ORIGINAL ARTICLE

ULTRASONIC BASED DIFFERENTIAL DIAGNOSIS OF RENAL CYSTS

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ABSTRACT

Background: Renal masses can be broadly categorized into cysts, tumors and inflammatory lesions. Although simple cysts are usually asymptomatic, they occasionally cause flank or abdominal pain, a palpable abdominal mass or hematuria. This study was conducted to see the role of ultrasonography in evaluation of renal cysts. **Methods:** This descriptive study was carried out at Department of Radiology & Urology Chandka Medical College Hospital, Larkana, from January 2009 to April 2010. One hundred (symptomatic or asymptomatic) patients of either sex with renal cysts detected on ultrasonography were included in the study. Along with history, physical examination renal ultrasonography was performed to see the site, size and number of cysts. Just Vision ultrasound machine by Toshiba with 3.5 MHz convex, multi frequency probe was used for kidneys examination. **Results:** Among 100 patients. 72 were males and 28 females, with male to female ratio 2.5:1. Age range was 1-100 years. Among these, 40 patients presented with symptoms but 60 were asymptomatic. In this series there were 89% cases of simple renal cyst, followed by, 7% hydronephrosis, 2% renal cystic disease, 1% polycystic kidney disease, 1% hematoma. **Conclusion:** The most common differential diagnosis of renal cyst is simple cortical renal cyst with highest incidence in 6th and 7th decades of life. The least common is polycystic kidney disease and hematoma. Ultrasound is a simple and effective means for detection and differential diagnosis of renal cysts.

KEY WORDS: Renal cyst, Ultrasonography, Renal ultrasonography.

INTRODUCTION

Renal masses can be broadly categorized into cysts, tumors and inflammatory lesions. Although simple cysts are usually asymptomatic, they occasionally cause flank or abdominal pain, a palpable abdominal mass or hematuria. Malignant masses may produce the same symptoms, or they may be associated with paraneoplastic syndromes. Inflammatory lesions are not usually incidental because there is almost always an associated clinical history when symptoms are present. A history of fever with chills or urinary tract infection suggests an infected cyst or an abscess[1]. With the proper history and interpretation of the renal ultrasonogram and/or CT scan, family physician can correctly identify the majority of renal masses, which are simple renal cysts. They can also identify complex cysts and solid masses, which require further evaluation. Probable benign cysts may undergo surveillance, where as indeterminate or complex cysts should be referred for surgical evaluation.

Renal cysts are common renal mass. Their frequency increase with age and they are present in half the population above the age of 50 years. The etiology of renal cysts is not known, but it is possible that they form from the epithelial overgrowth of tubules or collecting ducts, with resulting distension of the nephron. This would explain why cysts enlarge over time, and the involvement of adjacent nephrons might explain why thin septations develop[2]. Elkin and Bernstein classified renal cysts; (1) renal cysts due to dysplasia of the kidney; (2) polycystic disease; (3) cortical cysts; (4) medullary cysts; (5) miscellaneous intrarenal cysts; (6) extraparenchymal renal cysts. Ultrasound criteria for the diagnosis of a simple renal cyst includes (1) Spherical or ovoid shape; (2) absence of internal echoes; (3) presence of a thin, smooth wall that is separate from the surrounding parenchyma; and (4) enhancement of the posterior wall, indicating ultrasound transmission through the water-filled cyst.[3]

The objective of this study was to detect the ultrasonic-based differential diagnosis of renal cysts, because ultrasonography is a safe and non-invasive means of diagnostic imaging. Renal cysts are common incidental findings on ultrasonography but may also form part of specific disease process. Differentiation of the patterns of the cystic disease is necessary for diagnosis.[4]

MATERIAL AND METHODS

This study was conducted from January 2009 to April 2010 at Department of Radiology and Urology, Chandka Medical College Hospital, Larkana. One hundred symptomatic or asymptomatic patients of either sex with renal cysts detected on ultrasonography were included in the study. Along with history, physical examination renal ultrasonography was performed to see the site, size and number of cysts.

No preparation was required for ultrasound examination. Just Vision 400 ultrasound machine by Toshiba with 3.5 MHz convex (multi frequency) probe was used for kidneys examination. Different patient positions were used to get the proper results.

