Bacterial peritonitis caused by *Listeria monocytogenes*: Case report and review of the literature

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JS DYLEWSKI. Bacterial peritonitis caused by *Listeria monocytogenes*: Case report and review of the literature. *Can J Infect Dis* 1996;7(1):59-62. Although *Listeria monocytogenes* has been isolated from the gastrointestinal tract, it is an infrequent cause of bacterial peritonitis. Since 1963 only 23 cases of peritonitis caused by listeria have been reported. This report describes another case in a patient with cirrhosis and chronic renal failure and presents a review of the literature. Most (16) of the previous cases were cirrhotic while six were undergoing chronic ambulatory peritoneal dialysis. Eight patients were on immunosuppressive therapy. Blood cultures were positive in fewer than half (42%) of the cases and Gram stain of peritoneal fluid was positive only twice. The peritoneal fluid protein concentration was relatively high compared with other causes of bacterial peritonitis. Ampicillin was the drug most commonly used for treatment, and the majority of patients survived the acute infection.

Key Words: *Bacterial peritonitis*, *Listeria monocytogenes*

Péritonite bactérienne causée par *Listeria monocytogenes* : rapport de cas et revue de la littérature

RÉSUMÉ : Même si *Listeria monocytogenes* a été isolé dans les voies digestives, il est rarement en cause dans la péritonite bactérienne. Depuis 1963, 23 cas de péritonite à *Listeria* seulement ont été déclarés. Ce rapport décrit un autre cas, chez un patient cirrhotique et insuffisant rénal de longue date et présente une revue de la littérature. La plupart (16) des cas précédents touchaient des cirrhotiques, alors que six étaient sous dialyse péritonéale ambulatoire. Huit patients étaient sous traitement immuno-suppressif. Les hémocultures se sont révélées positives dans moins de la moitié des cas (42 %) et la coloration de Gram du liquide péritonéal n'a été positive que dans deux cas. La concentration protéique du liquide péritonéal était relativement élevée comparativement aux autres causes bactériennes de péritonite. L'ampicilline est le médicament le plus couramment employé et la majorité des patients survivent à l'infection aiguë.

L *isteria monocytogenes* is a Gram-positive rod that is most frequently associated with infections in neonates and in adults with impaired cell-mediated immunity. The most common clinical presentation of listeria infection has been

sepsis and/or meningitis. Only 23 cases of peritonitis caused by this organism have been reported in the English literature since 1963 (1-20). The majority of cases were described in patients with cirrhosis or in those undergoing chronic ambu-

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latory peritoneal dialysis (CAPD). A case of listeria peritonitis in a cirrhotic patient with coexisting chronic renal failure is reported along with a review of the literature.

CASE PRESENTATION

A 76-year-old male was admitted to hospital with a one-week history of fever and increasing weakness. Past medical history included admissions for recurrent hepatic encephalopathy secondary to cryptogenic cirrhosis and chronic renal failure secondary to a proliferative glomerulonephritis. He had been on hemodialysis for five months and had recovered from an episode of *Staphylococcus aureus* septic arthritis of the left wrist three months before this admission. On examination his temperature was 38.7°C and he appeared lethargic but oriented. There was no asterixis and the neck was supple. Ascites was evident. Peripheral white blood cell count was $4 \times 10^9/L$. Five sets of blood cultures were obtained over a 48 h period and a peritoneal tap was performed. White blood cells in ascitic fluid totalled $46 \times 10^6/L$ (two neutrophils and 44 lymphocytes). On Gram stain no organisms were seen. The patient was observed for 48 h off antibiotics but did not improve. At this time the peritoneal fluid was reported as growing *Escherichia coli* and *L. monocytogenes*. A repeat peritoneal tap was performed and the cell count in the fluid was now $2850 \times 10^6/L$ neutrophils and $350 \times 10^6/L$ lymphocytes. Only listeria was isolated from this specimen. The patient was started on intravenous ampicillin 1 g every 6 h and treated for three weeks. A repeat peritoneal tap done after 10 days of treatment was sterile. All blood cultures taken before ampicillin was started were sterile. The patient initially responded to antibiotic therapy with resolution of fever, but two weeks after discontinuation of ampicillin he became more deeply jaundiced and then he developed a fatal upper gastrointestinal bleed. An autopsy was not performed.

