Septicaemia due to *Corynebacterium haemolyticum*

R. S. JOBANPUTRA AND C. P. SWAIN

From the Departments of Microbiology and Clinical Investigation, Northwick Park Hospital and Clinical Research Centre, Harrow, Middx HA1 3UJ

SYNOPSIS The clinical and microbiological features of a case of septicaemia due to *Corynebacterium haemolyticum* are described. Isolation of the organism from blood cultures taken at the time of admission, immediate response to penicillin, presence of agglutinating antibodies in high titre in the patient's serum, and our failure to find evidence of infection with any other pathogen suggests a causative rôle.

Corynebacteria, other than diphtheria bacilli, isolated from human subjects are in most instances assumed to be contaminants and are reported as 'diphtheroid bacilli'. In a detailed study of 27 patients with blood cultures yielding *Corynebacterium*, Fleisher (1952) suggested that repeated isolations of diphtheroid organisms indicate the possibility of Hodgkin's disease or malignant lymphomatous involvement with the organism as an opportunistic invader as a result of altered host defences. Reid and Greenwood (1967) reported two cases of endocarditis due to *Corynebacterium* but did not mention the exact identification of the organism. Kaplan and Weinstein (1969), in a study of diphtheroid infections of man, reported nine patients of whom four had bacteraemia, two had wound infections, and one each had meningitis, osteomyelitis, and hepatitis. The case reported here is the first to our knowledge of bacteriologically confirmed septicaemia due to *C. haemolyticum* in Britain.

Case Report

The patient, a 15-year-old schoolgirl, was admitted to Northwick Park Hospital via the Accident and Emergency Department with a history of sore throat for five days, anorexia and diarrhoea for four days, and abdominal pain for three days which localized on the day of its onset to the right iliac fossa and was associated with intermittent rigors. Two days before admission she vomited and noticed that her vomitus was streaked with fresh blood. On the day before admission she had a small haematemesis and developed right-sided pleuritic pain. She mentioned that for a few days before her illness she had had a

macular, reddish, non-irritant rash on the arms and trunk.

Her previous medical history included an episode of pleuritic pain one year before admission and an occasional brown vaginal discharge during the months before the illness.

On examination she looked ill; the temperature was 39.5°C with a sinus tachycardia of 124 beats per minute. She had a purulent tonsillitis. The chest was clear; the spleen and lymph glands were not palpable. She had abdominal tenderness, maximal in the right iliac fossa.

Investigations on admission revealed a haemoglobin of 13.1 g/dl, a white cell count 20 000, of which 18 500 were neutrophils, platelets 144 000/ μ l, ESR (Westergren) 78 mm at one hour. There was no laboratory evidence of disseminated intravascular coagulation (FDP 5 μ g/ml). Biochemical features included a lowered sodium 129 mmol/l, calcium 2.01 mmol/l, phosphate 0.80 mmol/l, and albumin 28 g/l and raised aspartate transaminase 40/U, bilirubin 20 μ mol/l, and urea 11 mmol/l. Mid-stream urine contained 5 red cells and 30 white cells per μ l; there were a few hyaline casts; culture yielded no growth. A throat swab and high vaginal swab yielded normal flora only. Chest radiography on admission was normal.

A provisional diagnosis of septicaemia was made and the girl was treated with benzylpenicillin, 1 mega-unit six-hourly intravenously, and oral probenecid. The pyrexia settled completely the next day and did not recur. After three days of intravenous penicillin, oral penicillin, 500 mg six-hourly, was continued for a week.

During the next 24 hours the right-sided abdominal pain became more severe and it was decided to

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Figure Chest radiograph 24 hours after admission

perform appendicectomy. At operation a macroscopically uninflamed appendix was removed and microscopy showed marked peri- and intra-vascular polymorphonuclear infiltration mainly in the serosa. An enlarged mesenteric lymph node was removed and showed reactive hyperplasia.

Shortly before operation and 24 hours after the first chest radiograph, another radiograph showed many areas of increased opacity suggestive of collapse and consolidation of the right lower lobe; the right diaphragm was raised; there was a band shadow in the right mid-zone, and a few ill-defined opacities in the left lower zone suggested collapse and consolidation (figure). These changes progressed during the following week to tenting of the right diaphragm and the development of a ring shadow in the right middle lobe, interpreted as representing a pneumatocele with resolving pneumonia. Sputum, obtained with difficulty, yielded at first *Haemophilus* sp. and then *Klebsiella* sp. 10 and 12 days after admission respectively.

