Case reports and mini review: Post gynecological surgery bladder dysfunction leading to chronic kidney disease.

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ABSTRACT

Chronic Kidney Disease is a longterm complication due to obstructive nephropathy secondary to the neurogenic bladder. There are many case reports of Neurogenic bladder caused by Pelvic/Gynecological surgeries. We present two such cases who had a history of pelvic surgery and developed neurogenic bladder which eventually lead to ESRD due to delay in diagnosis, evaluation, and management. First, is the case of a 48-year-old female, who underwent abdominal tubal ligation 15 years ago developed neurogenic bladder and then later chronic kidney disease. The second case is that of a 49-year-old female who underwent abdominal hysterectomy 10 years ago, developed neurogenic bladder, and eventually chronic kidney disease.

Key Words: *Postoperative urinary retention; chronic kidney disease; Neurogenic*

INTRODUCTION

Postoperative urinary retention (POUR) is a frequent consequence of gynecological surgery [1]. There is no standard definition for this condition, but it is characterized by impaired bladder emptying and a higher volume of retained urine. It can be acute/chronic, obstructive/non obstructive, immediate/delayed, partial/complete, transient /prolonged. Post-surgical changes lead to edema, inflammation, damage to peripheral nerve endings, and pain, which can all affect the bladder sensation and micturition pathway leading to POUR [2]. These are acute changes that may resolve spontaneously or after an intervention. Chronic retention secondary to the neurogenic bladder may complicate into serious sequelae like obstructive nephropathy and acute or chronic Pyelonephritis leading to chronic kidney disease.

CASE REPORTS

Case 1

A 48 Years old female, presented with complaints of straining while passing urine, dribbling of urine, abdominal discomfort, nausea, and vomiting from the last 15 days. She had a history of pulmonary tuberculosis 18years ago.

On detailed history taking, it was found that she had undergone laparoscopic tubal ligation 15 years ago. She developed complaints of straining while passing urine and painful retention a week after the procedure for that she had to be on Per Urethral catheterization (PUC) for 2-3 weeks. Afterward, she continued having straining while micturition, retention of urine, and abdominal distension intermittently and had undergone PUC. She had a history of multiple hospitalizations for recurrent urinary tract infection (catheter-associated urinary tract infection) and a history of blood transfusions with 2 units of PCV 2 years ago due to severe anemia.

On examination, she was afebrile and normotensive. She had pallor.

The cardiovascular, genitourinary, and gastrointestinal examination was normal.

Investigations revealed severe anemia, leukocytosis, and azotemia (Table 1).

Urine analysis revealed albuminuria- + (300 mg/dl), pus cells - 15-20/hpf, RBCs -15-20/hpf.

USG KUB suggested- Right kidney 12.4 × 5.1 cm and Left kidney 10.8 × 4.3 cm, bilateral gross uretero-hydronephrosis, and no renal or ureteric calculi, with foley's catheter in situ and high post-void residual volume.

The patient was diagnosed with acute kidney injury on Chronic Kidney Disease due to obstructive nephropathy secondary to the neurogenic bladder (post tubal ligation). Treatment with empirical antibiotics started, urine culture was sent which revealed *E. Coli*. Hence she was treated with appropriate antibiotics for UTI. Uroflowmetry showed Poor flow with Max velocity 4.3 ml/sec with post-void of 230 ml suggestive of the hypotonic bladder. She was given Tab Bethenchol 25 mg thrice a day for neurogenic bladder. After 10 days, catheter free trial was done which was successful and the patient could pass urine without much straining. She was discharged and advised Urodynamic studies but she was lost to follow up for the next 3 months. After 3 months she again presented with Uremic symptoms and Lower urinary tract symptoms. She was noncompliant with the treatment. She was diagnosed with End-stage renal disease and put on Maintenance Hemodialysis.

TABLE 1
Investigations of Case number 1.

Parameters	Pre-dialysis	Post-dialysis and blood transfusion
Hemoglobin	6.6	10.2
Wbc	27,000:85/12/1/2	13000:80/12/4/2
Platelets	6,14,000	5,50,000
Creatinine	10	8.2
Uric acid	5.3	
Calcium	6.7	
Phosphorus	3.9	
Sodium	134	138
Potassium	4.6	3.8
Bicarbonate	24	18

Case 2

A 49 years old female patient, presented with complaints of oliguria, dysuria, urinary urgency, low-grade fever, generalized weakness, and loss of appetite for 15 days. There was no history of hematuria, frequency of micturition, hesitancy or straining while micturition, incontinence, lower limb swelling, and dyspnea.

