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Calyceal Diverticula and Megacalycosis Urographic Diagnosis Complications and Treatment

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Abstract

Background: Calyceal diverticulae and megacalycosis are rare congenital anomalies. The majorities are asymptomatic but they can present with complications. **Objective:** The objective of this study is to describe the clinical presentations, complications, urographic diagnosis of calyceal diverticulae, megacalycosis, and their treatment. **Methods:** A descriptive study carried out over 8 years period from March 2012 to December 2019. In three big hospital of Aden province, we collect 15 patients aged from seven to 41 years (mean 13.5 years), our patients were 9 female (60%) and 6 male (40%). They diagnosed incidentally with calyceal diverticulae and megacalycosis by contrasted urography, describing the clinical manifestations, localization, complications, and type of treatment. **Results:** Sixty percent of patients with calyceal diverticulae and megacalycosis were women and (40%) were men. Clinical manifestations including, dull aching flank and abdominal pain in (40%), acute renal colic (20%), recurrent urinary tract infection (33%), and abdominal pain with a fever of unknown origin in (7%). Calyceal diverticula and megacalycosis were bilateral in (53%) and unilateral in (47%). In the right kidney were (57%), and in the left kidney (43%). In the upper pole of the kidney were (53.3%), middle pole (33.3%), and lower pole (13.3%). Complications occurred in (47%) of patients. They including, urinary stones in (71.4%), hypertension (14.3%), and delayed renal excretion (14.3%). Conservative treatment carried out in (73%) and surgically intervened in (27%). **Conclusions:** Calyceal diverticula and megacalycosis are rare anomalies. Dull aching flank pain and recurrent urinary tract infections are the most frequent clinical presentations. The most common complications are urinary stones. Conservative treatment is a common type of treatment.

Keywords

Calyceal Diverticulae and Megacalycosis, Diagnosis, Treatment

1. Introduction

Calyceal diverticula and megacalycosis are rare congenital anomalies. Calyceal diverticulae present as a cystic cavity of the renal calyceal system which communicates with it through a narrow fornical cannel, while megacalycosis is unilateral dilatation of the renal calyces in the presence of normal undilated renal pelvis and ureter. It results from abnormal budding of the ureteric bud with subsequent lack of parenchymal induction and resultant cystic cavity formation. Megacalycosis is a rare congenital malformation, characterized by homogenous dilatation of the renal calyces with non-obstructive and non-progressive evolution [1] [2]. Calyceal diverticulae were seen in 0.05% of patients out of 12,000 of examined excretory urography. In the majority of cases are asymptomatic, and incidentally diagnosed during imaging study but clinically can result in a variety of complications [3] [4]. Upright or right lateral decubitus plain abdominal radiography shows the half-moon shape of milky calcium appearance which is the pathogenic feature [5]. Ultrasound is the first investigation but is inconclusive because it resembles a simple cyst [6] [7]. The diagnosis is made by intravenous urography and computerized tomographic urography in complex cysts [8]. Stones in the pelvicalyceal diverticula occurred in up to 50% of patients and recurrent urinary tract infections in 25% of patients [9]. Historically open surgical procedures include excision, marsupialization, diverticulectomy or partial nephrectomy. Extracorporeal Shock wave Lithotripsy (SWL) is considered as the first line for treatment [10]. Percutaneous extraction and diverticulum fulguration with canal dilatation provide a good immediate success rate, and low morbidity, it is now accepted as the standard treatment [11]. The diagnosis of calyceal diverticula is a challenge, especially in children. They can result in various complications and diagnostic difficulties.

The objective of this study is to describe the diagnosis of calyceal diverticulae and megacalycosis and their treatment.

2. Methods

A descriptive study carried out over 8 years period from March 2012 to December 2019. In three big hospitals (Al-gamoriah teaching hospital, Al-Naquib and Almansorah Hospital) in Aden province, we collected 15 patients aged from seven to 41 years (mean 13.5 years), our patients were 9 female (60%) and 6 male (40%), Sixty percent of patients were children (60%) and (40%) were adults. They presented with nonspecific clinical manifestations, and incidentally diagnosed with calyceal diverticulae and megacalycosi by contrasted excretory urography.

Describing the clinical manifestations and localization whether unilateral or

bilateral, poles localization whether in the upper, middle, or lower pole of kidneys, the radiologic findings, complications, and type of treatment whether medical or surgical interventions. The data collection was retrieved from medical outpatients' registries and Hospitals' retained Medical documents.

Inclusion: We included those patients who attended these three Hospitals in Aden Governorate and diagnosed with calyceal diverticulae or megacalycosis.

Exclusion: The patients who had the acquired types, and those diagnosed as simple or complex renal cysts were excluded from the study.

Statistic: Statistics method carried out with frequencies and percentages, and confection of tables carried out manually using a summary measure. Data was processing and analyzed using Social Science Statistics software.

Ethical Approval and Consent for patients were not applicable, and patients' identifiers and organ exposure for patients are not involved.

