

Cystoscopy Findings in Females with Recurrent Lower Urinary Tract Infections who were referred to Tishreen University Hospital between 2021 - 2022

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DOI: 10.29322/IJSRP.12.05.2022.p12552

<http://dx.doi.org/10.29322/IJSRP.12.05.2022.p12552>

Paper Received Date: 2nd May 2022

Paper Acceptance Date: 1th May 2022

Paper Publication Date: 20th May 2022

Abstract- Background :

The importance of our study comes from that recurrent lower urinary tract infection in females is one of the most common cases that referred to the urology clinic, and it is considered a challenge to treatment in the case of reliance on clinical, radiological and laboratory diagnosis only, while cystoscopy may provide information that may be useful in managing the reviewed cases.

Objective :

Recurrent urinary tract infection is common in adult females. This study aimed at study of cystoscopic findings in females with recurrent lower urinary tract infections and their usefulness in the treatment and prevention of recurrence

Patients and Methods :

1. In this cross-sectional study, females (above 20 years) with recurrent lower urinary tract infection, who were referred to Tishreen University Hospital between 2021-2022, were evaluated. After collecting demographic information, urine culture and lower urinary tract ultrasonography were performed for all patients; those with Primary neurogenic bladder, Urogenital cancers, and congenital urinary tract anomalies were excluded. Eligible patients underwent urethra and bladder cystoscopy, and the findings were recorded. Associations between clinical risk factors and abnormal findings were analyzed.

Results :

- The sample size of female patients in our study was 53 patients, 21 patients (39.6%) had abnormalities of the lower urinary tract, 14 patients (66.7%) had significant abnormalities, 7 patients (33.3%) had changes in the bladder mucosal , Biopsies were taken for histological study.
- The significant lower urinary tract abnormalities were as follows: 9 patients had meatal urethral stenosis (64.3%), 3 patients had bladder diverticula (21.4%), 1 patient had a urethral polyp (7.1%), and one patient had a sessile bladder tumor (7.1%).
- The biopsies result was as follows: 4 patients had cystic cystitis (57.1%), 2 patients had chronic cystitis (28.6%), and one patient had squamous metaplasia (14.3%).
- Evaluation of the relationship between risk factors and cystoscopic findings showed that only the age of patients was related to the presence of bladder diverticulosis (P value = 0.032), where the mean age of bladder diverticulosis patients (63.6 years) was significantly higher than that of patients without bladder diverticulosis (49.7 years). The evaluation also showed that there was no correlation between cystoscopic findings and other various risk factors (P value > 0.05).

Conclusion:

- Although the majority of lower urinary tract abnormalities in females who have recurrent lower urinary tract infections can be detected by different imaging methods, cystoscopy has an effective role in diagnosing lower urinary tract abnormalities in some cases, especially in patients who do not show an improvement in the treatment plans followed.
- And although cystoscopy may be unpleasant and cause pain, bleeding and infection, with the patient exposed to the complications of anesthesia, it may be of great benefit in revealing some of the possible causes of infections that can be treated and thus improving the quality of life of patients and reducing significant costs on health care systems.

Keywords :Recurrent Lower Urinary Tract Infections – urethra and bladder Cystoscopy - Cystoscopy Findings

I. INTRODUCTION

Lower Urinary Tract Infections is one of the most common types of infections in women, especially bacterial infections, which pose a challenge to clinicians and impose significant costs on health care systems. (Miller JL, Krieger JN. Urol Clin North Am. 2002.)

□ Each year, about 10% of women have a one-time lower urinary infection, about 53% of women over 55 years of age and 36% of younger women have a recurrence of symptomatic lower urinary infection within one year.

