Extravasation of Urine Into the Superficial Perineal Space Due to Ureteral Necrosis after Kidney Transplantation: A Case Report

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Case Report

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Abstract

Background: Urinary fistula is a common complication of kidney transplantation. It may cause severe complications like graft loss and patient death.

Case presentation: Here we present a recipient who developed graft ureteral necrosis with leakage of urine into the superficial perineal space but not into the peri-graft or the retroperitoneal space, as an unusual clinical feature. This may be due to dense adhesions in the peri-graft region and dam-like effect of adhesive spermatic cord and inferior epigastric vessels traversing across the graft ureter. Urine leaking out with high pressure extravasates through the potential gaps in the incision of aponeurosis at the lateral margin of the rectus abdominis and into the superficial perineal space. The proximal ureter of the graft was end-to-end anastomosed to the right ureter. Both the recipient and graft recovered well.

Conclusions: Comparing the creatinine levels in the leaking fluid and serum is an effective way to confirm urinary fistula. Early aggressive management is a rational option for treatment of urinary fistula.

Background

Urinary fistula (UF) is a common complication of surgical procedures involving ureteral manipulation. The reported incidence rates of UF within 1 month after kidney transplantation (KT) range from 2–5% [1]. We report a case of UF after living-related donor KT with leakage of urine into the superficial perineal space but not into the peri-graft or the retroperitoneal space.

Case Presentation

A 32-year-old man with confirmed end-stage renal disease since 4 years underwent KT; left kidney was obtained from his mother after laparoscopic nephrectomy. He recovered well and the catheter was removed on the 6th postoperative day (POD 6). Serum creatinine (Scr) level decreased from 1631 $\mu\text{mol/L}$ (18.24 mg/dL) to 106 $\mu\text{mol/L}$ (1.20 mg/dL). However, in the night of POD 6, he complained of acute sharp pain in the region of inguinal ring associated with local tenderness. The pain aggravated with time. On POD 7, there was diffuse subcutaneous edema with sharp pain over the right lower abdomen, inguinal region, and scrotum. Ultrasonography showed 0.9 cm dilation of the graft collecting system (Fig. 1b) and edema in the right inguinal subcutaneous tissue; in addition, there was 4.3 cm $\times$ 1.4 cm $\times$ 2.1 cm hydrops with a small amount of gas (Fig. 1c). Aerogenic infection was considered. Subcutaneous paracentesis was performed and 8 mL light yellow colored clear fluid was aspirated. Smear examination and culture of fluid yielded negative results; in addition, blood and urine investigations revealed no signs of infection. However, creatinine level in the aspirated fluid was 8.25 mmol/L (93.22 mg/dL). Based on the presumptive diagnosis of UF, the patient was recatheterized. CT scanning on POD 8 showed edema of the aforementioned region and a small amount of hydrops located in the right prevesical space, anterior to the urinary bladder (Fig. 1d).

Although the catheter drainage was good, the urine volume showed a gradual decrease; on POD10, the Scr level had increased to 459 $\mu\text{mol/L}$ (5.19 mg/dL). In addition, the patient's signs and symptoms worsened gradually; the edema and pain extended to the right waist, right upper thigh, perineum, and scrotum, i.e., the region of right superficial perineal space, in communication with the potential space of abdominal superficial fascia (Fig. 1a). Exploratory surgery was performed in the early morning of POD 11 after failure of the catheterization management. Graft ureteral necrosis was found at the middle section; the necrotic segment was located infero-posterior to the spermatic cord and the inferior epigastric vessels (Fig. 1e). No urine was found in the peri-graft region. The proximal ureter of the graft was end-to-end anastomosed to the right ureter. Subsequently, the signs and symptoms were relieved and urine volume was >2000 mL/d after surgery. Scr descended to the trough line, 97 $\mu\text{mol/L}$ (1.10 mg/dL), at 3 days postoperatively. Histopathological examination confirmed ureteral necrosis with abscission of epithelium. The postoperative period was uneventful and the recipient was discharged 9 days after exploratory surgery.

Discussion And Conclusions

Extravasation of urine within the superficial perineal space is typically observed in cases of traumatic rupture of the bulbous urethra [2]. To the best of our knowledge, this is the first documented instance of UF in a KT recipient leading to leakage of urine into the superficial perineal space with further communication with the potential space of the abdominal superficial fascia; however, there was no passage of urine into the peri-graft or the retroperitoneal space. This may be due to dense adhesions in the peri-graft region and dam-like effect of adhesive spermatic cord and inferior epigastric vessels traversing across the graft ureter. Urine leaking out with high pressure extravasates through the potential gaps between stitches of the aponeurosis at the lateral margin of the rectus abdominis and into the superficial perineal space. Ureteral necrosis is the major cause of UF after KT and is frequently caused by technical problems [3–4]. The ureteral necrosis of our recipient is presumably related to the injury caused during laparoscopic separation of ureter or during placement of ureteral stent. Aerogenic infection needs to be ruled out when subcutaneous hydrops and gas are detected on ultrasonography in association with acute pain. In this case, infection was ruled out by laboratory investigations. Comparing the creatinine levels in the fluid and serum is an effective way to confirm UF. The gas was likely attributable to residual gas retained during suture of the incision or during perfusion of the bladder during ureterocystostomy, which subsequently leaked to the subcutaneous tissue. Primary reconstruction is a favorable option for treatment of UF [4]. Uretero-ureterostomy with ureter of recipient in this case resulted in favorable short-term prognosis. However, further follow-up is required to determine the long-term prognosis.

Abbreviations

UF: Urinary fistula; KT: Kidney transplantation; POD: Postoperative day; Scr: Serum creatinine; CT: Computed tomography.

Declarations

Ethics approval and consent to participate: Ethical approval is not required because this is a single case report that involves only a retrospective review of medical records and does not include data that can identify the patient. Written informed consent was obtained from the patient for participation in this case report..

Consent for publication: Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Availability of data and materials: Not applicable.

Competing interests: The authors declare that they do not have any competing interests.

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Authors' contributions: YF, TL and ZIH participated in the kidney transplantation surgery; YF, XdW and QZ participated in the exploratory surgery; YF, XdW and TL made substantial contributions to the conception and design, drafting and revision of the work; YF and TL participated in funds collection; TrS participated in data collection and made the illustration, Figure 1; All authors have participated in the care of the patient and approved the final manuscript.

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Figures

Figure 1

Clinical signs, ultrasonography, CT findings, and intraoperative findings of the KT recipient with UF. a) Signs: Leakage of urine manifesting as subcutaneous edema extending from the right waist to right upper thigh, perineum, and scrotum (within the dotted line). b) Ultrasonography of graft: 0.9 cm dilation of the graft collecting system with no peri-graft fluid collection (arrow: ureteral stent). c) Ultrasonography of right inguinal tissue: Subcutaneous hydrops (4.3 cm×1.4 cm×2.1 cm) with a tiny amount of gas (arrow). d) CT scan: Subcutaneous edema of right abdomen; hydrops in the right prevesical space, anterior to the urinary bladder; gapped incision of aponeurosis at the lateral margin of the rectus abdominis (arrow). e) Intraoperative findings: Necrosis of the middle section of graft ureter (orange arrow).

arrow); adhesive spermatic cord and inferior epigastric vessels (blue arrow). KT: Kidney transplantation; UF: Urinary fistula.