Comment

Improvement in the standardisation of laboratory control of anticoagulation has not been accompanied by similar progress in the quality control of treatment.[3] Clinical practice varies widely among centres, which have differing therapeutic ranges and frequencies of attendance.[1] Clinics offering shorter intervals between appointments must balance the potential benefits of close monitoring against the greater cost to the hospital and inconvenience to the patient. Many patients receiving long term treatment with anticoagulants are elderly and require the provision of transport.[4]

In our patients extension of the interval between appointments to 12 weeks had been compatible with good control.[1] This study suggests that there is no benefit to be derived from monitoring this cohort of patients at shorter intervals. Though all appointment intervals should be under constant review, we found that few patients being seen at intervals of 12 weeks needed to attend more frequently.

The use of an all embracing therapeutic range of international normalised ratio of 2·0-4·0 may be criticised. Duxbury observed that control with anticoagulants is likely to be more difficult with the narrower therapeutic ranges that have recently been recommended.[5] In our view the narrower ranges could safely be introduced for patients with stable control without an unacceptable proportion of patients becoming overtreated.

We thank Dr B E Roberts for permission to report on patients under his supervision.

1 Howard MR, Milligan DW. Frequency of attendance at anticoagulant clinics. *Acta Haematol (Basel)* 1986;**76**:78-80.
2 Shinton NK. *Guidelines on oral anticoagulation.* Glasgow: British Society for Haematology, 1984. (Haemostasis and thrombosis task force report to members.)
3 Loeliger EA. Laboratory control, optimal therapeutic ranges and therapeutic quality control in oral anticoagulation. *Acta Haematol (Basel)* 1985;**74**:125-31.
4 Stamp EJ, Jones SJ, Ryrie DR, Hedley AJ. Oral anticoagulants: a cost-effectiveness approach. *Journal of the Royal College of Physicians of London* 1985;**19**:105-8.
5 Duxbury BM. Therapeutic quality control leading to further clinical assessment of oral anticoagulation. *Acta Haematol (Basel)* 1986;**76**:65-7.

(Accepted 9 December 1987)

Department of Haematology, General Infirmary, Leeds LS1 3EX
M R HOWARD, MRCP, registrar
D W MILLIGAN, MD, MRCPATH, senior registrar

Correspondence to: Dr M R Howard, United Kingdom Transplant Service, Southmead Road, Bristol, BS10 5ND.

Haemolytic uraemic syndrome in adults

The haemolytic uraemic syndrome is characterised by microangiopathic haemolytic anaemia, acute renal failure, and thrombocytopenia. Most cases occur in children after a prodrome of painful bloody diarrhoea. Absence of this prodrome indicates a poor prognosis. Bacterial pathogens including shigella and salmonella have been associated with the diarrhoeal prodrome in a minority of cases in temperate countries; on routine culture most samples are negative for these pathogens and for campylobacter. Karmali *et al* found evidence of infection with *Escherichia coli* that produces verotoxin in 30 of 40 children with the syndrome.[1] Such *E coli* can also cause haemorrhagic colitis without the haemolytic uraemic syndrome. It was reported as causing haemorrhagic colitis in 32 of 89 adults and children; only two adults developed the haemolytic uraemic syndrome.[2] Very few other adult cases of the syndrome have been reported. Neill *et al* described two young women with a diarrhoeal prodrome who made a complete recovery,[3] and Ponticelli *et al* described 11 patients with a poor overall outcome; only one of these had a diarrhoeal prodrome.[4]

Over two years we have seen six patients wtih microangiopathic haemolytic anaemia after a diarrhoeal illness; four developed renal dysfunction. A common pattern of presentation was apparent.

