Peritonitis Prevention

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Peritonitis prevention

- Peritonitis remains a major complication in PD
- Peritonitis contributes to morbidity and mortality
- Leads to decreased quality of life
- Increased cost to health care system
- Peritonitis contributes to loss of RRF, peritoneal membrane failure leading to inadequate dialysis and UFF and in some cases leads to EPS
- Continues to be a leading cause of technique failure and transfer to HD

Peritonitis prevention: Routes of peritonitis

- Transluminal: touch contamination, connectology, contamination etc
- Periluminal: around the catheter, ie ESI, biofilm formation, tunnel infections
- Transmural: across the bowel wall, GI procedures, diverticulitis, bowel ischemia, colitis, perforations, constipation
- Hematogenous: procedures, ie dental, intravascular devices
- Gynecological: leaks, vaginal delivery, hysteroscopy,
Peritonitis prevention: catheter care

- No particular catheter has been shown to be superior ie Swan neck vs pre sternal va buried vs standard Tenckhoff catheter
- Double cuff catheters are superior to single cuff catheters
- Downward pointing exit site /downward directed tunnel
- Avoiding trauma and hematoma.

Antimicrobial prophylaxis for exit site infection and peritonitis

- Use of prophylactic antibiotics at catheter insertion.
- Exit site care to prevent peritonitis
- Prophylactic nasal antibiotic use
- Pre-procedural antibiotic use
- Prevention of fungal peritonitis
- Antibiotics for leaks/contaminations

Role of perioperative antibiotic with PD catheter insertion


1% (Vanco 1 gm) vs 7% (cefazolin 1 gm) vs 12% (no Abx) peritonitis rate within 14 days of catheter insertion.
One-dose cefuroxime i.v. (1.5gm) and 250mg i.p. in the 1st dialysis bag reduced microbial growth in PD patients after catheter insertion. Out of 38 pts, 18 received Abx and 20 did not. No pt who received abx had bacterial growth (within 10 days post op) vs 6/20 pts in control group had bacterial growth \( p=0.02 \)

ISPD guideline suggest use of Vancomycin at the time of catheter insertion

UK guidelines also recommend use of Abx with catheter insertion but do not specify

Australian (KHA-CARI) guidelines also suggest use of vancomycin, cephalosporins or gentamycin.

Exit site care for prevention of Peritonitis

Normal skin color
No Inflammation/redness
No drainage/crusting
No tenderness/swelling
Exit site infection prevention

- Downward pointing tunnel
- Good hand hygiene, thorough drying (avoid artificial nails)
- Avoiding trauma to exit site
- Exit site antibiotic protocol
- Antibiotics for leaks

Mupirocin versus no prophylaxis in prevention of ESI due to S. aureus.

1233 enrolled patients and 1217 controls were included in a review of 14 studies using Mupirocin for ESI and peritonitis prevention.

Risk reduction 72% 95% p<0.0001


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Mupirocin versus no prophylaxis in prevention of peritonitis due to S. aureus.

When only ESI and peritonitis due to S. aureus were considered, risk reduction was greater.

Risk reduction 70%, p<0.00001


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Mupirocin for preventing exit-site infection and peritonitis in patients undergoing peritoneal dialysis

- Mupirocin has been in use since 90’s and has excellent activity against gram positive organisms but does not affect gram negative organisms
- Concern that Mupirocin may induce resistance with prolonged use
- Resistance to mupirocin can be classified as “low” if the MIC is > or equal to 8 μg/mL, or “high” if the MIC is > or equal to 512 μg/mL
- High level resistance may lead to treatment failures
- SA resistance to mupirocin has to be monitored regularly in centres that have a policy of continuous mupirocin use

Routine use of mupirocin at the peritoneal catheter exit site and mupirocin resistance: still low after 7 years. Lobbezoo et al NDT 2004 Dec;19(12):3140-3

7 years use of maintenance mupirocin ointment in non-selected PD patients, there was no significant increase in the prevalence of MuRSA.

