



NERDC Dialysis Orders OSCE (PD question)

Examination Rubric (Acute Peritonitis in chronic PD)

17 Jan 2019 (For Fellow Testing 1.2)

Total Points: 22

Passing Score: 16

Objective: To assess proficiency in acute and longer-term management of peritonitis in a chronic PD patient

Evidence-based/Standard of care references are given after the question.

QUESTION GROUP #1 (8 points): Initial presentation of peritonitis in a chronic PD patient

- A. Give the 3 diagnostic criteria for peritonitis in CAPD. (1 point each—3 total)
[Know the diagnostic criteria for peritonitis in patients on chronic PD]
- Clinical features consistent with peritonitis
 - Dialysis effluent* white cell count $>100/\mu\text{L}$ or $> 0.1 \times 10^9/\text{L}$, with $>50\%$ PMN (may also say “predominance” or “majority” (0.5 point for each)
(Extra credit + 0.5 point if specifically indicated that dialysate effluent with at least 2 hour dwell is sample)
 - Positive dialysis effluent culture
 - Reference: ISPD Peritonitis guideline, 2016 | 1C, Recommended, Low quality evidence
- B. Can this patient be diagnosed with peritonitis at this point in the evaluation? Please explain why or why not. (2 points)
[Knowing the diagnostic criteria, preliminarily make the diagnosis and explain rationale in a PD patient with a typical presentation]
- Yes. (1 point)
 - The patient meets the recommendation of 2 of the 3 criteria (clinical features, effluent WBC count >100 with $>50\%$ PMN). (0.5 point for each of the 2 criteria)
 - Reference: ISPD Peritonitis guideline, 2016 | 1C, Recommended, Low quality evidence
- C. Would you manage this patient as an inpatient or an outpatient? Please explain what factors of this patient’s presentation, chronic dialysis prescription, and living situation influence your

decision – should discuss at least 3. (May chose either inpatient or outpatient, but must explain why. 1 point, should include at least 3. If fewer than 3, then no points)

[Know indications for inpatient admission and use these to support a decision for or against admission]

- a. Pain control
 - b. Ability to perform PD/comply with PD prescription at home
 - c. Ability to arrange for home antibiotic therapy
 - d. Ability to return to clinic / follow up
 - e. Systemic symptoms
 - f. Presence of clinical features requiring catheter removal
 - i. Reference: ISPD Peritonitis guideline, 2016 | Opinion based. Non-graded recommendation.
- D. Is empiric antibiotic therapy indicated? (1 point)
[Know when empiric antibiotic therapy is indicated]
- a. **Yes.** (1 point)
Empiric antibiotic therapy is indicated with:
 - i. A clinical diagnosis of peritonitis
 - ii. Cloudy effluent not meeting other diagnostic criteria before culture result
 1. Reference: ISPD Peritonitis guideline, 2016| 1C, Recommended, Low quality evidence
- E. When utilized, what antimicrobial coverage is necessary for empiric antibiotic therapy for peritoneal dialysis associated peritonitis? (1 point, no points if both are not indicated)
[Know the necessary coverage for empiric antibiotic therapy]
- a. Required to indicate gram negative coverage PLUS gram positive coverage
 - i. Reference: ISPD Peritonitis guideline, 2016| 1C, Recommended, Low quality evidence

QUESTION GROUP #2 (8 points): Recognizing and managing transient loss of ultrafiltration due to inflammatory-mediated conversion to high transporter status.

- A. What concerning feature is evident in the patient's PD exchanges? (1 point)
[Recognize that patient is incompletely draining and/or reabsorbing fluid (approx. 700 ml with his last 4 exchanges) and has gained 1.7 kg over the last 24 hours—although 1 liter was IV NA]
- a. Impaired ultrafiltration, reduced UF, or incomplete drainage
 - i. References:
 1. ISPD Peritonitis guideline, 2016 | Non-referenced observation
 2. Alterations in the peritoneal transport of water and solutes during peritonitis in CAPD patients. Eur J Clin Invest 17:43-52, 1987
 3. Rojas-Diaz et al. "Help of Remote Patient Monitoring in the Assessment of Changes in Ultrafiltration before, during, and after a Peritonitis

Episode in Patients on Automated Peritoneal Dialysis” Abstract TH-P0859. Kidney Week. 2 Nov 2017.

