the insertion of Utus paste into her uterus—intravascular haemolysis, consumption coagulopathy, and cardiac arrest. There can be little doubt that part of the injected Utus paste entered the blood draining the uterus. The high intravascular concentration of paste would result in dissolution of the red cell membrane. After this haemolysis coagulation would be triggered leading to fibrin formation. The haemolysis was unlikely to have been provoked by the deposition of fibrin because fragmented red cells were not seen in peripheral blood films.

The multiple fibrin emboli which would occur would bring about widespread obstruction within the microcirculation causing acute circulatory failure and large-scale shunting of blood within the lung. Good oxygenation of the lung would not then relieve gross hypoxaemia. This would explain the protracted cyanosis. Eventually the patient's own fibrinolytic system would become active and would lyse the fibrin occluding the pulmonary vessels, her colour improving as hypoxaemia was relieved.

Close comparison can be drawn between the above postulate and amniotic fluid embolism. In the latter condition, however, residual non-lysable evidence of previous embolism persists in the form of fetal squames, mucus, and sometimes meconium.

Various complications have been reported after the use of intrauterine pastes; haemolysis was initially reported by Weilerstein (1944) and later by Williams *et al.* (1955). These workers also described causes of collapse similar to those in our own case, as did Dutra *et al.* (1950). The latest report of the D.H.S.S. (1972) on maternal deaths in England and Wales included the case of a 38-year-old patient, 18 weeks

pregnant, who died 10 minutes after the injection of 25 ml of Utus paste into the uterus. The occurrence of consumption coagulopathy complicating the intrauterine injection of Utus paste has not, to our knowledge, previously been reported. The pathogenesis is uncertain but several potential mechanisms are possible. They include lysis of red cells with thromboplastin release, platelet lysis with thromboplastin formation, a direct action on the plasma coagulation mechanism, indirect initiation of coagulation of complement activation, or some synergy between several of these systems. Further studies have been undertaken by us into both the haemolytic and coagulation-inducing properties of Utus paste and the results will be reported elsewhere.

It is likely that the use of intrauterine pastes will be superseded by safer methods in the near future. This report adds yet another cause of consumption coagulopathy to the long list of medical and surgical conditions which are complicated by this syndrome.

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Glomerulonephritis Associated with *Coxiella burnetii* Endocarditis

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A patient with endocarditis associated with chronic *Coxiella burnetii* infection is described in whom glomerulonephritis developed with granular deposits containing immunoglobulins and complement in the glomeruli. The serum was notable for the variety of circulating antibodies detected, which included antibodies directed against native DNA.

Case Report

The patient, a man, had had rheumatic fever at the age of 12 years and at age 40 (1955) was found to have mitral stenosis which required mitral valvotomy. In 1964 the signs of mitral regurgitation and aortic stenosis and regurgitation were documented and two years later he developed intermittent fever, myalgia, and purpura and began to lose weight. Repeated blood cultures were sterile and antinuclear factor was not detected. In 1970 replacement of the mitral and aortic valves was performed using fascia lata prostheses and at operation the aortic valve was found to contain a defect suggesting endocarditis. After six months of symptomatic improvement he again lost weight and developed exertional

dyspnoea and a catheter study showed recurrence of mitral stenosis. No further surgery was undertaken. In February 1973 (age 58) he developed oliguria and haematuria and was admitted to hospital.

On admission he was in atrial fibrillation and was normotensive (blood pressure 130/70 mm Hg). He had the signs of mitral stenosis and regurgitation and aortic stenosis, splenomegaly, and purpura on the trunk and lower limbs. The blood urea was 230 mg/100 ml, serum creatinine 11.4 mg/100 ml, and haemoglobin 9.5 g/100 ml with a normochromic blood film. His platelet count was 79,000/mm³ and platelet antibodies were detected. Repeated blood cultures were sterile and the antistreptolysin-O titre was normal (<200 IU/ml). Serum immunoglobulins were raised (IgG 1,900 mg, IgA 700 mg, IgM 420 mg/100 ml). Tests for antinuclear and rheumatoid factors gave titres of 1/250 and 1/64 respectively and the direct Coombs test was negative. Anti-DNA antibody was found to be raised on two occasions, at 60% on 25 March and 57% on 11 May (normal range 0-30%). Complement fixation tests were negative for brucella but positive for anti-*Cox. burnetii* antibodies (titres for phases I and II were both 1/640) and hepatitis-B antigen (HBsAg) was detected in the serum. Serum complement (C3) was reduced (range of values 38-54 mg/100 ml; normal range 81-150 mg/100 ml) and no cryoglobulins were detected. The L.E. cell phenomenon was absent. Urine microscopy showed red cells and granular casts and urine culture was sterile. A high-dose infusion pyelogram showed normal renal size.

