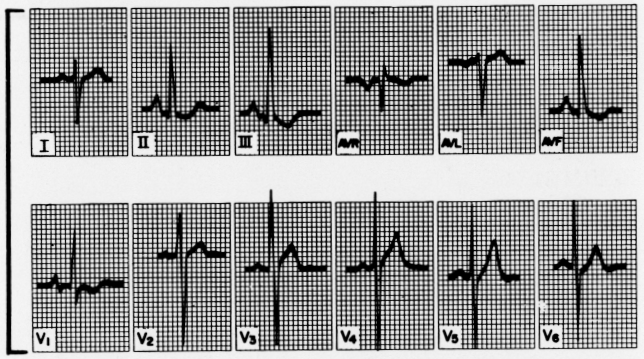
Of no diagnostic significance. When associated with other abnormalities of the electrocardiogram, the diagnosis is based on these other findings. → **FIG. R45**



*Usually **right ventricular hypertrophy** (Fig. R46, V leads).*

*Confirms diagnosis of **right ventricular hypertrophy**.*

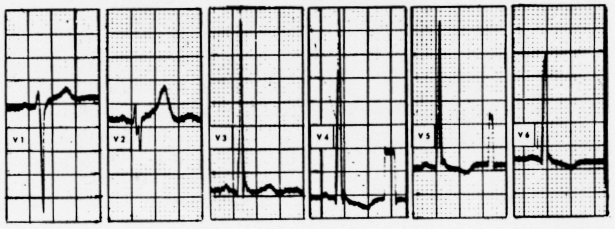
→ **FIG. R46**



Refer to Left Axis Deviation section, page 118-120.

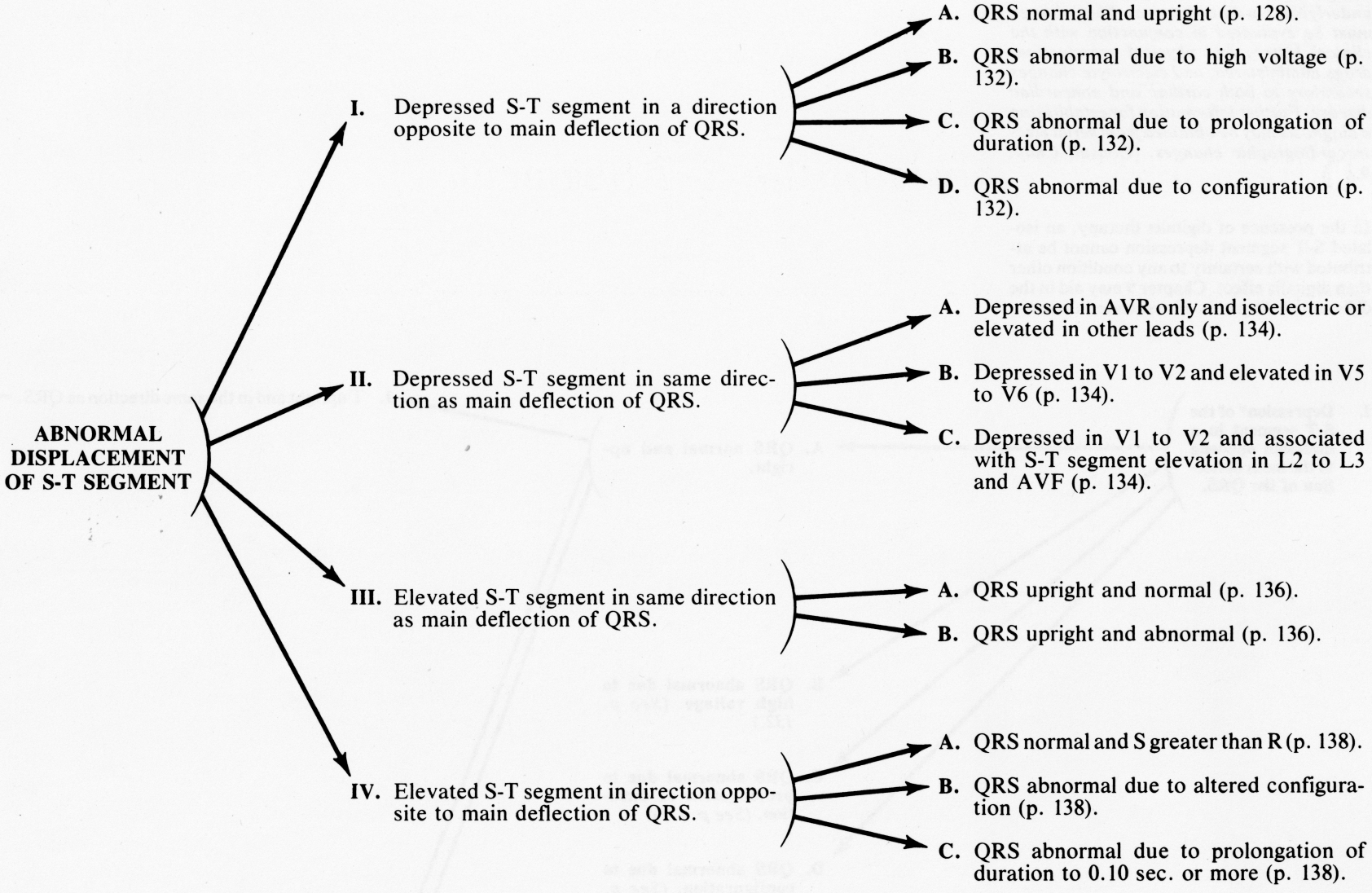
Normal when no other associated electrocardiographic abnormalities are present. → **FIG. R47**