- B. What is your full/expanded differential diagnosis and initial evaluation (to be done at this time) for this issue? (3 points)

[Recognize that during acute inflammation/peritonitis, PD transport physiology often changes to high/fast transport type resulting in loss of ultrafiltration capacity with longer dwells. This is far and away the most likely process here. However, must also take into account alternative etiologies of fluid retention]

- a. DDx:
- i. Peritonitis related impaired ultrafiltration, high/rapid transport due to peritonitis (1 point)
 - ii. Catheter malfunction (1 point, including if any of below are included)
 1. Constipation
 2. Migration
 3. Kink
 4. Transcription or recording error by patient

- b. Initial evaluation (1 point, must have at least 2 of the 3)

- i. Plain film X-ray (anterior and lateral)
- ii. Physical exam
- iii. Catheter fill and pull/drain testing, aka catheter assessment
(We’re looking for initial evaluation here—PET testing would normally not be done at initial presentation, but after resolution of peritonitis. Don’t take off points for PET testing, but none should be given either.)

- C. Please write an updated set of orders for peritoneal dialysis (use institutional order sheets). (4 points = 1 for indicating each component [4])

[Altering a patient’s PD regimen to account for decreased ultrafiltration ability]

- a. Order should indicate:
- i. Modality – CCPD or CAPD; CCPD should only be ordered if the patient is admitted and your facility has a cyclor available. He does not have a cyclor at home, nor has he been trained. (1 point)
 - ii. PD fluid type/concentration – should indicate an increase in dextrose concentration to 2.5% or higher for some or all exchanges, unless there is a switch to CCPD with shortened dwell times. Alternatively, can use 7.5% Icodextrin--**if available to your unit**—with the patient’s long dwell. (1 point)
 1. References:
 - a. Posthuma et al. Nephrol Dial Transplant (1998) 13: 2341-2344
 - b. Chow et al. Nephrol Dial Transplant (2014) 29: 1438-1443.
 - iii. Dwell volume – labs do not indicate a need for acutely higher clearance. Volumes of 10-12L / day would be adequate to accommodate cycle treatments (1 point).

- iv. Dwell duration / cyclor frequency (1 point) –
 - 1. CAPD – can remain with current dwell durations (~6 hours) as long as PD dextrose concentration is increased or there is utilization of Icodextrin, although reducing dwell duration is also ok.
 - 2. CCPD – night cycles should have reduced duration. Anticipating the patient’s increased transport status a dwell time of 2-3 hours would prove optimal. Long day dwell should include Icodextrin (with caveats above) or higher % dextrose solution.

QUESTION GROUP #3 (6 points): Managing uncomplicated gram negative peritonitis based on sensitivities

- A. Given the results above, what is your recommended treatment for peritonitis in this patient? (Antibiotic choice/dosing with route of administration, frequency of administration, and duration of therapy for this patient? (4 points, must include: antibiotic choice, correct dosing, route of therapy, frequency of dosing, and duration of therapy)
[Select a treatment based on sensitivities, and prescribe duration/route]
 - a. Antibiotic: See highlighted choices in Tables 5 and 6 at the end. IP or PO is required.
Asked not to give IV.
 - i. Highlighted choices in Table 5. May also select oral Ciprofloxacin 250mg twice daily or TMP/Sulfa 160mg/800mg twice daily.(1 point)
 - b. Route: Intraperitoneal or oral; depending on selection in (a) (1 point)
 - c. Dosing frequency: IP = continuous or intermittent -> no difference in outcomes – so either may be used, but dose must be appropriate to frequency as per Table 5, and loading dose must be used when appropriate. If explicitly stated, dose may be adjusted upward for residual renal function as per 2005 and 2010 ISPD guidelines (1 point)
 - d. Treatment duration: recommendation is **21 days** (Staph aureus, Enterococcus species, Pseudomonas/Stenotrophomonas, **Gram negative**, and multi-organism = 3 weeks | Coag Negative Staph, Streptococcal species, and culture negative = 14 days). (1 point)
 - i. Reference: ISPD Peritonitis guideline, 2016 | various grades of recommendations
- B. What are the indications for PD catheter removal? Is it indicated in this patient? (2 points)
[Know/list indications for catheter removal]
 - a. Indications: (1 point, should include at least 3)
 - i. Relapsing / Recurrent peritonitis
 - ii. Refractory peritonitis
 - iii. Fungal peritonitis
 - iv. Mycobacterial peritonitis
 - v. Peritonitis associated with intra-abdominal pathology/surgical event or polymicrobial infection

Correct, though not associated with this case

- vi. Exit-site / tunnel infection simultaneous or leading to peritonitis**
- vii. Pseudomonas infection with exit site/tunnel involvement
- viii. Damaged or fractured catheter
- ix. Sclerosing peritonitis
- x. Refractory catheter infections

1. References:

- a. ISPD Peritonitis guideline, 2016 | 1C, Recommended, Low quality evidence
 - b. ** ISPD Catheter-related infection recommendations, 2017 | 2C, Suggested though alternatives may be reasonable, Low quality evidence
- b. It is not indicated in this patient (1 point)

