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Bilateral Xanthogranulomatous Pyelonephritis With Extensive Abscess Associated With Neurogenic Bladder: A Case Report

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Xanthogranulomatous pyelonephritis (XGP) is a rare and severe form of chronic pyelonephritis. We report a case of bilateral XGP complicated by extensive abscess formation. A 47-year-old man presented with fatigue and generalized weakness. Laboratory evaluation revealed leukocytosis and elevated serum creatinine levels. Urinalysis demonstrated pyuria and bacteriuria. Computed tomography (CT) revealed bilaterally enlarged kidneys with multifocal renal parenchymal and perirenal abscesses. The CT scan also demonstrated severe bilateral hydronephroureter and diffuse bladder wall thickening, with a radiologic impression of severe pyelonephritis with abscess formation and neurogenic bladder. The patient was admitted and treated with intravenous antibiotics and percutaneous nephrostomy tube placement. However, no clinical improvement was observed with conservative management. The patient subsequently underwent right open radical nephrectomy. Histopathological examination confirmed the diagnosis of XGP with extensive abscess formation. The patient experienced no further complications or recurrence after surgery. This case suggests that chronic untreated neurogenic bladder may contribute to the development of severe chronic pyelonephritis such as XGP.

Keywords: Xanthogranulomatous pyelonephritis, Neurogenic bladder, Nephrectomy, Abscess, Case reports

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• **Research Ethics:** This study was approved by the institutional review board (IRB) of Seoul Medical Center (IRB No. 2025-01-003). The requirement for informed consent was waived by the IRB.
• **Conflict of Interest:** The authors have nothing to disclose.

HIGHLIGHTS

Neurogenic bladder-associated xanthogranulomatous pyelonephritis could present with bilateral involvement, complicating surgical management.

INTRODUCTION

Xanthogranulomatous pyelonephritis (XGP) is a rare and severe variant of chronic pyelonephritis, characterized by progressive destruction of the renal parenchyma and its replacement with granulomatous tissue, abscesses, and lipid-laden macrophages. This pathological entity was first described by Schlagenhaufer in 1916 [1].

Parsons et al. [2] have reported that the incidence of XGP accounts for 0.6%–1.0% of all renal infections, and the disease can occur across all age groups, though it is more frequently observed in women than in men. The exact pathogenesis of XGP remains unclear. However, it is commonly associated with recurrent urinary tract infections (UTIs) and urinary tract obstruction, particularly nephrolithiasis [3].

In this report, we present a rare case of bilateral XGP associated with extensive abscess formation in a patient with chronic untreated neurogenic bladder. This case suggests that neurogenic bladder may contribute to the development of this aggressive and potentially life-threatening form of chronic pyelonephritis.

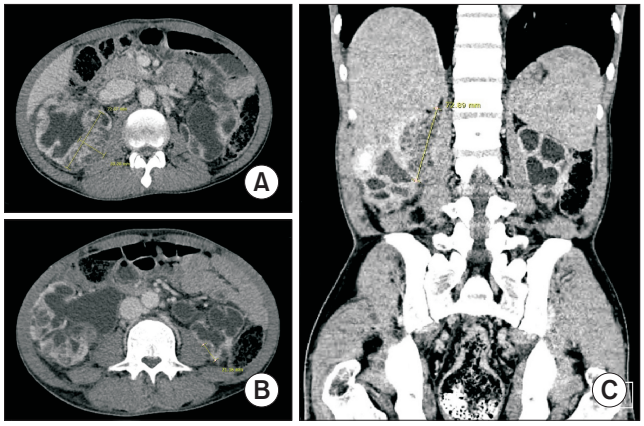

Fig. 1. The computed tomography images of patient. (A) Rt. kidney with 7.3×3.3-cm-sized multifocal renal parenchymal and perirenal abscess. (B) Lt. kidney with 2.1-cm-sized ovoid renal parenchymal abscess. (C) Multifocal renal abscess with severe dilatation of the renal pelvis and calyces.

CASE REPORT

A 47-year-old male, living alone with no known prior medical history, was brought to the Emergency Department via ambulance due to severe fatigue. The patient reported experiencing long-standing, untreated lower urinary tract symptoms. On physical examination, the lower abdomen was distended. Following placement of an indwelling Foley catheter, approximately 1,000 mL of urine was drained.

