
Urine Extravasation Into the Scrotum

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A case report demonstrating urine extravasation into the scrotum following renal transplantation is presented. An anatomic explanation of the pathway of urine drainage into the scrotum is offered with a brief discussion of extravasation following renal transplantation and its detection by scintigraphy.

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Renal scintigraphy is often performed in patients following renal transplantation for the evaluation of perfusion and function. Ureteral fistula with extravasation of urine is a serious complication that can be diagnosed by renal scintigraphy, although its appearance varies. We report the unusual scintigraphic appearance of urine extravasation into the scrotum and offer an explanation on an anatomic basis for the passage of urine into the scrotum. This case stresses the importance of clinical correlation and appropriate imaging views in the detection of urine extravasation into the scrotum.

CASE REPORT

The patient was a 48-yr-old man with renal failure on the basis of bilateral vesicoureteral reflux and chronic hydronephrosis despite multiple attempts at surgical correction. In preparation for transplantation and due to recurrent urinary tract infections, the patient underwent bilateral nephroureterectomy and received a living related renal transplant from his brother several months later.

On admission for transplantation, the patient's BUN and creatinine were 84 mg/dl and 15.5 mg/dl, respectively. The remaining preoperative laboratory blood tests were unremarkable. Physical examination revealed an elevated blood pressure of 180/108 mmHg, a well-healed midline abdominal incision (status postbilateral nephrectomy) as well as absence of the left testicle (status post left orchiectomy at the age of 24 yr for nondescended testicle).

A living related extraperitoneal renal transplant was performed to the right iliac fossa. Urinary drainage was accomplished with a ureteroneocystostomy. A small amount of urine production was observed by the end of the surgical procedure.

However, over the next several hours, urine output remained poor and renal scintigraphy with technetium-99m diethylenetriaminepentaacetic acid (^{99m}Tc)DTPA and iodine-131 (^{131}I) hippuran was performed. These scans were felt to be consistent with acute tubular necrosis (ATN), revealing good perfusion and uptake of radiopharmaceutical by the transplant kidney, but no evidence of urine excretion. At our institution, the evaluation of renal transplants by renal scintigraphy is performed in two parts: (a) 15 mCi [^{99m}Tc]DTPA are injected intravenously followed by sequential 2-sec images in the anterior projection over the course of 1-min followed by sequential 1-min images for ~5 min in order to evaluate perfusion which is then followed by (b) an i.v. injection of 250 μCi [^{131}I] hippuran with sequential 2-min images in the anterior projection over 20 min in order to evaluate tubular function.

Urine output remained negligible over the next 7 days with repeat scintigraphy showing no significant interval change from the immediate postoperative study.

At that time, the patient began to complain of lower abdominal discomfort which was attributed to constipation, as well as minimal right scrotal swelling that was painless and nontender on physical exam. A renal scan performed on the tenth postoperative day (Figs. 1 and 2) revealed extravasation of activity into the scrotum, and possibly adjacent to the bladder.

At surgical exploration on the same day, the transplant ureter was found to be necrotic distally at the site of anastomosis with the bladder, and there was a collection of urine in the perinephric region. The necrotic ureter was resected and a vesicopyelostomy was performed.

The remainder of the patient's postoperative course was relatively uncomplicated, and renal scintigraphy performed following repair showed no evidence of urine extravasation.

DISCUSSION

Ureteral fistula with extravasation of urine following renal transplant is a well known and serious complication of renal transplantation and may be the result of a deficit in ureteral blood supply (resulting in ureteral

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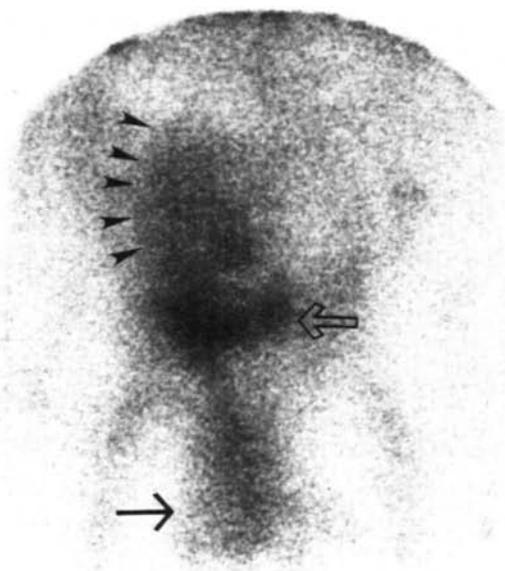


FIGURE 1

Delayed (30-min) anterior image of pelvis and scrotal area following 15 mCi [^{99m}Tc]DTPA injection. Large arrow indicates position of scrotum containing extravasated urine activity. Small arrows outline contour of transplanted kidney that is poorly defined, most likely due to perinephric urine extravasation identified at surgery. Activity indicated by open arrow most likely represents a combination of urine activity within bladder and collection of extravasated urine adjacent to bladder

necrosis, as in this case), a defect in the surgical anastomosis, or involvement of the ureter as well as the kidney with rejection (1,2). The occurrence of this complication in reported cases varies from 1 to 30% (3-5). Extravasation of urine from vesicle fistula can also occur with similar clinical consequences if undetected and untreated (1,6,7).

