Discussion

Although white blood cells normally make little contribution to the viscosity of the blood, it has been suggested that granulocytes have a greater effect on it than whole blood viscosity measurements indicate.[4] Increased concentrations of white cells moreover may greatly influence the viscosity of packed red cells.[5] Several workers have shown the high intrinsic viscosity of white blood cells,[5 6] and it has been suggested that some of the clinical features of chronic granulocytic leukaemia may result from the effects on viscosity of the increased white cell mass.[7] Our data suggest that this may be true of several morphological types of leukaemia.

Neurological symptoms are not uncommon in patients with leukaemia. They can be produced by leukaemic infiltration into the central nervous system and haemorrhage, and some are accentuated by the electrolyte imbalance found particularly in acute myeloblastic leukaemia and the blast crisis of chronic granulocytic leukaemia. Nevertheless, our patients showed clinical features that were identical, apart from the absence of severe haemorrhage, with those that are common in Waldenström's macroglobinaemia, including auditory and visual disturbances, abnormalities of gait, and alterations of consciousness. The fact that leucapheresis could rapidly abolish them is evidence that in leukaemia also these symptoms and signs may be explained solely by increased blood viscosity; and indeed the clinical responses, excellent in three cases and partial in a fourth, were associated with appreciable falls in total white blood count and whole blood viscosity.

Neurological symptoms seemed to occur at lower white cell counts in patients with myeloid leukaemias, and we found that a given increment in the white cell count of these patients produced a greater rise in blood viscosity than a similar increase in lymphocytes. Cell size is almost certainly an important factor, though probably not the only one; and the MWCVs were indeed appreciably greater in the myelogenous than the lymphoid group.

Leucapheresis is an extremely effective method for removing large numbers of circulating white cells and therefore alleviates the symptoms caused by the associated hyperviscosity. As it is not a procedure without hazard, patients should be carefully selected.

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SHORT REPORTS

Mycoplasmal (ureaplasma) septic arthritis in hypogammaglobulinaemia

Patients with primary hypogammaglobulinaemia commonly suffer from bacterial infections of the respiratory tract and occasionally develop bacterial meningitis or arthritis. They also tend to develop atypical and chronic *Mycoplasma pneumoniae* lung infections,[1] although no other organs have previously seemed to be susceptible. We describe here the isolation of mycoplasmas of the species *Ureaplasma urealyticum* from the septic joint of a patient with primary hypogammaglobulinaemia.

Results of immunological and microbiological investigations

Investigations	Results
Immunology	
White blood count ($\times 10^{-9}$/l)	9
Lymphocytes ($\times 10^{-9}$/l)	1·365
Polymorphs ($\times 10^{-9}$/l)	6·188
B lymphocytes (surface Ig)	Absent
T lymphocytes (E rosettes) (%)	66
Lymphocyte transformation (phytohaemagglutinin)	Normal
Dinitrochlorobenzene contact sensitivity	Positive
IgG (g/l)	3
IgA (g/l)	<0·02
IgM (g/l)	<0·10
Microbiology	
No of ureaplasmas isolated (in urea-containing medium[5])*:	
Synovial fluid:	
16 April	?
19 April†	10/0·2 ml
21 April	$\geqslant 10^3$/0·2 ml
Throat swab:	
20 April	$\geqslant 10^3$
24 May	10^4
16 September	10^3

*All were sensitive to $\geqslant$0·1 mg/l of rolitetracycline, doxycycline, minocycline, and spectinomycin and were resistant to $\leqslant$250 mg/l of erythromycin, gentamicin, streptomycin, and clindamycin.
†Specimen frozen before testing.