Initial laboratory investigations revealed marked leukocytosis (white blood cell count: 55.3 $\times 10^3/\mu L$), elevated serum creatinine (15.44 mg/dL), and hyperkalemia (6.7 mmol/L). Complete blood count showed severe anemia with a hemoglobin level of 4.4 g/dL and a hematocrit of 17.5%. Urinalysis revealed pyuria and bacteriuria. Interestingly, both blood and urine cultures yielded Staphylococcus aureus, which is an uncommon pathogen in XGP. This finding suggests that hematogenous spread or severe systemic infection may have contributed to the clinical presentation.

Computed tomography (CT) images demonstrated bilaterally enlarged kidneys, with multifocal renal parenchymal and perirenal abscesses measuring up to 7.3 cm on the right and up to 2.1 cm on the left. Additional findings included severe bilateral hydronephroureter, diffuse thickening of the bladder wall, and features suggestive of severe pyelonephritis with abscess formation, likely in the context of a neurogenic bladder. Despite the presence of bilateral hydronephroureter, no definitive obstructive lesion was identified on imaging (Fig. 1).

The patient was admitted and received blood transfusions and emergent hemodialysis. The initial empiric antibiotic therapy was vancomycin. After microbiological results from urine and intraoperative tissue cultures became available, the antibiotic regimen was changed to intravenous ciprofloxacin. Due to the presence of bilateral abscesses and hydronephroureterosis, bilateral percutaneous nephrostomy tubes were inserted. However, there was no significant clinical improvement despite appropriate conservative management. Following consultation with the department of urology, the patient underwent simple nephrectomy of the right kidney, where CT demonstrated more severe XGP. Considering the potential for intraperitoneal adhesions secondary to inflammation, an open surgical approach was selected. Gross pathological examination revealed hydronephrotic kidneys with diffuse calyceal dilation, papillary effacement, cortical thinning, and numerous yellow nodules of varying sizes, many of which contained purulent material (Fig. 2). Histopathological analysis confirmed the diagnosis of XGP, characterized by extensive infiltration of

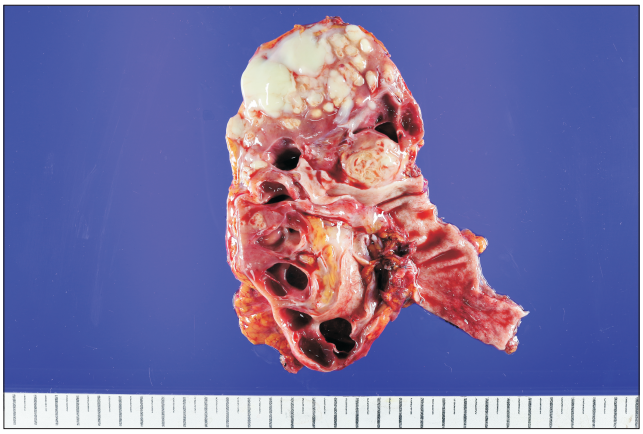

Fig. 2. Gross appearance of the longitudinal section of the right kidney. The kidney is markedly hydronephrotic with diffuse calyceal dilation. Multiple yellowish nodules containing purulent material are observed in the upper pole.

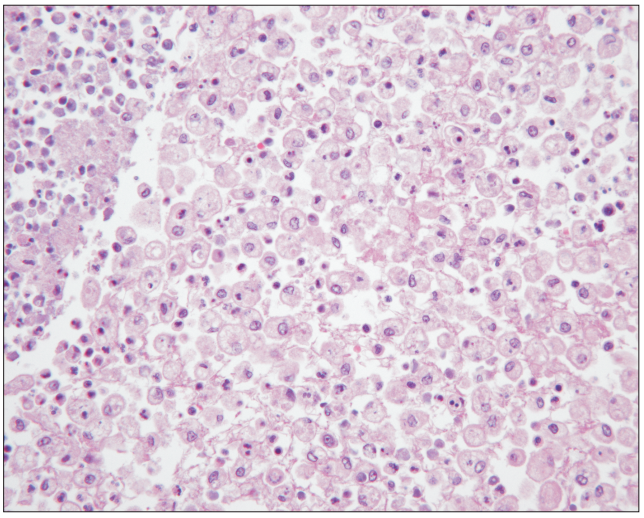

Fig. 3. Histopathological image demonstrating xanthogranulomatous inflammation characterized by numerous foamy histiocytes, neutrophils, and cellular debris (hematoxylin and eosin stain, original magnification ×400).

foamy histiocytes, neutrophils, lymphocytes, plasma cells, and cellular debris. The foamy histiocytes exhibited abundant clear to vacuolated cytoplasm, vesicular nuclei, and prominent nucleoli (Fig. 3).

