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Moraxella catarrhalis bacteraemia in an immunocompetent patient in Lahore, Pakistan

S. MORTLOCK

Shaukat Khanum Memorial Cancer Hospital and Research Centre, Johar Town, Lahore, Pakistan

Moraxella catarrhalis was once regarded as a common, essentially harmless inhabitant of the pharynx but is now recognised as an important pathogen in respiratory tract infections in both children and adults, particularly in immunodeficient and hospitalised patients.[1,2] However, bacteraemia caused by *M. catarrhalis* is less well understood and, although only reported infrequently over the last decade, the number of invasive infections has been increasing.[3-6] Bacteraemia can be subdivided broadly on the basis of the host's medical history, which commonly shows an underlying respiratory disorder or can be essentially normal; however, the major predisposing factor is neutropenia.[7,8]

In the immunocompetent patient the origin of infection is usually from the respiratory tract or ears, while the immunocompromised patient may have no defined portal of entry. If affected by *M. catarrhalis* bacteraemia, a patient's symptoms can range from those associated with a self-limiting febrile illness to life-threatening sepsis.[9,10] The report presented here details a case of *M. catarrhalis* bacteraemia in a previously healthy patient.

A 39-year-old women presented to the Shaukat Khanum Memorial Cancer Hospital out-patient department complaining of headache, dry cough with chest pains, fever and chills. On initial examination, the only remarkable feature was a temperature of 40°C. Chest X-ray showed no abnormality and there were no other visual signs. The patient was admitted for observation. Routine samples of blood and urine were taken, and two sets of blood cultures were drawn.

Chemical analysis on the urine sample showed no evidence of protein or glucose but a slightly increased number of white blood cells (WBCs) (35/mm^3; normal range: 0–25/mm^3) on microscopy. Blood smears for malaria were negative. Although blood WBC count was normal (4.83 x 10^3/μL), there was a slightly raised neutrophil count (3.81 x 10^3/μL; normal range: 1.53–3.62 x 10^3/μL). Erythrocyte sedimentation rate (ESR) was raised at 37 mm/hr (normal range: 0–15 mm). The patient was started on intravenous ceftazidime and gentamicin, as outlined by hospital policy for cases of pyrexia.[11]

After overnight incubation at 37°C, all blood culture bottles were tested and small Gram-negative cocci were seen on microscopy. The bottles were subcultured onto blood and chocolate agar plates and incubated at 37°C in 5% CO_2. The following day a β-lactamase-positive *M. catarrhalis* was isolated from all bottles and identity was confirmed using the API NH system (bioMérieux, France). An antibiotic sensitivity test was set up following NCCLS guidelines and the plates were incubated at 37°C in 5% CO_2.[12,13]

Correspondence to: Dr Stephen Mortlock
Quest Diagnostics, Cranford Lane, Heston, Middlesex TW5 9QA.
Email: wolverine@dragonflight.demon.co.uk

The *M. catarrhalis* was resistant to ampicillin but sensitive to cefuroxime, gentamicin, ceftriaxone, ciprofloxicin, trimethoprim, cefotaxime and ceftazidime. The patient's antibiotics were changed to once daily intravenous ceftriaxone for five days. The sample of urine showed no growth after overnight incubation.

Owing to the unusual finding in the blood culture, the patient's history was re-examined and although she had no recollection of recent upper respiratory tract infection, she subsequently mentioned a tooth extraction at a local surgery some 36 hours before the symptoms started. The surgery was contacted and a copy of the dentist's report was obtained. This mentioned moderate gingivitis and inflammation around the gums, which bled on probing. The extracted tooth was rotten.

Swabs were taken from the patient's mouth and around her gums, but this was almost 72 hours after antibiotic therapy had been started. Gram staining showed mixed mouth flora organisms, but culture on blood and chocolate agar after 48 hours' incubation at 37°C (both aerobically and anaerobically) produced a scanty growth of mouth flora, no anaerobes and a single *M. catarrhalis* colony. A sensitivity test was carried out on this organism and it showed a similar resistance pattern to *M. catarrhalis* from the original blood culture bottles.

After five days the patient was afebrile and she was discharged from hospital. Subsequent blood cultures were negative and the ESR returned to within normal parameters. Treatment was changed to a seven-day course of oral Augmentin to be taken at home.

