Lesson of the Week

Septic arteritis complicating salmonellosis

P H WINOCOUR, G R WILLIAMS, J F BOYD, D H KENNEDY

Intestinal infection with salmonella is associated with a low but definite mortality. We report the clinical findings of two recent deaths where necropsy showed septic arteritis, a rare but recognised complication, and discuss the need for more immediate use of antibiotics in patients at risk.

Case reports

CASE 1

An 84 year old man was transferred from a surgical unit with a three week history of watery diarrhoea. *Salmonella typhimurium* had been isolated from stool culture. Intravenous fluids were required initially in the surgical unit. The medical history was of inferior myocardial infarction in 1973 and vagotomy and gastrojejunostomy in 1979. On examination he had no abnormality apart from an abdominal scar. Mild hypokalaemia of 2.8 mmol(mEq)/l, readily corrected with oral supplements, was the only abnormal laboratory finding. Stool frequency thereafter was up to three times a day, and *S typhimurium* was repeatedly isolated. He improved generally, although he remained weak.

After seven days fever developed, associated with mild dysuria, frequency, and low backache (fig 1). Only the first of three blood cultures, taken during spikes of fever, grew *S typhimurium*. Of three urine cultures, *Escherichia coli* was grown from only one specimen with scanty pyuria in all three. The fever settled without antibiotic treatment. He remained well apart from persistent backache. Right basal lung crepitations developed but a chest x ray film showed no abnormality. Sputum culture later yielded four potential pathogens. The backache of presumed musculoskeletal origin slowly intensified, radiating to both buttocks. It was readily relieved by analgesics. The left femoral pulse was reduced in volume.

Seventeen days after admission lower abdominal pain, haematuria, and hypotension developed. The left femoral pulse was very weak and a tender pulsating periumbilical mass was palpable with an associated bruit. An electrocardiogram showed acute inferolateral ischaemic changes. Despite active resuscitation he died later that day.

At necropsy severe generalised calcifying atheroma with ulceration was seen throughout the major vessels. There was a fusiform aneurysm caudal to the renal arteries, but no mural thrombus. The right common iliac artery showed localised

Metastatic infection should be considered in older patients with salmonella infection

dissection of its medial wall, with haemorrhage into the soft tissues between the aortic bifurcation, and a 30 ml haematoma encircled, without obviously compressing, the left common iliac artery. Histological examination showed that infected thrombus constituted the dissection of the right common iliac artery and colonies of Gram negative bacilli were present. Swabs of this lesion and of the spleen, taken at necropsy, yielded *S typhimurium* and *E coli*. Other findings included a recent right coronary artery thrombosis and extensive posterolateral myocardial fibrosis.

FIG 1—Case 1: relation between temperature and selected laboratory data.

CASE 2

A 72 year old woman gave a three day history of fever, vomiting, abdominal colic, and watery diarrhoea, occurring up to six times daily. She had had mild exertional dyspnoea and ankle swelling for some time, and had been recently investigated for intermittent backache and urinary symptoms. On examination there was ankle oedema, tenderness over the descending colon, and mild dehydration confirmed biochemically: urea concentration was 9.0 mmol/l (54 mg/100 ml), creatinine concentration 130 μ mol/l (1.48 mg/100 ml). The erythrocyte sedimentation rate was 40 mm in first hour. *Salmonella panama* was isolated from stool cultures.

The diarrhoea settled after five days but she remained lethar-

University Departments of Infectious Diseases and Pathology of Infectious Diseases, Ruchill Hospital, Glasgow G20 9NB

P H WINOCOUR, MRCP, registrar

G R WILLIAMS, MRCP, DTM&H, lecturer

J F BOYD, MD, FRCP(G), senior lecturer

D H KENNEDY, MRCP, consultant physician

Correspondence to: Dr Winocour, Hope Hospital, Salford M6 8HD.

Reprint requests to: Dr J F Boyd, Brownlee Laboratory, Ruchill Hospital, Glasgow G20 9NB.

gic. Fever and low back pain soon developed without urinary symptoms (fig 2). Two urine specimens showed scanty pyuria, with growth of *S panama* initially and subsequently *E coli*, both sensitive to amoxycillin. Blood cultures remained sterile. Erythrocyte sedimentation rate was now 70 mm in first hour, and white cell count was $18.2 \times 10^9/l$ (88% neutrophils). A

FIG 2—Case 2: relation between temperature, selected laboratory data, and antibiotic treatment.

six day course of oral amoxycillin was prescribed. Her fever subsequently abated but she had persistent worsening back pain, which was poorly relieved by analgesics. She insisted on being discharged but returned six days later with constant severe back pain and fatigue. On examination she was afebrile, blood pressure was 100/70 mm Hg (previously 140/90 mm Hg), and she had a leucocytosis of $15.4 \times 10^9/l$ (89% neutrophils) and mildly raised alkaline phosphatase and transaminase activities and urea and creatinine concentrations. She died suddenly the next morning from a massive haematemesis.

