

Durability and efficiency of symptomatic simple renal cyst aspiration

Hossam H.H. Bakkar
Faculty of Medicine
University of Benghazi
Dr.hossamhatem@yahoo.com

Ali .A. Elobedi
Faculty of Medicine
University of Benghazi
Ali.bokhish77@gmail.com

Tarik .A. Aldart
Faculty of Medicine
University of Benghazi
Tarikeldarat@yahoo.com

Abdulraof Elkwafi
Faculty of Medicine
University of Benghazi
raoufkawafi@gmail.com

Abstract:

Aim of study; the study planned to evaluate the effectiveness and safety of symptomatic simple renal cyst aspiration.

Materials and methods; a prospective study over a period of seven years from January 2013 to December 2020, 60 patients with simple renal cysts underwent percutaneous aspiration with and without injection of 95% ethanol. Out of the 60 patients there were 40 males and 20 females whom ranged in age from 25-75 years. The presentations of patients were flank or back pain in 35 patients (58.3%), painful flank mass (the pain is due to the size of cyst itself or due to compression of the urinary collecting system causing mild to moderate hydronephrosis) in 15 patients (25%), painless clinically palpable abdominal mass in 5 patients (8.3%) and 5 cases (8.3%) presented with hypertension. The patients (60) were divided into two categories (according to the management plan):

Category 1: Includes 30 patients with symptomatic cysts (50%) that underwent aspiration of cysts only.

Category 2: Includes 30 patients with symptomatic cysts (50%) managed by aspiration and sclerotherapy.

All patients included in the study underwent an active surveillance of follow up at 3, 6, and 12 months for the assessment of subjective improvement (improvement of symptoms) and objective improvement (ultrasonic evidence disappearance or decrease in the size of renal cysts). The complete and partial success was defined as symptoms resolution with either total cyst ablation or more than 70% reduction of cyst size.

Results;

Category 1: complete disappearance of cyst was noticed in 20 cysts out of 30 (66.6%) and partial reduction in size was recorded in 10 cysts (33.3%), 25 patients out of 30; showed complete

disappearance of their symptoms (83.3%) while 5 patients show no improvement of symptoms (16.6%) the average follow up period (3-12 months).

Category 2: complete disappearance of cyst was noticed in 25 patients out of 30 (83.3%) and partial reduction in size was recorded in 5 cysts (16.6%), improvement in symptomatic patients was noted in 28 patients (93.3%) and only 2 patients show no improvement in symptoms (6.6%).

Conclusions; aspiration of simple renal cyst (with or without ethanol) is a safe, simple, minimally invasive, and cost effective and should be recommended as an option for treatment of symptomatic simple renal cysts in selected patients.

Key words; Simple renal cyst, percutaneous aspiration, sclerotherapy.

الملخص

الهدف من الدراسه: خطت الدراسة لتقييم فعالية وسلامة شفط الكيس الكلوي البسيط المصحوب بأعراض.

المواد والأساليب: تمت الدراسة على مدى سبع سنوات من يناير 2013 إلى ديسمبر 2020، خضع 60 مريضاً يعانون من أكياس كلوية بسيطة لعملية شفط عن طريق الجلد مع أو بدون حقن 95% من الإيثانول. تم تقسيم المرضى (60) إلى فئتين (حسب خطة العلاج):

الفئة الأولى: تشمل 30 مريضاً يعانون من أكياس ذات أعراض (50%) خضعوا لعملية شفط أكياس فقط.

الفئة الثانية: تشمل 30 مريضاً يعانون من أكياس عرضية (50%) تتم معالجتها عن طريق الشفط والعلاج بالتصليب (حقن الإيثانول). وخضع جميع المرضى المشمولين في الدراسة لمراقبة نشطة للمتابعة كل 3 و 6 و 12 شهراً لتقييم التحسن الذاتي (تحسن الأعراض) والتحسين الموضوعي (اختفاء الكيس وذلك عن طريق الفحص بالموجات فوق الصوتية أو انخفاض حجم الأكياس الكلوية).

