CASE REPORT

Shigella sonnei bacteraemia occurring in a young man with shigellosisAndrew Huynh,¹ Christian McGrath,² Douglas Johnson,^{1,2} Louise M Burrell^{1,3}¹Department of General Medicine, Austin Health, Heidelberg, Victoria, Australia²Department of Infectious Diseases, Austin Health, Heidelberg, Victoria, Australia³Department of Medicine, Austin Health, The University of Melbourne, Heidelberg, Victoria, Australia

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SUMMARY

A 34-year-old man presented with a 6-day history of diarrhoea, abdominal cramps and fever. Blood cultures were initially reported as positive for *Escherichia coli* using matrix-assisted laser desorption/ionisation time of flight (MALDI-TOF) mass spectrometry. Contrast CT of the abdomen and pelvis revealed pancolitis and terminal ileal thickening. The patient was treated empirically with ampicillin, ciprofloxacin and metronidazole. Stool cultures were positive for *Shigella sonnei*. Subsequent testing on the initial blood culture correctly identified the organism as *S. sonnei*. On further questioning, the patient reported unprotected men who have sex with men (MSM) 3 months previously. His symptoms resolved during his 3-day admission, and he was discharged on 14 days of ciprofloxacin. He remains well. This case highlights that shigellosis is increasingly seen in MSM, with no history of travel, and may result in bacteraemia. This case also highlights the benefits (rapid identification of organisms) and limitations (inability to distinguish between *E. coli* and *Shigella* spp) of new technologies such as MALDI-TOF.

BACKGROUND

Shigella is a common cause of dysentery and is increasingly seen in men who have sex with men (MSM).¹ There have been major outbreaks of shigellosis in Africa, Central America and South Asia.² In the state of Victoria, Australia, there are usually about 100 cases of shigellosis annually,³ but from 1 January to 31 December, 2014, 466 cases of shigellosis were reported.³ Two-thirds of the reported cases in adult males occurred through MSM.⁴ *Shigella sonnei* bacteraemia is very rare. New technologies such as matrix-assisted laser desorption/ionisation time of flight (MALDI-TOF) have benefits (rapid identification of organisms) but also limitations (inability to distinguish between *Escherichia coli* and *Shigella* spp). This case was previously presented in abstract form at the Austin Research Week Meeting, Melbourne, Australia, 2014.⁵

CASE PRESENTATION

A 34-year-old man presented to the emergency department with a 6-day history of watery diarrhoea, abdominal cramps and rigours. He was febrile with a temperature of 38.6°C. Blood cultures were taken and he was discharged from the emergency department with paracetamol/codeine phosphate and hyoscine butylbromide. The patient was recalled the next day due to blood cultures in the anaerobic bottle initially isolating *E. coli* by MALDI-TOF mass spectrometry.⁵

He was admitted to hospital. A contrast CT of the abdomen and pelvis revealed a pancolitis with terminal ileal thickening, and no evidence of perforation or intra-abdominal collection.⁵ On further questioning, the patient reported unprotected MSM 3 months prior to presentation, no sick contacts and no recent travel. The only history of note was a colonoscopy 2 years prior for rectal bleeding. HIV tests performed as an inpatient and 2 months prior to admission were negative.⁵

INVESTIGATIONS

A stool sample contained erythrocytes (4+) and leucocytes (3+), and stool culture was subsequently positive for *S. sonnei* biotype f.⁵ The isolation of *Shigella* spp from the faeces prompted a review of the initial identification of the blood culture isolate, which was determined to be a non-motile, Gram-negative bacillus. This organism was subsequently identified as *S. sonnei* by Vitek-2 (bioMérieux), a method that identifies organisms according to biochemical properties. The blood culture isolate was referred to the enteric reference laboratory and using further biochemical and serotyping tests, was confirmed as *S. sonnei* biotype f. Antimicrobial susceptibility testing identified the organism as sensitive to ciprofloxacin, gentamicin and augmentin, but resistant to ampicillin, streptomycin, tetracycline, sulphonamide and doxycycline. Full blood examination on admission revealed a white cell count of $8.9 \times 10^9/L$ (normal $4-11 \times 10^9/L$), neutrophil count of $6.1 \times 10^9/L$ (normal $2.0-7.5 \times 10^9/L$) and an elevated C reactive protein level of 39.9 mg/L (normal <5.0 mg/L). Renal and liver function tests were unremarkable.⁵

TREATMENT

The patient was initially treated empirically with ampicillin, ciprofloxacin and metronidazole, prior to stool and blood culture results.⁵

OUTCOME AND FOLLOW-UP

During the patient's 3-day admission, his symptoms resolved, he remained afebrile and clinically well. The patient completed a 14-day course of ciprofloxacin postdischarge, and was clinically well at follow-up 2 weeks later.⁴ An outpatient colonoscopy was normal. He continues to remain well 6 months post *S. sonnei* bacteraemia.

