CASE REPORT

A case of renal dysfunction caused by pelvic organ prolapse

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Abstract Pelvic organ prolapse (POP) is the descent of pelvic organs through the vagina, and sometimes causes hydronephrosis. Although the association between POP and hydronephrosis has long been recognized, severe hydronephrosis and renal dysfunction are rarely seen. We report a case of 66-year-old woman who had a vaginal delivery presented with externalized uterine and bladder prolapse during the previous 2 years. She had a 3-day history of hypophagia and vomiting, and laboratory analysis resulted in serum creatinine of 5.75 mg/dL and blood urea of 78.1 mg/dL. The patient was treated urgently with vaginal pessary to return the uterine and bladder into the pelvis. After 2 weeks, her serum creatinine dropped to 3.66 mg/dL, but chronic renal failure persisted. Hydronephrosis caused by POP may lead to renal dysfunction and can advance to irreversible renal damage if left untreated. Important is early evaluation of renal function and images of the kidney and ureter.

Keywords Pelvic organ prolapse · Renal dysfunction · Hydronephrosis · Obstructive nephropathy

Introduction

Pelvic organ prolapse (POP) is the descent of pelvic organs (bladder, uterine, and rectum) until the organs protrude through the vagina, and is a common problem in elderly women [1]. The prevalence of POP defined as stage II or greater in the general population is reported to be 37% and increases to 64.8% in elderly women [2]. Although the association between POP and hydronephrosis has long been recognized, severe hydronephrosis and renal dysfunction are rarely seen [3]. We report a case of bilateral hydronephrosis and chronic renal failure caused by POP.

Case report

A 66-year-old woman was referred to our hospital from an outside facility for evaluation of a 3-day history of hypophagia, vomiting, and renal dysfunction. This female patient had a vaginal delivery presented with externalized uterine and bladder prolapse during the previous 2 years. The patient's serum creatinine was 0.5 mg/dL 3 years prior. The patient had no history of any surgery or trauma.

On admission, the patient's height was 150 cm and she weighed 52.8 kg. The patient's temperature was 36.4 °C and blood pressure was 128/76 mmHg. Her heart rate was 94 beats per minute and regular, and oxygen saturation was 96%. There was no costovertebral angle tenderness, and a pelvic examination revealed fourth degree uterine prolapse and cystocele.

Laboratory analysis resulted in serum creatinine of 5.75 mg/dL, blood urea of 78.1 mg/dL, potassium of 3.6 mmol/L, white blood cell count of 10,000/mm³, hemoglobin of 6.4 g/dL, and C-reactive protein of 10.07 mg/dL. Venous blood gas was pH 7.314, pCO₂ 27.7 mmHg, and HCO₃⁻ 13.8 mmol/L, indicating an anion gap dilatation

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Fig. 1 **a** Day 1: On admission, the kidneys had bilateral severe hydronephrosis and cortical loss. **b** Day 1: The terminal ureters dilated out of the pelvis

Fig. 2 Day 9: After inserting pessary, the uterine and the bladder were returned into the pelvis

Fig. 3 Day 211: Hydronephrosis improved and renal atrophy advanced

metabolic acidosis with respiratory compensation. The urinalysis demonstrated pyuria, but urine cultures grew no bacteria.

A CT scan showed her kidneys had bilateral severe hydronephrosis, cortical loss, and the terminal ureters dilated out of the pelvis (Fig. 1a, b). The patient was treated urgently with vaginal pessary to return the uterine and the bladder into the pelvis (Fig. 2). Administrations of intravenous fluid and sodium bicarbonate were followed together with antibiotic treatment, resulting in improvement of her systemic conditions.

After 2 weeks, her serum creatinine dropped to 3.66 mg/dL, and she was discharged on Day 16 of hospitalization. After discharge, the patient was leading a normal everyday life, and her renal function further gradually improved. On Day 106, the patient's serum creatinine was 2.88 mg/dL, and 2.57 mg/dL on Day 211. Reexamination of the CT scan

on Day 211 showed disappearance of hydronephrosis and advanced renal atrophy (Fig. 3). She had irreversible renal dysfunction.

Discussion

The number of patients with pelvic organ prolapse (POP) is increasing in aging societies, and the need for improving the quality of life of a patient with this symptom is growing [4]. The risk factors of POP are multifactorial, including family history, vaginal delivery, advancing age, obesity, heavy lifting, nerve injury, previous hysterectomy, rapid decline in tissue strength, and a damaged levator ani muscle [5, 6]. Our case had a vaginal delivery and hiatus hernia, which may suggest tissue fragility.

POP causes various symptoms as voiding dysfunction (frequency, incontinence), dyschezia (tenesmus

and constipation), flank pain, and pelvic discomfort [3]. Although many patients with POP are asymptomatic and do not need treatment [5], some patients are found with serious complications. Hydronephrosis is one of the most serious complications of POP, and may lead to renal dysfunction or urinary infection [1, 3].

