Tropical Journal of Nephrology Vol.12 No 2, December, 2017 39 - 43

Aetiopathogenesis and Differential Diagnosis of Perinephric Fluid Collection after Renal Transplantation

Awobusuyi J.O[1], Adekoya AO[1], Omisanjo O[2], Ikuerowo O[2], Umeizudike TI[1] and Amisu M[1]

1. *Department of Medicine, Lagos State University Teaching Hospital, Ikeja, Lagos*
2. *Department of Surgery, Lagos State University Teaching Hospital, Ikeja, Lagos*

INTRODUCTION

Perioperative surgical complications in renal transplantation can, in the majority of cases be categorised as either vascular (e.g. vascular thrombosis, haemorrhage and renal artery stenosis) or urologic (e.g. urinary fistula, ureteral obstruction and reflux). These complications can occur at any point peri-transplantation from the intraoperative period, through the immediate post-operative period to several months after the transplantation. Their diagnosis could be incidental or they may be diagnosed in association with significant post-transplantation morbidity and mortality[1,2]. Although the use of imaging techniques such as ultrasonography and computerised tomography enables visualisation of radiological characteristics and the anatomical relationship of these collections to the transplanted kidney, percutaneous aspiration and biochemical analysis of the collections is instrumental to the establishment of the aetiology of such perinephric fluid collections[3].

This review focuses on the aetiopathogenesis and differential diagnosis of the perinephric fluid collection after renal transplantation, and provide an evidence-based management of the condition.

Aetiopathogenesis and Differential Diagnosis of Perinephric Fluid Collection Post Renal Transplantation.

Productive surgical drainage post-transplantation results from the perinephric fluid collection after the surgical procedure. Perinephric fluid collections are common post renal transplantation occurring in close to 50% of renal transplantation[4–6]. However, the incidence and prevalence vary widely from centre to centre, depending on the experience of the transplant team and available diagnostic facilities. Common aetiologies of perinephric wound collection are:

I. Haematoma
II. Lymphocele
III. Seroma
IV. Abscess
V. Urine leak and urinoma

Generating a differential diagnosis often depends on the temporal relationship of the transplantation surgery to the development of fluid accumulation. Haematomas and urinomas usually occur within days of the transplant surgery, while Lymphoceles develop a few weeks to many months after the transplantation.

HAEMATOMA

Haematoma may occur as a result of the transplant surgery procedure, or secondary to a complication of renal biopsy, or as a result of rupture of graft pseudoaneurysm. They usually occur in the immediate post-operative period. Haematomas complicating transplant surgeries can be located anywhere (intrarenal, subcapsular, Perinephric, intravesical and the patient's pelvis)[7,8]. Most haematomas are small, identified as small crescentic perinephric fluid collections during ultrasound review of the transplanted kidney and are regarded as normal sequelae of the transplant surgery requiring no

Corresponding author: **Awobusuyi J.O.** Lagos State University Teaching Hospital, Ikeja, Lagos. *E-mail:* awojaco@yahoo.com

intervention. However, haematoma could be massive, causing haemodynamic instability in the patient or renal compromise as a result of hydronephrosis from extramural ureteric obstruction or page kidney[6,9,10].

Surgical drainage in haematoma is sanguineous, and biochemical analysis of the drained fluid is identical to that of patient's serum. Radiological appearance of haematomas on ultrasound can also assist in distinguishing haematoma from other perinephric collections. Typically, it is echogenic in the immediate perioperative period and may have multiple septations[4,6,11]. Its echogenicity would, however, decrease over time as clot lysis occurs. Computerised tomography would show perinephric fluid collection with high attenuation[12]. Small perinephric haematomas are managed conservatively, while surgical intervention is required in large haematomas causing ureteric obstruction or renal compression with worsening renal function[5,10].

LYMPHOCELE

In the renal transplant patient, lymphocele (defined as a pseudocysctic collection containing lymph) develop as a result of disruption of lymphatic channels during surgery. The collection could result from disruption of the iliac lymph vessels of the recipient or from the lymph vessels of the graft hilum. Its aetiology has been ascribed to inadequate ligation of lymph vessels overlying recipient's iliac vessels or vessels in the hilum of the transplanted kidney. Lymphorrhagia occurs as a result of drainage from lymphoceles and typically presents several weeks to months after surgery [13–15]. The incidence of lymphocele varies from 0.6 to 22%(5,14,16), patients on sirolimus are more likely to developed lymphoceles when compared with other recipients due to delayed wound healing[17,18]. Clinical presentation varies widely depending on the volume and location of the lymphocele. Most lymphoceles are asymptomatic, However, clinical presentations from mass effects such as; compression of the ureter causing hydronephrosis, iliac vessel compression with oedema of the lower limbs and renal compression with resultant impairment of renal function have all been documented in the literature[2,19].

