CASE REPORTS

Spontaneous splenic rupture and pseudo-hyperkalaemia in chronic lymphatic leukaemia

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Summary

Two unusual complications are described in a patient who had chronic lymphatic leukaemia. Spontaneous rupture of the spleen occurred and was related to subcapsular infarction and haemorrhage. The possibility of this complication should always be considered when signs of an acute abdomen develop in a patient with leukaemia. The phenomenon of pseudo-hyperkalaemia was demonstrated. This was most likely due to increased leucocyte fragility *in vitro*.

Introduction

Spontaneous rupture of the spleen in leukaemia is very rare, but occurs most frequently in patients with acute leukaemia (Hynes, Silverstein and Fawcett, 1964). In chronic leukaemia, there have been three cases of splenic rupture recorded in the myeloid variety (Greenfield and Lund, 1944; Neal, 1940; Sarin and Sarin, 1957) and only one report in a patient with chronic lymphatic leukaemia (Cooray, 1952). One further case of spontaneous rupture of the spleen is recorded here in a patient with chronic lymphatic leukaemia. This case also exhibited the phenomenon of pseudohyperkalaemia which has a more frequent association with myeloproliferative disorders (Myerson and Frumin, 1960).

Case report

A 64-year-old miner was admitted as an emergency with a 10-hr history of extreme weakness, dizziness and sweating. He had no chest pain but had some discomfort under the left costal margin. There was no haematemesis or melaena and no history of trauma to his chest or abdomen. Two years previously he had attended the out-patient department having vomited on three occasions during the preceding 3 weeks. He had no dyspepsia, abdominal pain or disturbance of bowel habit. At that time he appeared well and the only abnormalities found on physical examination were a blood pressure of 170/105 mmHg and associated arteriovenous nipping in the fundi. Chest X-ray showed left ventricular

prominence and barium meal revealed a grossly scarred duodenal cap. Haemoglobin was 16.5 g/100 ml and white blood count 10,300/mm³ with 78% lymphocytes, some of which were of atypical morphology. At that time he was treated with methyldopa 250 mg t.i.d. and no specific therapy was given for his haematological state. Six weeks before his emergency admission he developed a widespread petechial rash which became confluent in some areas, and for this reason his general practitioner discontinued methyldopa therapy.

On physical examination on admission he was pale and tachypnoeic with widespread purpura and ecchymoses. There was no superficial lymphadenopathy. The blood pressure was 130/80 mmHg and the pulse rate 120/min. Heart sounds were normal and there was no evidence of cardiac failure. His chest was clear on auscultation. Abdominal examination revealed left upper quadrant fullness and tenderness. There was no rebound tenderness or sign of intraperitoneal fluid. There was dullness on percussion to 8 cm below the left costal margin but the spleen edge was impalpable. There was no hepatomegaly. Bowel sounds and rectal examination were normal but the faecal occult blood test was mildly positive. Neurological examination was unremarkable.

Initial investigations showed Hb 9 g/100 ml, PCV 28%, MCHC 32.5, white blood count 496,000/mm³ (98% lymphocytes and many smudge cells in the film) and platelets 66,000/mm³. Prothrombin ratio was 1.6 : 1. Blood urea was 48 mg%, Na⁺ 140 mEq/l, K⁺ 7.3 mEq/l, Cl⁻ 103 mEq/l, HCO₃⁻ 20 mEq/l, bilirubin 1.8 mg%, SGPT 78 I. units/ml, alkaline phosphatase 17 KA units%, total proteins 5.5 g/100 ml and albumin 2.6 g/100 ml. Chest X-ray was normal. Supine abdominal X-ray showed a very large soft tissue mass in the left hypochondrium and epigastrium. ECG showed sinus tachycardia and left axis deviation with no evidence of ischaemia, infarction or electrolytic disturbance.

Repeat plasma K⁺ 1 hr following administration

of 50 ml of 50% dextrose and 10 units of soluble insulin i.v. was greater than 8.0 mEq/l. Further plasma K⁺ levels were normal when estimations were performed on plasma which was separated immediately after venepuncture.

He was transfused with 4 units of whole blood but he remained relatively hypotensive and his Hb 24 hrs after admission was still only 7.8 g/100 ml. By this time there was evidence of increasing abdominal girth. There was, however, no significant increase in abdominal tenderness and bowel sounds were still present. A clinical diagnosis of retroperitoneal haemorrhage was made. His condition rapidly deteriorated and he died 29 hr after admission.

At post-mortem the peritoneum was found to contain a large quantity of fresh blood, and over 1 kg of blood clot localized mainly around the spleen. The liver weighed 1 kg and the spleen 2 kg. On the posterior part of the upper pole, the splenic capsule was torn over a 5 cm diameter area, and from this there had been extensive haemorrhage into the abdominal cavity. Elsewhere, the splenic capsule was tense and there was an adjacent sub-capsular haematoma of 5 × 3 cm diameter. On slicing the splenic pulp, numerous areas of haemorrhage measuring up to 6 cm across were present and it was from one of these that the sub-capsular haematoma and rupture occurred. Some recent infarcts were also noted near the capsule. The changes in the spleen suggested that there had been recurrent episodes of bleeding in the weeks before death. The lymph nodes throughout the body were mostly small but a few para-aortic nodes were enlarged owing to leukaemia. Histological examination confirmed evidence of chronic lymphatic leukaemia in several organs, in particular the lymph nodes, spleen and bone marrow.