Necropsy showed that a saccular aortic aneurysm containing a laminated thrombus had ruptured into the third part of the duodenum. The duodenal wall was stretched over and inseparable from the aneurysmal wall and there was moderate atheromatous change. Histological examination showed that the aneurysmal thrombus was infected with abundant colonies of Gram negative bacilli. The slides showed clearly that the infection had proceeded from the aorta to the duodenum rather than in the other direction. *S panama* was cultured from a sample of blood taken from the right auricle at necropsy but bacteriological study of the aneurysm contents was not made. Other findings included a right coronary artery thrombosis and posterior myocardial fibrosis.

Comment

Necropsy showed arteritis and continuing intravascular salmonella infection in both patients. In the patient in case 1 *E coli* was also isolated from the spleen and arteritic lesion. When salmonella invade an arterial wall the usual route of infection is intravascular, either directly on to atheromatous plaques or by way of the vasa vasorum,¹ although aortic lesions may be secondary to vertebral osteomyelitis.² Pre-existing lesions such as atherosclerosis or aneurysms as these two patients had are to be expected. It is possible that a coronary arteritis³ predisposed both patients to subsequent thrombosis, but histological examination was not performed. Both patients had only brief febrile periods, which is unusual, as persistent fever normally occurs.⁴

The onset of salmonella arteritis is insidious and it progresses

rapidly. The average time from onset of symptoms to rupture or operation of distal aortic lesions was reported to be five weeks in one review.² A more recent review of 48 previously reported cases showed the aorta (75%) and the femoral arteries (15%) to be most commonly affected.¹ Overall mortality was 67% but rose to 83% when the aorta was affected. Antibiotic treatment alone invariably fails and surgical excision is necessary.^{2 4-6} Salmonella arteritis is uncommon in people under 50.⁷ Salmonella intestinal infections are commonest in babies under 1 year of age and isolation rates remain fairly constant throughout adulthood. Blood cultures are reported to be positive in 2-3% of reported infections, but the ratio of septicaemia to intestinal infections is not evenly distributed among age groups, being highest in those over 60 years of age.⁸ The mortality from salmonella septicaemia is less than that from septicaemias caused by other Gram negative bacilli. In children the septicaemia may be brief and blood culture results often become available after the patient is asymptomatic.⁹ Brief periods of septicaemia also occur in elderly patients but those with atherosclerosis are especially at risk of arteritis.

It has been suggested that antibiotics may be indicated for treatment of acute salmonella infections in all patients over 50 years,⁷ but this is controversial.^{10 11} We think that as the absolute numbers of both salmonella infections and the population of elderly people are increasing metastatic infections will become more common and suggest the following policy in managing salmonellosis:

(1) All patients with suspected salmonellosis should have blood cultured if feverish or if suffering symptoms that are unusual for intestinal illness.

(2) We recommend appropriate antibiotic treatment when (a) salmonella is isolated from a blood culture, and (b) "at risk" patients with known salmonellosis develop fever. We regard patients to be at increased risk of developing septicaemia and its complications if aged over 60 years or if there is evidence of atherosclerosis. These measures aim at preventing metastatic infection but this cannot even be attempted if a considerable proportion of lesions are seeded while the patient is afebrile.

(3) A high index of suspicion must therefore be maintained about symptoms that are unusual for intestinal infections, and if localised pain occurs, particularly back pain, arteritis should be considered. Urgent surgical assessment and arteriography are required as antibiotics are ineffective alone but cures have been achieved with surgery.

We thank Dr R J Fallon and staff, Department of Laboratory Medicine, Ruchill Hospital, for the laboratory results.

References

- Wilson SE, Gordon HE, Van Wagenen PB. Salmonella arteritis. *Arch Surg* 1978;**113**:1163-6.
- Reichle FA, Tyson RR, Soloff LA, Lautsch EV, Rosemond GP. Salmonellosis and aneurysm of the distal abdominal aorta. *Ann Surg* 1970;**171**:219-28.
- McGee MB, Khan MY. Ruptured mycotic aneurysm of a coronary artery. *Arch Intern Med* 1980;**140**:1097-8.
- Mendelowitz DS, Ramstedt R, Yao JST, Bergan JJ. Abdominal aortic salmonellosis. *Surgery* 1979;**85**:514-9.
- Jarrett F, Darling RC, Mundth ED, Austen WG. Experience with infected aneurysms of the abdominal aorta. *Arch Surg* 1975;**110**:1281-6.
- Tillotson JR, Lerner AM. Mycotic aneurysm and endocarditis. *Am J Cardiol* 1966;**18**:267-74.
- Cohen PS, O'Brien TF, Schoenbaum SC, Medeiros AA. The risk of endothelial infection in adults with salmonella bacteremia. *Ann Intern Med* 1978;**89**:931-2.
- Centers for Disease Control. Salmonella bacteremia: reports to the Centers for Disease Control, 1968-1979. *J Infect Dis* 1981;**143**:743-6.
- Cherubin CE, Neu HC, Imperato PJ, Harvey RP, Bellen N. Septicemia with non-typhoid salmonella. *Medicine (Baltimore)* 1974;**53**:365-76.
- Bowmer MI. Salmonella gastroenteritis in older patients. *Ann Intern Med* 1979;**90**:855.
- Bennett JV, Feldman RA. Treatment of salmonella infections. *Ann Intern Med* 1979;**91**:654-5.

(Accepted 20 April 1983)