*Occasionally seen in **left ventricular hypertrophy** where other and more characteristic changes in the electrocardiogram will be found.* → **FIG. R48**



CHAPTER 6

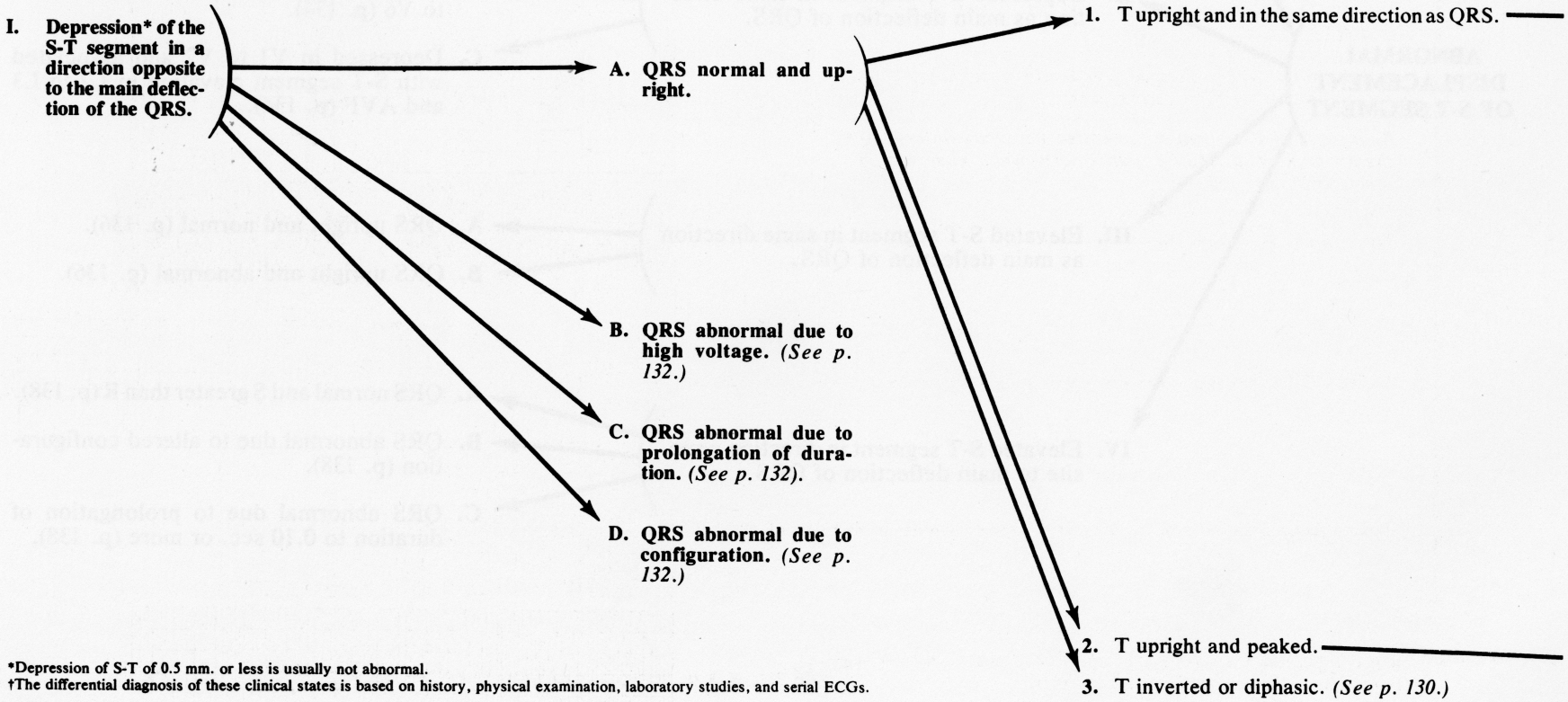
Differential Diagnosis of the S-T Segment


