Medical and Research Publications
International Open Access

**Case Study** **Journal of MAR Case Reports (Volume 6 Issue 1)**

# What has Xanthogranulomatous Pyelonephritis Got to do with The Lotus Pod?

Fatimah Lateef *

**Corresponding Author: Fatimah Lateef,** FRCS (A&E), MBBS, FAMS (Em Med). Dept of Emergency Medicine, Singapore General Hospital, Director, SingHealth Duke NUS Institute of Medical Simulation (SIMS), Singapore



**Received Date: September 27, 2022**

**Published Date: October 04, 2022**

## Introduction

Xanthogranulomatous Pyelonephritis (XP) represents a chronic inflammatory condition affecting the kidneys, which often leads to the destruction of the parenchyma. The latter is caused the infiltration by lipid-laden foamy macrophages. Histologically, the granulomatous infiltrate is often made up of neutrophils, plasma cells, lymphocytes, xanthomatous histiocytes and multinucleate giant cells. It is rare and only make up less than 1% of all chronic pyelonephritis. Persons affected are frequently middle-aged women, with a gender preponderance of 6:1. (1-3)

The presentation is very much similar to that of upper urinary tract infection or pyelonephritis with fever, flank pain or septic shock. The commonest organisms implicated has been E coli and P mirabilis. Other organisms have also been reported less frequently. (1,3,4)

Patients affected by XP will often present with recurrent infections, leukocytosis, anemia and renal impairment or acute kidney injury. There has also been reports whereby a mass is noted due to the enlarged kidneys. The tissue and parenchyma destruction as well as the hydronephrosis like presentation predisposes affected patients to urolithiasis. Other complications such as abscess formation, with or without perinephric spread and fistula have also been reported. Frequently it affects unilateral kidney and the process is generally diffuse throughout the whole kidney parenchyma. (1,4)

### Imaging in Xanthogranulomatous Pyelonephritis

Often the diagnosis is first suspected from ultrasound or CT Scan imaging done for such patients. CT scan is now the mainstay of diagnostic imaging assessment for XP. It is also helpful in staging and planning eventual management decisions. Multiple segmentations, looking like dilated calyces, will be noted in the more advanced stages (Fig 1). The kidney is also enlarged and the outline and shape is usually not as smooth. as in a normal kidney. Incidentally, calculi, including staghorn calculi may be seen. The appearance is largely due to the parenchymal tissue destruction. The multiple rounded segments with low attenuation, radiating outwards towards the renal cortex and centred on a contracted pelvis is quite characteristic, but not pathognomonic. The thin rim of higher attenuation represents the residual renal parenchyma. This appearance has been previously coined as the ‘bear paw’ sign. (1,3,5)

Here, our new suggestion of the term, ‘lotus pod sign’ is proposed as it is depicting a closer resemblance to the CT image appearance. The rounded areas or segments appear like “holes”, and this is where the lotus seeds are embedded. The fresh pod is usually green and mature whilst the dried lotus pod would have shades of brown. (Fig 2) Moreover the ‘bear paw sign’ will only have 4 rounded

segments as this is what the actual bear paw structure is. With the lotus pod, there can be more segments as is usually the case with the imaged appearance of XP. Thus, the proposal for the use of the more appropriate, “lotus pod sign”

As to how CT scan imaging can facilitate staging Malek RS et al has quite early on, in 1978, proposed the following: (6)

Stage 1: confined to renal parenchyma

Stage 2: Involvement of renal parenchyma and perinephric fat

Stage 3: Involvement of para-renal space and retroperitoneum

This staging was initially used in the paediatric population but has now been found to be applicable to the adult XP population as well. Other more advanced stage complications such as infiltration of the pancreas, spleen, liver with abscess formation as well as colonic fistulae or rib osteomyelitis can be clearly demonstrated on CT scans. Other modalities such as nuclear imaging and magnetic resonance imaging may have their own pros and cons when used for interpretation at the different stages of the disease. Interventional radiology has also offered options today, especially in the management of complications related to XP. (5,6)

