Diagnostic Images

Deep vein thrombosis – the impedance phlebogram

Presented by L. Kreel

Newham General Hospital, London E.13, UK.

The patient

A woman age 36 years. 12 days after the birth of her ninth child complained of pain in the right loin which later localised to the lower chest. On examination the temperature was 38°C, the heart rate 100 beats/min and the blood pressure 110/60 mm Hg. There were inspiratory crackles over the left lower zone. The white cell count was $13 \times 10^9/l$.

Figure 1 Chest radiograph. Marked alveolar shadowing right cardio-phrenic angle.

Figure 2 Isotope scan. Mismatched VQ scan with defect at left base on perfusion (PERF) but not on ventilation (VENT) and also in the right costo-phrenic angle.

Comment

Most institutions would accept an area of homogeneous lung shadowing and a positive VQ lung scan as diagnostic of pulmonary emboli, and anti-coagulate the patient.

However the presentation is not infrequently that of pain in the calf or leg swelling with calf tenderness. Deep vein thrombosis then requires exclusion and contrast venography was undertaken previously.

Impedance phlebography (IPG) uses electrical plethysmography to detect venous obstruction. A cuff constricts the thigh and as the limb fills with blood the resistance to the passage of a weak high-frequency current is lowered with a rise in the trace. As the calf pressure is released there is a rapid increase in resistance with a sharp fall in the trace. It is simple, non-invasive and reliable for the definitely positive or definitely negative results, contrast venography being used for equivocal cases.

False positives occur with extrinsic obstruction to veins as with an abdominal mass, in congestive heart failure and in cellulitis. False negatives occur with thrombosis limited to calf veins or if there is a well established collateral circulation following deep vein thrombosis.

However if the IPG indicates definite normality the chance of a significant pulmonary embolism is less than 0.5% even in high risk patients and is now recommended as the screening test for deep vein thrombosis of the lower limbs.

Reference

- WHEELER, H.B. & ANDERSON, F.A. Jr. (1982). Impedance phlebography: the diagnosis of venous thrombosis by occlusive impedance plethysmography. In *Non-invasive diagnostic techniques in vascular disease*. 2nd Edition, pp.482–496. E.F. Bernstein, (Ed). C.V. Mosby: St Louis.

Figure 3 IPG (Impedance phlebogram). The left leg has a normal filling phase and emptying phase whereas on the right there is a slower rise and prolonged fall indicating venous obstruction. As shown on the chart the ringed dots (left leg) are above the line and the black dot (right leg) below the line.