ABNORMAL DISPLACEMENT OF S-T SEGMENT
I. Depressed S-T segment in a direction opposite to main deflection of QRS.
A. QRS normal and upright (p. 128).
B. QRS abnormal due to high voltage (p. 132).
C. QRS abnormal due to prolongation of duration (p. 132).
D. QRS abnormal due to configuration (p. 132).
II. Depressed S-T segment in same direction as main deflection of QRS.
A. Depressed in AVR only and isoelectric or elevated in other leads (p. 134).
B. Depressed in V1 to V2 and elevated in V5 to V6 (p. 134).
C. Depressed in V1 to V2 and associated with S-T segment elevation in L2 to L3 and AVF (p. 134).
III. Elevated S-T segment in same direction as main deflection of QRS.
A. QRS upright and normal (p. 136).
B. QRS upright and abnormal (p. 136).
IV. Elevated S-T segment in direction opposite to main deflection of QRS.
A. QRS normal and S greater than R (p. 138).
B. QRS abnormal due to altered configuration (p. 138).
C. QRS abnormal due to prolongation of duration to 0.10 sec. or more (p. 138).

ABNORMAL DISPLACEMENT OF S-T SEGMENT

Isolated displacement or alteration of form of the S-T segment is nonspecific and, though abnormal, is not diagnostic of the underlying cardiac disease. This change must be evaluated in conjunction with the clinical history and physical examination, drugs administered, and electrolyte changes secondary to both cardiac and noncardiac disease. Further information for establishing a diagnosis may be obtained from serial electrocardiographic changes. (Consult Chap. 9.)

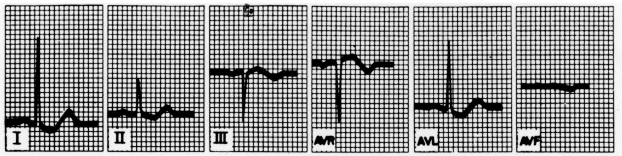
In the presence of digitalis therapy, an isolated S-T segment depression cannot be attributed with certainty to any condition other than digitalis effect. Chapter 9 may aid in the differential diagnosis of associated disease.