Randomized controlled trial of prophylactic rifampin for peritoneal dialysis-related infections

- 64 patients received either rifampin 300 mg twice daily for 5 days every 3 months or no treatment.
- The rifampin-treated patients had a significant delay in time to first catheter-related infection (P <0.015) and significantly fewer catheter-related infections overall (P < 0.001)
- However there was greater pt withdrawl in Rifampin group due to Adverse effects (4 vs 0)
A single-dose vial of 0.5 mL ciprofloxacin (1 mg) was applied daily around the insertion site after cleaning vs control (soap & water).

Fig 108. Effect of topical local peritoneal prophylaxis on peritonitis rates. Trials shown are randomized trials on adult in-center CAPD. Mupirocin vs no treatment or placebo. Data derived from [9, 10, 11]. ES = exit site. "no prophylaxis" vs "prophylaxis".


A prospective RCT of 133 patients, which compared the topical application of mupirocin cream (2%) or gentamicin sulphate cream (0.1%) to the exit site.
Antimicrobial prophylaxis for exit site infection and peritonitis: what are the evidences

- Gentamycin had the advantage of being effective against gram negative organisms, i.e., Pseudomonas
- Gentamycin decreased peritonitis rates for both gram positive and gram negative organisms
- There is some concern of decreased susceptibility against gentamycin of Enterobacteriaceae and Pseudomonas

Concentration of decreased susceptibility against gentamycin

Pierce et al., PDI, 2012 32(5):325-330
Topical mupirocin/sodium hypochlorite reduces tunnel infection and exit-site infection rates in children

Annualized Rates of ESI/TI


Topical mupirocin/sodium hypochlorite reduces peritonitis and exit-site infection rates in children

Annualized Rates of Peritonitis


Exit-Site Infection of Peritoneal Catheter is Reduced by the Use of Polyhexamidine. Perit Dial Int. 2014 May; 34(3): 271–277

<table>
<thead>
<tr>
<th>Exit-Site Infections During the Follow-Up Period.</th>
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<tbody>
<tr>
<td>Traditional</td>
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<tr>
<td>------------</td>
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<tr>
<td>Patients ESI</td>
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<tr>
<td>ESI rate</td>
</tr>
</tbody>
</table>

Organisms (n): S. aureus (6)  P. aeruginosa (3)

Corynebacterium (2)
P. aeruginosa (1)

Patients ESI = number of patients who developed exit-site infections; ESI = exit-site infection.

RCT of 60 patients, 30 each arm 1 episode/36.6 vs 1 episode 102.7 months

*All infections in Polyhexidine arm were pseudomonas.
A higher rate per year of fungal ESIs was seen in patients using P(3) (0.07 versus 0.01; P=0.02) with a corresponding increase in fungal peritonitis (0.04 versus 0.00, respectively; P<0.05).

Conclusion: P(3) was not superior to mupirocin in the prophylaxis of PD-related infections. Colonization of the exit site with fungal organisms is of concern and the use of P(3) over mupirocin is not advocated in the prophylaxis of PD-related infections.
Antibacterial honey for the prevention of peritoneal-dialysis-related infections (HONEYPOT): a randomised trial

Forest plot of the effect of honey on the primary efficacy endpoint by subgroups HR-based ratios.

On subgroup analysis participants with diabetes who had peritoneal dialysis and received antibacterial honey had significantly higher risks of the primary composite outcome.


Fungal peritonitis prophylaxis in PD patients

- Pts receiving prolonged or repeated courses of antibiotics are at risk for developing fungal peritonitis
- 2 RCTs looking at Nystatin and Fluconazol
  - Nystatin tablets 500,000 units QID vs placebo whenever antibiotics were prescribed to PD pts. Lo et al Am J Kidney Dis. 1996
  - Fluconazole 200 mg every 48 hours po given to PD patients that had infectious bacterial complications (BP, ESI, TI) were included in a prospective randomized trial Restrepo et al. Perit Dial Int. 2010 Nov-Dec;30(6):619-25

A prospective randomized control study of oral nystatin prophylaxis for Candida peritonitis complicating continuous ambulatory peritoneal dialysis

Probabilities of the number of patients with Candida peritonitis varied by treatment arm.
Fungal peritonitis in peritoneal dialysis patients: successful prophylaxis with fluconazole, as demonstrated by prospective randomized control trial

Restrepo et al. PDI, 2010, 30(6) 619-25

Percentage of fungal peritonitis secondary to use of prophylactic fluconazole. Fluconazole 200 mg q 48 hr was given during the time they received antibiotics.