Sonographically, lymphoceles appear as fluid collections in the inferio-medial aspect of the graft, often contains septations and have low levels of internal echoes[2,16,19]. The drain fluid electrolytes and creatinine are not remarkably different from serum values [20]. Some investigators have however reported higher enzymatic activity of creatine kinase in perinephric lymphocele[21].

SEROMA

Seromas are accumulation of proteinaceous fluid in the body that is thought to form as plasma from local haemorrhage or other serous fluid accumulate at sites of trauma or surgery. Seromas are different from haematomas as they do not have red blood cells, and from abscesses, as they are sterile. In renal transplantation, they are usually located anterior to the transplanted organ[22]. Peri-transplantation seromas are typically managed with aspiration and catheter drainage[9].

ABSCESS

Perinephric abscess collections are uncommon and they usually develop in the first few weeks post transplantation. They could occur as sequelae of pyelonephritis, or be due to bacterial seeding of haematoma, urinoma or lymphocele[18,19]. Symptoms may be few due to the immunosuppressed state, however, patients may develop lower abdominal pain at the transplant site and constitutional symptoms such as; fever, malaise, anorexia and weakness. Tenderness would be elicited at the site of transplantation[6].

They appear as nonspecific complex cysts on ultrasound, Computerised tomography would reveal areas of fluid attenuations with the intra-lesion gas collection[6,19]. Aspirated fluid from the perinephric abscess is purulent with a high polymorphonuclear count. In addition, bacterial culture would be positive.

Drainage of the abscess with appropriate antimicrobial therapy is the mainstay of treatment in patients with perinephric abscesses[23,24].

URINE LEAK AND URINOMA

Urinomas typically present as perigraft collectins with very high creatinine and potassium concentrations in fluid aspirate compared with concentrations in simultaneously taken blood sample. They typically have an early temporal relationship post renal transplantation[6]. The incidence ofurinomaspost-transplantation ranges between 1.2% and 8.9%[25–27) It constitutes an early urological complication commonly occurring within the first two weeks of transplantation.

Blood supply to the ureter is from various sources; renal pedicle, adjacent lumbar arteries, the urinary bladder and uterine arteries in females [28]. The bladder, lumbar and all other sources of arterial supply to the ureter are lost during the harvest of the kidney leaving the vascular supply from renal pedicle which is tenuous and easily damaged as the only blood supply of the ureter. Surgical anastomosis techniques using ureteroureterostomy or pyeloureterostomy have been found to increase the likelihood of this complication compared with ureteroneocystostomy[6].

A major cause of urine extravasation is ureteric necrosis from vascular insufficiency or increased intraluminal pressures from urinary obstruction. Also, leakages as a result of non-water tight anastomosis at the ureteroneocystostomy site may occur, as well as caliceal leakage as a result of a segmental infarction in kidneys with ligated accessory vessels or that of a polar artery [5,6]. Thus, extravasation of urine can occur from any anatomical site along the urinary tract; Pelvis, ureter and the ureteroneocystostomy site[6].

Clinical Presentation of Urinoma

Urinomas occur early in the post-transplantation period, mostly within the first two weeks after transplantation. They vary in size and can occur at any point between the transplanted kidney and the urinary bladder, though occurrence at unusual sites such as the scrotum and thigh have been described in the literature[29,30]. Patients with urinomas present with excessive surgical drain fluid or extravasation from the surgical wound site. There may be fullness and tenderness around the graft with ipsilateral leg swelling, labial or scrotal oedema in addition to a reduction in urine output[5,6,31]. Renal function impairment may occur from ureteral obstruction with back pressure on the graft parenchyma. Unusual presentation of rupture into the peritoneum causing urine ascites has also been reported[32].

Urinomas appear as a well-defined anechoic fluid collection without septations along the urinary tract on ultrasound that increases rapidly in size. Radio nuclear imaging with Technetium-99m Mercaptoacetyltriglycerine (MAG_3) radioisotope scan will demonstrate progressively increasing retention of radiotracer activity within the collection(9,19,33,34). The definitive diagnosis of urinoma is based on biochemical analysis of the aspirated fluid. Elevated fluid creatinine and potassium concentrations are seen in urinomas when compared with their serum concentrations in patients with a functioning graft.

