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Major Changes in Urine Investigations after Orthotopic Cystectomy with Ileal Neobladder

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ABSTRACT

Background: urinary and metabolic changes differ in their severity and consequences. The severity of these changes is directly related to the type of bowel segment, surface area of bowel used, duration of urine storage concentration of solutes in urine, urinary PH and osmolarity, medications and underlying renal and hepatic function of the host. **Aim of the work:** this study aimed to characterize the physical, chemical and biological characters of urine in patients who underwent radical cystectomy with ileal neobladder and these could be utilized as a nomogram to which urine disorders in diversion patients were compared.

Design*:* this was a retrospective cohort.

Patients and Methods*:* this study was a prospective cohort and it included 150 patients and it was carried out in outpatient Clinic of Urology and Oncology Centers. 100 patients had radical cystectomy and ileal neobladder at least 6 months before the study. 50 of them were on alkaline treatment, the rest 50 were not. The last 50 were served as the control group. Also, all the patients had signed consent for taking their information in this study.

Results: this study included 150 patients who underwent radical cystectomy and ileal neobladder. The mean age + Sd was 59.8 + 9.5 and for the control group was 47.6 + 8.7 with no significant difference (p value 0.08). No significant difference was detected between both diversion groups as regard demographics (including sex) and follow up period except taking oral urine alkalinizers.

Conclusion*:* the urine excreted from diverted patients differed from those with normal bladder and this would be of real importance to announce and increase the awareness among the treating physicians including the general practitioners, the urologists and other health providers. They have to know that those patients do not have a classic urinary bladder that is to say their urine is not real urine representing the urinary tract and this may avoid a lot of unnecessary procedures or to protect such group of patients from unrecognized clinical and medical mistakes.

Keywords*:* orthotopic cystectomy, ileal neobladder, orthotopic bladder substitution.

INTRODUCTION

After orthotopic cystectomy, the urinary diversion must be done. Variety of options had been suggested for the usage of the intestine such as: urinary conduits, ureterosigmoidostomy, orthotopic bladder substitution (OBS), continent cutaneous diversion [(1)]. Colon has less compliance than ileum, which in turn has lower contractility with minimum metabolic complications (as far as Vit. B12 deficiency and megaloplastic anemia) so it has the upper hand in the favoritism of the urologists [(2)]. Bowel segment differs from relative urothelium, exposure of bowel segment to the urine results in exchange of water and solutes across intestinal mucosa due to its absorptive and secreting properties. This mechanism may alter the volume and composition of the urine when stored in the reservoir for a time. These urinary changes result in multiple short and long term sequels and changes in both the urine composition and serum [(3)].Urinary and metabolic changes differ in their severity and consequences. The severity of these changes is directly related to the type of bowel segment, surface area of bowel used, duration of urine storage concentration of solutes in urine, urinary PH and osmolarity, medications and underlying renal and hepatic function of the host [(4)].

PATIENTS AND METHODS

This study was prospective cohort and it included 150 patients and carried out in outpatient clinic of Urology and Oncology Centers, 100 of the patient had radical cystectomy and ileal neobladder at least 6 months before the study: 50 of them were on alkaline treatment, the rest 50 were not. The last 50 served as the control group. Also, all the patients had signed consent for taking their information in the study.

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Inclusion criteria

Typical radical cystectomy with prostatectomy was done with fair pelvic lymph node resection for each case of the 50. The urinary reservoir was taken from the distal 45 cm. segment of the ileum. The isolated segment was either arranged into w shape using Hautmann's criterion. The ureters were implanted using either the serous-lined extramural tunnel technique or as a bilateral direct anastomosis into the ileal chimney on both sides of the fashioned pouch, or arranged by any other shape. The minimum postoperative observation time was six months; all the studied patients were chosen to be in good health, having satisfactory function of the reservoirs with normal upper tract and renal function.

Exclusion criteria

Patients with oncological failure, diversion related complications e.g. unilateral or bilateral hydronephrosis, total urinary incontinence, those who maintained on CIC or with renal or reservoir stones were excluded from this study. Those with medical diseases that may affect urine parameters e.g. diabetes or using special medications e.g. diuretics were also excluded. No patient in this study had symptoms of urinary tract infection e.g. dysuria, urinary incontinence or frequency, Lower abdominal pain or receiving antibiotics at the time of the study.

