standard programme: we asked them to bring things—an account of a patient, or an idea; or we'd hand over sessions to individual general practitioners. And they were very popular—everyone wanted to turn up to hear the neighbouring practice talk about how they tackled a problem. We played with this for about 18 months, and evaluated it every term, and, although the wonderful lecture from Mr So-and-so about such-and-such always came top in the evaluation, and the other things below it, they still came every week.

RS: Whilst we evangelise about our view of the world, and what we're trying to establish, it's only a part of the way. There are some doctors who would not like to learn in this way, and that's perfectly OK. But there are some doctors who would actually benefit from this, and we don't want to deprive them of the opportunity. Both approaches are valid.

I think that our scheme is valuable in that it exists, but I don't how you broadcast that, especially to people who

may not even begin to understand what it is that we're trying to do. General practice has come of age and its training should no longer be an add on to the hospital specialties, which is how it started off in the 1970s. Vocational training has probably been the single most brilliant innovation in training that this country has produced this century, and yet it is still hanging on the coat tails of the hospital specialties. That's not to say that we don't need the hospital specialties: we do need them and we need their expertise, but we need it in a different way, and it needs to be part of a partnership, not something that is handed down as a grace and favour.

CV: The one thing that we don't need is more research with its inevitable five year lag time. Yes, we're taking risks, but we think we're the best bet that's on offer for giving young principals a sense of general practice as a journey, not a career plateau from which you die in harness at the age of 67—dreadful thought!

Lesson of the Week

Cholesterol emboli may mimic systemic vasculitis

D S Peat, Peter W Mathieson

Multiple cholesterol emboli may cause symptoms, signs, and laboratory abnormalities indistinguishable from those of primary systemic vasculitis

The clinical syndrome resulting from multiple cholesterol emboli is a great mimic. Many organs may be affected: typical features include a purpuric rash, livedo reticularis, myalgia, and acute renal failure. Cholesterol emboli may complicate cardiac catheterisation or arteriography, or they may occur spontaneously, even in patients without previously known vascular disease.

We report on a 73 year old man with acute renal failure in whom clinical signs and laboratory tests suggested a pulmonary-renal syndrome caused by systemic vasculitis but who turned out to have cholesterol emboli. The treatment and prognosis of the two conditions are radically different.

Case report

A 73 year old man was admitted to our hospital with rapidly deteriorating renal function. In the referring hospital chest pain and hypertension had been treated with nifedipine and aspirin. Initial plasma urea concentration was 17 mmol/l and plasma creatinine concentration 222 μ mol/l. Over the next two weeks he became oliguric and plasma biochemical values deteriorated.

On transfer he was unwell with severe dyspnoea at rest, repeated haemoptysis, and profound oliguria. Chest radiography showed bilateral alveolar shadowing. Blood gases while breathing air showed a partial pressure of oxygen (P_{O_2}) of 8.6 kPa, partial pressure of carbon dioxide (P_{CO_2}) of 2.3 kPa, and hydrogen ion of 91 nmol/l. Plasma urea was 65 mmol/l, plasma creatinine 823 μ mol/l, haemoglobin 112 g/l, total white cell count $24.6 \times 10^9/l$, predominantly of neutrophils, but the eosinophil count was $0.44 \times 10^9/l$. Indirect immunofluorescence showed him to be positive for antineutrophil cytoplasmic antibody; antiglomerular basement membrane antibodies were not detected.

Haemodialysis was started, with ultrafiltration to remove fluid, but 12 hours after admission he had deteriorated, with increasing dyspnoea and further haemoptysis. P_{O_2} was 7.7 kPa while breathing 35% oxygen. He was transferred to the intensive care unit and treated with antibiotics, physiotherapy, and 60% inspired oxygen. A

presumptive diagnosis of pulmonary-renal syndrome due to systemic vasculitis was made, based on the rapidly deteriorating renal function, increasing respiratory distress despite fluid removal, and the positive antineutrophil cytoplasmic antibody titre.

