

Xanthogranulomatous Pyelonephritis as a Complication of Obstructive Uropathy: Clinical Case

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ABSTRACT

Introduction: Described in 1916 by Schlagenhauser, Xanthogranulomatous Pyelonephritis (XGP) is an uncommon type of chronic infectious pyelonephritis that evolves with a suppurative process and severe impairment of the renal function. Adult women and seniors are most affected and are commonly associated with urinary tract obstruction and infection. Children are rarely affected, as well as bilateral impairment. **Clinical Case:** A 54-year-old female comes to the emergency room with right lower back pain, nausea, vomiting, and fever. She denies chronic degenerative diseases and refers to herself as a carrier of right renal lithiasis. **Surgical History:** open cholecystectomy 20 years ago, two cesarean sections 33 and 23 years ago. The current condition began two months ago with pain in the right lumbar region, accompanied by intermittent fever during the day, presenting partial improvement with analgesics and antipyretics. In the last 24 hours, he presented vomiting of gastro biliary content on four occasions and increased lumbar pain. Upon admission, we performed abdominopelvic tomography, in which an enlarged right kidney was observed, with extensive loss of morphology with ectasia throughout the collecting system that extends to the UP junction with the presence of a 20x20 mm stone with a density of 800 HU inside, ureter with slight ectasia along its entire length, identifying the bear claw sign. Due to tomographic findings with obstructive uropathy and in the presence of data of systemic inflammatory response, he decided to perform diversion of the urinary tract with a double J ureteral catheter without success despite several attempts. **Discussion:** The precise pathophysiology remains incompletely understood. However, given the observed associations, the combination of obstruction and infection is presumed to be the primary initiators, resulting in interstitial pyelonephritis and a subsequent chronic granulomatous immune response that fails to eradicate the inciting agent.

Keywords: Calculi, Xanthogranulomatous pyelonephritis, Bacterial profile, Diagnosis, Treatment.

INTRODUCTION

Described in 1916 by Schlagenhauser, Xanthogranulomatous Pyelonephritis (XGP) is an uncommon type of chronic infectious pyelonephritis that evolves with a suppurative process and severe impairment of the renal function. Adult women and seniors are most affected and are commonly associated with urinary tract obstruction and infection. Children are rarely affected, as well as bilateral impairment (1)

Recurrent urinary tract infections and chronic obstruction are physiopathological hallmarks of the XGP. Urolithiasis was present in 89.5% of patients of our series as the cause of obstruction, with staghorn calculi in more than half of patients (2).

The XGP is a rare, severe form of chronic bacterial renal infection. Most cases are unilateral, with obstructing renal calculi and granulomatous inflammation resulting in a non-functioning, hydronephrotic, enlarged kidney with diffuse parenchymal destruction. Its peak incidence is at ages 50 to 70 years, with a 2:1 female to male preponderance. Its population incidence is 1.4 cases per 100 000 per annum. However, amongst patients with chronic pyelonephritis, XGP comprises 0.6-1.0% of cases and 19% of those requiring nephrectomy. At least 15% of patients require intensive care unit admission.

Moreover, almost all undergo unilateral radical (total) nephrectomy. XGP is considered life-threatening, and peri-operative mortality is reported as high as 40%. However, the mortality rate has not yet been established. There have been no systematic reviews, with the literature limited to case reports and case series. Therefore, the aim of this study was to systematically analyze the modern mortality rate of patients with XGP, which we hypothesized would be <10%. Your secondary aim was to summarize the demographics and treatment patterns associated with this disease (3).

CLINICAL CASE

A 54-year-old female comes to the emergency room with right lower back pain, nausea, vomiting, and fever. She denies chronic degenerative diseases and refers to herself as a carrier of right renal lithiasis. Surgical history: open cholecystectomy 20 years ago, two cesarean sections 33 and 23 years ago. The current condition began 2 months ago with pain in the right lumbar region, which is accompanied by intermittent fever during the day, presenting partial improvement with analgesics and antipyretics; in the last 24 hours, he presented vomiting of gastrobiliary content on four occasions and increased lumbar pain.

Upon admission to the emergency department, he was diaphoretic, tachycardic, and had a fever of 38.3°C. Regarding his admission laboratories, leukocytosis of 12,000, WHO grade III anemia, and slight elevation of serum creatinine.