Management

Therapeutic concerns in the management of patients wit urinomas include; Decision on the most appropriate intervention for the aetiology of the urinoma, investigation and management of the associated renal function impairment and prevention of worsening of hyperkalaemia.

The initial management of UL post renal transplantation usually involves the placement of the urinary catheter in the bladder and percutaneous nephrostomy tube for diversion of urine away from the site of ureteral leakage(25). Double-J stents could be placed either by percutaneous antegrade approach or retrogradely from the bladder through cystoscopy for maximal decompression(25). Opinion on the utility of stents differs however as some authors have not found any significant effect on urological complications with its usage(35). For small distal UL, this conservative intervention may suffice. The effectiveness of conservative measures for small ULs has been documented by some investigators(25,35).

Surgical exploration is required in proximal or extensive ULs and in patients with renal compromise. It is also required in early (few days post operation) and in patients in whom conservative measures have not resolved the extravasation(3,36). The urinoma is drained with resection of the devitalized area of the ureter and subsequent re-implantation if viable. If the viable length of the ureter is short, a bladder flap is required. Omental interposition may be necessary for patients with uretero or vesico-cutaneous leakages(36).

CONCLUSION

In conclusion, Perinephric fluid collection is one of the frequent urologic complications seen post-transplantation, radiological evaluation is required for quantification of the collection and localisation.

Definitive aetiological diagnosis is however based on biochemical analysis of the aspirated fluid from the perinephric collection.

Large or symptomatic perinephric fluid collections require aggressive surgical intervention to prevent graft loss or patient's demise.

REFERENCES

1. Humar A, Matas AJ. Surgical Complications After Kidney Transplantation. Semin Dial 2005;18(6):505–10.
2. Stephen Corrigan Rayhill. Renal Transplantation: Surgical Procedure and Complications. Urology. 2004;12(1):2–12.
3. Richard HM. Perinephric transplant fluid collections. Seminars in Interventional Radiology.2004;21(4):235–7.
4. Kolofousi C, Stefanidis K, Cokkinos DD, Karakitsos D, Antypa E, Piperopoulos P. Ultrasonographic features of kidney transplants and their complications: an imaging review. ISRN Radiol. 2013;2013:480862.
5. Marcelo Ferreira Cassini MF de A, Junior and ST. Surgical complications of renal transplantation. Surg Complicat Ren Transplantation, Underst Complexities Kidney Transplantation. InTech; 2011;39–44. url: http://www.intechopen.com/books/understanding-the-complexities-of-kidney-transplantation/surgical-complications-of-renal-transplantation
6. Akbar SA, Zafar Jafri SH, Amendola MA, Madrazo BL, Salem R, Bis KG. Complications of Renal Transplantation. RadioGraphics. 2005;25:1335–1356.
7. Winsett R, Martin J, Reed L. Kidney Transplantation. Medscape. 2002 url: http://www.medscape.com/viewarticle/443490_13
8. O'Neill WC, Baumgarten DA. Ultrasonography in renal transplantation. Am J Kidney Dis. 2002;39(4):663–78.
9. Richard HM, III. Perinephric transplant fluid collections. Semin Intervent Radiol 2004;21(4):235–7.
10. Butt FK, Seawright AH, Kokko KE, Hawxby AM. An Unusual Presentation of a Page Kidney 24 Days After Transplantation: Case Report. Transplant Proc. 2010;42(10):4291–4.
11. Fananapazir G, Rao R, Corwin MT, Naderi S, Santhanakrishnan C, Troppmann C. Sonographic Evaluation of Clinically Significant Perigraft Hematomas in Kidney Transplant Recipients. Am J Roentgenol. 2015;205(4):802–6.
12. Lai S, Citation MS. Role Of Computed Tomography In Perinephric Haematoma; A Pictorial Review. Internet J Radiol. 2012;14(1).
13. Mazzucchi E, Souza AA, Nahas WC, Antonopoulos IM, Piovesan AC, Arap S.Surgical complications after renal transplantationin grafts with multiple arteries. Urol Int Braz J Urol. 2005;31:125–30.
14. Safa J, Nezami N, Tarzamni MK, Zarforooshan S, Rahimi-Ardabili B, Bohlouli A. Post-transplant urological and vascular complications. Saudi J Kidney Dis Transpl. 2009;20(5):867–71.
15. Ranghino A, Segoloni GP, Lasaponara F, Biancone L. Lymphatic disorders after renal transplantation: new insights for an old complication. Clin Kidney J. 2015;8(5):615–22.
16. Pozniak MA, Dodd GD, Kelcz F. Ultrasonographic evaluation of renal transplantation. Radiol Clin North Am. 1992;30(5):1053–66.
17. Ranghino A, Segoloni GP, Lasaponara F, Biancone L. Lymphatic disorders after renal transplantation: new insights for an old complication. Clin Kidney J. 2015;8(5):615–22.
18. Ghanta M, Dreier J, Jacob R, Lee I. Current Issues and Future Direction in Kidney Transplantation]. Current Issues and Future Direction in Kidney Transplantation. InTech.2013;15(34)4225-4233
19. Brown ED, Chen MY, Wolfman NT, Ott DJ, Watson NE. Complications of renal transplantation: evaluation with US and radionuclide imaging. RadioGraphics. 2000;20(3):607–22.
20. Ebadzadeh MR, Tavakkoli M. Lymphocele After Kidney Transplantation. Where are we standing now? Urol J. 2008;5(3):144–8.
21. Pacovsky J, Hyspler R, Navratil P, Ticha A, Brodak M. The estimation of post-transplant lymphocele origin using creatine kinase activity. Ups J Med Sci. 2010;115:187–92.
22. O'Neill WC, Baumgarten DA. Ultrasonography in renal transplantation. Am J Kidney Dis. 2002;39(4):663–78.

