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CASE REPORT

Anatrophic Nephrolithotomy Surgery for Staghorn Calculi: A Case Report at Tertiary Care Hospital of Faisalabad, Pakistan

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ABSTRACT

Background: In this minimally invasive endo urological era, anatrophic nephrolithotomy is a urological procedure that is rarely performed. However, in the case of sophisticated staghorn calculus, it is still a possibility. A single sitting with a near-complete excision of the big calculus will be less expensive than numerous sittings with minimally invasive techniques.
Case study: A 20 year old male patient came to Urology OPD of Pakistan Atomic Energy Commission Hospital (PAEC) from Faisalabad with diagnosis of bilateral kidney stones performed anatrophic nephrolithotomy.
Results: On the fourth postoperative day, an abdominal X-ray confirmed that the right kidney was stone-free The drain was removed the same day. The ureteral stent was removed after two months. Additionally, three months following surgery, a renal ultrasound revealed no hydronephrosis and no residual stones in the right kidney. The renal function was determined to be normal. PNL is scheduled on the left side and will occur shortly. **Conclusion**: Open surgery anatrophic nephrolithotomy to remove Staghorn calculi is of great importance, especially in developing countries. Anatrophic nephrolithotomy thus is a valid approach for managing large Staghorn calculi with failed minimally invasive approaches.
Keywords: Anatrophic nephrolithotomy, Staghorn calculus, Tertiary care hospital

INTRODUCTION

The anatropic nephrolithotomy technique employs an intersegmental parenchymal panel, creating a relatively avascular line (Brodel's white line), enable for the removal of large renal calculi like Staghorn stone.[1] There have been favorable benefits to human health since 1976 when nephrolithotomy was the first employed.[2] Treatment of adult renal calculi with this method was well recognized across the world.[3] In the past, kidney stones were removed through open surgery and commonly performed and recommended for the treatment of renal stones. However, dramatical changes occurs in the last several decades and open surgery has been superseded by less invasive modern techniques like extracorporeal shock waves lithotripsy (ESWL), ureterorenoscopy (URS), and percutaneous nephrolithotripsy (PNL) for ureteral and renal stones especially in case of the huge staghorn stone.[4]

CASE STUDY

A 20-year-old male patient presented as a case of bilateral kidney stones at the Out-patient Urology department of Pakistan atomic energy commission hospital (PAEC) from Faisalabad. The abdomen X-ray presented the Staghorn calculi with several calyceal stones on the right side and a big one with two little calculi on the left side. He complained of periodic bilateral flank discomfort that was more acute on the right side. The pain was colicky and occurred occasionally for around four months with no other co-morbidity associated with nausea and pain that was worse by effort and dehydration. Left pyelolithotomy was performed in 2006, while ESWL for bilateral kidney stones was performed 12 years earlier in 2008. Ultrasound confirmed the presence of bilateral renal stones measuring approximately 3.3 cm x 2.8 cm on the right side and multiple small calculi with hydronephrosis on the left side, as well as a large calculus measuring approximately 3.1 2.4 cm on the left side and two small calculi with hydronephrosis. X-ray KUB reveals a Staghorn with several little calyceal stones on the right and a Staghorn with two small stones on the left (Fig. 1). Renal function was normal, with a serum creatinine of 1.1 mg/dL and serum urea of 34 mg/dL. Preoperative IVU revealed a delayed nephrogram and a narrowed infundibulum with a reduced infundibulopelvic angle (Fig. 2). Before surgery, urine culture was also done and revealed no growth. Additionally, a renal scan was done, which revealed 49 percent split function with a GFR of 25 ml/min on the left and 51 percent split function with a GFR of 26 ml/min on the right. Prior to surgery, a metabolic workup was performed to determine the volume of 24-hour urine (2800 ml), the concentration of urinary creatinine (21 ml), the concentration of 24-hour urinary creatinine (588 ml), the concentration of urinary magnesium (4.4 mg/dl), the concentration of 24-hour urinary magnesium (123 mg/24h), the concentration of urine sodium (8 mEq/l), the concentration of urinary protein (5 mg/dl), the concentration of 24 hours TLC and HB levels are typical in a complete blood count. Total Bilirubin was 0.24 mg/dl, ALT was 11 U/L, alkaline phosphatase was 107 U/L, urea was 43 mg/dl, creatinine was 1.39 mg/dl, and uric acid was 3.76 mg/dl. The PT, INR, and APTT are all within normal limits.