LITERATURE REVIEW

MEDLINE was searched using index terms 'listeria infections' and 'peritonitis'. Additional cases were identified by review of the references found during the search. Twenty-three cases of listeria peritonitis have been reported in the English language literature since 1963 (Table 1). Including this case, there has been a male predominance (15 to nine) with an average age of 60 years (range 31 to 82). Sixteen patients suffered from cirrhosis and six were on CAPD. Eight patients were receiving some form of immunosuppressive therapy. Peripheral white blood cell count was greater than $10 \times 10^9/L$ in only 50% of the cases. Peritoneal fluid white blood cell count ranged from 46×10^6 to $14,987 \times 10^6/L$ and the mean protein concentration was 24 g/L (range 0.8 to 49.0). Blood cultures were positive in eight of 19 (42%) cases. One patient was diagnosed on the basis of a positive peritoneal biopsy done at laparoscopy. In only two cases did the Gram stain of ascitic fluid reveal Gram-positive rods. Nineteen patients received either ampicillin or amoxicillin as part of their treatment. Five deaths were reported with at least two being attributed to gastrointestinal bleeding. Three patients survived their acute infection only to succumb later to gastrointestinal bleeding.

DISCUSSION

Bacterial peritonitis may occur spontaneously or as the result of bowel perforation. Anaerobes and coliforms are the usual organisms isolated from cases of secondary bacterial peritonitis, while *E. coli*, *K. pneumoniae* and *Streptococcus pneumoniae* predominate in spontaneous bacterial peritonitis (SBP) (21). *L. monocytogenes* is present in the gastrointestinal tract of up to 10% of healthy individuals (1) but it has only rarely been isolated from peritoneal fluid. In only one of the cases reviewed here was perforation of the bowel thought to lead directly to listeria peritonitis (13). Other possible mechanisms include spontaneous bacteremia or translocation of listeria into preexisting peritoneal fluid. Endoscopy may have precipitated the bacteremia in a few cases (20) although fewer than half had positive blood cultures. Outbreaks of listeria have been associated with ingestion of contaminated foods (22), and organisms may transmigrate the intestinal wall into ascitic fluid or peritoneal dialysate. Bacteria in peritoneal fluid may be eradicated by host defences by means of opsonins and macrophages. A low protein content of peritoneal fluid has correlated with an increased risk of acquiring SBP (23). This may be due to the absence of opsonins and other proteins, which then would allow a small inoculum of bacteria to multiply to numbers significant enough to produce disease (24). Over 50% of cases of SBP in one series had a peritoneal protein content of less than 5.0 g/L (25). In this review of cases there was a relatively high peritoneal fluid protein content (mean 24 g/L). This difference may be because host defences against listeria depend more on lymphocyte and mononuclear phagocyte function than on opsonization.

The concomitant isolation of *E. coli* in the initial paracentesis is unusual; only one other case of listeria peritonitis (13) had additional bacteria isolated from the ascitic fluid. The inability to grow the *E. coli* on the repeat tap before therapy may reflect this patient's ability to neutralize this organism.

The clinical presentation of listeria peritonitis is similar to other causes of SBP in that fever, abdominal pain and change in mental status are the most common manifestations (18). Gram stain of peritoneal fluid was positive in only two cases; however, care must be taken not to disregard a report of Gram-positive rods present on stain or culture. Peritoneal fluid should be inoculated into blood culture bottles to enhance isolation (26). Treatment should involve either penicillin or ampicillin. Combination therapy with an aminoglycoside does not appear to be a necessity. Other antibiotics that have been used successfully include trimethoprim-sulfamethoxazole and erythromycin. Vancomycin failure has been reported (15). The duration of antibiotic therapy is not known, with most cases cured with two to three weeks of treatment.

CONCLUSION

Bacterial peritonitis caused by *L. monocytogenes* remains a rare occurrence but should be considered in patients with cirrhosis or in those on CAPD who develop fever, abdominal pain and a change in mental status.