الاستنتاجات: يعد شفط الكيس الكلوي البسيط (مع أو بدون الإيثانول) إجراءً آمناً وبسيطاً وبسيطاً وفعالاً من حيث التكلفة ويجب التوصية به كخيار لعلاج الكيسات الكلوية البسيطة المصحوبة بأعراض لدى مرضى مختارين.

الكلمات المفتاحية: كيس كلوي بسيط , شفط الكياس, العلاج بالتصليب (الحقن)

Introduction:

It is typically seen among middle-aged and older adults, Simple renal cyst indicates the presence of abnormal fluid-filled sacs in the kidney. The causes of formation of these cysts are not well-understood, but it may be due to blockage of the kidney tubules. There are also no well-established

risk factors for simple renal cysts. Many cysts are found incidentally while examining the individual for other medical conditions. The signs and symptoms depend upon the size of the cysts and it may include abdominal pain and obstruction of the urinary tract (when the cyst is huge). The treatment of symptomatic and large renal cysts may include sclerotherapy and percutaneous fluid aspiration. However, a wait and watch approach for cysts presenting no significant symptoms is an option. Generally, the prognosis of simple renal cyst is excellent, since it is a benign cyst. In some individual, hypertension may develop due to renal cysts that can be corrected either by surgically, laproscopically or percutaneously.

The cyst is congenital or acquired is not clear, however its origin may be similar to that of polycystic kidneys because of defects in development of the collecting and urinifrous tubules in mechanism of their joining; blind secretory tubules that are connected to functioning glomeruli become cystic: on other hand, simple cysts have been produced in animals by causing tubular obstruction and local ischemia, this suggests that the lesion can be acquired. As simple cysts grows, it compresses and thereby may destroy renal parenchymal.

The incidences of simple renal cyst increases with age, both male and female gender are affected, but a predilection for males is observed. And no specific ethnic or racial preference is seen. Also there are no definitive risk factors have been noted for simple renal cyst.

A solitary cyst may be placed in such a position as to compress the ureter, causing progressive hydronephrosis. The majorities of simple renal cysts (mainly small cysts) are asymptomatic and discovered incidentally during routine ultrasonic examination of abdomen or during imaging studies for other abdominal problems. However large renal cysts may be manifested by abdominal and flank mass and / or either dull flank or back pain which can be acute and sever (due to sudden distention of cyst by internal bleeding, or rupture of the cyst spontaneously).The patient may present with hematuria due rupture of the simple renal cyst into PCS. However the other manifestations of renal cysts are fever and hypertension (because of renal ischemia secondary to the pressure effect of the cyst on nearby normal parenchyma, or the pressure effect on the main renal vessels, also hydronephrotic changes due to drainage obstruction may be manifested by hypertension) (Gunnel, 1974).

The simple renal cyst can be single or multiple, unilateral or bilateral; can be affecting any part of kidney but mainly lower renal pole. The sizes of simple renal cysts are ranging from few millimeters to many centimeters in diameters. In evaluating suspicious simple renal cysts,

important ultrasonographic features include thickness and contour of the cyst wall, number and thickness of any septa, presence of any calcifications, density of the renal cyst fluid, and presence of solid components. A renal cyst that is not clearly a simple cyst by strict ultrasound criteria should be evaluated further with computed tomography (CT).

Renal CT scan with and without the administration of contrast material remains the single most important radiographic test for delineating the nature of renal cyst. In general, any renal cyst (mass) that enhances with intravenous administration of contrast Material on CT by more than 15 Hounsfield units (HU) should be considered a renal cell carcinoma (RCC) until proved otherwise. Bosniak developed a useful classification scheme primarily based on CT imaging criteria that divides renal cystic lesions into categories that are distinct from one another in term of the likelihood of malignancy (Bosniak , 1997 and Israel ,2005).see table 1.

