Emphysematous perinephritis in kidney graft

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ABSTRACT

The formation of renal and perirenal abscesses is closely associated with well-known risk factors. Patients that undergo kidney transplantation generally present with a base pathology that, together with immunosuppression management, makes them vulnerable to infection, thus increasing their morbidity and mortality. Emphysematous perinephritis is defined as a perirenal collection that is accompanied by gas. The following is a clinical case of emphysematous perinephritis in a patient having undergone kidney transplantation.

Keywords: Emphysematous perinephritis, renal graft, transplantation, Mexico.

INTRODUCTION

Perirenal abscesses are considered to be one of the pathologies of the retroperitoneum with the greatest mortality, reaching reported figures of 56%, even after drainage. These figures have been modified with the advent of better diagnostic methods such as computed tomography (CT) scan and magnetic resonance imaging (MRI).1 Currently multiple risk factors have been associated with the development of perirenal abscesses such as urinary infection, trauma, and lithiasis. The most highly associated risk factor is diabetes mellitus which has been established as the most important in patients with urinary tract abnormalities.2 Perirenal abscess diagnosis is not easy and requires a high level of suspicion.

RESUMEN

La formación de abscesos renales y perirrenales está relacionada estrechamente con factores de riesgo bien descritos. Los pacientes sometidos a trasplante renal por lo general cuentan con una patología de base que junto con el manejo inmunosupresor los hace vulnerables a infecciones aumentando su morbimortalidad. La perinefritis enfisematosa se define como una colección perirenal que se acompaña de gas. A continuación, presentamos el caso de una perinefritis enfisematosa en una paciente con antecedente de trasplante de injerto renal.

Palabras clave: Perinefritis enfisematosa, injerto renal, trasplante, México.
on the part of the physician. Infections of the surgical site are common in patients with kidney graft as a consequence of the immunosuppression those patients are subjected to.\textsuperscript{3,4} Emphysematous perinephritis is defined as a perirenal collection accompanied with gas that can be a consequence of a burst intrarenal abscess, an infected hematoma, or the introduction of gas-producing bacteria from the exterior.\textsuperscript{5} The case of a patient with past history of kidney transplantation with symptoms of emphysematous perinephritis is presented.

## CASE PRESENTATION

The patient is a 64-year-old woman with genetic load for diabetes mellitus and high blood pressure. Past personal history included type 2 diabetes mellitus of 25-year progression in treatment with insulin, high blood pressure without treatment, and chronic kidney failure of 5-year progression treated with peritoneal dialysis for 1 year and hemodialysis for 3 years. Past surgical history of live-donor kidney transplantation 1 year before related to present illness and patient is presently under immunosuppressant treatment with ciclosporin, mycophenolate, and prednison. Patient had undergone transfusions, is not allergic, and did not suffer trauma.

Her illness began 3 days prior to hospital admittance with diarrheic evacuations with mucus, unmeasured fever, hyporexia, nausea without vomiting, asthenia, adynamia, and general malaise. Rapid blood glucose determination was done resulting in 517mg/dL for which patient went to the emergency room where study protocol was begun. Due to findings in plain abdominal film, urology service was interconsulted (Image 1). Physical examination revealed heart rate of 112 bpm, respiratory frequency of 22 rpm, temperature of 37.5°C, and blood pressure of 140/80 mmHg; facial edema, oral mucosa fairly hydrated, tegument paleness, well-ventilated lung fields with no rales or aggregates, and rhythmic heart sounds. Abdomen was distended due to the panniculus adiposus, non-secretion 5 cm surgical wound dehiscence in right flank, hypoactive peristalsis, pain upon deep palpation of hypogastrium, right flank and iliac fossa, no peritoneal irritation data, negative ureteral points, and negative costovertebral angle percussion. Increased consistency was palpated in the kidney graft zone with no crepitations. External genitals were normal in relation to age and sex with no alterations. Extremities were integral, there were peripheral pulses, and pitting edema.

Laboratory work-up provided the following results: hemoglobin 10.6 g/dL, hematocrit 31.9 %, MCV 32.5 pg, leukocytes 16 400 /mL, platelets 181 000 /mL, glucose 445 mg/dL, BUN 55 mg/dL, creatinine 2.2 mg/dL, Na 121 mmol/L, K 4.5 mmol/L, Cl 93 mmol/L. Arterial blood gas with pH 7.34, pCO\textsubscript{2} 22.5 mmHg, pO\textsubscript{2} 48.5 mmHg, SO\textsubscript{2} 75.9%, HCO\textsubscript{3} 11.9 mmol/L. Urinalysis with pH of 5, urine was yellow, cloudy, with density of 1.010, hemoglobin ++, glucose 1000, 30-40 leukocytes/field, 3-5 erythrocytes/field, negative nitrites and abundant bacteria. Computed tomography (CT) scan showed irregular, heterogeneous image in right iliac fossa with presence of gas in the interior, suggestive of kidney graft perirenal abscess (Image 2). Emergency surgical exploration was then performed and important fibrosis at the level of the right iliac fossa was found. During dissection the exit of gas and 200 mL of grayish liquid was observed. An old perirenal hematoma was found and drained and then surgical wash was carried out. A 2 x 3 cm renal hypoperfusion zone was observed on the posterior surface. Biopsy was taken and kidney graft was preserved. Culture of kidney graft secretion was positive for \textit{E. coli} and \textit{S. epidermitis} that was managed with imipenem in the intensive care unit (ICU). Kidney biopsy revealed no alterations and inflammatory infiltrate. Control ultrasound was ordered that showed perfusion reduction in less than 20% of the upper pole. Patient improved and was released and continued follow-up as out-patient of transplantation service. At one month Doppler ultrasound of kidney graft was ordered that showed signs of normal resistance in all vessels. Kidney scintigram with DTPA was ordered at two months and showed total glomerular filtration of 25.41 mL/min in the kidney graft (Image 3). At 7 months 24-hour creatinine clearance in urine was 42.16 mL/min demonstrating kidney graft viability and functionality.

