

CALYCEAL DIVERTICULUM: A CASE REPORT

Dwi Nanda Satriyo Arif Wibowo^{1*}, Doddy M Soebadi¹

¹Department of Urology, Faculty of Medicine, Universitas Airlangga, Dr Soetomo Academic Hospital, Surabaya

ABSTRACT

Calyceal diverticula are often benign and asymptomatic. On the other hand, some interventions are necessary in several symptoms. Radiological imaging is performed to make diagnoses, but somehow can pose misinterpretation of radiological imaging results and mistreatment from the urologist. To present a case of a calyceal diverticulum treated with open diverticulectomy. This study reported a case of a calyceal diverticulum in a 30-year-old man with an almost 1-month history of left flank pain. The patient underwent several imaging diagnostics, before finally diagnosed calyceal diverticulum with a stone inside it. The patient had undergone open diverticulectomy. Initially, cystoscopy and insertion of Double J Stent (DJ Stent) were done, and then using the lumbotomy approach the incision that had been made. This case demonstrated the use of imaging combined with urologist interpretation and surgical management which was successfully treated the patient's clinical problems.

Keywords: flank pain; calyceal diverticulum; open diverticulectomy

ABSTRAK

Divertikel kaliks seringkali jinak dan tidak bergejala. Di sisi lain, intervensi diperlukan bila didapatkan gejala. Pencitraan radiologis dilakukan untuk membuat diagnosis, dengan kemungkinan ketidaktepatan interpretasi hasil pencitraan radiologis dan berpengaruh pada tindakan ahli urologi. Kami melaporkan sebuah kasus divertikel kaliks yang dilakukan divertikulektomi terbuka. Kami melaporkan kasus divertikulum calyceal pada pria berusia 30 tahun dengan riwayat nyeri panggul kiri hampir 1 bulan. Pasien menjalani sejumlah pencitraan, sebelum akhirnya terdiagnosis divertikel kaliks dengan batu di dalamnya. Kami mengerjakan sistoskopi dan pemasangan Double J Stent (DJ Stent) terlebih dahulu, kemudian pasien diposisikan lumbotomi untuk prosedur divertikulektomi terbuka. Kasus ini menunjukkan penggunaan pencitraan dikombinasi dengan interpretasi urologis dan tindakan pembedahannya yang berhasil mengatasi keluhan klinis pasien.

Kata kunci: nyeri panggul; divertikel kaliks; divertikulektomi terbuka

Correspondence: Dwi Nanda Satriyo Arif Wibowo, Department of Urology, Faculty of Medicine, Universitas Airlangga, Dr Soetomo Academic Hospital, Surabaya. Email: dwinanda.urologi@gmail.com

pISSN:2355-8393 • eISSN: 2599-056x • doi: 10.20473/fmi.v57i1.21197

• Fol Med Indones. 2020;57:76-81 • Received 5 Aug 2020 • Accepted 27 Oct 2020

• Open access under CC-BY-NC-SA license • Available at <https://e-journal.unair.ac.id/FMI/>

INTRODUCTION

A calyceal diverticulum is an event of the upper collecting system located in the kidney parenchyma and relatively uncommon with various unique clinical, pathological, and therapeutic features (Timmons et al 1975). The formation of the non-secretory sac is limited by transitional epithelial cells and is related to the main collecting system through a narrow channel, so that it allows passive filling of urine (Wein et al 2016). A century before, Prather put forward the term calyx diverticula used today (Dineva et al 2016).

A diverticulum can be caused by secondary factors due to trauma or due to previous surgical processes such as

percutaneous nephrolithotomy (PNL) (Middleton & Pfister 1974). Described in most literature, diverticles are divided into 2 types, type I is the type that is more often found, located at the upper pole, and connects with minor calyx, usually the fornix. Whereas type II connects with calyx major or with kidney pelvis and tends to provide clinical symptoms, because its size can develop to be quite large and/due to stone formation (Rapp & Gerber 2004). In this study, we described the treatment of calyceal diverticulum in superior left kidney with open diverticulectomy.

CASE REPORT

A 30-year-old man presented with sudden left dull flank pain, weighing for almost a month. The patient had fever and hematuria intermittently. There was no history of allergies to certain medicine/food, trauma, and previous surgery. Cigarette consumption was confirmed by the patient for approximately 1 pack/2 days. The patient was a Javanese native with no family members who have similar symptoms. His vital signs and physical test were in normal limits. The abnormal laboratory results found in urinalysis leukocytes +2, blood +3, protein +3, from urine sediment obtained leukocytes and full erythrocytes per visual field.