TABLE 1
Reported cases of *Listeria monocytogenes* peritonitis

Case	Reference	Year of report	Age	Sex	Underlying disease	Peripheral WBC ($\times 10^9/L$)	Blood culture for listeria	Ascitic fluid WBC ($\times 10^6/L$)	Protein (g/L)	Treatment	Infection outcome
1	1	1967	64	F	Reticulum cell sarcoma, IS	1.6	+	NR	NR	Tetracycline	Died
2	2	1974	53	M	Hodgkin's disease, IS	2.8	+	4760	NR	Penicillin Gentamicin	Died GI bleed
3	3	1977	49	M	Alcoholic cirrhosis	18.9	+	1720	12	Ampicillin Cefazolin	Survived
4	3	1977	63	M	Alcoholic cirrhosis	7.0	+	1100	34	Ampicillin	Survived
5	4	1983	71	F	ITP, CAPD, IS	NR	+	1288	NR	Erythromycin	Survived
6	5	1984	76	M	Alcoholic cirrhosis	10.2	+	6150	49	TMP-SMX	Survived
7	6	1988	64	M	Alcoholic cirrhosis	20.8	+	7200	11	Ampicillin Amikacin	Died GI bleed
8	7	1988	32	M	Renal transplant, Cirrhosis, IS	3.3	—	250	39	Ampicillin	Survived
9	8	1989	82	M	Alcoholic cirrhosis	NR	—	950	0.8	Cefotaxime Ampicillin	Survived
10	9	1989	52	M	Alcoholic cirrhosis	NR	NR	NR	NR	Ampicillin Tobramycin	Survived
11	9	1989	75	F	Alcoholic cirrhosis	NR	NR	NR	NR	Ampicillin Gentamicin	Survived
12	10	1989	69	M	Cirrhosis, Rheumatoid arthritis	7.2	—	2100	23	Cephapirin Gentamicin Ampicillin	Survived
13	11	1989	31	F	SLE, CRF, IS, CAPD	12.7	ND	1002	NR	Ceftazidime Vancomycin Ampicillin	Survived
14	12	1989	50	F	SLE, CAPD, IS	NR	ND	NR	NR	Vancomycin Gentamicin Ampicillin	Survived
15	13	1990	47	F	Alcoholic cirrhosis	11.6	—	1670	NR	Vancomycin Ampicillin	Survived
16	14	1990	53	M	Wegener's granulomatosis, CAPD, IS	NR	—	800	NR	Vancomycin Aztreonam Ampicillin	Survived
17	15	1991	60	M	CLL, CAPD, IS	NR	—	NR	NR	Vancomycin Gentamicin Ampicillin	Survived
18	16	1991	67	M	Alcoholic cirrhosis, CAPD	15.1	—	1020	NR	Vancomycin Gentamicin Ampicillin	Survived
19	17	1992	38	F	CAPD	NR	ND	280	NR	Tobramycin Ticarcillin Ampicillin	Survived
20	18	1992	70	F	Cirrhosis due to hepatitis C, CRF	8.3	+	14,987	35	TMP-SMX Ampicillin	Survived
21	19	1992	64	F	Cirrhosis due to hepatitis C, Diabetes	NR	—	2000	21	Cefotaxime	Died
22	19	1992	74	M	Cirrhosis, CRF, Diabetes	NR	—	300	19	Ampicillin	Died
23	20	1994	66	M	Cirrhosis due to hepatitis C	12.0	—	3168	<20	Cefotaxime Ampicillin	Survived
24	Present case	1994	76	M	Cirrhosis, CRF	4.0	—	46 then 3200	ND	Ampicillin	Survived

CAPD Chronic ambulatory peritoneal dialysis; CLL Chronic lymphocytic leukemia; CRF Chronic renal failure; GI Gastrointestinal; IS Immunosuppressive therapy; ITP Immune thrombocytopenic purpura; ND Not done; NR Not reported; SLE Systemic lupus erythematosus; TMP-SMX Trimethoprim-sulfamethoxazole; WBC White blood cells

ADDENDUM

Since this paper was accepted for publication, an additional case of *Listeria monocytogenes* peritonitis has been reported in a 29-year-old female (27). Information on the characteristics of the peritoneal fluid was not given. She was treated with ampicillin and an aminoglycoside and recovered.

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