A 42 Year Old Female with Pyonephrosis

and Multiple Subcapsular Abscesses:

Saving a Threatened Kidney

Talal Al-Qaoud

Urology program, McGill University, Quebec, Canada
Dr.Talqaoud@gmail.com

Abdullatif Al-Terki

Department of Surgery, Section of Urology, Al Amiri Hospital, Kuwait

Abstract

Objective: The following report entails how the use of appropriate treatment and imaging leads to an excellent outcome. This description of dealing with a threatened kidney delineates the importance of critical thinking and application of least invasive techniques to provide optimum treatment and satisfaction to the patient, avoiding unnecessary loss of a viable kidney.

Clinical Presentation: The following case is of a 42 year old woman, presenting with left loin pain and fever, eventually diagnosed to have a left obstructed kidney due to a
stone with pyelonephritis complicated by pyonephrosis and multiple subcapsular abscesses.

**Intervention:** While in hospital, the patient received appropriate antibiotics, had a ureteric stent placed initially while the stone was manipulated into the left kidney, followed by drainage of two large subcapsular abscesses. Following discharge, during follow up she had the stent and stone removed rendering her symptom and stone free. CT was the imaging modality used in hospital and for follow up.

**Conclusion:** When faced with multiple pathologies, such as our case, using gold standard imaging and tapering treatment to patient characteristics and needs, helped us tackle different pathologies in a step-wise manner with an excellent endpoint. The use of ureteric stenting, combined with percutaneous drainage of the subcapsular abscesses, was an excellent choice, one that saved the patient her left kidney.

**Keywords:** pyonephrosis, subcapsular abscesses, ureteral catheterization

**Introduction and Objective**

Urolithiasis affects 10% of the population at some point in their life[1]. The presentation with acute renal colic is common, and management of simple renal colic has been standardized worldwide[2]. However once complications such as pyelonephritis and pyonephrosis occur secondary to obstruction by stones, this poses a challenge with strict contemplation on deciding when to intervene and avoid highly invasive procedures, with end results of low morbidity and mortality.
In managing acute infected hydronephrosis, the combination of early adequate drainage and rapid institution of broad-spectrum antibiotics is paramount. The use of ureteric stenting or percutaneous nephrostomy (PCN) tube for the purpose of kidney drainage, have both been proven to be life saving in the treatment of pyonephrosis[3,4]. We describe a 45 year old woman, presenting with left loin pain with upper urinary tract infection and obstruction secondary to a stone that was managed by ureteric stenting with an excellent outcome.

**Clinical Presentation and Intervention**

A 45 year old Kuwaiti female, mother of 4, presented to our hospital with a 5 day history of fever, left loin pain, haematuria, dysuria, and oliguria with no history of stones. Patient was a known case of hypothyroidism on treatment, past medical history was otherwise unremarkable.

On examination the patient appeared ill, in moderate pain, and febrile. Examining the abdomen demonstrated left renal angle tenderness. Investigations revealed leukocytosis with mildly impaired renal function. Urine and blood cultures where sent.

Initially in the casualty department the patient had received intravenous Rocephin (Ceftriaxone) 1 gm, and Amikacin 500mg. X-ray of kidneys, ureter and bladder (KUB) showed a stone in the left ureter at the level of L3-L4, with an intrauterine device in place. Plain CT abdomen showed mild to moderate dilatation of the left pelvicalyceal system till the level of the stone at L3. Stranding was seen in the left perirenal and periureteric area mainly at the site of the stone (Figure 1). Patient was admitted as a case of obstructed left kidney with pyelonephritis, and antibiotics resumed.
The following day she underwent cystoscopy demonstrating infected urine in the bladder with pus effluent per ureter upon cannulation with a double J ureteric stent; stone was pushed up to the kidney. Blood culture was positive for Klebsiella pneumonia sensitive to Amikacin and her urine cleared.