RESULTS

One hundred patients with renal cysts were studied; 72 males and 28 females, with a male to female ratio of 2.5:1. Age range was 1-100 years.

Out of these 100 patients, 40 presented with symptoms but 60 were asymptomatic. In the 40 symptomatic patients, the most common clinical presentation associated was diabetes mellitus in 10 (25%) and abdominal pain in 7 (17.5%) patients. (Table 1)

Table 1: Symptomatic patients (n=40).

Symptoms	Number of patients	Percentage
Diabetes mellitus	10	25%
Abdominal pain	7	17.5%
Hypertension	6	15%
Chronic renal failure	3	7.5%
Haematuria	2	5%
Retention of urine	2	5%
Loin pain	2	5%
Obstruction	2	5%
Dizziness	1	2.5%
Congestive heart failure	11	2.5%
Uremia	1	2.5%
Anuria	1	2.5%
Over active bladder	1	2.5%
Carcinoma prostate	1	2.5%

Regarding the differential diagnosis of renal cysts; in 89 (89%) patient simple renal cysts were detected, hydronephrosis in 7 (7%), renal parenchymal disease in 2 (2%), polycystic disease in 1 (1%), and hematoma in 1 (1%) were observed.

Of the 89 patients of simple renal cysts 57 (64%) were cortical cysts, 4 (4.5%) medullary cysts, 22 (25%) parenchymal cysts, 4 (4.5%) para pelvic cysts, 2 (2.2%) extra parenchymal cysts.

Different sizes of simple renal cysts were measured and ranged from 1–100 mm. (Table 2 and Fig. 1)

Table 2: Size of cysts.

Cyst size	Number of patients	Percentage
1-10 mm	3	3.409%
11-20 mm	25	28.409%
21-30 mm	11	12.500%
31-40 mm	27	30.337%
41-50 mm	9	10.227%
51-60 mm	5	5.282%
91-100 mm	3	3.409%
Variable size	6	6.818%
Total	89	100%

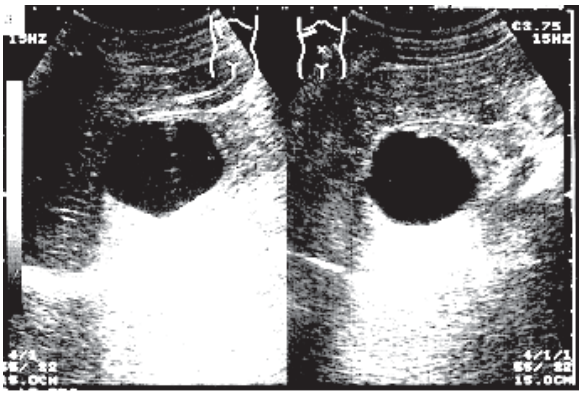

Figure: Simple renal cyst.

Cystic criteria were also assessed as in Table 3.

In 89 patients of simple renal cysts concomitant sonographic abnormalities were detected. (Table 4)

Table 3: Cystic criteria.

Cystic criteria	Number of patients	Percentage
Uniloculated	87	98
Biloculated	2	2
Multiple cysts	9	10
Bilateral cysts	8	9
Enhancement of posterior wall	89	100
Thin wall	89	100
Spherical or ovoid shape	89	100
Absence of internal echo	89	100

Table 4: Concomitant sonographic abnormalities.

Concomitant abnormalities	Number of patients	Percantage
Aspirate (clear)	2	2.27
Fatty liver	4	4.55
Angiomyolipoma	1	1
Benign prostate	1	1
Renal stone	1	1
Pleural effusion	1	1
Enlarged prostate	1	1
Renal enlargement	1	1
Reduced kidney size	1	1
Ectopic kidney	1	1
Renal transplantation	1	1

DISCUSSION

This study was carried out on 100 patients in whom renal cysts were identified sonographically, 72 were males and 28 females. So males were more affected in our study than females. Previous study by Hanna et al confirmed that, the distribution is equal between males and females[5]. In our series 89% of cases were diagnosed as simple renal cyst which represent the most common differential diagnosis of renal cysts followed by, 7% hydronephrosis, 2% renal parenchymal disease, 1% polycystic kidney disease, 1% hematoma. There was no case presented with renal dysplasia. .Study by Yamagishi et al confirmed that, thorough review of family history can also add valuable information. Differential diagnosis includes multicystic and polycystic kidney disease and structural anomalies such as duplication and calyceal diverticula, tumor, abscess and hematoma may be considered, but they most likely will have internal echoes. Although renal cysts can be seen in chromosomal abnormalities, there are usually other anomalies present.[6] When cystic lesion is seen in the upper pole, an adrenal origin must also be considered. Finally, a cystic teratoma of the retro peritoneum can be considered.