23. El-Nahas AR, Faisal R, Mohsen T, Al-Marhoon MS, Abol-Enein H. What is the best drainage method for a perinephric abscess? Int braz j urol. S. 2010;36(1):29–37.

24. Saiki J, Vaziri ND, Barton C, California I. Perinephric and Intranephric Abscesses: A Review of the Literature. West J Med. 1982;136:95–102.

25. Duty BD, Barry JM. Diagnosis and management of ureteral complications following renal transplantation. Asian J Urol. 2015;2(4):202–7.

26. Streeter EH, Little DM, Cranston DW, Morris PJ. The urological complications of renal transplantation: a series of 1535 patients. BJU Int. 2002;90(7):627–34.

27. Krajewski W, Dembowski J, Ko³odziej A, Ma³kiewicz B, Tupikowski K, Matuszewski M, et al. Urological complications after renal transplantation – a single centre experience. Cent Eur J Urol. 2016;69:306–11.

28. Durga Sukumar C, priyanka Janamala R, Mahalakshmamma V. An anatomica study on blood supply of ureter. Int J Anat Res. 2015;3(1):970–5.

29. Yu JQ, Zhuang H, Xiu Y, El-Haddad G, Kumar R, Alavi A. Small urine leak after renal transplantation: detection by delayed 99mTc-DTPA renography—a case report. J Nucl Med Technol. 2005;33(1):31–3.

30. Dirlik A, Erinç R, Özcan Z, Duman S, Özkahya M, Süreyya Özbek S, et al. Diagnosis of urinary leakage in renal transplant patients: Ultrasonographic, cliinical and scintigraphic findings. Türk Nefroloji Diyal ve Transplant. 2001;10(4):239–43.

31. Krajewski W, Dembowski J, Ko³odziej A, Ma³kiewicz B, Tupikowski K, Matuszewski M, et al. Urological complications after renal transplantation - a single centre experience. Cent Eur J Urol. 2016;69(3):306–11.

32. Mark Fister, Tom R. Miller. Post-transplant urinoma. MIR Teaching file case rs026. 2001 url: http://gamma.wustl.edu/rs026te187.html

33. Son H, Heiba S, Kostakoglu L, Machac J. Extraperitoneal urine leak after renal transplantation: the role of radionuclide imaging and the value of accompanying SPECT/CT - a case report. BMC Med Imaging. BioMed Central; 2010;10:23.

34. Yu JQ, Zhuang H, Xiu Y, El-Haddad G, Kumar R, Alavi A. Small urine leak after renal transplantation: detection by delayed 99mTc-DTPA renography—a case report. J Nucl Med Technol. 2005;33(1):31–3.

35. Nie Z-L, Zhang K-Q, Li Q-S, Jin F-S, Zhu F-Q, Huo W-Q. Treatment of Urinary Fistula After Kidney Transplantation. TPS. 2017;41:1624–6.

36. Duty BD, Barry JM. Diagnosis and management of ureteral complications following renal transplantation. Asian J Urol . 2015;2(4):202–7.