An abdominopelvic tomography, showed in which an enlarged right kidney, with extensive loss of morphology with ectasia throughout the collecting system that extends to the ureteropyelic junction with the presence of a 20x20 mm stone with a density of 800 HU inside, ureter with slight ectasia along its entire length, identifying the bear claw sign. Due to tomographic findings about obstructive uropathy and the presence of data on the systemic inflammatory response, we decided to perform diversion of the urinary tract with a double J ureteral catheter without success despite several attempts.



Figure 1: Abdominal CT scan showing a stone in the right proximal ureter measuring approximately 2 cm.



Figure 2: Right kidney with altered morphology, increased in size.

The diagnosis of right Xanthogranulomatous Pyelonephritis plus right renal exclusion are diagnostics; therefore, an open right subcapsular nephrectomy was done using a lumbotomy approach. The following findings were reported: the right renal unit with loss of morphology, an artery and a vein enlarged by 15x10 cm, purulent material discharged approximately 50 cc; Transoperative bleeding of 1500 cc reported, requiring a transfusion of 2 erythrocyte concentrates and fresh frozen plasma. The patient required circulatory support with norepinephrine during surgery.

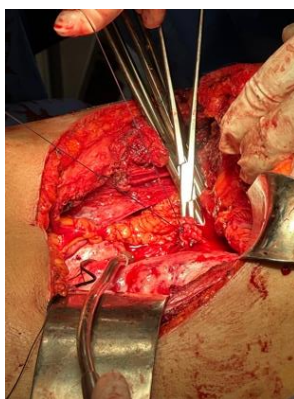


Figure 3: Ligation of renal vessels



Figure 4: Product of right nephrectomy.



Figure 5: Sagittal section of removed right kidney.

During his stay in the Urology area, he had an adequate post-surgical evolution; he tolerated the oral route, drainage progressed with a decrease in output, and he maintained serous characteristics and adequate urinary volume. Her control laboratories: Hemoglobin of 11.4 g/dL, Creatinine of 1.8 mg/dL, and Urea of 68.5 mg/dL. The histopathological report reported: "Liquefied tissue with multiple multi-infarct zones."

She was discharged due to improvement seven days after her surgery, with follow-up in the outpatient clinic, so far with adequate progress.

DISCUSSION

The precise pathophysiology remains incompletely understood, but given the observed associations, the combination of obstruction and infection is the primary initiator, resulting in interstitial pyelonephritis, followed by a subsequent chronic granulomatous immune response that fails to eradicate the inciting agent.

A typical obstructive pathway likely results in superinfection of static urine with consequent stone formation. Infected debris (usually with relatively indolent agents), incites the chronic granulomatous inflammatory response with incomplete clearance of the provoking factor. Evidence to support the hypothesis that granuloma formation is induced primarily by bacteria includes the presence of bacteria within the granulomas in both intra- and extracellular locations, including within cytoplasmic vacuoles. The failure to completely degrade the

bacterial products provokes a chronic inflammatory response but also suggests a limited/incomplete host immune response.

An increased incidence of calyceal stones and staghorn calculi, recurrent urinary tract infections, and chronic interstitial nephritis is well established, and these are the most common associations. Similarly, an increased incidence of conditions leading to obstruction, such as pyeloureteric junction obstruction, ureteropelvic duplication, ureteral schistosomiasis, and obstructing tumors (including renal and transitional cell carcinomas), has been documented. A case described in a 21-day-old neonate arose secondary to grade V vesicoureteric reflux. Despite the presence of a staghorn calculus in the renal pelvis of the majority of affected patients, renal parenchymal destruction and subsequent renal impairment occur secondary to the chronic inflammation and macrophage infiltration as opposed to obstructive uropathy, as the urine can usually bypass the staghorn, which results in a partial, rather than complete obstruction.

The process is usually unilateral and disseminated (involving the entirety of the kidney); however, a more atypical distribution of segmental/focal XGP can also occur in 17% of cases. The process can extend beyond the kidney into the perinephric and para-renal spaces and may infiltrate adjacent tissues and viscera in severe, advanced cases. The degree of extra-renal extension can be profound, with reported cases of pancreatic, splenic, and hepatic infiltration with abscess formation, cutaneous, colonic, and duodenal fistulae, and rib osteomyelitis also described. Sporadic renal amyloidosis secondary to XGP has been reported (4).