Discussion

An abdominal emergency may occur in leukaemia either as a result of the disease itself or as a complication of treatment. The disease may produce severe thrombocytopenia and consequent gastrointestinal haemorrhage. Corticosteroid therapy may cause peptic ulceration with complicating haemorrhage and perforation which may be 'silent'. The enlarged spleen in chronic myeloid leukaemia may be associated with local symptoms such as dragging loin pain, more acute pain due to splenic infarction, or constitutional symptoms, but in chronic lymphatic leukaemia the spleen itself rarely causes symptoms.

The possibility of splenic rupture should be considered when abdominal pain or signs of an acute surgical condition develop in a patient with leukaemia. With splenic rupture the pain is variable in severity but upper left quadrant tenderness is constant. The abdomen is soft and bowel sounds are

present until the onset of paralytic ileus within 3–4 hr (Clain, 1973).

Two main mechanisms may be responsible for spontaneous rupture in the diseased spleen: (1) unnoticed trauma, unexpected or unguarded movements of the trunk or sudden increase in intra-abdominal pressure. The best known example occurs in infectious mononucleosis when the spleen is more likely to rupture because of its enlargement and because it is soft and fleshy (Macpherson, Richmond and Stuart, 1972); (2) splenic infarction with sub-capsular haemorrhage and rupture at this point. Splenic infarction results from local hypoxia caused by a number of factors, in particular, the size of the spleen relative to its blood flow, compression of extra- and intrasplenic vessels by lymph nodes and leukaemic tissues respectively, and systemic hypoxia due to anaemia. In the case described above the factor identified was subcapsular infarction and haemorrhage.

Definitive diagnosis of haemoperitoneum may be achieved by four-quadrant abdominal paracentesis. Early diagnosis is of major importance because successful splenectomy has been recorded as an emergency procedure in cases of spontaneous splenic rupture in leukaemia (Cooray, 1952; Tartaglia, Scharfman and Propp, 1962).

Elevation of the serum potassium that does not reflect the level of plasma potassium *in vivo* as judged by clinical symptoms and cardiographic features has been observed and described as spurious or pseudo-hyperkalaemia, and attributed to the release of potassium from platelets during coagulation (Hartmann, Auditore and Jackson, 1958). The same phenomenon has been observed in myeloproliferative disorders with thrombocytosis (Myerson and Frumin, 1960). In three cases of chronic myeloid leukaemia, pseudo-hyperkalaemia has been shown to be due to release of potassium from the white blood cells during clotting (Bronson *et al.*, 1966), but in these latter cases, the hyperkalaemia was prevented by heparin. Increased white blood cell fragility and potassium release in the absence of coagulation have been demonstrated and implicated in pseudo-hyperkalaemia (Wills and Fraser, 1964). Incubation of leukaemic cells from a patient with acute myeloid leukaemia in the patient's own plasma and in control plasma have been shown to produce hyperkalaemia *in vitro* suggesting that these cells are the source of potassium (Ringlehann, Laszlo and Vajda, 1974). Rapid lysis of leukaemic cells has been suggested as a possible cause of extreme true hyperkalaemia which developed within 12 hrs of treatment in acute lymphoblastic leukaemia (Fennelly, Smyth and Muldowney, 1974). However, release of potassium from the white cells *in vitro* appears to have been the cause of the apparent

hyperkalaemia in the case reported above. This should be borne in mind in patients with leukaemia who may appear to have hyperkalaemia and it does not carry with it the known dangers of hyperkalaemia *in vivo*.

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Agranulocytosis and systemic candidiasis following clomipramine therapy

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Summary

A case of agranulocytosis following clomipramine treatment is described. The period of agranulocytosis lasted for 19 days and was complicated by systemic *Candida* infection which was successfully treated with flucytosine.

Introduction

Agranulocytosis is a well recognized complication of phenothiazine administration, and these drugs are the most important cause of drug-induced agranulocytosis at the present time. Agranulo-

cytosis has been recorded with imipramine (Miller, 1963; Bird, 1960) and desipramine (Crammer and Elkes, 1967). There are no published reports of this complication following clomipramine, but three cases of clomipramine-induced agranulocytosis have been reported to the makers in the U.K. (Dr G. Beaumont, personal communication). Intravenous clomipramine is used in the treatment of severe and resistant forms of depression. A case is now reported of severe agranulocytosis occurring in a patient who had received intravenous clomipramine for depression. The illness which followed was complicated by systemic *Candida* infection which was successfully treated with flucytosine.

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