DISCUSSION

S. sonnei is the most common type of *Shigella* infection reported in Australia.⁶ Shigellosis typically presents with an acute onset of fever, abdominal cramps and diarrhoea, and the stool contains

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blood, pus and mucus. Transmission is via the faecal-oral route, through the ingestion of contaminated food⁷ or water,⁸ and through sexual transmission.⁹ The incubation period is 1–3 days, with a duration of illness of 4–7 days. *Shigella* has a low infectious dose (as few as 10 organisms),¹⁰ and cases remain infectious as long as there is ongoing bacterial shedding in faeces, which can be up to 4 weeks.⁴

Shigella bacteraemia in an adult, however, is very rare. *S. sonnei* bacteraemia has been reported in 10 cases,^{11–19} with only one case that occurred with no gastrointestinal symptoms.¹² It is more common in children¹⁹ and more likely in adults with malnutrition, renal failure, HIV, organ transplantation, malignancy, leukaemia, neutropaenia, diabetes and/or cirrhosis.¹¹ *Shigella* bacteraemia is associated with increased mortality. However, the 3 deaths in the 10 cases with *Shigella* bacteraemia were not directly associated with bacteraemia, but were secondary to cryptococcal meningitis,¹¹ breast cancer¹¹ and lung cancer.¹² Interestingly, our case was previously well with no underlying comorbidities.

Prevention of shigellosis is through good personal hygiene such as hand washing with soap and water. The Australian Therapeutic guidelines suggest all cases of shigellosis be treated with antibiotic therapy according to antibiotic susceptibility, choosing between ciprofloxacin, norfloxacin or trimethoprim and sulfamethoxazole, and for a total of 5 days.²⁰ Oral aminoglycosides, first and second generation cephalosporins, amoxicillin and nitrofurans should not be used for the treatment of shigellosis due to their poor penetration of the intestinal mucosa even if they show susceptibility on testing.² The length of treatment for *S. sonnei* bacteraemia remains unclear, but 14 days has been the commonly used regime.¹¹ Shigellosis cases should have contacts traced and treated appropriately.

In this case, blood cultures were initially reported as positive for *E. coli* by MALDI-TOF, but subsequent testing of the initial blood culture correctly identified the organism as *S. sonnei* biotype f. MALDI-TOF is used to identify cultured organisms much more rapidly than traditional methods, and is in use by all major public and private microbiology laboratories in Melbourne, Australia. It is also being increasingly used to identify organisms directly from clinical specimens such as blood cultures^{21 22} in order to provide even more rapid results.

Although generally regarded as accurate (>90%),²³ MALDI-TOF is unable to differentiate between *E. coli* and *Shigella* spp due to a high degree of similarity at the genomic level,²⁴ as *Shigella* is a member of the Enterobacteriaceae family and very closely related to *E. coli*.²⁵ This difficulty has been previously reported, with Neville *et al*²⁶ finding eight cases of *Shigella* initially identified as *E. coli* on MALDI-TOF, and Bizzini *et al*²⁴ reporting two cases. Stool cultures positive for *Shigella* but with blood cultures identified as *E. coli* by MALDI-TOF require conventional serological and biochemical identification techniques to identify *Shigella* spp.²⁶

This is clinically relevant as *E. coli* bacteraemia is associated with urinary tract infections, biliary sepsis and intraperitoneal infections,²⁷ and may require further investigation for an underlying urinary tract or gastrointestinal source²⁷ (as occurred in our case with an abdominal–pelvic CT scan). In comparison, *Shigella* bacteraemia has not currently been shown to have an association with surgical pathology, and further investigations for a source are unlikely to be indicated especially if the patient improves with conservative management.

This case highlights a number of important points for clinicians. Shigellosis is increasingly being seen in MSM without a history of travel and may result in bacteraemia. Technologies for

rapid identification of organisms such as MALDI-TOF are increasingly being used and may become the standard method for species identification in the future.²¹ Clinicians and microbiologists need to be aware of their benefits and limitations.

Learning points

- ▶ Shigellosis presents with an acute onset of fever, abdominal cramps and diarrhoea. The stool contains blood, pus and mucus.
- ▶ Transmission is via the faecal-oral route, through the ingestion of contaminated food or water, and through sexual transmission. Shigellosis requires a low infectious dose, and cases can be infectious for up to 4 weeks.
- ▶ Shigellosis incubation period is 1–3 days, with a duration of illness of 4–7 days.
- ▶ Shigellosis is increasingly being seen in men who have sex with men without a history of travel and may result in bacteraemia.
- ▶ Newer technologies such as matrix-assisted laser desorption/ionisation time of flight are in use for the identification of organisms, but clinicians and microbiologists need to be aware of their benefits (rapid identification) and limitations (inability to distinguish *Escherichia coli* and *Shigella* spp).

Contributors AH was involved in the initial assessment, management and follow-up of the patient, and contributed towards the writing of the case report. CM was involved in the management and further follow-up of the patient, and contributed towards the writing of the case report. DJ was the supervising consultant and contributed towards the writing of the case report. LMB was the supervising consultant and supervised the management of the patient, and contributed towards the writing of the case report.

Competing interests None declared.

Patient consent Obtained.

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