CASE REPORT

Colovesical fistula presenting as *Listeria monocytogenes* bacteraemia

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SUMMARY

We present a case of colovesical fistula presenting with a clinical syndrome of urosepsis subsequently demonstrated to be due to *Listeria monocytogenes* bacteraemia. The patient had a history of previous rectal cancer with a low anterior resection and a covering ileostomy that had been reversed 6 months prior to this presentation. *L. monocytogenes* was also isolated among mixed enteric organisms on urine culture. There were no symptoms or signs of acute gastrointestinal listeriosis or meningoencephalitis. This unusual scenario prompted concern regarding the possibility of communication between bowel and bladder, which was subsequently confirmed with CT and a contrast enema. The patient recovered well with intravenous amoxicillin and to date has declined surgical management of his colovesical fistula. This case illustrates the importance of considering bowel pathology when enteric organisms such as *Listeria* are isolated from unusual sites.

BACKGROUND

Listeria monocytogenes is an uncommon human pathogen that most often causes a self-limiting gastrointestinal illness in immune-competent hosts but can cause life-threatening bacteraemia and meningoencephalitis, typically in the elderly or immune compromised (including pregnant women and neonates). Less common presentations include endocarditis and osteoarticular infection.¹ *L. monocytogenes* infection has previously been associated with bowel pathology, but infection of the urinary tract is extremely unusual.^{2–4}

CASE PRESENTATION

A 69-year-old man was admitted to the internal medicine service via the emergency department after a fall at home. The fall occurred following 48 h of fever, chills, dysuria and increased urinary frequency, and 24 h of delirium and light-headedness. The patient had an extensive medical history including obesity, hypertension, dyslipidaemia, obstructive sleep apnoea and type 2 diabetes mellitus, with complications including renal impairment (CKD2) and neuropathy. He also had an extensive surgical history with a previous diagnosis of rectal cancer treated with a low anterior resection following neoadjuvant radiotherapy 3 years prior to this presentation. Owing to a positive leak test at the time of this initial surgery, a covering loop ileostomy was formed. Prior to reversal of this stoma the patient underwent a contrast enema, which revealed a small, contained anastomotic leak. This was not amenable to closure and, aware of the

risks, he proceeded to reversal of the stoma 6 months prior to this presentation. Since the stoma reversal he had returned to hospital twice for rectal bleeding. On the latter occasion, 1 month prior to the current admission, a small rectal ulcer was noted for which he received treatment with steroid enemas and antibiotics.

At presentation, the patient was febrile with a temperature of 39°C and tachycardic at 120 bpm, but normotensive. His blood sugar was elevated at 14.9 mmol/L. His respiratory rate and oxygen saturation were normal. Examination of the cardiac and respiratory systems was normal and the abdomen was obese with multiple surgical scars and mild tenderness in the suprapubic region. A mid-stream urine sample revealed $>1000 \times 10^6$ white cell count/L, and bacteria were seen on microscopy. Blood cultures and routine blood tests were drawn. Fluid resuscitation and empiric intravenous cefuroxime and gentamicin were administered.

On the second day of admission, one of the initial blood cultures was reported to be positive for Gram-positive cocci resembling streptococci. The cefuroxime was changed to intravenous amoxicillin-clavulanic acid to cover the possibility of enterococcal urosepsis. On the third day of admission this organism was formally identified as a Gram-positive bacillus, *L. monocytogenes* (penicillin minimum inhibitory concentration 0.38 mg/L) and the patient's treatment was changed to high-dose intravenous amoxicillin. The urine cultured a mixed growth of enteric organisms and was initially treated as a contaminated sample. After the blood culture result was obtained, the microbiology laboratory staff further revisited the urine culture and confirmed the presence of *L. monocytogenes* in the urine as well.

