Hypopotassemia Resembling Myocardial Ischemia*

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A 33-YEAR-OLD WHITE WOMAN WAS ADMITTED TO THE PSYCHIATRIC SERVICE SUFFERING FROM DEHYDRATION, NAUSEA, DROWSINESS, AND WITH A HISTORY OF POSSIBLE Hysterical Paralysis.

As part of a medical checkup, an electrocardiogram, shown in Fig. 1A, was ob-

![Electrocardiogram](image)

**SERUM K⁺ = 1.8 mEq/l.**

1 Hr. AFTER 40 mEq K⁺ (I.V.)

**FIGURE 1:** (Reproduced with the kind permission of Dr. E. Bajusz, guest editor, *Canad. J. Biol. and Med.*)
tained. In this tracing, the ST segments are horizontally and deeply depressed in leads V₁ through V₆ and leads I, II, III and aVF. Since these changes resembled subendocardial injury, a diagnosis of coronary artery disease was made. However, hypokalemia was considered because the profoundly depressed ST segments are shorter in duration than is usually seen in myocardial ischemia. The serum potassium was 1.8 mEq./L. This degree of ST segment change is associated with a low serum potassium concentration usually below 2.5 mEq./L. In hypokalemia, the P waves are usually taller than normal and slightly peaked, best seen in the standard leads; similar P wave changes may also be seen in other conditions. It is interesting that Prinzmetal has demonstrated that the underlying mechanism for ST segment depression in mild ischemia is intracellular flux of potassium.

After the intravenous administration of 40 mEq./L. of potassium in about one hour, the electrocardiogram shown in Fig. 1B was obtained. The ST segments were considerably less depressed, the P waves were diminished in amplitude and the U waves, best seen in leads V₂ through V₄, became more prominent. The normal Q-T interval and prolonged Q-U interval is characteristic of hypokalemia, as is the juxtaposition of the U wave to the T wave. These changes are best seen in the precordial leads.

Left ventricular hypertrophy often produces U waves and the depressed ST segments in the left precordial leads, but of a different configuration from hypotension. In the presence of both left ventricular hypertrophy and hypopotassemia, the ST segment also becomes depressed in leads V₁ to V₄.

It is worth emphasizing that the characteristic changes of hypokalemia are the depressed ST segments of short duration and prominent U-waves juxtaposed to the T waves. Inasmuch as the electrocardiographic diagnosis of hypopotassemia is often missed, and since this is a treatable condition, it is important that the cardiologist be aware of the subtle electrocardiographic changes in hypokalemia.

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RADIOCINEMATOGRAPHIC INVESTIGATION

The author's experience in clinical radiocinematography of the esophagus testifies to the fact that the study of the contractile capacity of esophageal walls in the diagnosis and differential diagnosis of tumors of the esophagus merits great attention. An analysis of segmental contractions is of greater significance than the assessment of peristaltic movements. According to the author, the underevaluation of the diagnostic importance of segmental contractions of the esophagus at the present time is due to the complex nature of their study during routine x-ray investigation. Radiocinematography with its peculiarities and possibilities opens new vistas in this direction.


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CONGENITAL DIAPHRAGMATIC HERNIA

A 45-year-old woman was referred to the surgical clinical for evaluation of abnormal chest roentgenogram. Chest film revealed a round tumor-like dense opacity adjacent to the heart in the lower field of the right lung. Lateral film disclosed the shadow behind the sternum. On fluoroscopy, there was noted a clear area in the shadow and careful auscultation revealed occasional intestinal sound over the right hemithorax. On thoracotomy, parasternal hernia (Morgagni) containing the omentum and a portion of the transverse colon was found and was repaired after a large portion of the omentum was excised.