All patients were subjected to the following:

- History taking and consenting
- Physical examination

A- Labs:

- Urine dipstick
- General urine examination
- Urine culture and sensitivity test
- Major urine electrolytes: sodium, chloride, potassium & calcium.

B- Data were recorded and be statistically compared between the 3 groups. Patients were advised to maintain regular intake of food and fluid for 48 hours before collecting urine sample. Patien's demographic data were collected including name, age, BMR, past medical and surgical histories, date of surgery, surgical technique and last follow up creatinine and hemoglobin.

RESULTS

The current trial was conducted at Ain Shams University Maternity Hospital during the period between January and August 2017. A total of 68 women with placenta previa were recruited in the trial.

Table 1: comparison of dipstick analysis between the diversion and control groups

Parameter	Diversion group (No=100)	Control group (No=50)	P value
PH, Mean(±SD)	6.1 (0.93)	5.6 (1.6)	0.01
Sp. Gr , Mean(±SD)	1.017 (0.004)	1.020 (0.005)	0.06
Blood:			
Positive, patient no (%)	16 (16)	5 (5)	0.05
+ l no.(%)	9 (56.25)	4 (80)	
+ 2 no. (%)	6 (37.5)	1 (20)	
+ 3 no. (%)	1 (6.25)	0 (0)	
Protein			
Positive, patient no (%)	39 (39)	4 (8)	0.01
Trace, no (%)	16 (41)	3 (75)	
+ l no. (%)	10 (25.6)	1(25)	
+ 2 no.(%)	8 (20.5)		
+ 3 no. (%)	4 (10.2)		
+ 4, no. (%)	1 (2.5)		
Leucocytes Positive, patient no (%)	30 (30)	4 (8)	0.003
+ l no. (%)	13 (43.3)	3 (75)	
+ 2 no. (%)	6 (2)	1 (25)	
+ 3 no. (%)	11(36.6)		
Nitrite*: Positive, patient no. (%)	20 (20)	3 (6)	0.02

KEYS

Parameter	+ 1	+ 2	+ 3	+ 4
Blood RBC/uL	25	80	200	
Protein gm/L	30	100	300	1000
Leucocytes WBC/uL	70	125	500	

Table 2: comparison of microscopic analysis between the diversion and control groups

Parameter	iversion group (No=100)	ontrol group (No=50)	e
Pus cells i.e. WBCs less than 5 /HPF	9 (9)	6 (12)	
Pyuria i.e. WBCs ≥5/HPF patient no. (%)	73 (73)	5 (10)	
RBCs/HPF	9 (9)	3 (6)	
Hematuria i.e. RBCs **≥3/** HPF Patient no (%)	20 (20)	3 (6)	
Crystals Positive patient no. (%)	8 (8)	5 (10)	
Crystals type (patients no)	Ca oxalate (8), Triple ph. (3) Uric acid (1) Amorphous (5)	Ca oxalate (3) Triple ph (1) Uric acid (1) Amorphous (3)	
Casts. Patients no (%)	1 (1)	No	
Epithelial cells. Patients no. (%)	13 (13)	6 (12)	

Table 3: major electrolytes in 24 hour urine collection

Parameter	Diversion group (No.= 100) Mean (±SD)	Control group (No. =50) Mean (±SD)	P value
Na(mmol/L)	90.1(45.7)	96.7(51.3)	0.42
Ca (mmol/L)	75 (57.4)	98 (62.7)	0.01
K (mmol /L)	36.5 (10.2)	40 (18.2)	0.07
Cl (mmol/L)	124 (46)	137.6 (72.5)	0.15

Table 4: results of urine culture

Culture results	Patients No. (%)
Negative	68 (68)
Positive:	32 (32)
E.coii	18 (56.2)
Proteus species	5 (15.6)
Klebsiella	4 (12.5)
Pseudomonas aerognosa	1 (3.1)
Enterococcus faecalis	1 (3.1)
Yeast	2 (6.2)
Staphylococcus aureus	1 (3.1)

Table 5: comparison of dipstick analysis between both culture groups within diversion

Parameter	Positive culture No=32	Negative culture No =68	P value
PH, Mean (±SD)	5.9 (1)	5.6 (0.8)	0.03
SG, Mean (±SD)	1.017 (0.005)	1.019 (0.006)	0.01
Blood Positive, patient no. (%)	6 (18.7)	10 (14.7)	0.03
Ptn.	10 (31.25)	30 (44.1)	0.08
Leucocytes: Positive, patient no. (%)	10 (43.75)	14 (20.5)	0.01
Nitrite Positive, patient no. (%)	12 (37.5)	6 (8.8)	0.01

