CASE REPORT

Percutaneous Nefrolitotomy in Duplex Collecting System

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ABSTRACT

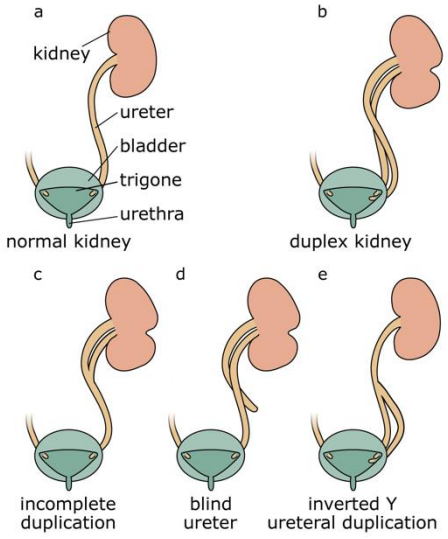
Duplex renal collecting systems are a common congenital abnormality. One of the complications of this is renal calculi. Management of renal calculi in this patient is complex. We describe a patient with renal calculus in duplex collecting system whom was performed PCNL.

Keyword: Duplex Collecting System, Stone, PCNL

Background

Duplex collecting system is one of the most common anomalies of the urinary tract. Its prevalence is 1 in 125 births. Child patients with duplicated kidneys and ureters usually present recurrent episodes of urinary tract infections (UTIs) or ureteral obstruction.[1]

Duplex collecting system have four classification[1,9], those are (1) duplex kidney (complete duplication produces a duplex kidney with two poles that drain into two ureters), shown in figure b; (2) incomplete duplication leads to a Y-shaped ureter (figure c); (3) Blind ureter which one of them not draining into the bladder (figure d); (4) inverted Y-ureteral duplication (rare case), whose two ureters fuse before entering the kidney (figure e).



Picture 1. Classification of duplex kidney

The management of staghorn calculi continues to remain a challenge despite the advances in instrumentation and technology. The various options available in the treatment of staghorn calculi include percutaneous nephrolithotomy (PCNL) monotherapy, single-tract PCNL with flexible nephroscopy, multi puncture PCNL, combinations of PCNL and extra corporeal

shockwave lithotripsy (ESWL), and open surgical options. PCNL offers high stone clearance rate and it is a safe in anomalous kidney. In that condition, PCNL is feasible procedure similar to normal kidney but requires careful preoperative planning and one has to be vigilant for all possible intra and post-operative complications.[2]

Case Report

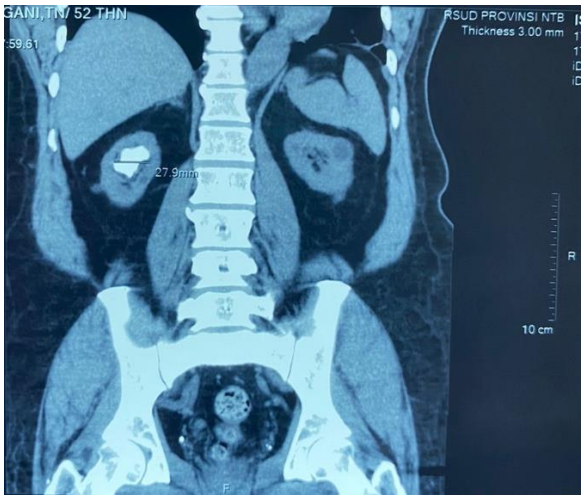
A 53-year-old male complained pain on the right flank for several weeks. No complained of dysuria, LUTS or gross haematuria. He has had several episodes of UTIs in the past. He has history of hypertension and chronic kidney disease.