Peritonitis rate in patients with and without hypokalaemia

Peritonitis rates were (6.9%) compared to those without hypokalaemia (2.1%, \( P < 0.001 \))


Peritonitis caused by either Enterobacteriaceae or epidermal flora in patients with hypokalaemia and normokalaemia.

**Risk with GI/GU procedures**

Risks and outcomes of peritonitis after flexible colonoscopy in CAPD patients

- 77 CAPD patients underwent 97 colonoscopies.
- The risk of peritonitis after colonoscopy without antibiotic prophylaxis was 6.3%.
- No peritonitis developed in the 18 cases which received Abx, all 5 cases were in pts who did not receive antibiotics.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Peritonitis</th>
<th>No peritonitis</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colonoscopy</td>
<td>6 (6.3%)</td>
<td>91 (93.7%)</td>
<td>0.008</td>
</tr>
<tr>
<td>Colonoscopy (with Abx)</td>
<td>1 (5.6%)</td>
<td>17 (84.4%)</td>
<td>0.008</td>
</tr>
<tr>
<td>Colonoscopy (without Abx)</td>
<td>0 (0%)</td>
<td>18 (100%)</td>
<td>0.008</td>
</tr>
<tr>
<td>Colonoscopy (with Abx)</td>
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**Prophylaxis during procedures**

- Antibiotic prophylaxis is recommended prior to invasive GI and GU procedures ie colonoscopy, barium enema, laparoscopic cholecystectomy, uterine bx and hysteroscopy.
- Peritonitis occurs due to transient bacteremia, due to transmural migration from gut and via GU tract.
- Transient bacteremia from dental work can also result in peritonitis.
- Several case reports of vaginal leak and peritonitis from vaginal flora have been reported.

**Prophylaxis during procedures**

- Dental: Amoxicillin upto 2 gm 1 hr prior to procedure (PCN allergy: Clindamycin or Azithromycin).
- Prophylaxis for GI/GU procedures; Ampicillin IV (50mg/kg) plus ceftazidime 50mg/kg IV (can be given IP in the dwell the night before).
- Ensure abdomen is empty.
- After contamination: Use a single IP dose of antibiotic, Tobra load with 1.7mg/kg, plus cefazolin 1 gm for a 6 hr dwell.
- Leak: Oral keflex.
Of the 124 cases of peritonitis with Zoonotic agents, Pets were involved in 30(24%) of the cases, most from Pasteurella 24/30

Peritonitis from Zoonotic organisms

- No-animal contact (76%)
- Pasteurella (20%)
- Other (4%)

Data derived from Broughton etal. Semin Dial. 2010 May-Jun;23(3):306-16

Peritonitis prevention: monitoring

- Every program should monitor infection rates at least quarterly.
- A team approach for continuous quality improvement (CQI) is the key to a successful PD program
- CQI team generally includes nephrologists, nurses, social workers, and dietitians
- Team should examine all PD-related infections, identifying the root cause of each episode.
- If a pattern of infections develops, the team needs to investigate

Summary

- Practicing hand hygiene (avoiding artificial nails)
- Good initial training with periodic retraining
- Good exit site care and preventing exit site infection including topical antibiotics
- Use of Mupirocin for nasal carriage
- Use of perioperative antibiotics at the time of catheter insertion
- Antibiotic prophylaxis during invasive GI/GU or dental procedures
- Avoidance/treatment of constipation
Summary

- Monitoring of infection rates and having a QI program
- Antifungal prophylaxis if prolonged/recurrent use of antibiotics
- Avoid/Treat hypokalemia
- Home visits by nurses may be beneficial
- Exposure to Pets: avoid while doing exchanges.

THANKS

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