Postoperatively, the patient showed no further complications. Despite conservative treatment for voiding difficulty, the patient showed no improvement; urodynamic study confirmed detrusor areflexia. The patient was advised to perform clean intermittent catheterization (CIC), which is the preferred bladder management strategy for patients with neurogenic bladder to ensure adequate bladder emptying. During a follow-up period of 12 months, the patient remained free of recurrent infection.

This study was approved by the institutional review board (IRB) of Seoul Medical Center (IRB No. 2025-01-003). The requirement for informed consent was waived by the IRB.

DISCUSSION

XGP is a rare and severe form of chronic renal inflammation characterized by the destruction of renal parenchyma and its replacement with lipid-laden foamy macrophages [4]. Most cases are unilateral. Bilateral XGP, particularly with extensive abscess formation, is exceedingly rare and is associated with a poorer prognosis due to compromised renal function [5]. Tsai et al. [6] reported a case of bilateral XGP and emphasized that aggressive treatment may be warranted in such cases, especially when accompanied by pyrexia, as antibiotic therapy alone is often insufficient for eradicating the infection. In our case, the patient received intravenous antibiotics, blood transfusions, hemodialysis, and radiological interventions including percutaneous nephrostomy. However, due to lack of clinical improvement, radical nephrectomy was ultimately performed. This case supports the notion that early and aggressive surgical intervention, including nephrectomy, may be necessary in cases of bilateral diffuse XGP.

Although the exact pathogenesis of XGP remains unclear, several contributing factors have been proposed. Genitourinary obstruction—most commonly from nephrolithiasis—and recurrent UTIs are the most well-established risk factors. Renal calculi are present in 47% to 100% of reported cases, although they are not essential for diagnosis. Other associated conditions include pregnancy, diabetes mellitus, rheumatoid arthritis, chronic hepatitis C, cirrhosis, and obesity [7,8].

Interestingly, our patient had no prior history of UTIs, renal calculi, or comorbid conditions commonly associat-

ed with XGP. However, he had long-standing untreated neurogenic bladder dysfunction. Neurogenic bladder can result in high bladder storage and voiding pressures, leading to vesicoureteral reflux and upper urinary tract deterioration. It is plausible that in this case, the chronic, unmanaged neurogenic bladder contributed to the development of bilateral diffuse XGP. To our knowledge, only a limited number of cases describing bilateral XGP associated with neurogenic bladder have been reported. Goswami et al. [9] described a patient with bilateral XGP and multiple abscesses who deteriorated rapidly and died 48 hours after admission despite antibiotic therapy and supportive care. The authors emphasized the importance of CIC in preventing life-threatening infectious complications in patients with neurogenic bladder.

CIC is a widely recommended bladder management strategy for patients with neurogenic bladder dysfunction. Regular and complete bladder emptying via CIC helps prevent bladder overdistension, reduces intravesical pressure, and improves bladder wall perfusion, thereby enhancing mucosal resistance to infection [10]. In our case, CIC was initiated postoperatively, and the patient experienced no recurrence of UTIs during the follow-up period.

In conclusion, chronic neurogenic bladder may lead to high intravesical pressure, vesicoureteral reflux, and progressive upper urinary tract damage, potentially resulting in XGP. XGP associated with neurogenic bladder dysfunction may present with bilateral involvement, although the evidence remains limited due to the rarity of reported cases. Therefore, clinicians should consider aggressive treatment including CIC in patients with chronic neurogenic bladder dysfunction.

NOTES

• **Author Contribution:** Conceptualization: SWL, HSC; Data curation: SWL; Formal analysis: SWL, HSC; Methodology: SWL, HSC; Project administration: SWL; Visualization: HSC; Writing - original draft: SWL; Writing - review & editing: SWL, HSC.

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