Conduction Abnormalities in A-V Junctional Rhythm Shortly After Cardiac Surgery*

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The patient was a 56-year-old man who had been in good health until two months prior to admission when he suddenly developed severe dyspnea and symptoms of congestive heart failure.

Physical examination, ECG, x-ray examination and catheterization of the heart suggested severe mitral regurgitation with left and right heart failure. He was scheduled for operation with the diagnosis of ruptured chordae of the mitral valve with severe mitral incompetence.

At operation, all chordae of the distal half of the posterior leaflet were found to be ruptured. The mitral valve and the papillary muscles were excised and replaced by a Starr-Edwards prosthesis.

The tracing was taken eight hours after the operation was completed. The pressure in the brachial artery was registered along with lead III. The electrocardiogram shows an A-V junctional rhythm, a finding not unusual after cardiac surgery.

As clarified by the diagram, several interesting phenomena are present:

1) negative P waves are shown following the QRS complexes. They represent retrograde conduction from the A-V junctional pacemaker to the

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atrium, with gradual increase in conduction time, showing Wenckebach-type retrograde conduction;

2) when the distance between the QRS complex and the retrograde P wave is longest, reciprocal activation of the ventricle takes place. The reciprocal beats are marked by arrows. These beats, in traversing the A-V junction, reset the A-V junctional pacemaker as shown in the diagram (A-V level);

3) as seen in the diagram, the intervals between the QRS complexes are not constant. After the reciprocal beat, these intervals increase slightly. Although not as clear as the retrograde conduction towards the atrium, a Wenckebach-type delay of conduction might also be present in an antegrade way from the A-V junctional pacemaker towards the ventricle.

Finally the brachial artery pressure tracing deserves a short comment.

One might wonder why the pressure in the brachial artery is lowest at the reciprocal beats, when the QRS complex is preceded by a P wave at an interval of 0.15 seconds, in other words, when atrium and ventricle are contracting in the correct sequence.

It is understandable if one realizes that:

a) the R-R interval of the nodal-reciprocal beat is 50 per cent less than the interval between two nodal beats,

b) the activation of the atria is in a caudocranial direction, and

c) both left and right atria were incised during cardiac surgery.

The function of both atria eight hours after this procedure was definitely impaired therefore.

Two other mechanisms seem to be of importance in determining the height of the brachial artery pressure. The highest pressures are found: 1) after the longest R-R interval, and 2) even higher than 1) with the nodal beat that terminates the interval following the reciprocal beat.

The latter is an example of potentiation of cardiac contractility and resulting brachial artery pressure elevation by the early occurring reciprocal beat. Both mechanisms are fundamental properties of heart muscle.

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DIAGNOSIS OF ISCHEMIC DISEASE OF THE HEART—A RUSSIAN STUDY

In order to evaluate the diagnostic significance of ventricular extrasystole and paroxysmal ventricular tachycardia in patients with myocardial infarction, the authors conducted ECG investigations in 68 patients. By the form of ventricular extrasystoles in chest leads, it is possible to reveal both the localization of myocardial infarction and the stage of the process. This also concerns instances of myocardial infarction complicated by paroxysmal ventricular tachycardia. In a number of cases, extrasystolic complexes pointed to the presence of a fresh myocardial infarction in cicatricial changes in the myocardium, whereas the usual ECG complexes showed no essential deviations.