Despite intervention with stent insertion and appropriate antibiotics the patient remained febrile (37.8 - 39), with improving but persistent leukocytosis. Post-stenting, Rocephin was replaced with Tazocin (Piperacillin + Tazobactam). In view of such situation whereby the patient was not improving as we would have anticipated, the question of a secondary septic focus had risen leading us to revise our thoughts and proceed with reimaging the left kidney. CT with contrast was done, showing an enlarged left kidney (13x8x8.5x3cm) with heterogeneous appearance, and poor parenchymal contrast enhancement with diminished calyceal opacification, which is in keeping with pyelonephritis. Multiple foci of subcapsular collection causing localized compression of the renal parenchyma were observed, the largest was antero-lateral in the lower pole and measured 6.3 by 3.1cm (figure 2).

The picture was clearly of pyonephrosis in combination with multiple subcapsular collections. Ultrasound guided drainage of the antero-lateral collection was attempted successfully, 50 cc of pus was aspirated and sent for culture (came back positive for Klebsiella). Despite drainage patient remained febrile with leukocytosis. Ultrasound of the left kidney was done showing shrinkage of the antero-lateral collection to 3.8x1.2cm, and so follow up CT was advised. CT showed multiple subcapsular left renal abscesses, the antero-lateral completely drained, with a postero-medial abscess (5x3cm) (figure 3, and 4). Hypodense areas representing inflammation were seen, along with multiple intra-renal abscesses measuring 1cm in diameter. Renal perfusion and parenchymal density had improved in comparison to previous CT. Drainage of the postero-medial abscess was done, and successfully 15cc of frank pus was aspirated and sent for analysis.
After successful drainage of both large subcapsular abscesses, patient showed dramatic improvement. Patient remained afebrile with minimal discharge in both drains. 3 days after inserting the postero-medial drain, patient was fit for removal of both drains. Following a hospital stay of 18 days, this case of left kidney pyonephrosis and multiple subcapsular abscesses was saved from nephrectomy and was discharged on oral Ciprofloxacin. After 2 weeks she was seen in clinic, stable and asymptomatic. On further follow up, X-ray KUB showed stent in good position with the stone in position as manipulated into the kidney. Follow up CT was done demonstrating improvement and complete resolution (figure 5, and 6), followed by flexible ureterorenoscopy, lithotripsy and stent removal rendering the patient stone and symptom free.

Discussion

Looking at the scenario, the patient was a case of a left ureteric stone causing obstruction leading to pyonephrosis with formation of multiple subcapsular renal abscesses.

Looking at the literature, with respect to the imaging modality used in initial diagnosis, CT scan is considered the gold standard for urolithiasis[1]. Plain radiographs determine whether stones are radio-opaque or not, and are mainly used in the follow up. Renal abscesses generally must be at least 2-3cm to be detected by ultrasound, and ultrasound cannot define fascial thickening or detect subtle changes of perinephric fat [5]. CT used in our case helped diagnose the stone, obstruction, pyelonephritis, subcapsular abscesses, and advocate the need for intervention.

Presence of infection and urinary tract obstruction, renal impairment, and urosepsis are absolute indications for urgent intervention[1]. Deciding which
intervention to use is debatable. In our case, the decision was to proceed with ureteral stenting as opposed to percutaneous nephrostomy. Several studies have compared using percutaneous nephrostomy and ureteral stenting/catheterization for decompression and diversion of hydronephrosis. Hassan Mokhmalji et al [6] have demonstrated in a group of 40 patients that percutaneous nephrostomy is superior to ureteral stenting for diversion of hydronephrosis caused by stones with usage of less analgesia, less radiological exposure, shorter antibiotic course and improved quality of life. Pearle et al [7] has demonstrated that in a group of 42 patients presenting with obstructing ureteral calculi and infection, retrograde ureteral catheterization and percutaneous nephrostomy are equally effective at relieving obstruction with no modality demonstrating superiority in speeding recovery after successful drainage; however percutaneous nephrostomy was less costly than ureteral catheterization. The decision is clearly based on surgeon preference, stone characteristics, and patient factors.