Fig 1: X-ray (KUB)

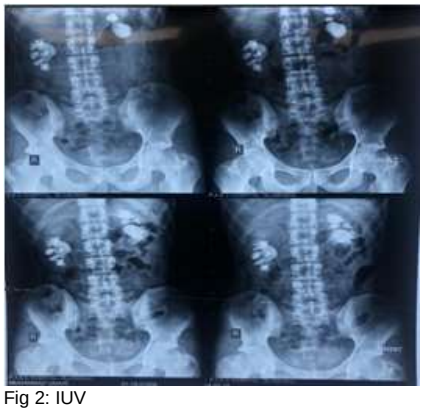
Fig 2: IUV

SURGICAL TECHNIQUE

A supratwelve flank incision was used to access the kidney. Once access to the retroperitoneal area was obtained, Gerota's fascia

was longitudinally cut and the perinephric fat was meticulously peeled away from the whole renal capsule. The renal artery and vein were identified, and the posterior segmental artery was isolated and briefly constricted during intravenous injection of 20mL methylene blue to establish Brodel's line. The primary renal artery and vein were then blocked by bulldog clamps, and ice slush was used to achieve cold ischemia around the kidney. To pack away the peritoneal contents, dry laparotomy sponges were utilized. Throughout the case, slush was delivered as required to maintain proper regional othermia while the renal arteries were blocked. Along the previously defined anatrophic plane, a nephrotomy was performed. The collection system was unlocked, revealing the stones. Staghorn calculi were entirely removed together with minor calyceal stones (Figs. 3-4) and the stones were cleared intraoperatively using fluoroscopy. A 6 Fr. double coil. Standard In the ureter, a multi-length stent was implanted, and a 24 Fr foey,s catheter was left in the pelvis. A 4–0 Vicryl suture was used to accomplish a calicoplasty, and a 2–0 Vicryl suture was used to finish the parenchymal suture. In the perirenal area, a 24-inch drainage tube was left in place. Approximately 500ml blood was lost during the procedure. The duration of cold ischaemia was 28 minutes, while the overall operating time was 180 minutes. One pint of fresh blood was transfused during operation.


Fig 3: Staghorn extraction


Fig 4: Stone removed

RESULTS

On the fourth postoperative day, an abdominal X-ray confirmed that the right kidney was stone-free (Figs.5-6). The drain was removed the same day. The ureteral stent was removed after two months. Additionally, three months following surgery, a renal ultrasound revealed no hydronephrosis and no residual stones in the right kidney. The renal function was determined to be normal. PNL is scheduled on the left side and will occur shortly.


Fig 5: Caloplasty and parenchymal closer


Fig 6: Post-operative Xray

DISCUSSION

Open surgical removal of renal calculi was of great importance in the management of calculous diseases.[5] Four types of treatments such as ESWL, Ureteroscopy, PNL, and open surgery are used for the removal of renal stones. Nowadays PNL and ESWL have widely used procedures for the treatment of ureteral and renal stones. These procedures have ended in the need for open surgery for kidney and ureteral stones, although the open surgery has its role to remove the Staghorn from the kidney.[3] The initiation of stone removal by laparoscopic technique has additionally minimized the need to perform open surgery, even anatrophic nephrolithotomy.[6] In the modern world, the approach to open stone surgery is minimized to about 1%–5.4% of the cases.[7] Open surgery for most renal stones now holds only historical importance. According to the European association of urology guidelines, the failure of ESWL and PNL are the dominant clues for open surgery. When these new procedures fail to remove the stone from the kidney then an atrophic nephrolithotomy procedure help to remove the stones from the kidney. Anatrophic Nephrolithotomy is the most ideal approach for open surgery as planned by Smith and Boyce in 1968.[7] Anatropic nephrolithotomy stone removal remains a feasible treatment procedure for some affected individuals. Technological advances and developed surgical abilities have greatly minimized the need for open surgery. Anatropic nephrolithotomy is mainly used for patients having Staghorn or the condition associated with other internal anatomic abnormalities. Open surgery may be preferred when the kidney contains a staghorn stone or any type of infection. The key signs for open renal surgery were staghorn stone load, treatment failures with

less-invasive modalities in the patient's medical history, anatomical complications, and comorbidities.[8] Staghorn calculi may cause severe morbidity due to severe infection, complications, renal failure, and death.[9]