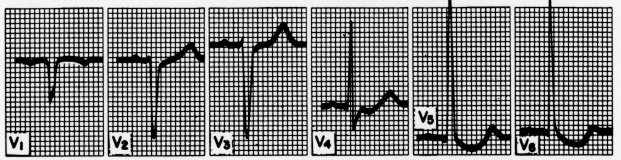
*Depression of S-T of 0.5 mm. or less is usually not abnormal.
†The differential diagnosis of these clinical states is based on history, physical examination, laboratory studies, and serial ECGs.

A nonspecific change:
The shape of the S-T segment is not diagnostic. However, on occasion, the shape may be very suggestive of a diagnosis. The following description of the various forms of the S-T segment, while limited in significance, may nevertheless be helpful in reaching a diagnosis in some cases.

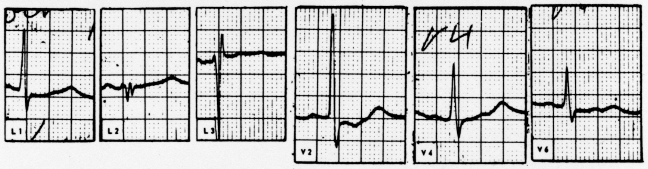
Digitalis effect — FIG. S-T 1
J depressed
Q-T shortened
S-T straight and falling
T reduced voltage



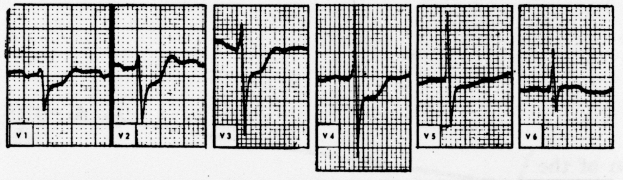
Left ventricular hypertrophy — FIG. S-T 2
J depressed
S-T depressed



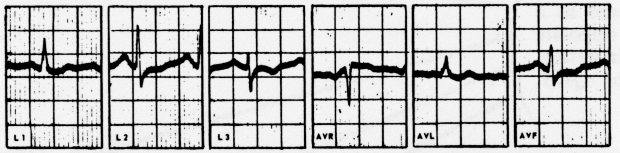
Potassium deficiency — FIG. S-T 3
J depressed
S-T sags downward in a U-shaped curve
Low, upright T
T followed by or fused with a prominent U wave.



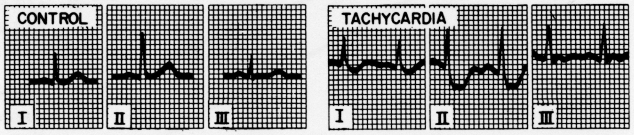
Cornary insufficiency or angina pectoris or subendocardial infarct† — FIG. S-T 4
J depressed
S-T straight and prolonged, frequently descending. (This change also seen in positive exercise test.)



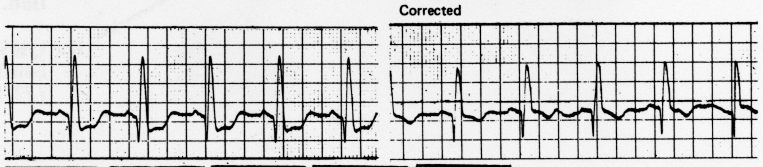
Nonspecific S-T depression, *so-called neurocirculatory asthenia or normal finding (particularly when observed in erect position).* — FIG. S-T 5



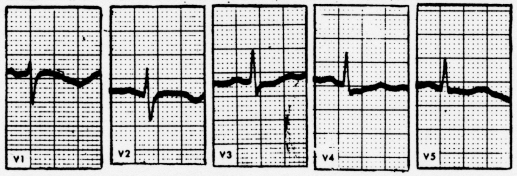
Tachycardia — FIG. S-T 6



Defective ECG machine. — FIG. S-T 7



Drug effects: *Quinidine, procaine amide.* — FIG. S-T 8



Suspect hyperkalemia *when J is markedly depressed and S-T is steep in its ascent to the peak of the T.* — FIG. S-T 9