The highest incidence of simple renal cyst in 6th and 7th decades of life, while the lowest incidence in the 1st and 2nd decades.

Previous studies confirmed that, the pathogenesis of renal cyst is not entirely known. Because of increasing frequency of renal cysts with age (they are found in over 50% of people over 50 years of age). It has been suggested that cyst formation is acquired - a result of the aging process.[5,7] Vascular changes associated with age affect blood flow to the kidneys. This decreased blood flow causes areas of ischemia or infarct and obstruction of the renal tubules which leads to cyst formation. Another theory suggests that cysts are developmental in origin. During renal organogenesis, the second to fourth generation of uriniferous tubules, resulting in cyst formation.[8]

Among 40 symptomatic patients the most clinical presentation associated with renal cyst in this study was diabetes mellitus 10 (25%) and abdominal pain 7 (17.5%) they were more frequently associated with simple cyst, there were 60 patients asymptomatic commonly associated with renal cysts.

Previous studies confirmed that, highlight a number of aspects pertaining to simple renal cysts. Firstly, most cases are asymptomatic and are best treated conservatively by regular ultrasound follow up. Lastly, as the natural history of simple cyst is not known, long- term sonographic follow-up is recommended; simple cysts can be the initial manifestation of autosomal dominant polycystic disease in a child.[9,10]

Sonographic evaluation of renal cyst revealed that simple appearances were most commonly seen in renal cysts and limited polycystic disease and hematoma. Along this series among 89 patients of simple renal cysts, the most frequent type of loculation was uni-loculated in 87 (98%) and bi-loculated in 2 (2%).

The major sonographic findings of wall thickness and regularity were thin and regular walls, that more presented in renal cysts.

There were (57 of 89) were cortical cyst, (22 of 89) were parenchymal cyst, (4 of 89) were medullary cyst, (4 of 89) were parapelvic cyst and (2 of 89) were extraparenchymal cyst. Previous study confirmed that, the upper pole is the most common site.[5]

Usually the cysts are solitary but may be multiple. As was seen in this study, 91% cases presented as unilateral simple renal cyst, 9% as bilateral simple renal cyst and multiple cyst nine in number. Previous study confirmed that, the distribution is equal between right and left kidneys.[5,11]

Internal echogenisity of simple renal cyst in this study revealed there were 100% takes all characteristics of simple renal cyst anechoic or echofree with absence of internal echoes. Previous study confirmed that, many incidental renal masses are discovered on abdominal ultrasound examinations. When the ultrasound criteria for a simple cyst are met, the likelihood of malignancy is extremely small. Asymptomatic patients with incidental renal cysts that meet these criteria require no additional evaluation.

Fatty liver was the most common concomitant with simple renal cyst during this study (4 Patients). There was one case showed benign prostate. Others each case for renal stone, pleural effusion, enlarged prostate gland, renal enlargement, reduce kidney size, ectopic kidney, renal transplantation and angiomyolipoma.

Fatty liver were the more frequent concomitant disease in association with simple renal cyst were detected as an incidental sonographic finding during this study. Previous study confirmed that, simple renal cyst has controversy related to hypertension and renal dysfunction. There were 15% hypertension patients during this study.

Different sizes of 89 simple renal cysts were measured, 3.40% measured 1-10 mm, 28.40% 10-20 mm, 12.50% 20-30 mm, 30.33% 30-40 mm, 10.22% 40-50 mm, 5.28% 50-60 mm, 3.40% 90-100 mm and 6.81% had variable sizes. Previous studies also show similar results.

CONCLUSION

The most common differential diagnosis of renal cyst is simple cortical renal cyst with highest incidence in 6th and 7th decades of life. The least common is polycystic kidney disease or hematoma. Ultrasound is a simple and effective mean for detection and differential diagnosis of renal cysts.

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