Case report

The patient, a dental student born in 1957, had no relevant family history. Hypogammaglobulinaemia was diagnosed at 3 years of age after some chest infections the preceding year. He received weekly gammaglobulin injections and remained in relatively good health until he was 14, when he developed a painful swollen right ankle after a sprain. Resolution took 12 weeks and left a fibrous arthrodesis despite treatment with penicillin, cloxacillin, kanamycin, and co-trimoxazole. He remained well until, at the age of 18, he developed a painful swollen left knee after a fall. Operation showed a torn medial meniscus and generalised synovial inflammation. Fever and a large knee joint effusion developed postoperatively. Fluid from the joint was purulent but no bacteria were grown. He was given oral tetracycline and cloxacillin and discharged in a plaster cast 10 days later when apyrexial. A few days afterwards he was readmitted with fever and swelling of the knee, and "sterile" purulent fluid was again aspirated. Gentamicin, carbenicillin, and cloxacillin were given intravenously for the next two weeks without effect.

After referral to Northwick Park Hospital ureaplasmas were sought for the first time and found in three separate joint aspirates (see table). The organisms were sensitive to tetracycline. Intravenous rolitetracycline (350 mg 12 hourly) was started and the joint was continuously aspirated via a Redivac vacuum drain for five days. He became apyrexial within 24 hours and his knee became less painful. A two-month course of oral doxycycline (200 mg three times a day) was substituted two weeks later and the patient was discharged nine weeks after the initial injury. Three months later he was walking without aids.

Comment

We know of only one other case of hypogammaglobulinaemia in which a ureaplasma was isolated from a septic joint (M Stukey *et al*, personal communication). The origin of infection in our patient was probably the throat (see table), and the arthritis four years earlier was probably caused by a similar organism. It is curious that the throat organisms persisted despite their known in-vitro sensitivity to tetracyclines. This is in contrast to the ease of eliminating ureaplasmas from the genital tract but in keeping with the difficulty experienced with *M pneumoniae* infections of the respiratory tract.[2]

The organisms isolated from this patient were probably not laboratory contaminants because they were found in synovial fluids on three occasions. They were strains of *U urealyticum* since they caused colour changes only in medium containing urea, produced characteristically small colonies on agar medium; were sensitive to

tetracyclines; and were identified as serotype 5 by specific rabbit antiserum. The pathogenicity of human ureaplasmas is still debated although some can cause non-specific urethritis.[3] This case shows that they can at least produce disease in patients with depressed immunity.

The arthritis in this case should not be confused with more chronic types of monoarthritis and polyarthritis that occur in patients with hypogammaglobulinaemia.[4] Fluid aspirated from an acutely inflamed joint in such patients should be cultured for bacteria and mycoplasmas, including ureaplasmas. The results of culture and antibiotic sensitivity testing may not be available for several days so intravenous tetracycline treatment should start immediately since only about 10% of human ureaplasmas are insensitive to tetracyclines. Prolonged tetracycline treatment over some months is probably necessary.

We thank Mr J B King, Mr L Lowe, and Mr P D Sutarir for their help with the surgical management of this patient.

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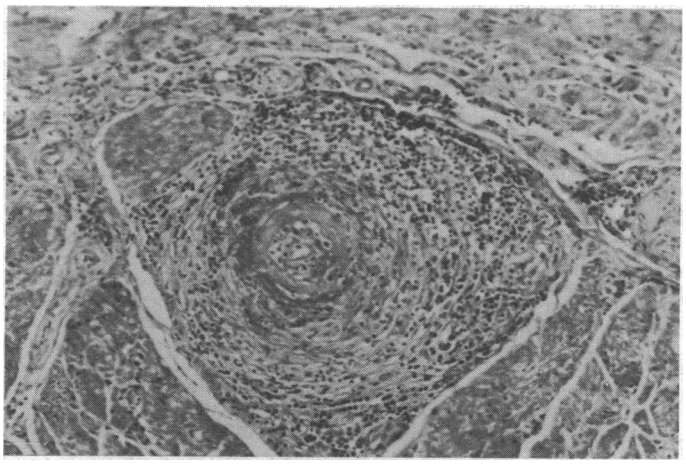
Rheumatoid stricture of oesophagus

Lesions of the upper alimentary tract and pathological changes in oesophageal vessels in rheumatoid arthritis have been described,[1] as have rheumatoid nodules of the pharynx.[2 3] Rheumatoid stricture of the oesophagus, however, has apparently not been observed. We describe such a case.