Renal stone formation is a major health problem in advanced countries. Its prevalence is more common in adults than in children.[10] In children, open surgery is still a treatment of priority because of metabolic disorders and anatomical abnormalities. For nephrectomy candidates having Staghorn calculi, laparoscopic nephrectomy is done but open nephrectomy is the best choice in this regard if there is severe renal inflammation. In developing countries, open surgery was carried out due to the cost-effective treatment modality.[11] The main objective of the open surgery was to eradicate Staghorn and other small renal calculi from the right kidney to improve urination, eliminate infections, and maintain renal function. Employing open surgery we got a stone-free right kidney without significant blood loss and with few days of hospitalization. According to previous history comparing reports of both open surgery and PNL, usually concluded in favor of PNL in terms of complications and postoperative pain. Another positive aspect of open surgery is its inimitable role in case of problems during endourologic procedures. Endourology minimizes the indication to open surgery in the treatment of renal large calculi but open surgery is still functional in rare cases. The open surgery approach is made to treat individuals with Staghorn calculi and complex collecting system anatomy.[12]

CONCLUSION

Open surgery anatrophic nephrolithotomy to remove Staghorn calculi is of great importance, especially in developing countries. Anatrophic nephrolithotomy thus is a valid approach for managing large Staghorn calculi with failed minimally invasive approaches. In cases of insignificantly offensive therapeutic failures, an open surgical approach becomes required. Open surgery stands as a gold standard for the removal of renal Staghorn calculi

REFERENCES

1. Jaffery AH, Zubair M, Abdullah A. Anatrophic nephrolithotomy in the management of large staghorn renal calculi. Pak J Surg 2008; 24(2):110-2.
2. Fernström I, Johansson B. Percutaneous pyelolithotomy: a new extraction technique. Scandinavian J Urol Nephrol 1976;10(3):257-9.
3. Singal RK, Denstedt JD. Contemporary management of ureteral stones. Urol Clin North Am 1997;24(1):59-70.
4. Chaussy CG, Fuchs GJ. Current state and future developments of noninvasive treatment of human urinary stones with extracorporeal shock wave lithotripsy. J Urol 1989;141(3):782-9.
5. Boyce WH, Elkins IB. Reconstructive renal surgery following anatrophic nephrolithotomy: follow-up of 100 consecutive cases. J Urol 1974; 111(3):307-12.
6. Gaur D, Trivedi S, Prabhudesai M, Gopichand M. Retroperitoneal laparoscopic pyelolithotomy for staghorn stones. J Laparoendoscopic Advanced Surg Tech 2002;12(4):299-303.
7. Unsal A, Cimentepe E, Saglam R, Balbay M. Pneumatic lithotripsy through pyelotomy incision during open surgery for staghorn calculi: an alternative method to anatrophic nephrolithotomy. Urologia internationalis. 2004; 72(2):140-4.
8. Paik M, Resnick M. The role of open stone surgery in the management of urolithiasis. Tech Urol 1997;3(2):96-9.
9. Simforoosh N, Aminsharifi A, Tabibi A, Noor-Alizadeh A, Zand S, Radfar MH, et al. Laparoscopic anatrophic nephrolithotomy for managing large staghorn calculi. BJU Int 2008;101(10):1293-6.
10. Woodside JR, Stevens GF, Stark GL, Borden TA, Ball WS. Percutaneous stone removal in children. J Urol 1985;134(6):1166-7.
11. Eze KC, Irekpita E, Salami T. Cost-effectiveness of extracorporeal shock wave lithotripsy in a poor resource setting: The Okada, Nigeria experience. Nigerian Med J 2016;57(1):44.
12. Assimos DG. Anatrophic nephrolithotomy. Urology 2001;57(1):161-5.