Xanthogranulomatous pyelonephritis (XGP) is an infrequent form of chronic granulomatous inflammation characterized by the destruction of the renal parenchyma and the replacement of solid sheets of lipid-laden macrophages. This rare entity constitutes less than 1% of chronic pyelonephritis. Because of diagnostic difficulties, relatively few cases have been published. Since then, a few cases (47 cases of at least ten reported cases) have been published, but no reviews are compiling these series. *Escherichia coli* and *Proteus mirabilis* are the isolated agents in approximately 90% of positive urinary cultures of XGP patients, although sterile urine cultures are not uncommon (5).

La XGP is characterized by infiltration of the renal parenchyma with lipid-laden macrophages. However, obstruction of urinary flow and chronic bacterial infection are considered to be associated with XGP development. XGP occurs in approximately 1% of adults with pyelonephritis and 16% of pediatric nephrectomy cases. Typical clinical symptoms of XGP are fever of unknown origin, abdomen/ flank pain, weight loss, anemia, or palpable renal mass. Xu Z et al. (6) present a case of XGP infected with *Providencia stuartii*.

The changes in the pathogen's characteristics increased the risk of newly acquired infections once considered opportunistic. *Stenotrophomonas maltophilia* is one of those agents more related to immunocompromised patients, presenting an increased incidence and modified antibiotic resistance profile in the modern era. Razvan-Cosmin et al. (7) reports a healthy female patient with an underlying renal stone pathology diagnosed with XGP related to *S. maltophilia* urinary infection. The case was treated as pyonephrosis after a complete biological and imaging evaluation. Empirical antibiotic administration and a surgical approach were considered. A total nephrectomy was performed, but the patient's condition did not improve.

The patient's status improved when specific antibiotics were administered based on the bacterial identification and antibiotic susceptibility pattern of drained perinephric fluid. Levofloxacin and Vancomycin were considered the optimal combination in this case. The histopathological examination revealed XGP secondary to chronic renal stone.

La Malakoplakia (MKP) and the XGP) are chronic inflammatory conditions of the kidney. Host responses to chronic infection result in characteristic pathological lesions. MKP is characterized by periodic acid-Schiff (PAS) positivity, whereas XGP is characterized by PAS negativity; otherwise, both diseases share similar gross presentation and microscopic features. Pan Y et al. (8) present an unusual case of MKP and XGP co-existing in the same kidney, indicating that MKP and XGP may represent different spectra of the same disease process. Therefore, MKP and XGP have similar features, but MKP is characterized by PAS positivity, whereas XGP is by PAS negativity. This case report emphasizes that these two diseases are not mutually exclusive but may exist simultaneously in the same patient, although rare. Moreover, XGP must be included in differential diagnosis even in patients without urolithiasis.

On the other hand, Bhatt et al. (9) report a case of XPG; however, the further progression of this inflammatory pathology to adjacent organs, including the ureter, bladder, and urethra, is sporadic. Xanthogranulomatous inflammation of the ureter is a chronic inflammatory state where foamy macrophages are seen in the lamina propria along with multinucleated giant cells and lymphocytes, forming a granulomatous inflammation, which is benign. Based on its appearance on computed tomography (CT) scan images, it can easily confuse as a malignant mass, and the patient can be subjected to surgery that can lead to complications.

There are two recognized forms of XGP: focal and diffuse. The diffuse form is more common when the kidney enlarges, retaining its reniform shape. The diffuse form is then further staged based on the extent of renal and perirenal involvement. The focal form is rare; pathologically, it is like the diffuse form but limited to one pole or less. The diffuse form of advanced XGP treatment is nephrectomy with pre- and post-surgical antibiotics. The focal form, however, is treated with antibiotics and drainage initially. If it fails to resolve, nephrectomy may be considered (10).

In cases where XGP is considered probable, the priority in preoperative CT must be to thoroughly evaluate the relationship of the kidney with the surrounding tissue and organs rather than investigate the patients' kidney volumes. Since the original report of a successful laparoscopic nephrectomy by Clayman et al. in 1991, laparoscopic nephrectomy has become an alternative to traditional open surgery. In 1993, Gaur and colleagues reported their first retroperitoneoscopic nephrectomy. Laparoscopy is gradually replacing the traditional open approach to remove benign XGP. The treatment of choice has been open nephrectomy, which is challenging given the extent of the disease and the relatively common involvement of the renal hilum and the contiguous structures. The laparoscopic approach has usually been contraindicated and not justified in XGP; however, improvements in the laparoscopist's skill, instruments, and technique have expanded the indications to include XGP in some cases (11, 12).

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