3. Results

Of the total 15 patients included in our study nine patients (60%) with calyceal diverticulae and megacalycosis were women's and six patients (40%) were men. The clinical manifestations (Table 1) including dull flank and abdominal pain in six patients (40%), acute renal colic three (20%), recurrent urinary tract infection five (33%), and diffuse abdominal pain associated with fever of unknown origin one patient (7%). Calyceal diverticulae and megacalycosis were diagnosed by contrasted excretory urography. They were bilateral (Figure 1) in eight (53%) and unilateral (Figure 2) in seven (47%). Unilaterally localized in the right kidney four (57%), and in the left kidney three (43%). Localized in the upper pole of the kidney eight (53.3%), middle pole four (33.3%) and in lower pole two patients (13.3%) as shown in Table 2. Megacalycosis are localized in the central portion of the kidney, characterized by non-obstructive dilatation of pelvis and conserved renal function (Figure 3), and one patient (7%) of them presented with an associated right renal agenesis (Figure 4). Complications (Table 3) occurred in seven patients (47%) including, urinary stones in five patients (71.4%). Anemia and hypertension in one patient (14.3%), and delayed renal excretion in another one (14.3%), Bilateral multiple small renal stones in the lower pole (Figure 5) found in three patients (60%) and unilateral in two (40%) of patients with urinary stones. Conservative treatment carried out in 11 patients (73%) and surgically intervened four (27%). They including (Table 3) excision of the diverticulum

Table 1. Calyceal diverticula and megacalycosis regarding to the clinical presentations.

Clinical presentations	NO	%
Dull aching flank pain	6	40
Acute renal colic	3	20
Recurrent UTI	5	33
Abdominal pain with Fever of unknown origin	1	7%
Total	15	100

Table 2. Calyceal diverticula and megacalycosis regarding to the site and kidney poles localization.

Unilateral	7	47	Upper pole	8	53.3
Right	4	57	Middle pole	5	33.3
Left	3	43	Lower pole	2	13.3
Bilateral	8	53	Total	15	100
Total	15	100			

Table 3. Congenital calyceal diverticulae and megacalycosis according to complications and surgical procedures.

Complications	No	%	Surgical procedures	No	%
Urinary stones	5	71.4	ESWL	2	50
Hypertension	1	14.3	Excision	1	25
Delay of excretion	1	14.3	Diverticulutomy	1	25
Total	7	100	Total	4	100

ESWL = Extracorporeal shock wave lithotripsy.

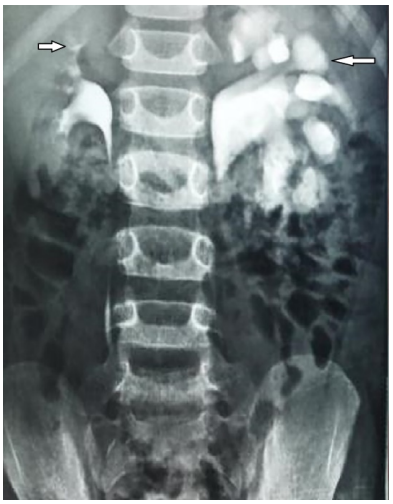

Figure 1. Intravenous urography (IVU) showing bilateral calyceal diverticula, more dilatation in the left side (bilateral arrows).

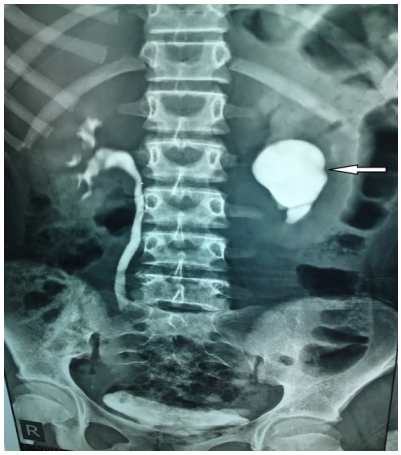

Figure 2. IVU Shows calyceal diverticula in the left pelvicalyceal system (arrow).

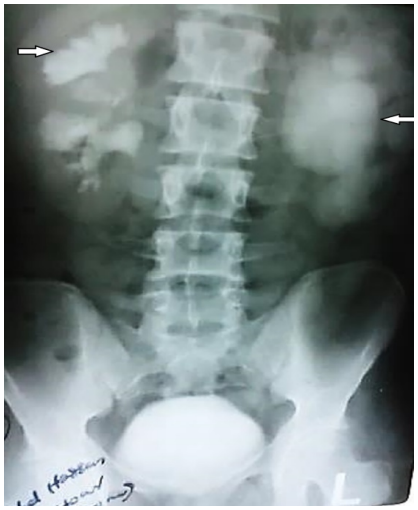

Figure 3. IVU showing bilateral megacalycosis, more calyceal dilatation in the left pelvicalyceal system (bilateral arrows).