The presence of *Listeria*, an enteric pathogen and colonist, in the blood culture and mixed flora including *Listeria* in the urine, along with the patient's complicated surgical history, prompted further review of the symptoms. On further questioning the patient revealed that he had been passing gas bubbles in the urine stream for some weeks prior to admission. This raised the suspicion of a colovesical fistula and a CT of the abdomen and pelvis was requested (figures 1 and 2). The patient could not recall consumption of any foods associated with a high risk of *Listeria* contamination and denied any recent febrile gastrointestinal illness.

The CT scan revealed a presacral collection and another collection between the bladder and rectum. Both collections contained gas. The bladder also

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Figure 1 CT axial image. In this image, gas is seen in the presacral collection and in the collection between the rectum and bladder. Gas and faeces is seen within the rectum between the two collections. Gas is also seen collecting anteriorly in the bladder.

contained gas and the posterior bladder wall was thickened. These findings were interpreted as indicating a likely colovesical fistula, although the fistulous tract itself was not seen. Following this result the patient was transferred to the care of the surgical team.

The intravenous antibiotics were continued and, as the patient was clearly improving, plans were made to repair the fistula as an elective procedure at a later date. A water soluble

Figure 2 CT sagittal image. In this image, gas is seen in the presacral collection and in the collection between the rectum and bladder. Gas and faeces is seen within the rectum between the two collections. Gas is also seen collecting anteriorly in the bladder.

contrast enema was performed, which confirmed the presence of a communication between the bowel and bladder, and also between the bowel and the presacral collection (figure 3).

TREATMENT

Following confirmation of *L. monocytogenes* bacteraemia, the patient was started on intravenous amoxicillin at a dose of 2 g six hourly as monotherapy. He completed 14 days of IV amoxicillin under the supervision of the hospital in the home team.

OUTCOME AND FOLLOW-UP

The patient had an excellent response to antibiotic therapy. In consultation with his surgical team, he has elected not to proceed to repair of the fistula as this would involve formation of a permanent end colostomy, which he would prefer to avoid given that the symptoms from the fistula itself remain mild and manageable. This leaves him with a risk for recurrent infection of the urinary tract with enteric organisms and as such a supply of emergency antibiotics has been dispensed to him to initiate if he becomes unwell and is unable to access immediate medical attention.

DISCUSSION

This report details a case of *L. monocytogenes* bacteraemia and urinary tract infection leading to the diagnosis of a colovesical fistula, which is thought to have provided a portal of entry for the bacteria into the blood stream. To the best of our knowledge, this is the first description of an association between *L. monocytogenes* bacteraemia and colovesical fistula, although *Listeria* bacteraemia has been documented in association with bowel pathology previously.^{2 3}

L. monocytogenes is a facultatively anaerobic, short, Gram-positive bacillus. It is catalase positive, oxidase negative and incompletely β -haemolytic on blood agar. It grows well on routine media and is notable for its ability to grow at typical refrigerator temperatures ($<4^{\circ}\text{C}$). On light microscopy, *Listeria* displays tumbling motility due to the presence of polar flagella.¹

Figure 3 Water soluble contrast enema. The rectal tube is seen passing into the rectum. From the rectum, contrast is seen passing posteriorly into the presacral collection and anteroinferiorly into the collection between the bladder and bowel.

L. monocytogenes is an uncommon cause of human infection but can cause severe illness in neonates, the elderly or immune suppressed and in pregnant women. *Listeria* is commonly found in the environment and is a member of the human bowel flora in approximately 5% of people.¹ Human infection occurs predominantly through the ingestion of contaminated foods. *Listeria* has been isolated from many different foods—products implicated in food-borne outbreaks of listeriosis include raw vegetables, dairy products such as soft cheeses and ready-to-eat delicatessen meat products. Given the frequency with which food is found to be contaminated, ingestion of *Listeria* is believed to be a common occurrence.⁵