The diagnosis of extravasation, which usually occurs within the first 3 wk after renal transplantation (2,8), can be difficult on clinical grounds, since ureteral obstruction, urinary fistula, and kidney rejection can all present with a decline in renal function and urine output, fever, wound tenderness, and swelling (2). While successful treatment of cystostomy leaks have been reported with conservative management of urethral drainage (3,6), the prompt diagnosis of extravasation is of vital importance. This is due to the high morbidity and mortality associated with urine extravasation (1-5), particularly during the first 6 wk following transplantation (2), and the need for early intervention, usually operative (1,2).

Imaging modalities that have been shown to be valuable in the diagnosis of urine extravasation in the renal transplant patient include ultrasound (US), scintigraphy, excretory urography, and contrast cystography (8).

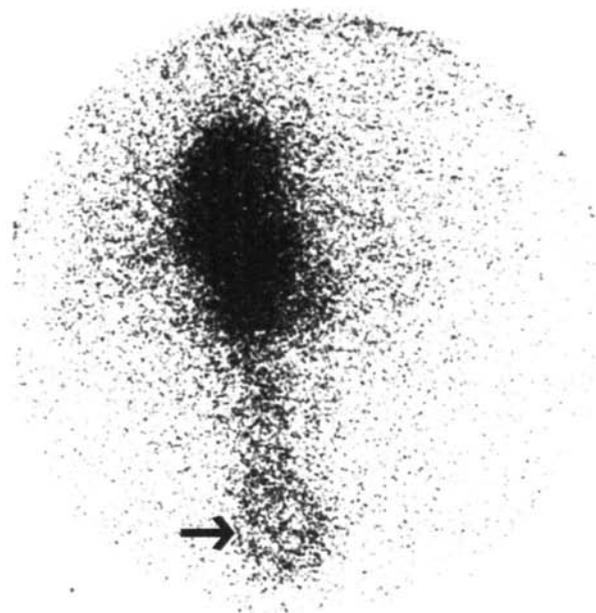


FIGURE 2

Iodine-131 hippuran (250 μCi) image obtained ~8 min after i.v. injection with positioning of patient similar to that in Fig. 1. Large black arrow again indicates extravasated urine activity within scrotum

However, we agree with others (4,9) that scintigraphy has an advantage over excretory urography because of poor contrast excretion often found in these patients, and over cystography because cystography will demonstrate a leak only if the bladder is the site of extravasation or if ureteral reflux is obtained. Also, scintigraphy is less invasive requiring no intravenous contrast injections.

Although ultrasound may be the definitive method in the detection of extrarenal fluid collections (8,10), scintigraphy offers the advantage of demonstrating the presence of extravasation, particularly important when the extravasation localizes in an unusual location as in this case. Also, the demonstration of extravasation is vital in differentiating between lymphocele and urinoma which both may appear similar by US (cystic with or without septations) (8).

Our experience with the usual scintigraphic findings in urine extravasation is similar to that reported previously (4). Urine activity may continue to flow into the bladder, as in our patient, and initially the patient may be clinically asymptomatic. On subsequent scans, usually performed for continued oliguria, a persistent collection of activity occurs which is diffuse, increasing in intensity with time but not conforming to any anatomic structure (i.e., renal pelvis, ureter, or bladder). The pattern of extravasation is variable, and postvoid lateral, decubitus, erect, and delayed images can be very valuable in detecting extravasated urine collections particularly those adjacent to the bladder (4). While the

extravasated urine often collects medial to the kidney and over the course of the distal ureter, the site can occur anywhere in the abdomen including the paracolic gutters, and even into the scrotum as observed here and reported in two other patients in other series (4,6). In our review of the literature only these two additional descriptions of urine extravasation into the scrotum could be found and, since this is the first case which we have observed over the last 2 yr. performing on average five to six transplant renal scans per week, we surmise that extravasation into the scrotum is a relatively uncommon occurrence. Although also uncommon, extravasation has also been reported into the peritoneal cavity through a small peritoneal tear causing diffuse activity accumulation throughout the abdomen (6).

Regarding the pathway of extravasated urine into the scrotum, the fluid most likely dissects through the inguinal canal along the spermatic cord. Anatomically, the course of the native ureter and the ductus deferens are within close proximity to each other as the ductus deferens crosses medial to the distal ureter after entering the pelvis. On its medial and downward course through the sacrogenital fold, the ductus runs along the posterior aspect of the bladder, eventually reaching the medial side of the seminal vesicle (11,12). The native ureter, as it approaches the bladder, lies in front of the upper end of the seminal vesicle on a plane anterior to that of the ductus deferens. Since the ureteral nipple constructed during ureteroneocystostomy is often placed within a few millimeters of the natural ureteral orifice (2), it is not surprising that the transplant ureter and ductus deferens are also closely enough associated to allow the extravasation of urine from the transplant ureter to track along the course of the spermatic cord structures into the scrotum.

The physician must be aware of this possible course of extravasated urine because if the standard scintigraphic views do not include the scrotum, scrotal activity can be easily missed, resulting in a missed diagnosis of urine extravasation. Scrotal edema is an important clinical sign that should arouse one's suspicion of a leak

into the scrotum and prompt one to obtain additional views of the lower pelvis and scrotum. If extravasation is suspected, it is especially important to obtain delayed images (30–120 min postinjection) since it may otherwise escape detection. Lateral decubitus and postvoid views may also be helpful.

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