(Aydin A, Ahmed K, Zaman I, Khan MS, Dasgupta P. Int Urogynecol J. 2015((Foxman B, Barlow R, D'Arcy H. Ann Epidemiol. 2000 (

□ Recurrent Lower Urinary Tract Infections are very common in women and have a significant impact on quality of life and reduced social function and can lead to sexual disorders. (Levin A. *An Intern Med.* 1998)

□ Lower Urinary Tract Infections are divided into two groups. "reinfection" and "bacterial persistence." Reinfection occur at irregular intervals and are caused by organisms that vary from one infection to another, while bacterial persistence is the persistence of the infection with the same organism without healing, as it goes through stages of remission and virulence. (ACOG Practice Bulletin No. 91. *Obstet Gynecol.* 2008.) (Nicolle LE, Ronald AR. *Infect Dis Clin North Am.* 1987.)

□ It is believed that most recurrent urinary tract infections are reinfections, which are more common in women who do not have urinary tract abnormalities. Whereas, bacterial persistence occurs in women with anatomical abnormalities, or with the presence of a foreign body in the urinary tract, or in patients with severe chronic diseases.

□ Diagnostic evaluation for recurrent lower urinary tract infection usually includes clinical, laboratory and ultrasound examinations. Other investigations in patients with uncomplicated recurrent lower urinary tract infection are unnecessary, as other imaging modalities and cystoscopy have a non-routine diagnostic role. (van Haarst EP, van Andel G, Heldeweg EA. *Urolog.* 2001) (Nickel JC, Wilson J, Morales A, Heaton J. *Can J Surg.* 1991)

□ There is a percentage of women with Recurrent Lower Urinary Tract Infections who have urinary tract abnormalities, such as urethral strictures and bladder diverticulosis, detecting and correcting the cause of the recurrent infection is necessary for the possibility of treating such patients. (Nicolle LE, Ronald AR. *Infect Dis Clin North Am.* 1987.)

□ Other imaging modalities and cystoscopy can be useful in such cases. (Lane DR, Takhar SS. *Emerg Med Clin North Am.* 2011) (Kumar V, Patel HR, Nathan SM, Miller RA, Lawson AH. *Urol Int.* 2004)

II. OBJECTIVES:

Our main aim is the study of cystoscopic findings in females with recurrent lower urinary tract infections and their usefulness in the treatment and prevention of recurrence.

The minor aims include:

1. Evaluation of the role of cystoscopy in identifying different pathogens of clinical significance in females with recurrent lower urinary tract infections.
2. Determining the predictive value of the risk factors in the cystoscopy findings.

Patients and Methods:

- The research included females patients who attended Tishreen University Hospital in Lattakia (clinic and urology department) who met the inclusion criteria in the period between: (10.02.2021 - 28.02.2022).
- The sample of patients was 53 patients.
- Before starting the study, the objectives of the study and the method of performing cystoscopy were explained in detail to all patients, with assuring them about the confidentiality of the data. After obtaining the informed consent of the patients, a full medical history was taken with a clinical examination and ultrasound. The patients were asked about the risk factors and recorded with other personal data.
- Urine and sediment examination and urine culture were performed for all patients.
- Cystoscopy and urethroscopy were performed on the patients under local or general anesthesia in the female position. A 20 rigid cystoscope with a 30° lens was used.

Inclusion criteria:

1. All patients with recurrent lower urinary tract infection at least twice within six months or three times within a year of women over 20 years of age.
2. Desire to participate in the study.

Exclusion criteria:

2. Primary neurogenic bladder.
3. Urogenital cancers.
4. Congenital urinary tract anomalies.
5. Not wanting to continue studying for any reason.

Statistical Analysis

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<http://dx.doi.org/10.29322/IJSRP.12.05.2022.p12552>

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Descriptive Statistics:

- Data were collected, organized, classified and quantitative variables displayed in a clear manner through arithmetic averages and standard deviations within tables.
- Qualitative variables are presented as percentages.

Inferential Statistics:

The following tests were applied:

- Chi-square test to test the relationship between two variables.
- Fisher's exact test to test the relationship between variables and risk factors.
- t-test to show the differences between the means.
- The results are considered statistically significant at P value < 0.05.
- The IBM® SPSS® (version 27) has been approved for data analysis and statistical results.