Computed Tomography (CT) - Abdominal scan and Intravenous Pyelogram (IVP) (Figure 1 and Figure 2) were performed. Those 2 modalities were still inadequate to visualized the delayed phase-contrast filling the kidney cystic mass, and later found out it as diverticulum while using Magnetic Resonance Imaging (MRI).



Figure 1. CT scan of the abdomen with contrast, the visible formation of cystic mass on the coronal and axial sides with sizes visible in each image 73.2 x 57.2 mm and 80.9 x 82.4 mm



Figure 2. IVP starts from a plain abdominal radiograph/kidney-ureter-bladder (KUB) x-ray pre-contrast. In the secretion phase in the 5th minute, the left kidney appears behind the right kidney. At 2 hours after filling the contrast, visible mass formation in the left kidney.

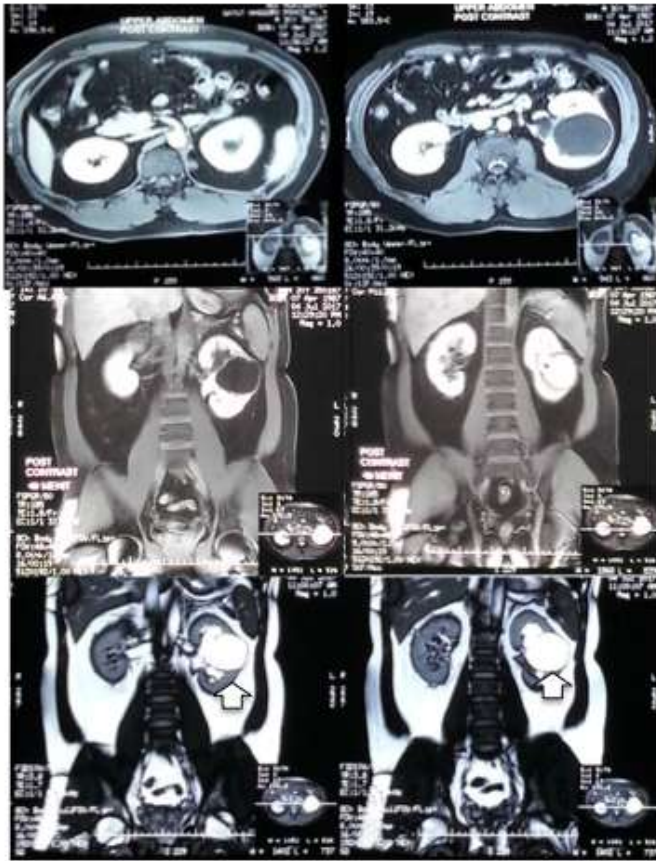


Figure 3. MRI Abdomen wedge Axial, Coronal T1Fat Sat, T2 Fat Sat, 2DFIESTA, 3D MRU without contrast, followed by T1FS with intravenous Gadolinium contrast. The post-contrast filling diverticulum is indicated with a white arrow.

MRI results obtained normal large right kidney, no hydronephrosis, no stones/cysts/nodules were seen. Left kidney appears large, cystic lesions appear related to the calyx of the upper left kidney, small neck diameter 16 mm and stones in neck diverticula size: 12.7 x 9.2 mm, no visible hydronephrosis, no visible solid mass. On the post-contrast, the contrast appears to fill the lesion. The diverticula size: 71 x 49 x 55 mm located between the upper calyx pole and the middle calyx pole of the left kidney when the middle pole is pushed down. Other organs were in normal limits.

The patient was planned for surgery. The surgery was performed with cystoscopy, left Retrograde Pyelography (RPG), and left Double J (DJ) Stent Ch 6 (Figure 4) and Folley Cath 16 Fr first, followed by open diverticulectomy (Figure 5).

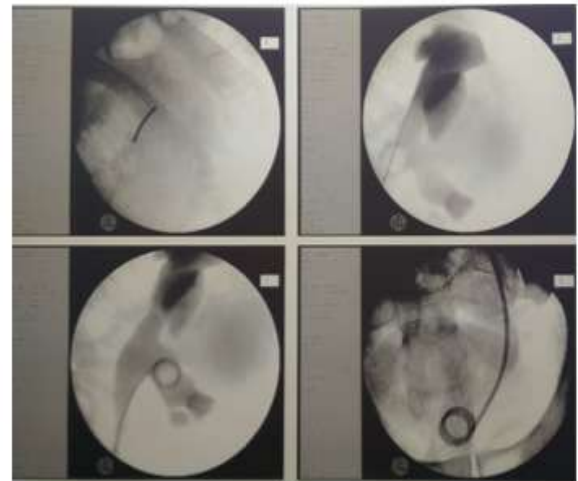


Figure 4. The RPG process and the insertion and correction of left kidney DJ stent.



