Non-Infectious Complications of Peritoneal Dialysis

PD Curriculum Series
North American Chapter of the ISPD

Joanne M Bargman MD FRCPC
Professor of Medicine, University of Toronto
Director, Home Peritoneal Dialysis Unit
University Health Network
Outline

• Increased Intra-Abdominal Pressure and Its Consequences
  – Hernias
  – Abdominal and Genital Leaks
  – Hydrothorax

• Hemoperitoneum and Other Causes of Coloured Dialysis Effluent
Mr C Gets a Lump

48 year old man with polycystic kidney disease is trained on cycler dialysis. Current prescription is 2.5 L X 4 exchanges over 8 hours at night, with 2.5 L day dwell

• one year later: he is doing well
• residual renal GFR is 8 ml/min
Mr C Gets a Lump (cont’d)

• at clinic, he reports a new “lump” in his left groin. He had been gardening and felt a “pop” and some tenderness in the groin
• on physical exam, there is a lump in his left inguinal area
Mr C and his Lump
Increased Intra-abdominal Pressure (IAP)

- instillation of dialysate into the peritoneal cavity leads to increased IAP
- the magnitude of the increase depends upon:
  - volume of dialysate instilled
  - position of the patient (sitting > standing > supine)
  - age, body mass index
  - coughing, lifting, straining at stool
Intra-Abdominal Pressure (IAP), Position & Dialysate Volume

![Graph showing the relationship between IAP (mmHg) and volume of dialysate (L) for sitting, standing, and supine positions.](image)

- **IAP (mmHg)**
- **Volume of Dialysate (L)**

Legend:
- **Sitting**
- **Standing**
- **Supine**

After Twardowski
Hernias

Clinical Presentation:

- lump or swelling that may be tender
- bowel incarceration or strangulation
Other Hernias: Ventral Hernias
Umbilical Hernia

Biggest risk for incarceration
60 year old woman on PD presents with localized abdominal pain
Hernias (cont’d)

Treatment:

• warn patient about signs of incarceration
• surgical repair:
  - dialysis around repair depends on renal function and condition of the patient
  - don’t usually have to put them on HD!
  - reintroduce PD with low volumes, supine posture, increase volume over 2 weeks
So What Happened to Mr C?

- continued night cycler dialysis
- dry during day (RRF 8 ml/min)
- elective hernia repair
- no PD for 2 days
- back to night cycler 1.5L volume X 2 weeks, 2L volume X 2 weeks, then 2.5 L volume
- day dwell re-introduced 2 months later
Abdominal Wall and Genital Edema

Presentation:

• abdominal swelling or bogginess, scrotal or labial edema
• diminished effluent return
• weight gain without peripheral edema
• pericatheter leak: wetness or swelling at exit site
Abdominal Wall & Genital Edema

Diagnosis:
- physical exam (have patient stand in front of you)
- unchanged PET results
- CT scan
- pericatheter leak: ultrasound around exit site
Abdominal Wall and Genital Edema

Diagnosis by CT Scanning:

- add 100-150 ml Omnipaque to dialysis bag
- infuse dialysate into patient
- have patient ambulatory for 30 to 60 minutes to increase intra-abdominal pressure
- send for CT scan - discuss with the radiologist
CT Dye Dissecting through *tunica vaginalis* into scrotal wall
CT Scan with IP Dye
Demonstrating Leak through Hernia
Abdominal Wall & Genital Edema

Management:

• reintroduce low pressure PD (eg APD with low volumes)
• temporary HD to allow healing
• Abdominal wall: CT scan for occult hernia
• Genital: CT scan for patent processus vaginalis, which is easily repaired
Abdominal Wall & Genital Edema

Diagnosis

- Careful clinical exam, with the patient standing
- CT scanning with IP dye
- In case of dye allergy
  - T2-weighted MRI (no Gd necessary: the dialysate is its own tracer)
Early-Onset Shortness of Breath in a PD Patient

FM is a 61 year old woman with IgA nephropathy and progressive renal insufficiency. A PD catheter was inserted.