She did not have any major co-morbidities. On further inquiring, she revealed that she is having complaints of urinary urgency, dysuria for 10 years. She underwent abdominal hysterectomy 10 years ago for fibroids. After that gradually she developed recurrent dysuria with urgency within 1 year of surgery, which became more frequent in subsequent years.

On examination, she was afebrile, pale, and euvolemic with a pulse rate of 96/min and Blood pressure of 190/100 mmHg (First time detected, not on any antihypertensives). Fundus showed Hypertensive retinopathy.

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TABLE 2
Investigations of Case number 2.

Parameters	Test results
Hemoglobin	8.4 gm/dl
Wbc	7300/cubic mm dc:80/12/4/2
Platelets	2,52,000/cubic mm
Creatinine	4.9 mg%
Urea	126 mg%
Uric acid	7.7 mg%
Calcium	8.3 mg/dl
Phosphorus	4.6 mg/dl
Sodium	138 meq/l
Potassium	3.8 meq/l
Bicarbonate	20 meq/l
Urine r/m	Alb - absent Pus cells : 8-9/hpf, No rbc or casts
Urine c/s	*E. coli*, >105 cfu

Respiratory, cardiovascular, and Gastrointestinal system examinations were normal (Table 2).

USG KUB suggested Right kidney size - 8.3 × 5.0 cm, Left kidney size - 7.8 × 4.6 cm with mild bilateral Uretero-hydronephrosis. Pre void volume was 255 ml and post-void was 229 ml. The urinary bladder was distended with the thickened and irregular wall, changes suggestive of chronic cystitis.

PUC was tried but could not be negotiated due to urethral stricture so an infant feeding tube was inserted.

Urology consultation was done and was advised MCUG which revealed the presence of anterior urethral stricture.

She was diagnosed as AKI on CKD with obstructive nephropathy, cause-urethral stricture, with chronic cystitis, with neurogenic bladder with a past history of post abdominal hysterectomy and newly diagnosed hypertension.

She was treated with antibiotics, intravenous fluids, and antihypertensive medications. Urethral dilatation was done with graded dilators.

Post dilatation foley's catheter was inserted and she was asked to come for follow up after 10 days.

After 10 days foley's catheter was removed and uroflowmetry was done which was suggestive of Max urine flow of 10.3 ml/sec with post-void of 130 ml.

DISCUSSION

Postoperative urinary retention results from voiding dysfunction of bladder. Normal bladder function involves storage and emptying. Normal bladder sensations begin at around 150 ml, the first urge occurring at 250 ml, strong urge at around 400 ml and capacity of 400-700 ml [3]. Micturition occurs when bladder wall is distended which activates stretch receptors that in turn send afferent signals up the spinal cord to the cerebral cortex, which determines appropriate place to allow micturition, by sending an efferent signal to pontine micturition center which in turn activatesparasympathetic motor neurons that cause detrusor contraction along with inhibition of somatic efferent motor neurons which leads to urethral sphincter relaxation.

Any surgery has a risk of urinary retention, but gynecological surgeries have an increased risk. Voiding dysfunction postoperatively ranges between 39%–84% with retention rates after pelvic surgery range from 2.5%–43% [4]. The higher rates include any transient voiding dysfunction that is documented in the postoperative period, as early as in the recovery room. Prolonged retention for 4 weeks or longer after surgery, is much rarer, with rates of 2%–4% [5].

Risk factors for postoperative urinary retention include demographic and surgical risk factors. Among these are, age>50 years, female sex, lower body mass index, baseline bladder dysfunction, previous incontinence surgery, advanced-stage pelvic organ prolapse(stage 3-4), and postoperative UTI [6]. Intraoperative risk factors for POUR have also been demonstrated. Keita et al found that intraoperative fluid administration ≥750 mL and bladder volume ≥ 270 mL on entry to the postanesthesia care unit significantly increases the risk of POUR [7].

Pain medications given postoperatively can also exacerbate bladder dysfunction and increases the rate of urinary retention. Increased use of opioid pain medication has demonstrated an almost 1.5-times-greater risk of developing postoperative retention [8]. In another study comparing pudendal block with spinal block found a significantly higher rate of POUR in the spinal group (7.5% versus 69.6%, P<0.001) [9]. One study evaluating postoperative urinary retention after resection of endometriosis, majority of patients (87.5%) with resection of at least one branch of inferior hypogastric nerve demonstrated retention and need for self-catheterization [10]. Multiple studies have also confirmed the association of neuraxial anesthesia and the development of Postoperative urinary retention [11]. By denervating the regional pelvic nerves for pain control, neuraxial anesthesia also leads to denervation of the bladder for a transient period of time. Local anesthetics in the spinal anesthesia block both the afferent and efferent pathways of the voiding mechanism.