Bacteraemia caused by what is essentially an upper respiratory tract organism is an unusual finding; certainly bacteraemia caused by *M. catarrhalis* is not common but the number of reports seems to be on the increase. This was the first recorded occurrence at the hospital, out of the 550 bacteraemias identified over a three-year period.[14,15]

The patient presented with none of the classic symptoms (e.g., a petechial or purpuric skin rash) but simply pyrexia with a dry cough and no history of immunosuppression. She did, however, appear to fit most of the criteria used to determine the significance of isolates from blood cultures – *M. catarrhalis* was recovered from all four bottles and growth occurred within 48 hours.

In the absence of any other recoverable organisms (blood culture media for anaerobes was not being used in the hospital at that time) and the heavy growth of the organism from all four bottles, it was decided that *M. catarrhalis* was the cause of the bacteraemia.

Was the point of entry the result of the dental work? Bacteraemia following dental treatment is not an uncommon finding but it is generally transient in nature.[16-18] Periodontal probing and extraction are certainly considered to be high-risk activities, as is any procedure that leads to bleeding, although it has been shown that significant bacteraemia can also occur in the absence of gingival bleeding.[19]

The bacteria found in these cases of gingivitis or other periodontal diseases form very complex populations consisting of Gram-positive and Gram-negative organisms (both aerobes and anaerobes). *Streptococcus mutan*s and *S. sanguis* appear to be important in the initiation of dental caries because their activities lead to the colonisation of the tooth surfaces. Once the enamel has been weakened, other oral bacteria such as lactobacilli and Actinomyces gain entry and contribute to the progression of the lesion.

Increased populations of Actinomyces have been found in dental plaque, along with other streptococci and anaerobes. If a combination of these is introduced into the blood then subsequent cultures should show mixed growth. However, over half of the bacteraemias found after periodontal probing in one study gave pure growths.[20]

The blood cultures taken in the case study reported here revealed a pure growth of an upper respiratory tract organism from a patient with no history of an upper respiratory tract infection who had undergone dental work prior to the onset of symptoms. In the absence of an anaerobic blood culture system at the hospital, it is only possible to say that *M. catarrhalis* was the only 'aerobic' organism isolated.

M. catarrhalis seemed out of place but it was recovered in small numbers from swabs taken from the patient's mouth. Although it was not possible to prove conclusively that the dental work was the cause of the bacteraemia, it seemed to be the best candidate and was reported as such. Fortunately, the patient was not immunosuppressed, had no other predisposing factors and she responded to prompt antibiotic treatment. □

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Peripheral blood CD34+ cell counts allow improved management of peripheral blood stem cell collections

G. GIBBS and S. BOLAM

Department of Haematology, Taunton and Somerset Hospital, Taunton, Somerset TA1 5DA, UK

The use of peripheral blood (PB) CD34+ cell counts on the day of, or the day prior to, peripheral blood stem cell harvest (PBSCH) to predict CD34+ progenitor cell yield has been the subject of considerable interest in recent years. Since 1996, we have followed the reports of those who have studied the relationship between PB CD34+ cell counts (and other indicators such as PB white blood cell count [WBC]) and the final CD34+ cell concentration following apheresis. Most reports have demonstrated a correlation between PB CD34+ cell count and harvest yield,[1-9] while one has reported poor correlation.[10]

Between 1996 and September 2002, PB CD34+ cell counts and WBC data were collected on 80 peripheral blood stem cell harvests from 57 patients (38 male, 19 female; age: 18–69; weight: 40–117 kg) with haematological malignancies (non-Hodgkin's lymphoma [NHL; n=33], myeloma [n=9], Hodgkin's disease [n=4], chronic myeloid leukaemia [n=3], acute myeloid leukaemia [n=3], acute lymphoblastic leukaemia [n=1], T-prolymphocytic leukaemia [n=1]) or solid tumours (n=3) immediately preceding the harvest. PBSC CD34+ cell counts were also performed following collection.