Treatment with prednisolone and cyclophosphamide was started; haemodialysis was continued. Five days later his breathlessness was much improved and he was well enough to undergo percutaneous renal biopsy, which

Fig 1—Cholesterol clefts in afferent arteriole supplying glomerulus (haematoxylin and eosin)

Fig 2—Cholesterol clefts surrounded by inflammatory cells, extending through vessel wall, with disruption of smooth muscle cells (methenamine silver)

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Fig 3—Skin biopsy specimen showing cholesterol clefts in arterioles within subcutaneous tissues (haematoxylin and eosin)

yielded renal cortex containing 38 glomeruli, 14 with global or partial sclerosis, but no evidence of necrotising glomerulonephritis. Focal interstitial fibrosis and tubular atrophy were evident. Several medium sized arteries and many arterioles, including one afferent arteriole, contained needle shaped crystal clefts (fig 1). One arcuate artery contained similar clefts surrounded by lymphocytes, macrophages, and eosinophils admixed with loose fibrous tissue. The inflammatory cells extended through the vessel wall with disruption of the elastic lamina and intimal smooth muscle cells (fig 2). The appearances were of multiple cholesterol emboli with disruption of the arterial wall amounting to a vasculitis.

Cyclophosphamide was stopped, and the prednisolone dose was reduced. The patient's continuing hospital course was complicated by recurrent unstable angina, worsening cardiac failure, and palpable tender skin lesions. A biopsy specimen of one such lesion showed necrosis and calcification with cholesterol emboli in underlying vessels (fig 3). The patient died 39 days after admission from intractable cardiac failure. At necropsy the enlarged, dilated heart showed concentric left ventricular hypertrophy, widespread coronary atheroma, and organising infarction in the intraventricular septum. There was severe atherosclerosis of the abdominal aorta with the renal artery ostia narrowed by ulcerating atheroma (fig 4). Histological examination showed cholesterol emboli in many organs, some surrounded by a fibroblastic response indicating chronicity (fig 5).

Fig 4—Abdominal aorta with severe complicated atherosclerosis

Comment

The clinical presentations of systemic vasculitis and cholesterol embolism are remarkably similar.¹⁻³ Added to these are the laboratory finding of antineutrophil cytoplasmic antibodies, as in this case. Two other cases have recently been reported,⁴ together with a case referred to in a discussion on the diagnostic specificity of these autoantibodies,⁵ which provide a useful diagnostic test for systemic vasculitis⁶⁻⁷ but clearly may not discriminate between systemic vasculitis and cholesterol embolism. Whether antineutrophil cytoplasmic

antibodies are primary or secondary and whether they are directly pathogenetic remain controversial.⁶ Their occurrence in patients with cholesterol emboli could be a secondary phenomenon, resulting from destruction of the vessel wall. The importance of tissue biopsy in confirming the diagnosis of systemic vasculitis cannot be overemphasised.⁵

Typically, cholesterol embolism occurs in elderly men within the eight weeks after arterial surgery or instrumentation.⁸ An association with anticoagulants or thrombolytic agents is also well established.⁹ Most patients have known risk factors for vascular disease.¹⁰ Cholesterol crystals become detached from atherosclerotic plaques in major arteries (a process exacerbated by anticoagulants) and lodge downstream in smaller calibre vessels. Diagnosis can be made only by histological examination, when the characteristic needle shaped spaces left by the dissolved crystals are seen. Recent emboli are surrounded by inflammatory cells; older emboli are encased in fibrous tissue.

Features shared by systemic vasculitis and cholesterol emboli include cutaneous manifestations such as purpura, vasculitic rash (seen in around a third of patients with cholesterol emboli), livedo reticularis, ulceration, and skin infarction.³ Renal failure is also common to both: in cholesterol emboli renal impairment occurs in about half the cases and is often progressive.¹¹ Eosinophilia is commonly associated with cholesterol emboli¹² and is also a typical feature of Churg-Strauss vasculitis.¹³

Hypocomplementaemia may be present with cholesterol emboli¹⁴ but is rare in systemic vasculitis. Atheromatous material has been shown experimentally to activate complement,¹⁴ and infusion of atheromatous material provokes an eosinophilic reaction.¹⁴ The reasons for these immunological phenomena are unknown, but they may explain the response to corticosteroids reported in some cases. Investigations indicating an acute phase response (raised erythrocyte sedimentation rate or C reactive protein, anaemia, leucocytosis) do not discriminate between these conditions.

The cholesterol embolism syndrome is associated with high mortality owing to the underlying atheromatous disease. Recognition of this syndrome prevents unnecessary immunosuppressive treatment. Differentiation from systemic vasculitis is important in determining treatment and outcome, as even with advanced renal failure vasculitis may have an excellent prognosis when treated aggressively.¹⁵ Tissue biopsy specimens provide the most reliable means of discriminating between systemic vasculitis and cholesterol embolism.

Fig 5—Widespread arterial cholesterol emboli with surrounding fibrosis (haematoxylin and eosin)

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