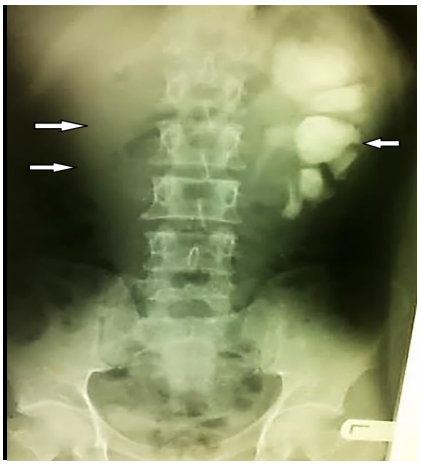

Figure 4. IVU showing left megalocalycosis (Single arrow) associated with right renal agenesis (Two arrows).

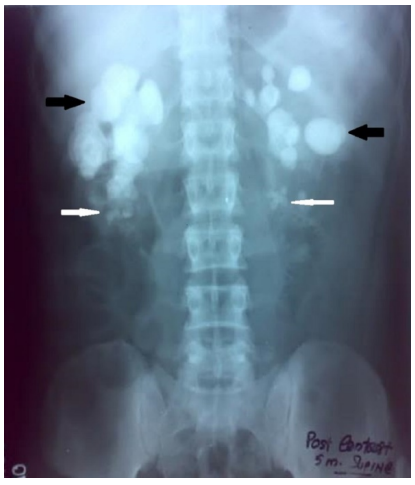

Figure 5. IVU showing bilateral megacalycosis (black arrows) with very small stones in both lower poles of kidneys (white arrows).

and marsupialization in one patient (25%), diverticulectomy in another one (25%), and two patients (50%) carried out extracorporeal shock wave lithotripsy (ESWL). Stones in the lower poles of kidneys in three patients were very small and treated medically. All patients were under continued follow up at our outpatient clinic and the outcome was excellent.

4. Discussion

Calyceal diverticula and megacalycosis are rare congenital anomalies; both represent dilatation of the collecting system but differ in their pathological and radiological features. Two types of calyceal diverticula are recognized. Type I: Calyceal diverticula is the most common, is related to a minor calyx [12]. Type II: It is an extremely rare renal anomaly; it communicates with the renal pelvis or major calyx. It is larger, and symptomatic in the majority of patients. Characterized by non-obstructive dilatation of calyces, the renal pelvis is not dilated, and the ureteropelvic junction is normal and conserved renal function [13]. Calyceal diverticula in the majority are asymptomatic. One-third to one-half of patients present with flank pain, urinary tract infection, and/or hematuria, and stones formation [14]. The calyceal diverticulae were bilateral in 53% and unilateral in 47% of patients, Calyceal diverticulae were commonly unilateral and less frequent bilaterally described by Jain *et al.* 2004 [15]. It is two times more often found in the right kidney than in the left one, and solitary calyceal diverticulae occurs in 90% of patients described by Surendrababu [16]. They should differentiated simple renal cysts, renal cortical abscess, papillary necrosis, and early stage of adult dominant polycystic kidney disease [17]. Clinical presentations and urographic findings are consistent with reported [18] by Stunnell *et al.* 2010. Megacalycosis is a rare congenital anomaly, mostly asymptomatic and discovered incidentally or by their complications. The renal pelvis, infundibulum, and ureter are not dilated [19]. Calyces in calyceal diverticulae present as a semilunar configuration rather than the triangular or conical form. Kaviani A. *et al.* 2010 [20]. Reported a huge extraordinary calyceal diverticulum. In this study stones size range from 3 mm to 18 mm. Touzani *et al.* 2015 [21] reported a giant stone of 28 mm complicating calyceal diverticula, localized in the upper pole of the kidney, treated by flexible uretero-renoscopy. In this study, the majority of patients were treated conservatively in 73% of patients.

Estrada *et al.* 2009 described a series of 22 children treated surgically in 43% of patients. Stones in this study presented in 20% of patients with calyceal diverticulae less than reported by Estrada *et al.* 2009 [22]. Waingankar *et al.* 2014 [23] in his review for a total of 497 patients with calyceal diverticulae determined that they were more common in women in 63% versus 37%. In men, located in the upper pole of the kidney in 48.9%, middle pole 29.7% and lower pole in 21.4%, Presented in the right kidney in 49% and left kidney in 51%, and stones in 96%. Most patients were treated by conservative treatment consistent with this study. Surgery carried out in patients with chronic pain, recurrent or persis-

tent urinary tract infections, obstructive stones, and renal damage. Surgical treatment is consistent with reported by Nerli R. B. *et al.* 2014 [24].

Different treatment modalities like percutaneous nephrolitottomy and flexible uretero-renoscopy. Urolithiasis was described by Baso *et al.* 2015 [25]. Recent study by Laura McGarry concludes that Laparoscopic ablation is the optimal treatment and has significantly higher success rates than the ureteroscopic approach [26]. Carcinoma in a calyceal diverticulum is largely uncommon but some cases were reported [27] this goes with our study no malignancy reported.

5. Conclusion

Calyceal diverticulae are rare congenital anomalies and megacalycosis is an extremely rare anomaly. The most common clinical manifestation is abdominal and flank pain in 60% followed by urinary tract infection. Urinary stones were the most common complications, 73% of patients treated conservatively and only 27 of patients need intervention.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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