Results:

- Table 1 shows that the average age of females in our sample of patients was (50.5 years), and their ages ranged between (32-72 years), while the average age at first diagnosis of lower urinary infection was (32.5 years), and the age of onset of infection ranged between (20-45 years), The average number of recurrences of lower urinary infection annually was (4.5 times), and the number of recurrences in the study sample ranged between (3-6 times annually), our body mass index was (25.2), and the index in the sample of patients ranged between (20-30.5).
- Table 2 shows that the patients in the study sample were distributed according to their marital status, where the number of married patients was (45) patients, (84.9%) of the study sample, while the unmarried women were (8) patients, or a percentage of (15.1%).
- Table 3 shows that the patients were distributed according to their use of contraceptives. The number of patients who used contraceptives was (18), or (34%) of the study sample size and (40%) of married patients, while the number of patients who did not use contraceptives was (35) patients, or (66%) of the total sample size.
- Table 4 shows that the patients who use contraceptives were distributed according to the type of contraceptive used. Patients used the IUD primarily as a contraceptive (6) patients with a percentage of (33.3%), then the contraceptive pills (5) patients with a percentage of (27.8%), then condoms (4) patients with a rate of (22.2%), and finally natural contraception was (3) patients, or (16.7%) of the sample of patients who use contraceptives.
- Table 5 shows that the sample of patients was distributed according to the presence of prolapse in their pelvic organs, whether uterine prolapse or bladder prolapse, and their number was (14) patients, or (26.4%).
- In Table 6 shows that the Patients were distributed according to their pelvic surgery to correct uterine prolapse, bladder prolapse or hysterectomy. The number of women who underwent surgery was (16) patients, representing (30.2%) of the total sample size.
- Table 7 shows that the patients were distributed according to the presence of menopause, the number of patients with menopause was (32) and their percentage was (60.4%) of the total sample size.
- Table 8 shows that after performing an cystoscopy of the urethra and bladder with a rigid cystoscope measuring 17 for all the (53) patients, the results showed the presence of abnormalities in the lower urinary tract in (21) patients, or a rate of (39.6%), while the cystoscopic findings were normal in (32) patients (60.4%) of the total sample size.
- Table 9 shows that the cystoscopic findings of the sample patients were divided into two groups: a group that had significant cystoscopic findings (important abnormalities in the lower urinary tract) and their number was (14) patients, representing (66.7%) of the sample size of patients who had cystoscopic findings, and a group that had insignificant cystoscopic findings (changes in the lower urinary tract mucosa) and their number was (7) patients, representing (33.3%) of the sample of patients with cystoscopic findings.
- Table 10 shows that our significant cystoscopic findings were distributed as follows: (9) patients had urethral meatal stenosis (64.3%) of the significant cystoscopic findings, (3) patients had bladder diverticulosis (21.4%), and one patient

had a bladder tumor sessile (7.1%), and one patient had a urethral polyp (7.1%).

- Table 11 shows that as for the patients who had changes in the lower urinary tract mucosa with cystoscopic findings, who were (7) patients with a percentage of (13.2%), a biopsy was taken from the suspected cystoscopic areas using a 20 rigid cystoscope and biopsy forceps and the samples were sent to the histopathology laboratory .
- Table 12 shows that the results of biopsies for the patients were as follows: (4) patients had cystic cystitis (57.1%), two patients had chronic cystitis (28.6%), and one patient had squamous metaplasia (14.3%).
- Table 13 shows that by dropping the data, we found that the value of the statistical significance of all the studied risk factors for patients with urethral strictures was > 0.05 , meaning that they are not statistically significant (there are no significant differences for risk factors between the group of patients who have urethral stricture and the group of patients who do not have urethral stricture).
- Table 14 shows that by dropping the data, it was found that the statistical significance of age for bladder diverticulosis patients was < 0.05 , meaning that it is statistically significant, as the average age of bladder diverticulosis patients was (63.6) years higher than that of patients without bladder diverticulosis (average age of 49.7 years). The rest of the risk factors were not statistically significant for bladder diverticulosis patients (significant value > 0.05).
- Table 15 shows that by dropping the data on the SPSS program to show the relationship between all risk factors and cystoscopic findings as a whole, we found that the marital status of patients and their use of contraceptives has statistical significance (significance value < 0.05), as the highest percentage of patients with cystoscopic findings in our study were from Married women who use contraceptives, and this is due to the fact that the highest percentage of married patients in our study (45 patients out of 53 was married), (84.9%) of the total sample size. The predominant segment of married women in our study is due to our selection of the age segment greater than 20 years in this study, and the youngest patient in our study was 32 years old. The rest of the risk factors did not show any relationship between them and the cystoscopic findings (statistical significance value > 0.05).