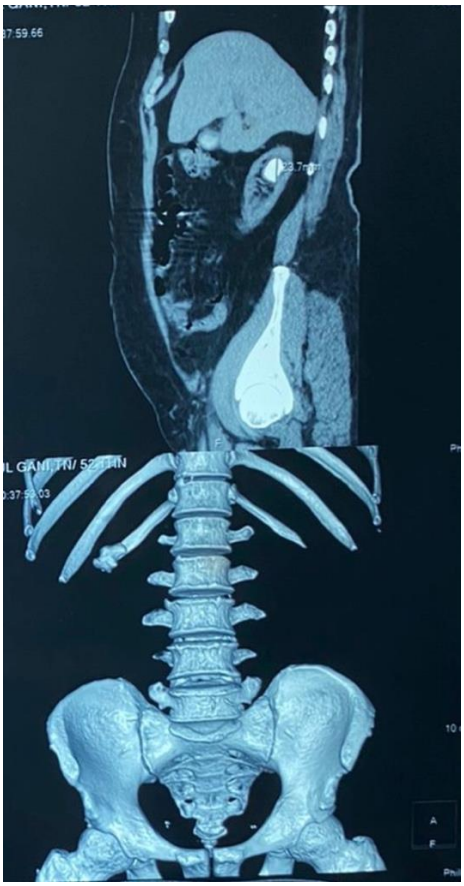
On physical examination, the general condition was good, blood pressure was 180/90, pulse rate was 75/minute, respiratory rate was 18/minute, and temperature was 37.6^{o}C. No abnormalities in the patient general physical examination. On right flank palpation, patient complained pain but no mass being detected. There was no tenderness in the left flank area. External genitalia examination was normal too. On laboratory examination, haemoglobin 11.2 g/L, leukocytes count 9.62x103/µL, platelets count 214x103/µL, urea 146 mg/L, and creatinine 4.4 mg/L.

Non contrast abdominal CT-Scan showed staghorn calculi in right kidney whose size was 2.79 x 1.8 cm. No anatomy abnormality was found in CT-Scan. The working diagnosis was right staghorn stone.

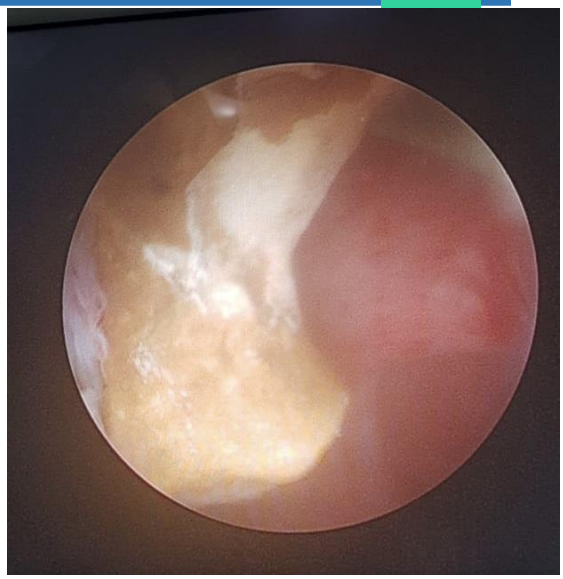
We performed percutaneous nephrolitotomy (PCNL) to remove the stones in this patient. Puncture was made via incision on 11th SIC. Incomplete duplex collecting system was found when we performed RPG before puncturing the kidney. The location of the stone was in upper moiety of the kidney. After dilating the wound, we placed amplatz sheath into it, the we inserted the nephroscope. The stone was fragmented with pneumatic lithoclast, and then removed by stone forceps.

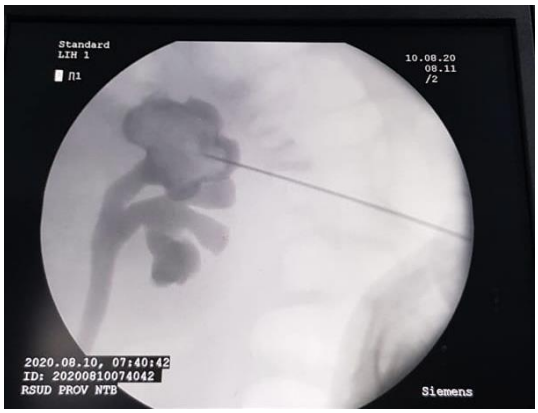
No rest stone was seen in nephroscope and X-ray procedure after surgery. A ureteral and urethral catheter were left. Patient was discharged from hospital in good condition two days after surgery. The ureter and urethral catheter was removed before he was discharged. He visited urology clinic seven days after surgery. The wound condition was good, and pain was mild.