Tests for immunological status showed results compatible with a response to recent infection in the presence of normal humoral immunity (IgG 1500; IgA 170; IgM 112 mgm %; *E. coli* antibodies 1:128 predominantly IgM). She remained well, the lung changes improved, her haematology and biochemistry returned to normal, and she went home four weeks after admission to hospital.

Results of the following investigations were negative: Paul-Bunnell test, virus serology, *Toxoplasma* dye test, anti-streptolysin titre, Widal test, *Brucella* agglutination, *Yersinia* antibodies, Reiter

complement fixation test, VDRL flocculation test, gonococcal complement-fixation test, LE-cell test, anti-nuclear factor.

MICROBIOLOGICAL FINDINGS

Blood for culture was taken when the patient was admitted to hospital and was inoculated into two bottles of liquid broth (Stokes, 1968). After incubation at 37°C for 24 hours in air with 10% CO₂ and anaerobically, each broth was subcultured to horse-blood agar which was incubated under the same conditions as the corresponding primary culture. After 24 hours both cultures had yielded minute colonies with a zone of β -haemolysis, reaching a size of about 0.5 mm at 48 hours. The organism was Gram-positive, non acid fast, without metachromatic granules, non-motile at 37°C and 22°C. The organism showed good growth under aerobic and anaerobic conditions but β -haemolysis was more marked after anaerobic incubation. The organism grew on Hoyle's tellurite medium but not on MacConkey's and Tomato-juice media.

The biochemical properties of the organism were as follows: catalase and oxidase negative; indole and urease negative; acid but not gas from glucose, lactose, trehalose, salicin, and maltose; acid not formed from mannitol, xylol; fermentation of sucrose doubtful; starch was hydrolysed; no opalescence on lecithinovitellin agar; gelatin not liquefied within 14 days, nitrates not reduced. On the basis of these findings the organism was identified as *C. haemolyticum*.

The organism was pathogenic for guinea-pig,

producing an acute pyogenic lesion in the skin. By disc test, the organism was sensitive to penicillin, erythromycin, tetracycline, cephaloridine, fusidic acid, carbenicillin, and clindamycin; it was resistant to sulphonamide, trimethoprim, streptomycin, gentamicin, neomycin, colistin, polymyxin, bacitracin, and naladixic acid. A sample of the patient's serum collected on the 12th day of the illness was examined for agglutinins to the organism that had been isolated from the blood; a formalized suspension of the organism was agglutinated by the patient's serum at a dilution of 1/1024.

Discussion

Human infections with *Corynebacterium haemolyticum* are uncommon. The organism was first recognized as a human pathogen by American workers in the south-west Pacific among American servicemen and the local islanders with tonsillitis and ulcerative skin lesions (MacLean *et al*, 1946). An opportunistic infection with *Corynebacterium pyogenes* producing empyema was reported in a 39-year-old housewife with widespread carcinoma of breast (Chlosta *et al*, 1970); the organism reported in this case was later identified as *C. haemolyticum*. There are some biochemical reactions which help to differentiate *C. haemolyticum* from *C. pyogenes* (Mr L. R. Hill, personal communications). A fatal case of brain abscess due to an unusual combination of *C. haemolyticum* and *Fusobacterium necrophorum* in a 17-year-old boy was reported (Washington *et al*, 1971). Ryan (1972) reported isolation of *C. haemolyticum* from three patients with membranous tonsillitis. Workers in Cambridge have reported isolation of *C. haemolyticum* from throat swabs of 70 patients with sore throat and about half of them had a maculopapular rash (Fell *et al*, 1973).

The question of taxonomy of *C. haemolyticum* is not settled. Souckova and Soucek (1974) have suggested that *C. haemolyticum* is synonymous with *C. pyogenes* var. *hominis* and that *C. pyogenes* itself

is distinct. *C. haemolyticum* is a widespread parasite of domestic animals and causes mastitis, pneumonia, endometritis, arthritis, osteomyelitis, endocarditis, and lymphadenitis. The pathogenesis in the present case is not known; the patient gave no history of drug abuse or contact with animals.

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