Discussion:

- The sample size of patients in our study was 53 patients.
- After performing the lower urinary cystoscopy for the study sample, the cystoscopic findings were as follows: 21 patients (39.6%) had abnormalities of the lower urinary tract. 14 patients (66.7%) had significant abnormalities, while 7 patients (33.3%) had changes in the bladder mucosa, from which biopsies were taken for histological study.
- The significant lower urinary tract abnormalities were as follows: 9 patients had urethral strictures (64.3%), 3 patients had bladder diverticula (21.4%), one patient had a urethral polyp (7.1%), and one patient had a sessile bladder tumor (7.1%).
- The biopsies result was as follows: 4 patients had cystic cystitis (57.1%), 2 patients had chronic cystitis (28.6%), and one patient had squamous metaplasia (14.3%).
- Evaluation of the relationship between risk factors and cystoscopic findings showed that there is no statistical relationship between the presence of urethral stricture and age at first diagnosis of infection, number of recurrences of infection, marital status, age, use of contraceptives, presence of uterine or bladder prolapse, correction of prolapse or hysterectomy, menopause, and BMI (P-value > 0.05).
- The evaluation of the relationship between risk factors and cystoscopic findings showed that only the age of the patients was related to the presence of bladder diverticulosis (P-value = 0.032), as the mean age of the patients with diverticulosis (63.6 years) was significantly higher than that of the patients who did not have bladder diverticulosis (49.7 years) while there is no statistical relationship between the presence of bladder diverticulosis and other risk factors.
- By evaluating the relationship between the complete cystoscopic findings and risk factors, it was found that the highest percentage of patients with cystoscopic findings were married women who use contraceptives (the statistical significance value < 0.05) because the married women in our study are the dominant group because we chose the ages in our study to be greater than 20 years, and the youngest patient in our study was 32 years old.

Conclusions:



Although the majority of lower urinary tract abnormalities in women who have recurrent lower urinary tract infections can be detected by different imaging methods, cystoscopy has an effective role in diagnosing lower urinary tract abnormalities in some cases, especially in patients who do not show an improvement in the treatment plans followed.



Although cystoscopy may be unpleasant and cause pain, bleeding and infection, with the patient exposed to the complications of anesthesia, it may be of great benefit in revealing some of the possible causes of infections and thus improving the quality of life of patients and reducing significant costs on health care systems.

III. RECOMMENDATIONS AND SUGGESTIONS:

We recommend cystoscopy of the bladder and urethra to all females with recurrent lower urinary tract infections who do not respond to the used treatment protocols because of its usefulness in detecting some abnormalities in the lower urinary tract that are not detected by ultrasound, thus contributing to the treatment and prevention of recurrence.