One week after training she calls the unit that she has become progressively short of breath over the past 3 days. There is no cough, wheeze or sputum production. She is 1 kg above her target weight.
Ms. F.M. Gets SOB
Hydrothorax

*Definition:* The presence of peritoneal dialysis fluid in the pleural cavity

*Incidence:* Probably < 5%

*Pathogenesis:* Movement of dialysate, under increased intra-abdominal pressure, from peritoneal to pleural cavity through congenital or acquired defects in the diaphragm
Hydrothorax (cont’d)

Presentation:
• may be asymptomatic
• shortness of breath
• no improvement with hypertonic dialysate
• diminished effluent return
• right-sided pleural effusion on CXR
Hydrothorax

**Diagnosis:**
- thoracentesis for relief of symptoms and/or diagnosis
- pleural fluid analysis:
  - transudate
  - high glucose concentration (*usually, but not always*)
  - cell count variable
Hydrothorax

**Treatment:**
- thoracentesis may be helpful if very SOB
- stop PD
- temporary hemodialysis, *if dialysis necessary*
Hydrothorax

Treatment

- trial of re-introducing “low pressure” PD (the dialysate in pleural cavity may have functioned as a sclerosing agent)
- pleurodesis (talc, tetracycline, bleomycin, autologous blood)
- operative or pleuroscopic repair (diaphragmatic defects identified and patched or oversewn)
Dialysate from an Asymptomatic 26 year old Woman
Hemoperitoneum

Definition:
• Bloody peritoneal effluent

Presentation:
• scary! (not as bad as it looks)
• must consider “benign” and “serious” causes
“Benign” Causes:

- menstruation
- ovulation
- ruptured renal or ovarian cysts
- trauma
- coagulopathy
Hemoperitoneum (cont’d)

Serious Causes:

- ischemic bowel
- colon cancer
- pancreatitis
- encapsulating peritoneal sclerosis
- urologic cancer
Hemoperitoneum (cont’d)

Treatment:

• IP heparin to avoid clotting of catheter
• flushes
• dialysate at room temperature
• investigations depend on whether benign or serious type of presentation

During training, warn females in advance of this complication
And What Do You Think About This?
Chyloperitoneum

- Drainage of chyle into the peritoneal cavity
- Comes and goes depending on dietary fat intake
- Effluent cell count is normal but triglycerides are high
- Patients should be investigated for underlying intra-abdominal pathology
- Treatment should include diet of small and medium chain fatty acids
And This?
Bile in the Dialysis Effluent

- The effluent bag on the left has green discolouration due to bilious drainage.
- This implies disruption of the biliary system and can rarely be seen after laparoscopic cholecystectomy.
Summary Points (I)

• hernias are unsightly, enlarge with time, and pose a risk for leaks and incarceration
• they can usually be repaired operatively without putting the patient on hemodialysis
• patients at risk should be on a “low pressure” PD regimen
Summary Points (II)

• edema of the abdominal wall and genitals is through a leak of dialysate
• often this resolves with “low pressure” dialysis
• fixed defects, such as hernias or patent processus vaginalis should be surgically repaired (and usually patient can stay on PD through the repair)
Summary Points (III)

• it is important to be aware of hemoperitoneum
• commonest cause of hemoperitoneum is menstruation, and is benign
Question 1

- One of your PD patients has noted diminished effluent volume and increased abdominal girth. Which one of the following statements best suggests that the cause is a leak of dialysis fluid?
  1. A 4 hour, 4.25% PET shows ↓ D/P creatinine.
  2. A 4 hour, 4.25% PET shows ↓ D/P urea.
  3. A rapid in-and-out exchange shows slow outflow.
  4. CT scan with IP dye shows dye in the tissue plane outside of the peritoneal cavity.
  5. The patient has a failed kidney transplant and is still on prednisone.
A patient with PCKD has been on PD for 2 years and has an umbilical hernia. He does not want it repaired. Which of the following statements is most correct?

1. As the hernia enlarges, there is an increasing risk of bowel incarceration.
2. Because the hernia is intraperitoneal, there is little risk of dialysis leak through the hernia.
3. The patient will not be able to receive a renal allograft unless the hernia is repaired.
4. If bowel strangulation supervenes, PD can be continued but with appropriate antibiotic coverage.
5. If there is residual renal function, the patient could do APD with day dry or lower day dwell volume.
A 62 year old woman on PD for 2 weeks develops SOB. CXR shows a large right pleural effusion. Which of the following statements is most correct?

1. The pleural fluid glucose should be at least 200 mg/dl higher than a simultaneous blood glucose.
2. The pleural fluid should be a transudate.
3. The pleural fluid PD should have > 100 X 10^9 WC and > 50% PMNs.
4. It is more common for PD hydrothorax to be left-sided.
5. It is more common for PD hydrothorax to occur in male patients > 60 years old.
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