Case report

A 46-year-old housewife had suffered from rheumatoid arthritis from the age of 19. Two pregnancies had produced some remission, but seven years before the present admission she had had a fracture of the right femoral neck, which had been treated by internal fixation. Since that time she had been chairbound. She had suffered from dysphagia for two years. On admission she had tight atrophic skin, and advanced arthritic changes of the hands, knees, and ankles. There were no visible signs of rheumatoid vascular changes or neuropathy. Her haemoglobin was 9·6 g/dl. This had been fluctuating between 6–9 g/dl according to her records. The sheep cell agglutination test was positive at 1/32, and the latex slide test was positive. Tests for antinuclear factor were not done. A barium swallow had shown a stricture in the mid-oesophagus and this had been treated by periodic dilatations at another hospital. Latterly, these had become difficult and she could swallow only liquids. Repeat barium studies showed a tight stricture 3 cm long at the level of the aortic arch; the rest of the oesophagus was normal and no hiatal hernia was seen. Oesophagoscopy confirmed a severe stricture at 20 cm with mucosal ulceration and slough formation. Overnight pH recordings with an electrode in the oesophagus 5 cm above the diaphragm showed no acid reflux. In view of the increasing difficulty in dilating this stricture, the age of the patient, and the progressive malnutrition, we decided that resection should be attempted. Total oesophagectomy with cervical oesophagogastric anastomosis was therefore performed and she made an uneventful recovery, except for a persistently raised blood urea concentration, possibly due to renal lesions from her rheumatoid disease.

The resected oesophagus showed mucosal ulceration over an area of 4 cm in the middle third, and the mucosa on either side of this was normal. The mucosa below the stricture was definitely squamous and not columnar. Histological examination (figure) showed an extensive area of shallow ulceration extending into the submucosa lined by necrotic tissue and inflamed granulation tissue with focal lymphoid aggregates. The adjacent squamous epithelium was hyperplastic. Within the submucosa and muscularis propria were two arteries showing a severe arteritis with complete destruction of the walls with fibrinoid necrosis and lymphoid infiltration. Other smaller arteries showed endothelial proliferation with calcification and obliteration of the lumen. The muscularis propria was hypertrophic and there was submucosal fibrosis. The ulceration and fibrosis appeared to be secondary to the arteritic process and, in view of the long history of rheumatoid arthritis, it was considered to be rheumatoid.



Rheumatoid nodule in excised oesophagus

Comment

Benign stricture of the middle third of the oesophagus has a variety of causes including columnar-epithelium-lined oesophagus, gastro-oesophageal reflux, corrosive injury, and involvement of the oesophagus in mediastinal disease such as tuberculosis. From the information obtained at operation and pathological examination of the resected oesophagus, clearly none of these causes could have been present in our patient. In addition, the histological evidence of unequivocal arterial occlusion due to arteritis suggested that this stricture had developed on the basis of local ischaemia from a rheumatoid arteritis. We could not find any record of this development in rheumatoid arthritis.

Requests for reprints to HRM.

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Exercise and insulin absorption from subcutaneous tissue

Exercise-induced hypoglycaemia in insulin-dependent diabetics has been attributed primarily to an increase in the peripheral tissue uptake of glucose.[1 2] We postulate instead that exercise enhances the absorption of insulin from the subcutaneous site of its injection.

Materials, methods, and results

Serial glucose and immunoreactive insulin (IRI) concentrations were measured in five healthy volunteers after (*a*) exercise alone; (*b*) injection of 10 IU of mono-component Actrapid insulin followed by complete rest;