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Table 1: shows the mean, standard deviation and range for each of the following variables: age - age at first diagnosis of lower urinary infection - number of recurrences of lower urinary infection - body mass index

age		Age at first diagnosis of infection	Number of recurrences of infection	BMI
N	Valid	53	53	53
	Missing	0	0	0
Mean		50.5283	32.5094	4.5094
Std. Deviation		10.98531	7.50031	1.12014
Minimum		32.00	20.00	3.00
Maximum		72.00	45.00	6.00

Table 2: shows the distribution of patients by marital status

Marital status

Frequency		Percent	Valid Percent
Valid	married	45	84.9
	unmarried	8	15.1
	Total	53	100.0

Table 3: shows the percentage and size of the sample of patients who use contraceptives.

Use of contraceptives

Frequency			Percent	Valid Percent
Valid	Yes	18	34.0	34.0
	No	35	66.0	66.0
	Total	53	100.0	100.0

Table 4: Distribution of the types of contraceptives used and their percentage of the sample size of patients who use contraceptives

Type of contraceptives

Frequency		Percent	Valid Percent	
Valid	natural contraception	3	16.7%	16.7%
	contraceptive pills	5	27.8%	27.8%
	condoms	4	22.2%	22.2%
	IUD	6	33.3%	33.3%
	Total	18	100.0	100.0

Table 5: shows the number and percentage of patients who have pelvic organ prolapse (uterine prolapse or bladder prolapse) .

Presence of uterine or bladder prolapse

Frequency		Percent	Valid Percent	
Valid	Yes	14	26.4	26.4
	No	39	73.6	73.6
	Total	53	100.0	100.0

Table 6: Indicates patients who have had a hysterectomy or surgery to correct uterine prolapse or bladder prolapse.

Correction of prolapse or hysterectomy

Frequency		Percent	Valid Percent	
Valid	Yes	16	30.2	30.2
	No	37	69.8	69.8
	Total	53	100.0	100.0

Table 7: Shows patients who have menopause and their percentage.

Menopause

Frequency			Percent	Valid Percent
Valid	Yes	32	60.4	60.4
	No	21	39.6	39.6
	Total	53	100.0	100.0

Table 8: It shows the number and percentage of patients who have lower urinary tract abnormalities.

Abnormalities of the lower urinary tract

Frequency			Percent	Valid Percent
Valid	Yes	21	39.6	39.6
	No	32	60.4	60.4
	Total	53	100.0	100.0

Table 9: Shows the distribution of abnormalities in the lower urinary tract according to importance to significant and changes in bladder mucosa.

distribution of abnormalities

Responses			Percent	Percent of Cases
N				
valid	Significant abnormalities	14	66.7%	66.7%
	Changes in the bladder mucosa	7	33.3%	33.3%
Total		21	100.0%	100.0%

Table 10: Shows the distribution of cystoscopic findings and their percentage from a sample of patients who have significant cystoscopic findings

distribution of significant cystoscopic findings

Responses				
N			Percent	Percent of Cases
Significant abnormalities	urethral meatal stenosis	9	64.3%	64.3%
	bladder diverticulosis	3	21.4%	21.4%
	bladder tumor sessile	1	7.1%	7.1%
	urethral polyp	1	7.1%	7.1%
Total		14	100.0%	100.0%

Table 11: shows the number and percentage of patients who had a biopsy taken during cystoscopy

Biopsy

Frequency				
			Percent	Valid Percent
Valid	Yes	7	13.2%	13.2%
	No	46	86.8%	86.8%
	Total	53	100.0	100.0

Table 12: Shows the biopsy results obtained during cystoscopy and their percentage of patients with changes in the bladder mucosa.

Biopsy results

Responses		N	Percent	Percent of Cases
Changes in bladder mucosa	Cystic cystitis	4	57.1%	57.1%
	Chronic cystitis	2	28.6%	28.6%
	Squamous metaplasia	1	14.3%	14.3%
	Total	7	100.0%	100.0%

Table 13: shows the mean, standard deviation and the statistical significance value of the risk factors among patients who have urethral stricture and those who do not have urethral stricture.