The Baden–Walker system or pelvic organ prolapse-quantification (POP-Q) system is mainly used for staging the degree of pelvic organ prolapse (Table 1). The incidence of hydronephrosis increases with severity of prolapse [7, 8]. Leanza et al. reported that in patients with fourth degree POP, the incidence of hydronephrosis was 13.7% and renal impairment with serum creatinine of 141–215 $\mu\text{mol/L}$ (1.60–2.43 mg/dL) was 3.3% [9].

The mechanism of hydronephrosis and hydroureter caused by POP is not clear, but there are several hypotheses on the mechanism of the symptoms [12, 13]: (1) Compression and obstruction of the ureters outside the bladder; (2) kinking of the ureters caused by uterine artery or ligament; and (3) stasis in the cystocele caused by dysuria.

The main cause of renal dysfunction of our case was obstructive nephropathy [14]. Long-term ureteral obstruction induces hydronephrosis and is accompanied by tissue loss, atrophy of tubular epithelial cells, and the development of interstitial fibrosis [15]. Little is known about the recoverability of renal function after the relief of ureteral obstruction. In an experiment with dogs, it is indicated that irreversible renal damage occurred at the 40th day from unilateral complete ureteral obstruction [16]. Shokeir et al. reported up to 8 weeks is necessary before the kidney makes new baseline of function [17].

Our patient's serum creatinine was 0.5 mg/dL 3 years ago, and she had urogenital prolapse for about 2 years. Her renal function may have been impaired with progression of POP. Due to the long duration of obstruction, the female patient got only partial improvement. Costantini et al. reported one POP patient with hydronephrosis had a high serum creatinine concentration of 220 $\mu\text{mol/L}$ (2.49 mg/dL). In addition, the patient's serum creatinine

had decreased to 170 $\mu\text{mol/L}$ (1.92 mg/dL) three months after surgery [1].

Surgical relief (e.g., such as nephrostomy using a Forley catheter) may be indicated for obstructive nephropathy if improvement of renal function appears probable [17]. However, the kidneys of our patient showed bilateral cortical loss, indicating chronic change and irreversible damage. Thus, we managed POP alone with informed consent.

The management options for POP include pessary and surgery. Vaginal pessaries have long been used for treatment of POP [18]. These devices are inserted into the vagina to provide support to related pelvic structures, and to relieve pressure on the bladder and bowel [5]. The complications of pessaries are vaginal discharge, odor, bleeding, constipation, and urosepsis, and vesicovaginal and rectovaginal fistula [5, 18]. To avoid these side-effects, regular follow-up treatment is important.

Surgical options for POP were previously colpocleisis, colposuspension, vaginal panhysterectomy, and anterior or posterior colporrhaphy. Recently, however, the transvaginal synthetic mesh kits in surgery are used for treatment of POP [19].

Women diagnosed with POP often feel anxiety, shame, and fear of rejection [9]. Due to these negative emotions, women with POP sometimes leave untreated, and are found with serious complications. To maintain our patient's renal function, we suggested that she changes her lifestyle to avoid risk factors of POP, such as obesity and heavy lifting [5]. Moreover, we provided her information about complications of POP and instructed her to use pessary. We also told her importance of regular follow-up.

It is reported that angiotensin inhibitors may have beneficial effects in unilateral ureteral obstruction [20, 21]. Thus, we used angiotensin receptor blocker to manage her blood pressure.

In conclusion, hydronephrosis caused by POP may lead to irreversible renal damage if left untreated. Women with severe POP are complicated with hydronephrosis at high frequency. Hydronephrosis is usually without symptoms at

Table 1 Staging of pelvic organ prolapse

Baden–Walker system [10]		POP-Q system [11]	
Grade	Description	Stage	Description
0	Normal position for each respective site, no prolapse	0	No prolapse
1	Descent halfway to the hymen	I	>1 cm above the hymen
2	Descent to the hymen	II	≤ 1 cm proximal or distal to the plane of the hymen
3	Descent halfway past the hymen	III	>1 cm below the plane of the hymen, but protrudes no farther than 2 cm less than the total vaginal length
4	Maximal possible descent for each site	IV	Eversion of the lower genital tract is complete

an early stage. Therefore, it is often found at an advanced stage with renal dysfunction. Important is early evaluation of renal function and images of the kidney and ureter to prevent irreversible damage to kidneys. Providing information about complications of POP to patients, and encouraging adequate follow-up visits are important, too.

Conflict of interest The authors have declared that no conflict of interest exists.

Human and animal rights This article does not contain any studies with human participants performed by any of the authors.

Informed consent Informed consent was obtained from participants included in the article.

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