Table 1:

Stage	Morphology	Characteristic	Management
Bosniak I	Simple cyst with fluid attenuation	No calcifications or septa; hairline-thin wall	No further workup needed
Bosniak II	Minimally complex cyst; diameter ≤ 3 cm; uniform hyper-attenuation	A few hairline-thin (<1 mm) septa or thin calcifications; wall shows minimal regular thickening	No further workup needed
Bosniak IIF	Complexity intermediate between Bosniak II and III	Increased number of septa, minimally thickened with nodular or thick calcifications; contrast may produce perceptible but not measurable enhancement of septa or wall	Ultrasound/CT follow-up
Bosniak III	Complex cyst; enhanced septations or wall	Thick, nodular, irregular calcification; septa show thick, irregular, measurable enhancement with contrast	Partial nephrectomy or radiofrequency ablation in elderly or poor surgical candidates
Bosniak IV	Cystic mass; enhanced soft tissue and cyst	Thick, nodular, irregular calcification; enhanced nodule in septa and wall	Partial or total nephrectomy

Once malignancy has been ruled out, surgical intervention for asymptomatic cyst is not indicated (Solvis and Kroovand, 1980). Large renal cysts may cause abdominal or flank pain, although this pain may be caused by a coexisting problem (i.e., nephrolithiasis), and other causes of pain should be ruled out.

Other symptoms that may arise as a result of simple cysts are pain resulting from hemorrhage into the cyst or calyceal or infundibular obstruction due to cyst impingement. In rare cases,

hypertension may occur, presumably from cyst compression causing segmental renal ischemia of the surrounding renal parenchyma. Cyst infection is a rare but potentially severe complication, with patients presenting with fever, flank pain, and, often, a symptomatic pleural effusion. Most of these patients are women, the most common pathogen is *Escherichia coli*, and urine culture can often be negative. Treatment of the simple cyst must be directed to the symptomatology. When a benign simple cyst causes pyelocalyceal obstruction or hypertension, the problem may be corrected either surgically, by unroofing the cyst, or percutaneously, by aspirating the fluid and perhaps injecting a sclerosing agent, particularly if the fluid has reaccumulated after an earlier aspiration. Percutaneous resection, intrarenal marsupialization, and laparoscopic unroofing (either transperitoneal or retroperitoneal) are all reasonable options for the treatment of symptomatic simple cysts [Meyer and Jonas 4]. If the cyst is huge and/or associated with other anomaly requires surgical treatment or if the sclerotherapy is failed or complicated by hemorrhage, septation or infection. Nevertheless laparoscopic intervention requires more technique, experience and equipment and so may be reserved for multiple, pelvic and more complicated cysts. Sclerotherapy is contraindicated when the following are present or suspected; malignancy, infection, communication with the renal collecting system, and peripelvic location. The treatment of symptomatic cysts with aspiration and sclerotherapy is more effective and is an effective minimally invasive option with good results. Sclerotherapy has been performed with several agents as mentioned before, including glucose, phenol, iophendylate, and 99% ethanol and bismuth phosphate. Other chemicals for sclerotherapy include 10% povidone-iodine and doxycycline (Chung 2000).

Materials and methods:

Sixty patients with symptomatic renal cysts underwent percutaneous drainage of their cysts under ultrasonographic guidance with or without using 95% ethanol sclerotherapy in Urology Center-Benghazi over a period of seven years from January 2013 to December 2020. From this study; a valuable base-line data had been obtained that has a great impact on understanding the natural history and course of cyst development and its direct impact on the patient's quality of life, these data include; age and gender of the patient, size of cysts, incidence of bilaterally, symptoms variations from one patient to another, objective and subjective improvement after cyst aspiration, tolerance and acceptance to the procedure, incidence and severity of possible complications after aspiration of cyst and sclerotherapy, and cooperation of patients in terms of regular follow up.

Among the overall number of patients (60 patients) , there were 40 males (66.6%) and 20 females (33.3%) and the age of patients ranged from 25 to 75 years with mean age group of 51.5 years as listed in detail in table 2, that shows the number of patients regarding their age and gender distribution (Table 2).