Picture 2. Abdominal Ct-scan shows the staghorn calculi in right kidney.





Picture 3: PCNL surgery and the appearance duplex collecting system and staghorn stone in the upper moiety.

Discussion

Urinary tract calculi, one of the most common benign urological diseases, is seen in 12% of patients and has a recurrence rate of approximately 50%. Factors that may play an important role in the increase of urinary tract stone disease include increases in metabolic syndrome, lifestyle changes, dehydration, lack of water intake, and low urine volume.[3]

Indications for surgery on calculus kidney are hydronephrosis due to obstruction, either due to uretheropelvic junction stenosis or stones, and patients with complaints of unbearable pain that can interfere with daily activities. Due to current development, many urological procedures are carried out using non-invasive and minimally invasive techniques, after the introduction of ESWL (*Extracorpal Shockwave Lithotripsy*) and PNL (*Percutaneous Nephrolitotomy*); those are very popular methods due to its fewer postoperative complications than open surgery. ESWL (*Extracorpal Shockwave Lithotripsy*) can be use to treat kidney stones less than 1 cm in diameter, while for kidney stones larger than 2 cm, PNL (*Percutaneus Nephrolithotomy*) is chosen.[4]

While ESWL has the advantage of being non-invasive and avoids the need for general anaesthesia, stone localisation can be difficult due to the overlying bony structures or due to interposed bowel gas. The skin to stone distance is often increased and, even if ESWL was successful in fragmenting the stone, impaired drainage can hinder the passage of the fragments, resulting in reduced Stone free rate. PCNL offered higher stone clearance rates compared to ESWL, but with a higher risk of associated complications. Due to the anatomical variations and abnormal relationship to the adjacent organs (especially bowel), there was an increased risk of iatrogenic injury during percutaneous access in PCNL, and access tracts were often longer.[5,6]

The common congenital renal anomaly present with stone diseases is horseshoe kidney, ectopic pelvic kidney, crossed ectopic kidney (fused or separate), kidney with duplex system, and mal-rotated kidneys. Minimal invasive techniques are advantageous in stone removal due to satisfactory stone clearance, reduced hospital stay, early recovery, and reduced analgesia requirement.[7,8]

Non-contrast CT kidney, ureter and bladder (KUB) is considered to be the gold standard imaging modality for calculi, but in this case it missed the diagnosis of duplex collecting kidney. Actually, CT scan can help determine if an obstruction exists and can aid in assessing the renal parenchyma. Because there was no hydronephrosis and other anatomy abnormalities in this case, contributed to the diagnosis missing.[10]

Abdominal CT scan with contrast can help to determine the abnormalities of the pelvic and calyces, so can diagnose duplex collecting system. As well as excretory urography almost always find anatomic abnormalities in duplex collecting system. Because contrast that filled the pelvicocalyceal system can distinguish the upper and lower moiety. In this case, we found that there was duplex collecting system when we performed

RPG. It was clearly seen that the stone located in upper moiety of the kidney.[10]

On evaluation X-ray after PCNL in this case, we found no rest stone. Stone-free rate after PCNL monotherapy for staghorn calculi is reported to range between 49% to 78%.[11] In another study reported 62,6 %.[12]

Conclusion

One of the most common anomalies of the urinary tract, duplex collecting system of the kidney has a reported prevalence of 1 in 125 births. Minimal invasive techniques are advantageous in stone removal due to satisfactory stone clearance, reduced hospital stay, early recovery, and reduced analgesia requirement. PCNL in anomalous kidney is a safe and feasible procedure similar to normally located kidney but requires careful preoperative planning and one has to be vigilant for all possible intra and post-operative complications.

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