The clinical course and characteristics of staphylococcus lugdunensis peritoneal dialysis related peritonitis – a matched comparative analysis

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Background

Staphylococcus lugdunensis (S. lugdunensis) is a coagulase-negative staphylococcus species (CoNS) that has been increasingly recognized to cause serious infections with virulence resembling staphylococcus aureus (S. aureus). S. lugdunensis have been shown to cause a variety of infections such as infective endocarditis. However, no studies have evaluated the characteristics and outcomes of patients with S. lugdunensis peritoneal dialysis related peritonitis compared those with S. aureus peritonitis.

Method

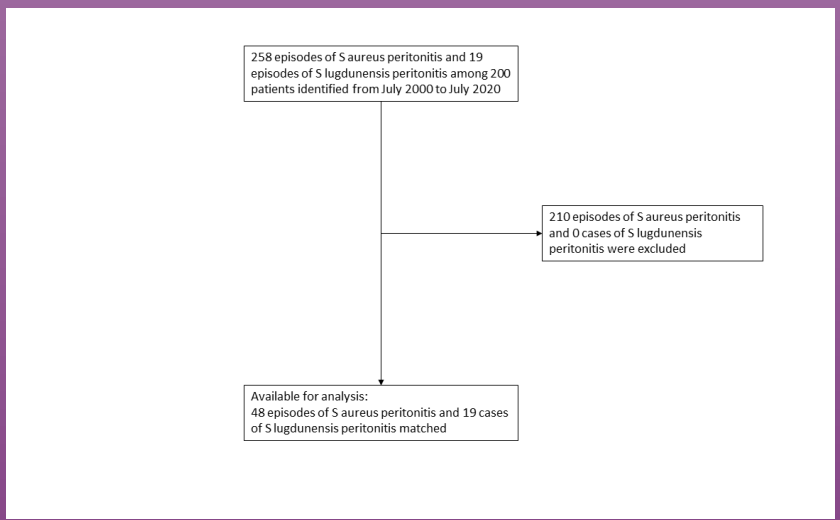
We retrospectively reviewed all episodes of peritonitis in our unit from July 2000 to July 2020. Peritonitis caused by S. aureus or S. lugdunensis were selected for comparative analysis. Bacterial causes other than those two organisms were excluded from this analysis. Polymicrobial peritonitis were also excluded. The cases identified were then individually matched for year of the peritonitis, gender, age (±10 years) and Charlson Comorbidity index (±3) with an intended matching ratio of 1:2-3. The case records of these episodes were reviewed and the demographic characteristics, underlying medical conditions, biochemical parameters and clinical outcome were examined.

Treatment failure were defined as failure of resolution of peritonitis in terms of cell count at day 5 or the need for peritoneal dialysis catheter removal or peritonitis related death. “Recent antibiotics/ topical agents” were defined as antibiotic therapy/ topical agents 30 days prior to the onset of peritonitis. Similarly, “prior procedures” were defined as procedure/ operation 30 days prior to the onset of peritonitis.

Discussion

Our study is the largest case series of S. lugdunensis peritonitis with a matched comparative analysis to S. aureus, an organism with well-known virulence. We demonstrated that S. lugdunensis peritonitis can cause significant peritonitis, even though S. aureus peritonitis is still far more virulent as reflected by the peritoneal dialysate cell counts and the higher prevalence of treatment failure and relapse. Interestingly, our study showed that there is a preponderance of S. aureus compared to S. lugdunensis among diabetic patients. The exact mechanism of such associations remains unclear, but it is likely related to the virulence of the organism and the reduced immune state in diabetic patients. S. lugdunensis remains remarkably susceptible to most antibiotics, as reflected by the high complete response in our cohort (94.4%).

Figure 1. Flow diagram of the study population



Demographic and clinical data between S. aureus and S. lugdunensis

Organism	S. Aureus (48)	S. Lugdunensis (19)	P value
Gender (M : F)	37 : 11	12 : 7	0.36
Age (years)*	60.8 ± 8.5	64.1 ± 10.8	0.18
Dialysis vintage (months)*	34.1 ± 29.2	61.3 ± 42.1	<0.01
Episodes of prior peritonitis	1.3 ± 1.6	1.9 ± 1.8	0.16
Renal diagnosis			
Diabetic kidney disease	25 (52.1%)	5 (26.3%)	0.05
Hypertensive nephropathy	7 (14.6%)	2 (10.5%)	1.00
Glomerulonephritis	6 (12.5%)	4 (21.1%)	0.45
Obstructive nephropathy	1 (2.1%)	2 (10.5%)	0.19
Polycystic kidney disease	1 (2.1%)	2 (10.5%)	0.19
Unknown	8 (16.7%)	4 (21.1%)	0.73
Comorbidity			
Diabetes	31 (64.6%)	6 (31.6%)	0.03
Hypertension	44 (91.7%)	19 (100%)	0.57
Ischaemic heart disease	13 (27.1%)	5 (26.3%)	1.00
Stroke	14 (29.2%)	8 (42.1%)	0.39
Peripheral vascular disease	6 (12.5%)	1 (5.3%)	0.66
Lung disease	2 (4.2%)	1 (5.3%)	1.00
Cancer	3 (6.3%)	1 (5.3%)	1.00
Charlson Comorbidity Index	7.6 ± 2.4	7.1 ± 3.1	0.48
System			
Machine assisted PD	5 (10.4%)	0 (0%)	0.31
Double-bag disconnect system	46 (89.6%)	19 (100%)	0.31
Low GDP solution	13 (27.1%)	6 (31.6%)	0.77
Symptoms			
Fever	26 (54.2%)	7 (36.8%)	0.28
Abdominal pain	38 (79.2%)	15 (78.9%)	1.00
Cloudy peritoneal dialysate	47 (97.9%)	18 (94.7%)	0.49
Vomiting	5 (10.4%)	4 (21.1%)	0.26
Diarrhoea	10 (20.8%)	4 (21.1%)	1.00
Total cell counts / white cell count			
Blood (x10^9/L)	10.5 ± 4.3	13.5 ± 9.1	0.22
PDF Day 0 (cells/uL)	4463.9 ± 5479.5	1807.9 ± 3322.7	0.05
PDF Day 3 (cells/uL)	1181.8 ± 2651.2	587.7 ± 1515.4	0.03

*Data expressed as mean ± standard deviation; # N of patients (%)

Predisposing factors & clinical outcome between S. aureus and S. lugdunensis

Organism (N of patient (%))	S. aureus	S. lugdunensis	P value
Predisposing factors			
Prior use of antibiotics	11 (22.9%)	7 (36.8%)	0.36
Prior use of topical agents	7 (14.6%)	2 (10.5%)	1.00
Prior procedure/ operation	2 (4.2%)	2 (10.5%)	0.32
Concurrent exit site infection	45 (93.8%)	16 (84.2%)	0.34
Same organism to peritonitis	30 (66.7%)	1 (6.3%)	<0.01
Clinical outcome			
Treatment failure	24 (50.0%)	3 (16.7%)	0.02
Complete response	39 (81.3%)	17 (94.4%)	0.26
PD catheter removal	1 (2.1%)	0 (0%)	1.00
Relapsed	14 (29.2%)	0 (0%)	0.01
Death	2 (4.2%)	1 (5.3%)	1.00

Summary

Although S. aureus peritonitis is more virulent with significant morbidity, S. lugdunensis can cause similarly serious peritonitis and should not be regarded as harmless unlike other CoNS. This largest cases series of S. lugdunensis peritonitis enabled better characterization in the clinical features and outcomes of patients with S. lugdunensis peritonitis.