## DISCUSSION

Surgical site infections following kidney transplantation are not uncommon and can derive directly from the exit of urine during procedure as well as from posterior immunosuppressant therapy. These infections can become evident 2-3 weeks after transplantation even though they can also appear after longer periods of time, especially when deep infections of soft tissues are involved.\textsuperscript{4,6} In the present case, the patient had surgical wound infection following procedure that was managed with general wound care for months. Some series describe a predominance of infections caused by gram negative bacteria but they can also be caused by gram positive bacteria. The presence of species of \textit{Staphylococcus} in the culture of these wounds can arise from normal skin flora.\textsuperscript{7} Patients with diabetes mellitus are more susceptible to these infections and commonly present with wound reinfections as a consequence of immunosuppression and slow, poor quality cicatrization, as was the case with the patient presented here.\textsuperscript{8} Other factors such as surgical technique and urine leakage from vesicoureteral neoanastomosis have been
implicated in the development of these infections. In their study, Ramos et al. concluded that the combination of diabetes mellitus and the use of immunosuppressants contributes to the development of surgical site infections in patients with kidney graft. Kidney and perinephric abscesses are an uncommon complication in kidney grafts. However, multiple etiological agents have been described as principal causes. In general, diabetes, lithiasis, the use of steroids, and immunosuppression are risk factors for developing perinephric abscesses. On an average, symptom duration of perirenal abscesses is 11 days before diagnosis is able to be established and only 35% are correctly diagnosed upon patient hospital admittance. Multiple agents are involved in abscess pathogeny, and gram negative bacteria predominate at 52%, especially *E.coli*, *Staphylococcus aureus* at 29%, and anaerobic bacteria at up to 17%. Two microorganisms can be identified in up to 30% of retroperitoneal abscesses. Age of patient at diagnosis is from 46-53 years and there is predominance in women. Diagnosis can be slow, however, thanks to the imaging studies available today, morbidity and mortality figures for this pathology have decreased. Diabetes mellitus is the risk factor most highly associated with and having the most repercussions on symptoms. Perirenal abscess symptoms manifest as fever, abdominal pain, urinary symptomatology, and general malaise. Siegel et al. reported leukocyte elevation as well as elevated creatinine figures above 1.7 mg/dL, and thrombocytopenia in their series. In the present case, leukocytosis figures reached 16,400 and creatinine reached 2.2 mg/dL. Creatinine was above the normal value, but this allowed for suspicion that there was some percentage of kidney graft function, and so graft preservation was an important objective.

Urological complications ranging from 4-20% following kidney transplantation have been reported in different published series. In the last decade, thanks to the introduction of medications such as ciclosporin for immunosuppression therapy, posttransplantation complications have decreased. Today, there are urological complications in 2-10% of kidney transplantations and the principal ones are ureterovesical junction stenosis and vesical fistula secondary to urine leakage. These complications present within the first year after transplantation. The patient documented here presented with risk factors for developing infection close to the kidney graft, however, the possibility that this abscess was secondary to ureterovesical anastomosis leakage cannot be ruled out.

Image 1. Plain abdominal film in standing and decubitus positions showing oval image with radiolucent halo toward pelvic cavity suggestive of gas surrounding kidney graft.
Currently imaging studies such as CT scan and MRI have high sensitivity for diagnosing kidney and retroperitoneal pathologies.20

The use of antibiotics in the treatment of kidney abscesses under 3 cm has been established even though it is not considered the treatment of choice since the probability of healing with medical management alone is low. Wide-spectrum antibiotic management should be initiated at the time of diagnosis and additional percutaneous drainage should be considered for abscesses larger than 3 cm. Open drainage is considered the treatment of choice for all perirenal abscesses larger than 5 cm.12 In the present case, percutaneous drainage would have been feasible due to immunosuppression and the conditions of the patient, but because the patient had a kidney graft and given the size of the abscess, exploration and open drainage were decided upon. There are no reports on cases that involve emphysematous perinephritis. Contrary to the recommendation of initiating treatment with antimicrobial agents and surveillance for patients with infectious perinephritis that have kidney graft, this

Image 2. CT scan with views at right iliac fossa level. Image is irregular, heterogeneous, with presence of gas in the interior at kidney graft site. It is not possible to delimit kidney unit.

Image 3. Kidney DTPA scintigram showing adequate perfusion of kidney graft with 25.4 mL/min glomerular function rate.
treatment represents high mortality risk for the patient with emphysematous perinephritis and high risk of kidney graft loss and therefore surgical management should be considered to be the first option. In the present case it was possible to determine graft viability with this procedure and document it with kidney biopsy that reported only inflammatory process. Because the kidney graft had adequate coloring and consistency it was decided to preserve the kidney unit. Presently the patient presents with intact glomerular function.

**CONCLUSIONS**

Due to the fact that the formation of perirenal abscesses and soft tissue infections in patients with kidney transplantation represents important morbidity and mortality risk and their frequency increases as a consequence of immunosuppression, these pathologies should be ruled out in all patients showing general signs of infection in order to receive opportune and effective treatment. Emphysematous perinephritis in patients with kidney graft is rare and despite not having found a series of reported cases suggesting standardized management, surgical management or percutaneous drainage should be contemplated when feasible with the objective of preserving the kidney graft.

**BIBLIOGRAPHY**