Urethral stricture		Age at first diagnosis of infection	Number of recurrence of infection	Marital status	age	Use of contraceptive -ves	Presence of bladder prolapse	Correction of prolapse or hysterectomy	Menopausal use	BMI
Yes	Mean	30.8889	4.7778	1.3333	51.5556	1.8889	1.7778	1.7778	1.3333	24.6111
	N	9	9	9	9	9	9	9	9	9
	Std. Deviation	7.09656	1.09291	.50000	14.44049	.33333	.44096	.44096	.50000	3.83061
No	Mean	32.8409	4.4545	1.1136	50.3182	1.6136	1.7273	1.6818	1.4091	25.4205

N	44	44	44	44	44	44	44	44	44
Std. Deviation	7.61560	1.13002	.32104	10.33795	.49254	.45051	.47116	.49735	3.06128
Total Mean	32.5094	4.5094	1.1509	50.5283	1.6604	1.7358	1.6981	1.3962	25.2830
N	53	53	53	53	53	53	53	53	53
Std. Deviation	7.50031	1.12014	.36142	10.98531	.47811	.44510	.46347	.49379	3.17822
p-value	0.482	0.436	0.097	0.761	0.116	0.760	0.576	0.679	0.492

Table 14: shows the mean, standard deviation, and the statistical significance value of the risk factors between patients who have bladder diverticulosis and those who do not have bladder diverticulum.

		Age at first diagnosis of infection	Number of recurrence of infection	Marital status	age	Use of contraceptives	Presence of uterine or bladder prolapse	Correction of prolapse or hysterectomy	Menopausal use	BMI	
Bladder diverticulosis	Yes	Mean	34.3333	4.0000	1.0000	63.6667	1.6667	1.6667	1.6667	1.0000	25.500
		N	3	3	3	3	3	3	3	3	3
		Std. Deviation	3.51188	1.00000	.00000	11.93035	.57735	.57735	.57735	.00000	3.1225
No	Mean	32.4000	4.5400	1.1600	49.7400	1.6600	1.7400	1.7000	1.4200	25.270	
		N	50	50	50	50	50	50	50	50	50
		Std. Deviation	7.67982	1.12866	.37033	10.53819	.47852	.44309	.46291	.49857	3.2122
Total	Mean	32.5094	4.5094	1.1509	50.5283	1.6604	1.7358	1.6981	1.3962	25.2830	
		N	53	53	53	53	53	53	53	53	53
		Std. Deviation	7.50031	1.12014	.36142	10.98531	.47811	.44510	.46347	.49379	3.1782
p-value		0.669	0.423	0.462	0.032	0.982	0.785	0.905	0.154	0.904	

Table 15: shows the mean, standard deviation, and the statistical significance value of the risk factors among patients who had cystoscopic findings as a whole and those who did not have cystoscopic findings.

		Age at first diagnosis of infection					Presence of uterine or bladder	Correction of prolapse or hysterectomy	

Cystoscopic findings			Number of recurrence of infection	Marital status	age	Use of prolapse contraceptives			Menopausal use	BMI
Yes	Mean	31.3333	4.5238	1.3333	52.0000	1.9048	1.8095	1.7143	1.3333	24.2381
	N	21	21	21	21	21	21	21	21	21
	Std. Deviation	7.40495	1.12335	.48305	14.37011	.30079	.40237	.46291	.48305	3.66271
No	Mean	33.2812	4.5000	1.0313	49.5625	1.5000	1.6875	1.6875	1.4375	25.9375
	N	32	32	32	32	32	32	32	32	32
	Std. Deviation	7.57855	1.13592	.17678	8.17130	.50800	.47093	.47093	.50402	2.71718
Total	Mean	32.5094	4.5094	1.1509	50.5283	1.6604	1.7358	1.6981	1.3962	25.2642
	N	53	53	53	53	53	53	53	53	53
	Std. Deviation	7.50031	1.12014	.36142	10.98531	.47811	.44510	.46347	.49379	3.20397
p-value		0.3533	0.9406	0.0021	0.4348	0.0018	0.3339	0.8392	0.4578	0.0582