In healthy persons, ingestion of a sufficient inoculum of *L. monocytogenes* can lead to a self-limiting febrile gastroenteritis.⁶ *L. monocytogenes* is an intracellular pathogen and cell-mediated immune function is key in the response to infection. Rates of invasive listeriosis are increased in those with defects of cell-mediated immunity such as pregnancy, AIDS, malignancy (especially haematological malignancy) and immune suppression from high-dose steroids, chemotherapeutic agents and TNF α inhibitors.⁵ Bacteraemia without a clear clinical focus is the most common form of invasive listeriosis and may follow a symptomatic gastrointestinal infection, but *Listeria* also has a predilection for causing central nervous system (CNS) infection.¹ *L. monocytogenes* is an important cause of bacterial meningitis (although less common than *Streptococcus pneumoniae* or *Neisseria meningitidis*) particularly in the neonatal period and in older adults. *Listeria* is able to directly involve the brain parenchyma and cause a variety of syndromes including meningoencephalitis, rhombencephalitis, cerebritis and brain abscess. CNS infection is often but not always associated with positive peripheral blood culture. Mortality rates are high, particularly among the immune suppressed, and residual disability is common among survivors.^{5 7 8} Other rare manifestations of *Listeria* infection include endocarditis and localised infections as a consequence of bacteraemia.^{9 10} In pregnancy, uncomplicated bacteraemia is the most common syndrome encountered, although chorioamnionitis, placental infection and infection of the fetus may occur.¹

L. monocytogenes infection has been described in relation to bowel pathology in the past. A MEDLINE search for “*Listeria monocytogenes*” and “colovesical fistula” failed to identify any previous case reports of *Listeria* bacteraemia due to the presence of a fistula. Cases of *Listeria* infection in patients with inflammatory bowel disease have been described, most often presenting after initiation of potent immune suppression such as biological anti-TNF α treatment.² *Listeria* meningitis has also been associated with an increase in cancer-related mortality among survivors in a Danish national cohort study. Gastrointestinal malignancies made up the largest group of incident cancer diagnoses. As it was felt that these patients probably had undiagnosed malignancies predisposing them to the development of *Listeria* meningitis, the authors go on to advise meticulous screening of *Listeria* meningitis survivors for occult malignancy.⁸ Other authors have also described cases of *Listeria* infection where colorectal cancer was identified and thought to have acted as a portal of entry for invasive listeriosis.^{3 4}

Treatment is usually recommended to be with intravenous amoxicillin or ampicillin, although benzyl penicillin is also effective. It is noteworthy that *Listeria* spp are intrinsically resistant to cephalosporins, meaning that agents active against *Listeria* must be added to cephalosporin-based regimens for meningitis in patients at elevated risk of *Listeria* meningitis.¹¹

Gentamicin can be added for synergistic effect, and this approach is recommended for endocarditis and CNS infection. The organism is also susceptible to trimethoprim-sulfamethoxazole and this is the second line agent of choice for those who are penicillin allergic. Some authors advocate the use of ampicillin and trimethoprim-sulfamethoxazole in combination.¹² Vancomycin, macrolides and carbapenems have all been used successfully in a small number of cases. Treatment is usually recommended for 2 weeks for isolated bacteraemia, 3 weeks for meningitis, 4–2 weeks for endocarditis and for 6 weeks or more for encephalitis or brain abscess.¹

Learning points

- ▶ The isolation of bacteria (especially from blood) that are not typical pathogens for the site of infection being treated should prompt further questioning and investigation to identify a reason for their presence.
- ▶ *Listeria* is an uncommon but important cause of human disease and is a member of the bowel flora in approximately 5% of humans.
- ▶ Recurrent urinary infection and passing gas or debris in the urine are typical symptoms, and should alert the clinician to the possibility of a colovesical fistula.
- ▶ Colovesical fistula is a rare but well recognised complication of pelvic surgery and of primary bowel pathology such as diverticular disease or Crohn's disease.
- ▶ *Listeria* is intrinsically resistant to cephalosporins but remains susceptible to penicillin antibiotics. Trimethoprim-sulfamethoxazole is the second line drug of choice in penicillin-allergic cases. Combination treatment is commonly used for serious infection such as that involving the central nervous system.

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