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Risk Factors for Recurrent Percutaneous Nephrostomy Tube Infection in Patients with Gynecological Malignancies

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Background and Objectives

- Percutaneous nephrostomy tube infections (PCNIs) are complex, affect quality of life, necessitate implant exchanges and increase health care costs.
- We analyzed risk factors for recurrent PCNIs in patients treated with our standardized institutional algorithm.

Methods

- We prospectively evaluated consecutive patients with gynecological malignancies who developed PCNIs between July 2019 and September 2021.
- Patients were treated using our institutional algorithm for PCNI which consists of:
  - Blood cultures, urinalysis and cultures from each PCN.
  - Ultrasound or CT abdomen/pelvis, to rule out hydronephrosis, pyelonephritis, or renal abscess.
  - Exchanging the PCN once patients are receiving concordant antimicrobial therapy.
  - Adequate course of targeted antimicrobials.
- Patients were followed up until reinfection, routine PCN exchange at 3 months, being lost to follow-up, or death.

Results

- We treated 100 consecutive patients.
- Their median age was 54 years; 53% were white (Table 1).
- The most common malignancies were cervical (61%), ovarian (23%), and endometrial (13%), with 60% being metastatic (Table 1).
- To analyze the risk factors for developing a recurrent PCNI, patients were evaluated in 3 different groups (Table 1):
  - Reinfected with the same organism.
  - Reinfected with a different organism.
  - Not reinfected.
- Overall, there were no differences among the patient groups regarding demographics, comorbidities, clinical presentation, infection timing, and PCN exchange (Table 1).
- Also, there were no statistically significant differences with the microorganisms encountered among all groups (Table 2).
- However, patients with prior radiation therapy or pelvic fistulas (urinary-vaginal-rectal or their permutations) had higher rates for developing a recurrent PCNIs with the same organism (P<.002) (Table 1).

Table 1. Patients' clinical characteristics

Variable	Reinfection with the same organism (n=19)	Reinfection with a different organism (n=17)	No reinfection (n=64)	*P*-value
Age (years), median (range)	54 (32-63)	50 (22-67)	54 (22-73)	.50
Race, n (%)				.49
White	10 (53)	7 (41)	36 (56)	
Hispanic	5 (26)	6 (35)	19 (30)	
Black	4 (21)	3 (18)	8 (13)	
Other	0 (0)	1 (6)	0 (0)	
BMI, median (IQR)	26.9 (18.3-38.0)	24.8 (20.6-28.1)	24.8 (20.7-31.7)	.71
Diabetes, n (%)	1 (5)	0 (0)	3 (5)	> .99
Nephrolithiasis, n (%)	3 (16)	3 (18)	9 (14)	.92
Underlying malignancy, n (%)				.08
Cervical	15 (79)	9 (53)	37 (58)	
Endometrial	1 (5)	4 (24)	8 (13)	
Ovarian	1 (5)	4 (24)	18 (28)	
Active chemotherapy, n (%)	15 (79)	13 (76)	54 (84)	.65
Prior radiation therapy, n (%)	17 (89)*	12 (71)	36 (56)*	.025 *(*P*=.008)
Metastasis, n (%)	9 (47)	9 (53)	42 (66)	.29
Pelvic fistulas, n (%)	15 (79)*	7 (41)	24 (38)*	.006 *(*P*=.002)
Prior pelvic surgery, n (%)	11 (58)	11 (65)	36 (56)	.82
Time from initial PCN placement to index case (days), median (IQR)	124 (77-492)	175 (50-280)	177 (74-416)	.81
Time from last PCN exchange prior to index case (days), median (IQR)	35 (14-74)	26 (12-41)*	50 (25-73)*	.02 *(*P*=.01)
Time from PCN infection to exchange for index case (days), median (IQR)	5 (3-6)	4 (3-7)	4 (3-6)	.45

Table 2. Urine and blood culture results for index cases

Variable	Reinfection with the same organism (n=19)	Reinfection with a different organism (n=17)	No reinfection (n=64)	*P*-value
Positive urine cultures, n (%)				.61
Monomicrobial	8 (42)	10 (59)	32 (50)	
Polymicrobial	11 (58)	7 (41)	32 (50)	
Organism isolated from urine culture, n (%)				
Enterococcus spp.	8 (42)	4 (24)	21 (33)	.50
Pseudomonas spp.	9 (47)	4 (24)	18 (28)	.22
Escherichia spp.	5 (26)	3 (18)	16 (25)	.89
Acinectobacter spp.	0 (0)	5 (29)	8 (13)	.026
Stenotrophomonas spp.	2 (11)	2 (12)	8 (13)	> .99
Staphylococcus aureus	2 (11)	1 (6)	7 (11)	> .99
Citrobacter spp.	2 (11)	2 (12)	5 (8)	.68
Klebsiella spp.	2 (11)	2 (12)	5 (8)	.68
Enterobacter spp.	1 (5)	2 (12)	4 (6)	.73
Proteus spp.	2 (11)	1 (6)	3 (5)	.60
Providencia spp.	1 (5)	0 (0)	3 (5)	> .99
Candida spp.	0 (0)	1 (6)	3 (5)	.80
Achromobacter spp.	0 (0)	0 (0)	3 (5)	> .99
Serratia spp.	0 (0)	1 (6)	1 (2)	.35
Brevundimonas spp.	0 (0)	0 (0)	2 (3)	> .99
Morganella spp.	0 (0)	0 (0)	1 (2)	> .99
Positive blood cultures, n (%)	0 (0)	3 (18)	5 (8)	.15

Conclusions

- Among patients living with gynecological malignancies, PCNI are frequent and complex, usually occurring soon after PCN insertion.
- Patients with prior radiation therapy and underlying pelvic fistulas have an increased risk for reinfection with the same pathogen.
- Further studies should be performed to mitigate this increased risk of recurrent infections with more frequent PCN exchanges, or more invasive procedures such as ureteral embolization, sclerosis, or ligation, to dissociate the upper and lower urinary tracts.

References

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