Terminology for defining various renal inflammatory/infectious processes and diseases is varyingly used by different individuals [8]. Pyonephrosis is a condition in which infection occurs in an obstructed renal collecting system, leading to accumulation of pus as in our case. The disease spectrum ranges from infected hydronephrosis, where renal function is intact, to xanthogranulomatous pyelonephritis, where kidney function is destroyed [9]. This condition is potentially life threatening and warrants immediate intervention. Our patient had already developed spread of infection as evident on blood culture and received potent intravenous antibiotics. Stent insertion deemed adequate as a method of decompressing the kidney, opening the ureter and managing the pyonephrosis. However we were faced with the second pathology of subcapsular abscesses. In retrospect even if a PCN tube was inserted instead of a DJ stent, we still would have had to insert drains for the subcapsular abscesses. Detection and drainage of these abscesses had proven to be superior in our case; it helped improve the outcome saving the patient and her kidney.
Ng et al [4] evaluated the efficacy of percutaneous nephrostomy drainage for the management of pyonephrosis. 92 patients were involved in the study, the majority of whom had underlying urinary calculi, with superimposed infection with E.coli and Klebsiella. The Study showed only 30% of bladder urine cultures were positive for microorganisms, as opposed to 58% evident by percutaneous nephrostomy cultures. In our situation blood, urine, and drain cultures were systematically positive for the same organism. The study also addressed the disadvantages of using stenting as opposed to percutaneous nephrostomy: 1) the stent usually comes in smaller sizes, therefore providing less effective drainage and decompression; 2) it needs to be performed under general anaesthesia as opposed to local anaesthesia for percutaneous nephrostomy; 3) risk of perforating the ureter upon manipulation, and bacteraemia and septicaemia may flare up under irrigation fluid pressure [4]. Percutaneous nephrostomy also has its risks including: post-procedural sepsis, hemorrhage, missed localization of collection, unabated persistence of reproducible sepsis, subsequent discplacement of the catheter, and less commonly pyopneumothorax and viscus perforation[3].

Adding up the literature, it is clear that selective approach for each patient is needed as per their pathology. Percutaneous nephrostomy versus ureteral stenting is superior in some studies and equal in others, however our case had superimposed subcapsular abscesses in which drainage was mandatory.

**Conclusion:**

Nephrectomy would have been inevitable if the kidney was deemed non-functioning after adequate decompression by ureteral stenting and abscess drainage. Both interventions had proved to reduce the bacterial burden, improving kidney perfusion and function, and preventing local extension and extrarenal abscess formation. Pressured pus impedes antibiotic access, but with percutaneous drainage of the
abscesses, and accessing more than one access point, achieved effective drainage and resolution. Points to remember are firstly to think critically and tailor treatment according to individual patient needs, being on guard and prepared beforehand to tackle any complication during the course of treatment, and as demonstrated, stenting is a viable option especially when no PCN facility is available. Use of CT in such situations has proven to be of critical importance and reimaging justifiable regardless of the issue of radiation, as it was the key to identifying the secondary pathology following stent insertion.

Percutaneous abscess drainage had proved to be a life saving adjunct to ureteral stenting in treating pyonephrosis complicated with subcapsular abscesses achieving adequate decompression and resolution of disease, avoiding the need for nephrectomy.

References

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FIGURES

Figure 1. CT scan of abdomen and pelvis demonstrating stone in left ureter.
Figure 2. CT abdomen and pelvis post stenting showing subcapsular anterolateral collection in left kidney.
Figure 3. Follow up CT abdomen and pelvis demonstrating drainage catheter in site and drainage of anterolateral subcapsular abscess.
Figure 4. CT abdomen and pelvis demonstrating posteromedial subcapsular abscess in left kidney that was eventually drained.
Figure 5. Follow up CT abdomen and pelvis demonstrating DJ stent in place and removal of drains, with complete resolution of previous subcapsular abscesses.
Figure 6. Follow up CT abdomen and pelvis with contrast demonstrating resolution of previous pathology.

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