Figure 5. (A). Exploration of the diverticular wall right in the middle of the left kidney; (B, C). Excision of the diverticula wall is approximately half

After excision of the diverticles, the mucosal wall and parenchyma sutured in two layers fashion. The wound was closed layer by layer and the Ch 14 vacuum drain was placed. The results obtained during surgery in the form of left calyx diverticles were examined for anatomic pathology (Figure 6). Microscopic results showed no malignancy, more likely a Cystic Disease of the kidney with Chronic Pyelonephritis.

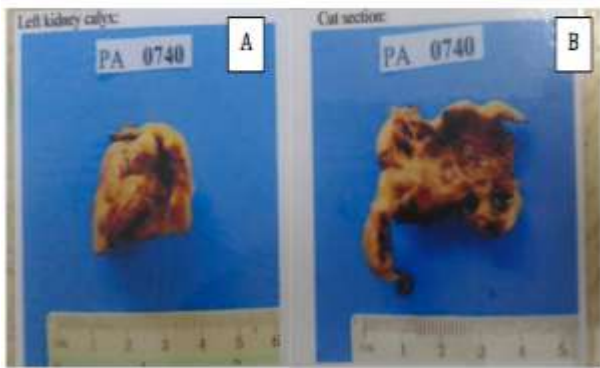


Figure 6. Specimens of left kidney diverticula (A) Part of left calyx kidney tissue, (B) Cut Section of left kidney calyx

After surgery, vital signs, symptoms, urine, and drain production were observed. One day after surgery, all laboratory and clinical results were in good condition. The patient also performed a KUB x-ray later (Figure 7). Continued on the third day after surgery the patient was examined for ultrasonography (USG) Urology (Figure 8). The results of the KUB x-ray and USG, right and left kidney within normal limit with left DJ stent visualized in a good position.



Figure 7. KUB x-ray one day after surgery



Figure 8. Urology USG showed left kidney after surgery, visualized tip of DJ Stent and no hydronephrosis, mass, stones, and blood clots were obtained. Doppler clearly showed good vascularity on both kidneys. Bladder and prostate are within normal limits.

On the sixth day, the drain was removed. On the seventh day after surgery, the patient was able to mobilize adequately and no other significant symptoms were obtained. The patient was discharged and scheduled for outpatient polyclinic control 1 month later.

DISCUSSION

The diagnosis of calyceal diverticulum relies heavily on radiological imaging. Misinterpretation of imaging later may be misleading the operator to choose surgical intervention methods. Since all of the symptoms (such as hematuria, urinary tract infections, and flank pain) in this patient were mostly considered as clinical kidney tumors. The symptoms that arise in our patients might be caused by diverticular neck obstruction causing calculus, or the calculus itself which obstructed neck's diverticles. Nearly 50% of the calculus in the diverticular cavity was calcium which moved with changes in body position (Tanagho & McAninch 2013, Burns et al 1984). According to the latest theory, the urine collected in the diverticula could be a single factor in the formation of stones (Auge et al 2006). Other

researchers have revealed that metabolic factors contribute to causing lithogenesis. This can be seen in the results of a 24-hour urine test, an abnormal parameter was found (Israel & Bosniak 2003).

MRI results visualized the longitudinal opacity which CT and IVP lacks sensitive when the contrast flew slowly from the neck and filled the diverticula. This phenomena was caused by the slow exchange of urine between the pelvicalyceal and the diverticula system, so that the contrast cannot reflux the diverticula or even visualized any opacity at all and could be interpreted as a kidney tumor or cyst (Ritchie et al 1990). Our patient diverticula size 71 x 49 x 55 mm was quite large, considering the size of the largest diverticles ever reported to be 18 cm (Auge et al 2006). It was assumed that the size of the diverticula increased with time if the patient had no symptoms. In principle, the management of diverticles followed by symptoms included taking stones and expanding infundibular stenosis to prevent urine accumulation or by ablation of the diverticular cavity at the same time (Tanagho & McAninch 2013).

The least invasive therapy was Extracorporeal Shock Wave Lithotripsy (ESWL) and was often chosen by patients and their families, but some studies showed the results of stone-free rates range from only 20-58% (Stroom & Yost 1992, Turna et al 2007). The selection criteria for ESWL included stone size <1.5 cm and the neck of the diverticula that must be short and open, where stone fragments could come out and minimize the number of further surgical procedures (Waingankar et al 2014, Tan et al 2013, Rathaus et al 2001).

Endourology procedures, such as ureteroscopy (URS) or PNL might offer substantial benefits regarding size and position from stone or diverticula. Both procedures had varied good stone-free rates (70 % to 100%) and symptom-free rates (77% to 100%) (Tanagho & McAninch 2013, Tan et al 2013). Overall, the stone-free rate of URS was superior compared to SWL, but more inferior to PNL (Waingankar et al 2014).