Table 6: comparison of microscopic analysis between both culture groups within diversion

Parameter	Positive culture No=32	Negative culture (No =68)	P value
Pus cells/HPF	6 (18.7)	3 (4.4)	0.01
Pyuria (>5/HPF) Positive, patient no, (%)	27 (84.3)	46(67.6)	0.05
RBCs/HPF	6 (18.7)	3 (4.4)	0.7
Hematuria (> 3 / HPF) Positive, patient no. (%)	13 (40.6)	7 (10.2)	0.3

Table 7: comparison of urine chemical analysis between both culture groups within diversion

Parameter	Positive culture No=32	Negative culture (No =68)	P value
Na (mmol/L)	88.7 (29)	95.9 (34)	0.12
Ca (mmol/L)	102 (8)	77.8 (6.2)	0.23
K(mmol /L)	29.4 (19.3)	35.8 (16)	0.01
CI(mmol/L)	105.3 (35.6)	123.7 (49.2)	0.01

DISCUSSION

In this work we selected 100 patients for whom orthotopic ileal neobladder was fashioned and were not suffering from any complications including oncological or functional outcome, furthermore all of them were operated in urology and nephrology center with minimum follow-up of 6 months duration.

Patients with stones, symptomatic infection, recurrent pyelonephritis, abnormal kidney function, practicing CIC, diabetics, under regular medications or postoperative chemotherapy all were excluded from this study to avoid the misinterpretation of the normal urine composition and to create the standard format of normal urine analysis among such group of patients for comparison in case of patients are complaining or showing abnormal outcome.The studied patients were categorized into 2 groups, 50 each: **group 1** was maintained on regular alkali therapy using sodium bicarbonate (5.6 gm. daily), while the other group was maintained without alkali treatment. The studied patients were advised to keep on regular diet with no eccentric deviation of the nutritional habits rather than they are using daily. The patients were subjected to urine examination for 3 sets of samples, one was taking a 24 hour urine collection, the second was a sample for dipstick and general urine examination and the last is for culture and sensitivity.

The studied patient's results were compared to the control group of patients selected from the outpatient clinic and were matched with the studied group regarding inclusion criteria. The operative surgical technique and the criteria of fashioning reservoir included the ileal segment length from which the pouch was fashioned as well as the method of ureteral reimplantation were reviewed and documented from the patient file.

This was an important factor to consider make sure that the technique was similar in all the patients and the surface area of the used ileum was comparable in the studied groups, furthermore the follow up range was similar in all patient's groups to avoid the influence of these parameters which may alter or influence the urine composition or the results of analysis profile.

In the present study, dipstick analysis revealed important results; diverted patients had significant higher urinary PH, hematuria, proteinuria and pyuria; while, the other parameters showed no significant differences. The microscopic analysis confirmed higher pyuria and hematuria in the diverted group.

The higher urinary PH in the diverted patient (mean 6.1 ± 0.93) than the control group (mean 5.6 ± 1.6) copes well with previous studies [5, 6]. This can be explained by the absorption of ammonium and bicarbonate secretion, but the mean PH was still acidic and within the normal range, also the use of alkali therapy had no effect on the urinary PH as there was no significant difference between both patient groups.

Proteinuria was diagnosed in 39 (39%) out of the diverted group compared to only 4 (8%) in the control group. The difference seems to be highly significant. Proteinuria in the diverted patient may be related to mucus secretion shaded epithelial cells from the ileum, higher urine PH or bacterial infection. There was no pathological finding in urine analysis of proteinuria group signify renal medical disease as evidenced by the absence of casts with no clinical findings associated with this proteinuria. Also the red cells in the urine were all isomorphic pattern.

CONCLUSION

The urine excreted from the diverted patients differed from those with normal bladder and this would be of real importance to announce and increase the awareness among the treating physicians including the general practitioners, the urologists and other health providers. They have to know that those patients do not have a classic urinary bladder that is to say that their urine is not real urine representing the urinary tract and this would avoid a lot of unnecessary procedures or to protect such group of patients from unrecognized clinical and medical mistakes.

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