Because of the oliguria at the time of admission peritoneal dialysis was carried out. Renal biopsy showed the glomeruli to be either hypercellular owing to proliferation of endothelial and mesangial cells, with an increase in the mesangial matrix (fig. 1), or sclerotic. Electron microscopy showed granular deposits close to the mesangial region with variable fusion of foot processes of the epithelial cells (fig. 2). Immunofluorescence examination showed IgG, IgA, and C3 in the glomeruli in a granular pattern (fig. 3).

After peritoneal dialysis his renal function improved and in view of the high anti-*Cox. burnetii* antibody titres, which suggested chronic infection with this organism, he was treated with cotrimoxazole. His renal function subsequently deteriorated, however, and he died in May 1973. Permission for necropsy was not obtained.

Since his illness had been prolonged several previous sera were available and these were examined for anti-*Cox. burnetii* and anti-DNA antibodies (see table).

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FIG. 1—Glomerulus showing hypercellularity and increased mesangial matrix. (H. and E. $\times 450$.)

FIG. 2—Electronmicrograph showing prominent mesangial matrix with electron-dense deposits (arrowed). Many foot processes of epithelial cells are fused. ($\times 27,000$.)

Comment

The persistently raised titre of phase I anti-*Cox. burnetii* antibodies in this patient in association with his heart valve lesions strongly suggests that he had Q-fever endocarditis (Clinicopathological Conference, 1968). The presence of electron-dense deposits on glomerular basement membranes of the renal biopsy specimen and the demonstration of a granular distribution of immunoglobulins and C'3 in the glomeruli in the presence of a reduced circulating C'3 concentration are consistent with an immune-complex mechanism for his glomerulonephritis.

Glomerulonephritis due or probably due to the deposition of immune complexes is a recognized complication of endocarditis resulting from infection with a variety of organisms, including bacteria, fungi, and viruses (Gutman *et al.*, 1972). Subacute infective endocarditis may be associated with a number of immunological abnormalities, including the presence of rheumatoid and antinuclear factors (Gutman *et al.*, 1972). The present case appears to be the first to

FIG. 3—Immunofluorescence showing C'3 in granular pattern in glomerulus. ($\times 715$.)

Antibody Titres Found in Sera

Date	Anti- <i>Cox. burnetii</i> Antibody Titres (Complement Fixation)		Anti-DNA Antibody Titres
	Phase I	Phase II	
18/4/70	1/1,280	1/640	37%
20/5/70			
22/6/70	1/640	1/320	42%
16/7/71	1/320	1/160	
15/9/71	1/320	1/160	60%
25/3/73	1/640	1/640	

be recorded in which *Cox. burnetii* endocarditis was associated with glomerulonephritis and also the first in which subacute infective endocarditis was associated with a high anti-DNA antibody titre.

The presence of HBsAg in the serum of this patient is interesting in view of the recognized association between Australia antigenaemia and immune-complex glomerulonephritis (Combes *et al.*, 1971; Myers *et al.*, 1973; Knieser *et al.*, 1974). Though an attempt was made to elute and identify antibody to *Cox. burnetii*, DNA, or HBsAg from the renal biopsy specimen this was unsuccessful. The mechanism of development of a high anti-DNA antibody titre in this man is obscure. Sera from four other patients with *Cox. burnetii* endocarditis have been examined for DNA-binding activity and in each of these the anti-DNA antibody titre was in the normal range (G. R. V. Hughes, personal communication).

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