**Title:** Renal scanning in a 48-year-old woman with uterine cancer.

**Learning Objectives:**

1. Demonstrate findings of partial obstructive nephropathy on renal scintigraphy with furosemide.
2. Illustrate unusual renal scan appearance of enterovesical fistula.
3. Demonstrate correlative CT findings on CT of radiation effects on the bladder.

**History:**

48-year-old female with history of uterine cancer has a history of prior hysterectomy and radiation therapy. CT one year ago showed right hydronephrosis and renal scan with furosemide at that time demonstrated partial right renal obstruction with split renal function 60% left kidney and 40% right kidney. Patient developed diarrhea and rising BUN and creatinine 6 days ago. Renal scan ordered to rule out renal obstruction.

**Technique:**

A renal flow and function study was performed in posterior projection after IV administration of 20 mCi Tc-99m DTPA. Angiographic images are shown reformatted at one frame per 3 seconds and the function images at 5 min per image.

**Question 1:** Based on the renal flow and function images shown (Figures 1 and 2) the best interpretation of this study is:

A. New bilateral renal obstruction.
B. New chronic high grade distal obstruction of the right kidney
C. Obstructing mass in the right kidney
D. Partial obstruction right kidney with no interval change.

Answer = D

A. There is normal blood flow and function of the left kidney.
B. There is only mild decreased flow and function of the right kidney. With high grade chronic obstruction there would be worsening function on the right (e.g. less than 40% split renal function).
C. On the right the early prominent “cold” central renal pelvis and calices all fill in with no persistent mass effect.
D. Visually the split renal function (60% left and 40% right) agrees with last prior value when partial obstruction was present and therefore visually appears unchanged. There is no evidence for new high-grade mechanical obstruction.

**Question 2:** The patient received 20 mg of furosemide IV and additional images (shown reformatted as 5 min per image) were acquired for up to 30 min. (Figure 3). The T1/2 washout time for the left kidney = 18 min and for the right kidney = 35 min. Based on these values and the images shown which of the following is the best interpretation?
A. Left hydronephrosis  
B. Enterovesical fistula  
C. Ileal conduit with obstruction left kidney  
D. High grade obstruction right kidney

Answer = B

A. Tubular structure seen on left after furosemide is not left ureter but activity in descending colon.  
B. Tubular structure seen on left after furosemide is filling of descending colon from bladder fistula  
C. No history of ileal conduit and early images (Figure 2 showed normal bladder.  
D. T1/2 of 35 minutes consistent with partial obstruction not high grade obstruction

**Question3:** CT images of the pelvis (Figure 3) before (left) and after IV contrast (right) was performed three month prior to the renal scan show which of the following:

A. Enterovesical fistula  
B. Radiation fibrosis  
C. Bladder diverticulum  
D. Local recurrence of uterine cancer

Answer = B

A. No site of contrast extravasation is seen on CT. No fistula identified at that time.  
B. Soft tissue density surrounding bladder does not enhance with contrast and represents radiation fibrosis not tumor.  
C. No bladder diverticulum seen  
D. Soft tissue mass surrounding bladder does not enhance. See item B above.

**Case Discussion**

Colovesicular fistulas are generally difficult to diagnose. Most authors recommend CT as the first diagnostic examination, and specific findings include air in the bladder without instrumentation, oral contrast in the bladder when no IV contrast is used, or IV contrast in the colon when no oral contrast is used. Nonspecific findings on CT include bowel or bladder wall thickening and adhesion, diverticular disease of the colon, and mesenteric inflammation. Reported sensitivity of CT for identifying colovesical fistula is 30-90%. Other examinations used to diagnose colovesical fistula include barium enema (sensitivity 20-30%), cystoscopy (sensitivity 40-90%), cystography (sensitivity 20-30%), colonoscopy (sensitivity 7-60%), and intravenous pyelogram (sensitivity 8-20%).

The most common location of colovesicular fistula is between the sigmoid colon and the dome of the bladder. Clinical manifestations include recurrent urinary tract infections, pneumaturia, fecaluria, diarrhea, fever, and lower abdominal pain. The most common underlying etiology is diverticulitis, followed by colon cancer, bladder cancer, Crohn’s disease, radiation, trauma, and ruptured appendicitis.
One case report in the literature (Kao et al.) of a patient who had a colovesical fistula was demonstrated on bone scan, and confirmed by diuretic renogram, but the overall sensitivity of nuclear medicine studies for demonstration of colovesical fistula is unknown.

**Selected references:**


**Key Words:** Renal obstruction, Diuretic renogram, Bladder fistula

**Authors:**

Brian Tweddle, MD and Alan H. Maurer, MD Division of Nuclear Medicine, Department of Radiology, Temple University Hospital, Philadelphia, PA

**CITATION:**

Figure 1
Figure 2