The laparoscopic approach or robotic surgeries of diverticles neck with stones had been described in a large number of studies and were often used for stones located anteriorly (Wyler et al 2005). Waingankar et al explained that the results obtained using the retroperitoneal and transperitoneal approaches for diverticles located in the posterior are astonishing. The incidence of 100% stone-free rates, ablation of the diverticles reached 92%, and symptoms-free conditions range from 75-87% (Waingankar et al 2014).

Meanwhile, an open approach for stone-forming calyx diverticles treatment became obsolete. There remained a

portion role for open surgery where anatomic and/surgical cost consideration, limited instrument availability, and patient or operator preferences excluded their uses. On the other hand, this open approach offered almost 95-100% stone-free rates and almost 90% symptoms-free conditions (Wein et al 2016, Tanagho & McAninch 2013, Ramakumar & Segura 2000).

CONCLUSION

Open surgical in developed countries has remained as the treatment of choice since it is safe, cheaper than the laparoscopic approach, and able to provide good results, coupled with the choice of an incision technique approach by the operator that allows for minimizing surgical scars. Periodic evaluations are needed if recurring symptoms arise with consideration of stone reformation.

REFERENCES

- Timmons JW Jr, Malek RS, Hattery RR, Deweerd JH (1975). Caliceal diverticulum. *J Urol*, 114, 6-9.
- Wein AJ, Kavoussi LR, Partin AW, Peters CA (2016). *Campbell-Walsh Urology Eleventh Edition*. Philadelphia: Elsevier-Saunders, p. 3134-3172.
- Dineva S, Halachev N, Smilov N (2016). Calyceal diverticulum: A case report. *Journal of Dental and Medical Sciences*, 15, 79-82. doi: 10.9790/0853-1512017982.
- Middleton AW Jr, Pfister RC (1974). Stone-containing pyelocaliceal diverticulum: embryogenic, anatomic, radiologic and clinical characteristics. *J Urol*. 111, 2-6. doi: 10.1016/s0022-5347(17)59872-9.
- Rapp DE, Gerber GS (2004). Management of caliceal diverticula. *J Endourol*, 18, 805-810.
- Tanagho E A, McAninch JW (2013). *Smith's general urology 18th*. New York: Mc Graw Hill, p. 182-196.
- Burns JR, Finlayso B, Gauthier J (1984). Calcium oxalate retention in subjects with crystalluria. *Urol Int*, 39, 36-9.
- Auge BK, Maloney ME, Mathias BJ, Pietrow PK, Preminger GM (2006). Metabolic abnormalities associated with calyceal diverticular stones. *BJU Int*, 97, 1053-6.
- Israel GM, Bosniak MA (2003). Calcification in cystic kidney masses: Is it important in diagnosis? *Radiology*, 226:47-52. doi: 10.1148/radiol.2261011704.
- Ritchie AW, Parr NJ, Moussa SA, Tolley DA (1990). Lithotripsy for calculi in caliceal diverticula? *Br J Urol*, 66, 6-8. doi: 10.1111/j.1464-410x.1990.tb14853.x.

- Stroom SB, Yost A (1992). Treatment of caliceal diverticular calculi with extracorporeal shock wave lithotripsy: patient selection and extended follow up. *J Urol*, 148, 1043-1046. doi: 10.1016/s0022-5347(17)36812-x.
- Turna B, Raza A, Moussa S, Smith G, Tolley DA (2007). Management of calyceal diverticular stones with extracorporeal shock wave lithotripsy and percutaneous nephrolithotomy: long-term outcomes. *BJU Int*, 100, 151-6. doi: 10.1111/j.1464-410X.2007.06911.x.
- Waingankar N, Hayek S, Smith AD, Okeke Z (2014). Calyceal diverticula: A comprehensive review. *Rev Urol*, 16, 29-43.
- Tan YK, Cha DY, Gupta M (2013). Management of stones in abnormal situations. *Urol Clin North Am*, 40, 79-97.
- Rathaus V, Konen O, Werner M, Shapiro Feinberg M, Grunebaum M, Zissin R (2001). Pyelocalyceal diverticulum: The imaging spectrum with emphasis on the ultrasound features. *Br J Radiol*, 74, 595-601.
- Wyller SF, Bachmann A, Jayet C, Casella R, Gasser TC, Sulser T (2005). Retroperitoneoscopic management of caliceal diverticular calculi. *Urology*, 65, 380-3.
- Ramakumar S, Segura JW (2000). Laparoscopic surgery for renal urolithiasis: pyelolithotomy, calyceal diverticulectomy, and treatment of stones in a pelvic kidney. *J Endourol*, 14, 829-832.