CD34 enumeration was performed by flow cytometry (Becton Dickinson FACScan) and the WBC by haematology analyser (Bayer H*1 or Advia 120). The Milan/Mulhouse protocol was used for CD34 enumeration as modified by the Nordic Stem Cell Laboratory Group prior to 1998 and Procount (Becton Dickinson) thereafter.[11]

The harvest day was guided initially by the choice of mobilisation regime (Table 1). Mobilisation was achieved either by cyclophosphamide priming chemotherapy and granulocyte-colony stimulating factor (G-CSF) (harvested on day 10), G-CSF only (harvested on day 5) or salvage therapy (harvested when WBC exceeded 5.0 x 10^9/L).

Correspondence to: Mr Graham Gibbs
Email: graham.gibbs@tst.nhs.uk

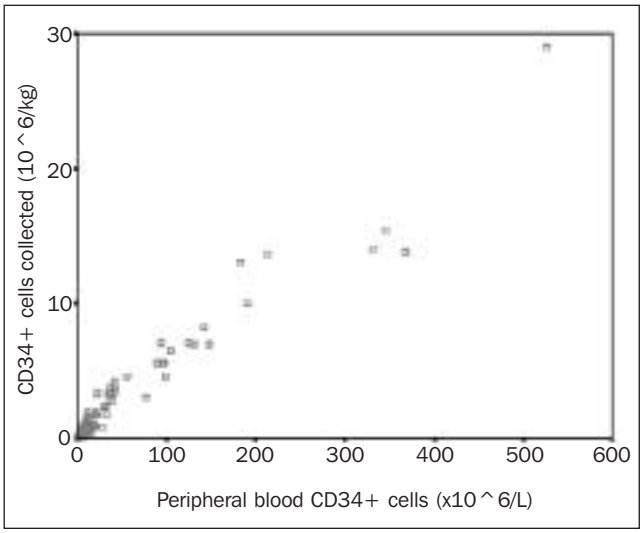

Fig. 1. Correlation between PB CD34+ cell count on the day of the harvest versus CD34+ cells collected (n=80).

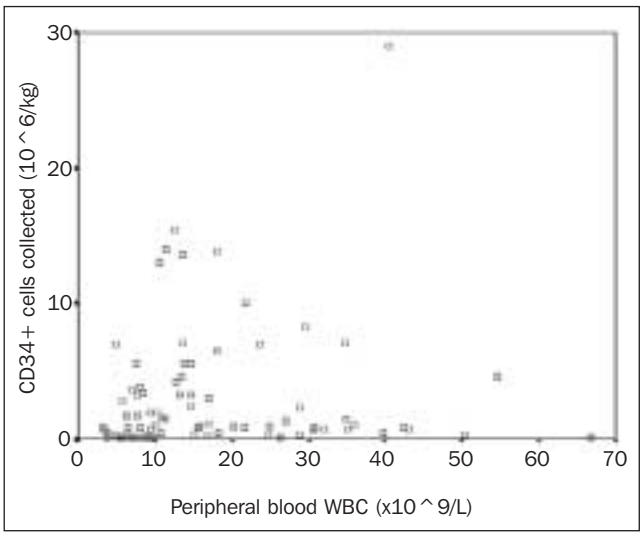

Fig. 2. Correlation between PB WBC on the day of the harvest versus CD34+ cells collected (n=80).

Analysis of data using Spearman's rank (non-parametric) test showed a strong correlation (r=0.94) between PB CD34+ cell count and the final concentration of CD34+ cells collected (Fig. 1). A comparison between PB WBC count and CD34+ cells collected showed only poor correlation (r=0.18) (Fig. 2).

In order to achieve haematopoietic recovery following high-dose chemotherapy, it is necessary to reinfuse sufficient CD34+ cells. The target yield for engraftment in Taunton is at least 2.0 x 10^6 CD34+ cells per kg of patient bodyweight.

The data presented indicate that a PB CD34+ count of ≥ 32.5 x 10^6/L yielded the target dose in a single procedure in all cases, irrespective of the choice of mobilisation regime or weight (range: 48–107 kg). A PB CD34+ cell count of ≤ 20.9 x 10^6/L failed to achieve the target dose in a single collection in all cases, There was some variation between >20.9 and <32.5 x 10^6/L (Table 2).

In addition, the possibility of using a PB CD34+ cell count to predict how many PBSC collections would be required