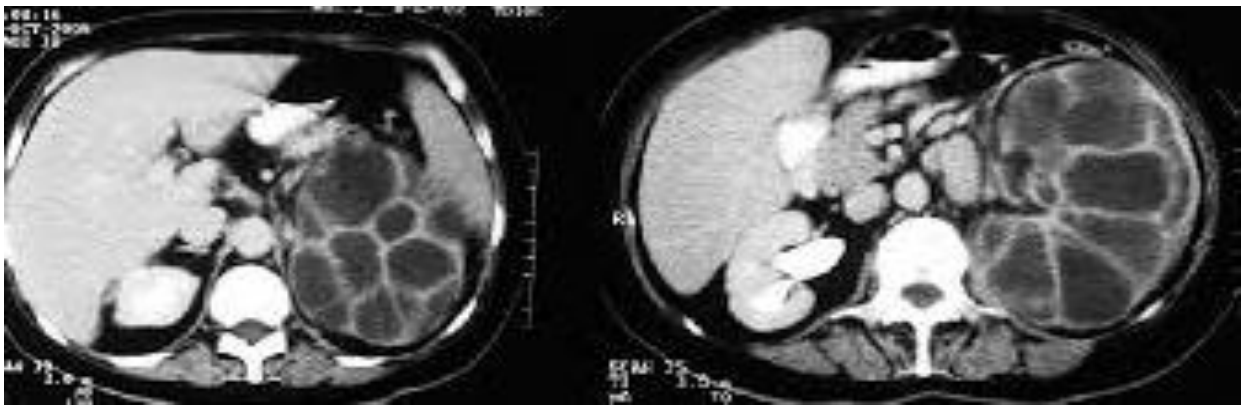

**Figure 1:** Cross-sectional CT Scan image of XP

This shows enlargement of the affected kidney, the renal parenchyma tissue destruction and the “lotus pod” appearance, as described.

**Figure 2a:** Fresh (green) lotus pod

**Figure 2b:** Mature or dried lotus pod appearance

## Conclusion

XP is a rare condition, whose management involved the mainstay of the use of antibiotics and with complications, surgical interventions or nephrectomy may be required. The 'bear paw" sign has been used to describe the CT image appearance in XP. Here, we are proposing the use of the term 'lotus pod sign' to describe the CT appearance and features as it is more apt and closely depict the pathological anatomy of features in XP.

## Reference

1. Razvan CP, Razvan IP, Cristian M et al. Xanthogranomatous pyelonephritis: presentation and management. J Mind Med Sci 2019; 6(1): 169-175

2. Ho CI, Wen YK, Chen ML. Xanthogranomatous pyelonephritis successfully treated with antibiotics only. J Chin Med Assoc 2008; 71(12): 643-645

3. Petca R, Popescu R, Petca A et al. Clinic and pathological features of Xanthogranomatous pyelonephritis: a single centre experience over 5 years. Eur Urol Supp 2017; 16(11): e2951

4. Leoni AF, Kinleiner P, Revol M Zaya A et al. Xanthogranomatous pyelonephritis: a review of 10 cases. Arch Esp Urol 2009; 62(4): 254-271

5. Bolger MP, Hennebry J, Byrne C et al. Xanthogranomatous pyelonephritis: a narrative review with current perspectives on diagnostic imaging and management, including interventional radiology techniques. Int J Nephrology and Renovascular Disease 2021; 14: 359-369

6. Malek RS, Elder JS. Xanthogranulomatous pyelonephritis: a critical analysis of 26 cases and of the literature. J Urol 1978; 119(5): 589-593

7. Motuzko E, Germaine P. Xanthogranulomatous pyelonephritis: the uncommon complication of the uncommon disease. Appl Radiol 2016; 45(6); 32-34