Patients develop the lower motor neuron (flaccid) type of neurogenic bladder where pressure is low, the volume is larger and contractions are absent, resulting from peripheral nerve damage. Detrusor areflexia occurs and the patient develops overflow incontinence and recurrent UTI due to prolonged retention [12].

In our two cases discussed above, as we can see that both female patients underwent a gynecological surgical procedure (Case 1 underwent Abdominal Tubal ligation, Case 2 underwent abdominal hysterectomy) and developed long-standing urinary retention (Case 1 due to Nerve injury and neurogenic bladder, Case 2 due to urethral stricture with bladder dysfunction) with recurrent UTI, eventually developing chronic kidney disease.

One study suggested the utility of preoperative urodynamic studies to predict postoperative voiding dysfunction [13]. In that study they identified three types of voiding mechanisms based on preoperative urodynamics in women 1) detrusor contraction with urethral relaxation which is normal, 2) urethral relaxation with the absence of detrusor contraction, 3) urethral relaxation with the absence of detrusor contraction with the presence of Valsalva voiding. They found a significant increase in the duration of retention in the latter two groups that had abnormal voiding.

Assessment for immediate postoperative POUR is highly important, a separate but equally important issue is delayed retention occurring after discharge from the hospital, often due to residual hyposensation due to surgery, the use of narcotics for pain control, and postoperative UTI. There can be complete or partial retention, the latter being more subtle and difficult to diagnose. Clinical symptoms that may provide an indication of delayed partial urinary retention include urinary hesitancy, slow stream, the need to lean forward to void, straining to void, a feeling of incomplete emptying, or overflow incontinence. When delayed retention is suspected the visual inspection of the urethra and vaginal examination should be performed for an assessment for other causes of POUR, including hematoma or abscess, pelvic floor spasm, and any specific areas of tenderness or pain. Post-void volume should also be obtained as it will allow the clinician to assess the degree of retention.

The key to management is early identification. So, all patients undergoing pelvic or abdominal surgeries should undergo an assessment of voiding function before discharge. There are several ways to assess voiding function but the gold standard is by measuring a PVR [13]. This assessment is called voiding trial with adequate bladder volume (at least 300 ml) prior to starting this trial. PVR of less than 100-200 ml is considered the passing score for the trial [14].

The goal of management is to decompress the bladder to avoid long-term damage to bladder integrity and function. Immediate catheterization is always the first step. Although the placement of an indwelling foley catheter is easier, there are several drawbacks to prolonged use of this method. Indwelling catheters lead to increased rates of UTI compared to Clean intermittent catheterization (CIC) [15]. Another option for prolonged bladder drainage in the postoperative period is a suprapubic catheter (SPC). This type of catheter is typically placed intraoperatively at the time of surgical procedures that are more likely to cause retention, by inserting the catheter directly through the abdomen in the midline of the suprapubic area (just superior to the pubic bone) and directly into the bladder. SPC has several advantages over a transurethral catheter, including lower infection rates, less maintenance, earlier ambulation, more comfort, and the ability to assess bladder function with the catheter in place [16]. The major benefit of an SPC over both CIC and the indwelling transurethral catheter is that a voiding trial can be conducted with the SPC in place.

The decision to discontinue bladder drainage is based on PVR measurements. The PVR will trend downward as bladder function returns. Transient retention can be expected to resolve spontaneously within 4–6 weeks with

the use of some form of bladder drainage to prevent damage to the bladder. A PVR ≤ 100 mL two times in a row and at least a 200 mL voided volume are criteria for passing [14].

Bethanechol is a synthetic muscarinic agonist with no significant nicotinic effects. It can be used to promote detrusor contraction in lower motor neuron type of neurogenic bladder.

For patients who have a neurogenic bladder with incomplete emptying (lower motor neuron bladder) and who have disabilities that make self-catheterization through the urethra impractical, a continent abdominal stoma can be created for clean intermittent catheterization surgically with a>90% success rate [17].

CONCLUSION

Postoperative urinary retention is a common complication of gynecologic procedures and pelvic surgeries. Patients at higher risk of developing urinary retention postoperatively should be identified prior to the procedure and counseled well. The key to management of Postoperative urinary retention is early identification, in order to avoid serious and preventable sequelae.

Neurogenic bladder dysfunction can be successfully treated to achieve goals of urinary continence, prevention of renal damage from chronically high detrusor pressures, and minimizing the risk of urinary tract infections or bladder overdistension.

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