Case reports

The table gives clinical details of the patients. All six patients had been in good health before admission. All experienced an acute diarrhoeal illness and had bloody stools; four had severe abdominal pain. One patient (case 2), who had had bloody diarrhoea for three weeks before being admitted, presented with lethargy secondary to anaemia. Haemoglobin concentrations fell in all patients, and blood films showed the characteristics of a microangiopathic haemolytic anaemia: fragmented red cells, helmet cells, and thrombocytopenia. The patient who presented with lethargy secondary to anaemia had a marginally raised urea concentration when admitted. Another patient received haemodialysis and regained normal renal function. Patients also received intravenous rehydration, blood products as required, and broad spectrum antibiotics for protracted colitic symptoms. An 85 year old woman (case 6) refused dialysis and died; the remaining five patients recovered completely.

Stool cultures for salmonella, shigella, and campylobacter and examinations for ova, cysts, and parasites uniformly yielded negative results, as did examination for cytotoxin produced by *Clostridium difficile*. Strain O 157 of *E coli* producing verotoxin was sought in two patients and was present in both.

Comment

The haemolytic uraemic syndrome is an uncommon complication of infective diarrhoea. Our cases show that the syndrome may affect adults of all ages. As in children, the prognosis is good when there is a prodrome of diarrhoea and stool culture yields negative results. Haemorrhagic colitis is sometimes seen in infectious disease units, and routine stool cultures usually yield negative results. We suggest that in patients with abdominal pain, bloody diarrhoea, and neutrophilia renal function and haemoglobin concentration should be monitored closely and blood film examined. *E coli* producing verotoxin should be sought if results of routine cultures are negative and facilities are available. In our cases the microangiopathic haemolytic anaemia varied in severity and was not always associated with severe renal dysfunction. Five of our six patients were women, and it will be interesting to see if this trend continues.

We thank Mr Peter Chapman of Sheffield Public Health Laboratory for identifying and O typing the strain of *E coli*.

1 Karmali MA, Petric M, Lim C, *et al.* The association between idiopathic haemolytic uraemic syndrome and infection by verotoxin producing Escherichia coli. *J Infect Dis* 1985;**151**:775-82.
2 Smith HR, Rowe B, Gross RJ, Fry NK, Scotland SM. Haemorrhagic colitis and verotoxin producing Escherichia coli in England and Wales. *Lancet* 1987;i:1062-5.
3 Neill MA, Agosti J, Rosen H. Hemorrhagic colitis with Escherichia coli O157:H7 preceding adult hemolytic uremic syndrome. *Arch Intern Med* 1985;**145**:2215-7.
4 Ponticelli C, Rivolta E, Imbascati E, Rossi E, Manucci PM. Hemolytic uremic syndrome in adults. *Arch Intern Med* 1980;**140**:353-7.

(Accepted 25 November 1987)

Department of Medicine and Communicable Diseases, Lodge Moor Hospital, Sheffield 10
D J WHITE, MB, MRCP, registrar
F YONG, MB, CHB, senior house officer
M W McKENDRICK, MB, MRCP, consultant physician

Correspondence to: Dr McKendrick.

Haemoglobin concentration and renal function in adults with haemolytic uraemic syndrome

Case No	Age (years) and sex	Concentrations at admission: Haemoglobin (g/l)	White cell count (×10⁹/l)	Platelet count (×10⁹/l)	Urea (mmol/l)	Creatinine (μmol/l)	Peak or trough concentrations: Haemoglobin (g/l)	White cell count (×10⁹/l)	Platelet count (×10⁹/l)	Urea (mmol/l)	Creatinine (μmol/l)	Time from onset of illness to peak or trough concentrations (days)
1	79 F	132	16·8	138	4·5	73	88	36·4	68	41·7	385	9
2	58 F	60	3·7	153	10·4	76	60	3·7	153	10·4	76	21*
3	58 F	145	19·2	275	18·0	134	84	12·4	242	20·3	208	11
4	53 M	180	16·5	209	5·2	97	88	11·0	150	21·5	261	10
5	38 F	168	28·2	270	6·1	76	73	18·9	90	6·1	76	10
6	85 F	140	16·7	160	10·4	103	89	12·9	87	65·1	1094	15†

*At admission.
†Day of death.