Spontaneous ureteral rupture during concurrent chemoradiotherapy in a woman with uterine cervical cancer

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ABSTRACT

Spontaneous rupture of the renal pelvis and ureter is associated with obstruction of the urinary collecting system, but is rarely caused by tumors. We describe our experience with a patient who had uterine cervical cancer with mild hydroureter in whom spontaneous ureteral rupture occurred during concurrent chemoradiotherapy. The patient was a 66-year-old woman with stage IIIb uterine cervical cancer and mild hydroureter who received concurrent chemoradiotherapy. The patient felt uncontrolled right-side abdominal pain caused by ureteral rupture after she was given hydration and an intravenous bolus injection of furosemide during the first week of chemoradiotherapy. Contrast-enhanced computed tomography was more useful than ultrasonography for diagnosis of the ureteral rupture. The ureteral rupture in our patient was attributed to a rapid rise in the pressure of the urinary collecting system caused by hydration and the bolus injection of furosemide. Placement of a double-J stent before starting concurrent chemoradiotherapy may help to prevent ureteral rupture in patients who have uterine cervical cancer with mild hydroureter.

1. Introduction

Most cases of spontaneous rupture of the renal pelvis and ureter are associated with ureteral obstruction by calculi. Although uterine cervical cancer is an exceedingly rare cause of renal pelvic or ureteral rupture, several cases have been reported (Singh et al., 2009; McClinton et al., 1989; Spurlock et al., 1987). The mechanism by which uterine cervical cancer causes spontaneous rupture of the renal pelvis and ureter has been suggested to involve obstruction of the ureter by tumor or swollen lymph nodes. We report a case of spontaneous ureteral rupture that occurred during concurrent chemoradiotherapy in a woman who had uterine cervical cancer associated with mild hydroureter without obstruction of the urinary collecting system.

2. Case report

A 66-year-old woman with a diagnosis of uterine cervical cancer was referred to the gynecologic department of our hospital. Pelvic examination showed a 5-cm cervical tumor with bilateral parametrial involvement, which had infiltrated to bilateral pelvic walls. Histopathological examination revealed squamous cell carcinoma of the cervix, and Federation of Gynecology and Obstetrics (FIGO) stage IIIb disease was diagnosed. The patient has never had any surgery on the genitourinary system. Contrast-enhanced computed tomography performed 10 days before starting concurrent chemoradiotherapy showed a normal renal pelvis and right mild hydroureter (Fig. 1). The serum creatinine and hemoglobin levels were 0.68 mg/dl and 12.9 g/dl, respectively. Uniform bilateral enhancement of the renal cortex was seen on contrast-enhanced CT, indicating normal functions of both kidneys. Moreover, contrast-enhanced CT and ultrasonography showed no stone in the ureter or renal pelvis. During the first week of concurrent chemoradiotherapy, 40 mg/m² of cisplatin and 3 L of infusion solution were administered as an intravenous drip infusion, followed by 2 L of infusion solution on the next day. The patient’s body weight increased by 2 kg as compared with before treatment, and 10 mg of furosemide was given as an intravenous bolus injection. After several hours, she felt uncontrolled right-side abdominal pain. Ultrasonography was performed immediately and revealed right hydronephrosis, but no abnormal fluid collection. The serum creatinine and hemoglobin levels were 0.80 mg/dl and 13.3 g/dl, respectively. There was no gross hematuria but positive test of RBC in urine. Subsequently, contrast-enhanced CT was conducted. Extravasation of contrast medium from the right upper ureter was confirmed (Fig. 2). A double-J stent was placed under cystoscopic guidance. There was no tumor, diverticulum, or stone in the bladder. No resistance was felt when the stent was inserted. We diagnosed stenosis of the right ureter, but no obstruction. After placement of the double-J stent, concurrent chemoradiotherapy was resumed.

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Our experience indicated two important clinical points. First, rupture of the renal pelvis and ureter can occur during concurrent chemoradiotherapy in the presence of uterine cervical cancer with ureteral stenosis. Second, contrast-enhanced CT was more useful than ultrasonography for the diagnosis of this condition.

First, our experience showed that rupture of the renal pelvis or ureter can occur during concurrent chemoradiotherapy in patients who have uterine cervical cancer with hydrourerter. Our patient had rupture of the upper ureter. Most previously reported cases of ureteral rupture involved the upper ureter. This is most likely attributed to the fact that the lower ureter has three layers of myometrium, whereas the upper ureter has only two layers. Although tumors rarely cause rupture of the renal pelvis or ureter, several previous studies have reported that obstruction of the ureter by tumor or swollen lymph nodes is a potential cause (Singh et al., 2009; McClinton et al., 1989; Spurlock et al., 1987). We confirmed that the ureter was not obstructed when the double-J stent was inserted after ureteral rupture. In the presence of normal kidney function with partial obstruction of the ureter, hydration causes increased urine production. However, hydration does not lead to increased urine production in patients who have decreased renal function with partial obstruction of the ureter. The renal rupture in our patient was apparently caused by the rapid elevation of intrapelvic pressure due to hydration and treatment with furosemide. To our knowledge, this is the first reported case of ureteral rupture occurring during concurrent chemoradiotherapy in a patient who had uterine cervical cancer without obstruction of the urinary collecting system.

Second important finding was that contrast-enhanced CT was more useful than ultrasonography for diagnosis immediately after ureteral rupture had occurred. Several case reports have documented that renal rupture complicated by retroperitoneal abscess can lead to sepsis (Hadar and Servadio, 1979; Lin et al., 2004; Coelho et al., 2007). Intravenous pyelography can confirm dilation of the ureter and renal pelvis, as well as perirenal extravasation of contrast medium. However, time is required to make a diagnosis. Ultrasonography represents the first line of investigation for renal colic. Although it is easy to diagnose renal rupture when we see a hyperechoic lesion and urine around the kidney, most ruptures of the renal collecting system are not associated with a hyperechoic lesion or urinoma immediately after rupture has occurred (Hwang et al., 2000; Koktener et al., 2007). Our patient showed only dilatation of the renal pelvis on ultrasonography. We diagnosed ureteral rupture on detecting the extravasation of contrast medium from the ureteral pelvis on contrast-enhanced CT. Therefore, if we encounter a patient with dilation of the renal pelvis with acute abdomen during concurrent chemoradiation, spontaneous ureteral rupture should be kept in mind.

Rupture of the renal pelvis caused by hydration has been reported previously. One report documented rupture of the renal pelvis in a patient with a ureteral stone who was being observed while receiving hydration and analgesics (Tas et al., 2013). Another study reported on a woman at 19 weeks’ gestation in whom rupture of the renal pelvis occurred after she received a rapid intravenous infusion before cervical cerclage during spinal anesthesia (Huang et al., 2002). Both cases of renal pelvic rupture were caused by a hydration-induced increase in urine flow under the condition of ureteral stenosis.

In conclusion, rupture of the renal pelvis and ureter can occur during concurrent chemoradiotherapy in the presence of uterine cervical cancer with ureteral stenosis. We consider contrast-enhanced CT to be more useful than ultrasonography for the diagnosis of rupture of the renal pelvis or ureter. The early diagnosis of renal pelvic and ureteral rupture can prevent the development of severe complications, such as abscess. In women who have uterine cervical cancer with ureteral stenosis and normal renal function, the placement of a double-J stent before concurrent chemoradiotherapy may help to prevent rupture of the renal pelvis and ureter.

Conflict of interest statement
The authors declare that there are no conflicts of interest.

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