Intraperitoneal Antibiotic Dosing Recommendations for Treatment of Peritonitis

	Intermittent (1 exchange daily)	Continuous (all exchanges)
Aminoglycosides		
Amikacin	2 mg/kg daily (252)	LD 25 mg/L, MD 12 mg/L (253)
Gentamicin	0.6 mg/kg daily (254)	LD 8 mg/L, MD 4 mg/L (255,256)
Netilmicin	0.6 mg/kg daily (233)	MD 10 mg/L (257)
Tobramycin	0.6 mg/kg daily (253)	LD 3 mg/kg, MD 0.3 mg/kg (258,259)
Cephalosporins		
Cefazolin	15–20 mg/kg daily (260,261)	LD 500 mg/L, MD 125 mg/L (254)
Cefepime	1,000 mg daily (262,263)	LD 250–500 mg/L, MD 100–125 mg/L (262,263)
Cefoperazone	no data	LD 500 mg/L, MD 62.5–125 mg/L (264,265)
Cefotaxime	500–1,000 mg daily (266)	no data
Ceftazidime	1,000–1,500 mg daily (267,268)	LD 500 mg/L, MD 125 mg/L (236)
Ceftriaxone	1,000 mg daily (269)	no data
Penicillins		
Penicillin G	no data	LD 50,000 unit/L, MD 25,000 unit/L (270)
Amoxicillin	no data	MD 150 mg/L (271)
Ampicillin	no data	MD 125 mg/L (272,273)
Ampicillin/Sulbactam	2 gm/1 gm every 12 hours (274)	LD 750–100 mg/L, MD 100 mg/L (253)
Piperacillin/Tazobactam	no data	LD 4 gm/0.5 gm, MD 1 gm/0.125 gm (275)
Others		
Aztreonam	2 gm daily (242)	LD 1,000 mg/L, MD 250 mg/L (243,244)
Ciprofloxacin	no data	MD 50 mg/L (276)
Clindamycin	no data	MD 600 mg/bag (277)
Daptomycin	no data	LD 100 mg/L, MD 20 mg/L (278)
Imipenem/Cilastatin	500 mg in alternate exchange (244)	LD 250 mg/L, MD 50 mg/L (236)
Ofloxacin	no data	LD 200 mg, MD 25 mg/L (279)
Polymyxin B	no data	MD 300,000 unit (30 mg)/bag (280)
Quinupristin/Dalfopristin	25 mg/L in alternate exchange ^a (281)	no data
Meropenem	1 gm daily (282)	no data
Teicoplanin	15 mg/kg every 5 days (283)	LD 400 mg/bag, MD 20 mg/bag (229)
Vancomycin	15–30 mg/kg every 5–7 days ^b (284)	LD 30 mg/kg, MD 1.5 mg/kg/bag (285)
Antifungals		
Fluconazole	IP 200 mg every 24 to 48 hours (286)	no data
Voriconazole	IP 2.5 mg/kg daily (287)	no data

LD = loading dose in mg; MD = maintenance dose in mg; IP = intraperitoneal; APD = automated peritoneal dialysis.

^a Given in conjunction with 500 mg intravenous twice daily (281).

^b Supplemental doses may be needed for APD patients.

Table 5. Li et al. “ISPD Peritonitis Recommendations: 2016 Update on Prevention and Treatment.” *Perit Dial Int* 36: 481-508, 2016

TABLE 6
Systemic Antibiotic Dosing Recommendations for
Treatment of Peritonitis

Drug	Dosing
Anti-bacterials	
Ciprofloxacin (237)	oral 250 mg BD ^a
Colistin (288)	IV 300 mg loading, then 150–200 mg daily ^b
Ertapenem (289)	IV 500 mg daily
Levofloxacin (239)	oral 250 mg daily
Linezolid (290–292)	IV or oral 600 mg BD
Moxifloxacin (293)	oral 400 mg daily
Rifampicin (294,295)	450 mg daily for BW <50 kg; 600 mg daily for BW ≥50 kg
Trimethoprim/ Sulfamethoxazole (252)	oral 160 mg / 800 mg BD
Anti-fungals	
Amphotericin (296)	IV test dose 1 mg; starting dose 0.1 mg/kg/day over 6 hours; increased to target dose 0.75–1.0 mg/kg/day over 4 days
Caspofungin (297,298)	IV 70 mg loading, then 50 mg daily
Fluconazole (299)	oral 200 mg loading, then 50–100 mg daily
Flucytosine (296)	oral 1 gm/day
Posaconazole (300)	IV 400 mg every 12 hours
Voriconazole (301–303)	oral 200 mg every 12 hours

BD = twice a day; IV = intravenous; BW = body weight.

^a Ciprofloxacin 500 mg BD may be needed if residual glomerular filtration rate is above 5 mL/min.

^b Expressed as colistin base activity (CBA).

Li et al. "ISPD Peritonitis Recommendations: 2016 Update on Prevention and Treatment." *Perit Dial Int* 36: 481-508, 2016