Renal Dynamic Scintigraphy as a Sensitive Tool for Detecting Small Volume Urinoma Following Live-Related Renal Transplant

Abstract
Renal transplant (RT) is the preferred treatment modality in patients with end-stage renal disease (ESRD). However, it is associated with a significant rate of complications. Early diagnosis and management of these complications are essential to prevent graft loss. Herein, we describe a case of a 48-year-old male who developed ESRD due to underlying autosomal-dominant polycystic kidney disease and underwent an RT. A routine renal dynamic scintigraphy (RDS) performed on day 4 posttransplant showed a focal minute area of radiotracer accumulation on the delayed static images raising suspicion for urinoma. However, it was deemed normal considering the normal renogram curve and stable clinical condition of the patient. However, on day 9 posttransplant, in view of clinical deterioration marked by decreasing urine output and rising serum creatinine levels, ultrasonography – kidney, ureter, and bladder (USG-KUB) and a repeat RDS were performed. Although the USG-KUB described a peri-nephric fluid collection, the nature of the collection could not be determined. RDS confirmed that the collection was urinoma. On retrospective analysis, the focal area of increased radiotracer uptake corresponded to the site of initial suspicion, although there was an increase in the size of the same. In experienced hands, RDS thus proves to be a highly sensitive tool for the diagnosis of urinoma, much before the clinical complications set in.

Keywords: Autosomal-dominant polycystic kidney disease, end-stage renal disease, renal dynamic scan, renal transplant, urinoma

Introduction
Renal transplant (RT) is now being increasingly performed in patients with end-stage renal disease (ESRD) dependent on hemodialysis. In such patients, RT improves the quality of life and facilitates more prolonged survival. RT is, however, associated with a considerable number of complications that may result in graft loss. The complications of RT may be broadly subdivided into (a) vascular (renal artery and vein stenosis and thrombosis, arteriovenous fistula, and pseudoaneurysms); (b) urologic (urinary obstruction and leak, and peritransplantation fluid collections that include hematoma, seroma, lymphocele, and abscess formation); and (c) nephrogenic (acute tubular necrosis, graft rejections that include hyperacute, acute and chronic, and neoplasm). Early diagnosis and management of these complications are of paramount importance to prevent graft loss and prolong the RTs survival. Noninvasive imaging modalities have become areas of active research and interest in the hope that they can detect these complications early and aid further treatment.

Case Report
A 48-year-old male who developed ESRD as a sequel of autosomal dominant polycystic kidney disease underwent RT from a live-related donor. On postoperative day (POD) 4, a renal dynamic scintigraphy (RDS) [Figure 1] was performed after intravenous injection of 8 millicurie 99 mTc-L, L, ethylenedecysteine (99 mTc-LLEC). Dynamic images were acquired on GE Healthcare Brivo NM615 Gamma Camera for 25 min which showed preserved perfusion and renal cortical function. This was followed by delayed static images up to 2 h which showed adequate clearance. However, a focal minute area of radiotracer accumulation was noted on the delayed static image. In view of the normal renogram curve and stable clinical condition of the patient, this was considered...
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Insignificant. Following this, the patient developed decreased urine output from POD 5 to POD 9 coupled with a rising trend of serum creatinine from 1.7 mg/dl to 2.02 mg/dl. Consequently, a ultrasonography – kidney, ureter, and bladder (USG-KUB) [Figure 2] was performed, which showed perinephric fluid collection. However, it was difficult to ascertain the nature of the collection. Therefore, a repeat RDS [Figure 3] was performed on POD 9, which showed a peripheral photopenic area in the early dynamic images. Differential diagnosis included hematoma, lymphocele, abscess, and urinoma. This was followed by delayed static images up to 2 h which showed progressive accumulation of the radio-tracer in the initial photopenic area with uptake higher than that of the background. Thus, the previously overlooked focal collection on RDS was now diagnosed as a urinoma. This case emphasizes the fact that careful observation can greatly enhance the ability of RDS in the establishment of timely and accurate diagnosis of urinoma.

Discussion

Postoperative fluid collections are common following RT, and these include urinomas, hematomas, abscesses, and lymphoceles. USG-KUB is one of the first investigations performed to detect such a fluid collection. However, it cannot determine the nature of the collection easily. This differentiation is essential for treatment planning.

Urine leaks and urinomas are one of the early complications of RT surgery. Direct trauma during the organ harvest or re-implantation may cause injury, which can result in a leak. Ischemic necrosis caused by vascular compromise and improper anastomosis is another reason for a urinary leak. On RDS, an initial photopenic region that becomes hotter than background levels over time is likely due to urine extravasation. Urinoma usually requires invasive treatment by either interventional radiology or early surgery.

Hematomas/abscesses occur in the early postoperative period. Abscesses arise as a complication of surgery or pyelonephritis or secondary infection of urinoma, hematoma, or lymphocele. On RDS, these appear as persistent photopenic areas that do not fill up on delayed images.

Lymphoceles, on the other hand, are typically seen 4–8 weeks after surgery. They occur due to lymphatic leakage into the peritoneal cavity from severed lymphatic channels surrounding the iliac vessels. On RDS, an initial photopenic region (with or without a surrounding rim of increased tracer activity) that gradually fills up with radiotracer with activity equal to that of background is highly suggestive of lymphocele. Furthermore, the presence of rim sign may add confidence to the diagnosis of lymphocele on scintigraphy.

Our case highlights that renal scintigraphy can play a vital role in diagnosing complications after RT. The importance of delayed imaging and follow-up studies to detect the same by renal scintigraphy should not be undermined.
In careful hands, RDS proves to be a highly sensitive modality for diagnosing urine leak and urinoma before clinical worsening occurs.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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