

## **Cystitis cystica: Cystoscopic confirmation of improvement/resolution after treatment**

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**Objective:** Cystitis cystica (CC) is the finding of raised or cystic bladder lesions on cystoscopy, but risk factors and outcomes of CC are poorly described. Another term for CC is follicular cystitis. This case series describes women with previously documented CC lesions who underwent repeat cystoscopy. We report their clinicodemographic factors, treatment regimens, and follow-up cystoscopy results.

**Methods:** Billing and diagnosis codes were used to identify patients at a tertiary urogynecology practice from 2015 to 2018 with follow-up cystoscopy after CC was diagnosed on prior cystoscopy. Medical records were reviewed by two team members. Mann-Whitney U-test and Fisher's exact test were used where appropriate.

**Results:** 58 patients had documented CC and underwent follow-up cystoscopy. Median age at first cystoscopy was 69 years (range 29-87). Median follow up time was 42 days (range 7-555). 88% of patients had a history of rUTI, with number of infections in the year prior to first cystoscopy ranging from 0 to 15. 36% of patients didn't have complete urine culture records. Based on available records, 64% and 33% of patients had documented *E. coli* and *Klebsiella* infections, respectively, in the 12 months preceding first cystoscopy. Prior to diagnosis, 62% of patients were on UTI prevention regimens (see Table 1 by outcome). After diagnosis, recommended rUTI prevention regimens included: vaginal estrogen therapy (VET, 62%), vitamin C (28%), D-mannose (26%), methenamine hippurate (16%), and 1-3 weeks of antibiotic therapy for acute cystitis (nitrofurantoin (55%), cephalexin (14%), or trimethoprim-sulfamethoxazole (9%)). On follow-up cystoscopy, 43% of patients had improved appearance of CC, 35% had complete resolution of CC, and 22% had no change or worsening CC, as subjectively quantified by the provider for both cystoscopies. UTI prevention regimens at time of second cystoscopy and extended antibiotic therapy (1-3 weeks) for acute cystitis after first cystoscopy were broken down by follow-up outcome (Table 1). 1-3 weeks of antibiotics ( $p=0.001$ ) and VET ( $p=0.111$ ) were the most common UTI prevention therapies used by patients with improved or resolved lesions.

**Conclusions:** 78% of patients with CC diagnosed on cystoscopy demonstrated improvement or resolution of their lesions on follow-up cystoscopy. 1-3 weeks of antibiotics ( $p=0.001$ ) and VET ( $p=0.111$ ) were the most common UTI prevention regimens used by patients with improved or resolved CC.

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<b>Table 1: Patients using UTI prevention regimen component by outcome of follow-up cystoscopy</b>				
<b>Outcome on follow up cystoscopy</b>	<b>CC lesions with no change or worse</b>	<b>Improvement of CC lesions</b>	<b>Resolution of CC lesions</b>	<b>p-value (no change vs combined Improve/Resolved)</b>
n	13	25	20	--
Age at first cystoscopy (median years (range))	65 (44-87)	71 (47-84)	67 (29-80)	0.302
Days between cystoscopy (median (range))	28 (7-130)	41 (14-466)	95 (14-555)	0.082
<b>Frequency of prevention regimen component at time of initial cystoscopy</b>				
Prophylactic antibiotic	--	12%	5%	0.565
Vaginal estrogen therapy (VET)	39%	60%	40%	0.747
D-mannose	8%	16%	5%	>0.999
Methenamine	8%	8%	--	0.540
Cranberry extract	--	12%	25%	0.179
Vitamin C	8%	28%	15%	0.426
Probiotics	--	16%	25%	0.188
Using any UTI prevention regimen	39%	76%	60%	0.059
<b>Acute antibiotic therapy prescribed after cystoscopy with CC diagnosis</b>				
1-3 wk of any antibiotic	46%	96%	85%	0.001
1-3 wk nitrofurantoin	46%	56%	60%	0.009
1-3 wk cephalexin	--	24%	10%	0.013
1-3 wk TMP-SMX	--	8%	15%	0.034
1-3 wk other antibiotic	--	8%	--	0.192
None	54%	4%	15%	--
<b>Frequency of prevention regimen component at time of follow-up cystoscopy</b>				
Prophylactic antibiotic	--	8%	5%	>0.999
Vaginal estrogen therapy (VET)	46%	76%	65%	0.111
D-mannose	15%	36%	30%	0.307
Methenamine	8%	24%	25%	0.264
Cranberry extract	8%	12%	20%	0.669
Vitamin C	23%	24%	45%	0.735
Probiotics	--	16%	20%	0.179
Using any UTI prevention regimen	54%	84%	80%	0.062
Most common combination regimens	-Only 1-3 wk nitrofurantoin (23%) -No regimen (23%) -1-3 wk nitrofurantoin plus VET (15%) -VET only (15%)	-Only 1-3 wk nitrofurantoin (20%) -1-3 wk cephalexin plus VET (16%) -1-3 wk nitrofurantoin plus VET (12%)	-1-3 wk nitrofurantoin plus VET (20%) -Only 1-3 wk nitrofurantoin (15%) -1-3 wk cephalexin plus VET (10%)	--