Age of patients	Number of cases	Sex	
		M	F
<30	1 (1.6 %)	1 (1.6%)	--
31-40	4 (6.6%)	--	4 (6.6%)
41-50	10 (16.6 %)	4 (6.6%)	6 (10%)
51-60	20 (33.3%)	15 (25%)	5 (8.3%)
61-70	10 (16.6%)	8 (13.3%)	2 (3.3%)
>70	15 (25%)	12 (20%)	3 (5%)
Total	60 patient	40 (66.6%)	20 (33.3%)

The unilateral renal cysts were 56 (93.3 %) and bilateral renal cysts only seen in 4 patients (6.6 %), and the right side was more than the left side, the right side renal cysts 34 (56.6 %) and the left side renal cysts 22 (36.6%).

Table 3 (side of renal cysts)

Side of renal cyst	Number of patients	Percentage
Right side	34	56.6 %
Left side	22	36.6 %
Bilateral	4	6.6 %

The following table shows the distribution of the renal cysts regarding their positions, where 3 (16.2%), 17 (55.8%) and 24 (27.9%) renal cysts were located at the middle portion (either at lateral aspect of kidney or parapelvic), upper pole and lower pole of kidney respectively (Table 4).

Number of cysts	Upper	Lower	Middle or Para-pelvic
3	--	--	3(5 %)
17	17(28.3 %)	--	--
40	--	40(66.6 %)	--
Total 60	17	40	3

The presentations of patients were flank or loin pain in 35 patients (58.3%), painful flank mass (the pain is due to the size of cyst itself or due to compression of the urinary collecting system causing mild to moderate hydronephrosis) in 15 (25%) patients, painless clinically palpable

abdominal mass in 5 (8.3%) patients and 5 (8.3%) cases presented with hypertension. (Table 5) demonstrates the presentation of renal cysts.

Number of patients	Presentations of renal cysts			
	Pain	Painful mass	Painless mass	Hypertension
35	35(58.3%)	--	--	--
15	--	15(25%)	--	--
5	--	--	5(8.3%)	--
5	--	--	--	5(8.3%)
Total	60			

The next table describes the age group and its relation to the presenting symptoms of the renal cysts (Table 6);

Age	Number of patients	Presentations of renal cysts			
		Pain	Painful mass	Painless mass	Hypertension
<30	1	--	--	--	1
31-40	4	--	--	--	4
41-50	10	8	2	--	--
51-60	20	14	6	--	--
61-70	10	8	1	1	--
>70	15	5	6	4	--
Total	60 patients	35	15	5	5

The estimated diameters of the renal cysts on the initial ultrasonographic images obtained before the procedures were 8.0--18.0 centimeters (cm) _ and the cysts are divided into 2 groups according to their size (less than 10 cm and more than 10 cm in diameter). Out of 60 patients with renal cysts there are 45 (75%) renal cysts less than 10 cm and the other 15 (25%) cysts are more than 10 cm in diameter (the biggest cyst is 18 cm in diameter).

(Table 7);

Number of cysts	Size of cyst	
	< 10 cm	> 10 cm
45	45(75%)	--
15	--	15(25%)

Table 8, the relation between the size of renal cyst and the patient's age:

Age of patients	Number of cysts	Size of cyst	
		<10cm	>10cm
<30	1	1	--
31-40	4	3	1
41-50	10	7	3
51-60	20	13	7
61-70	10	7	3
>70	15	14	1
Total	60 cysts	45	15

The volume of aspirated cystic fluid was ranging from 80 ml to 850 ml. In about 40 renal cysts (65 %) the amount of fluid aspirated was range from 500 ml to 850 ml, and from 200 ml to 500 ml of clear fluid was aspirated from 16 cysts (26.6%), however in 4 cysts (6.6%) the fluid was aspirated in the range of 80ml-200ml.(Table 9);

Number of cysts	Amount of fluid aspirated			
	80-200 ml	200-500 ml	500-850 ml	
40	--	--	40	
16	--	16	--	
4	4	--	--	
Total	60	4(6.6%)	16(26.6%)	40(66.6%)

All Procedures were performed as an outpatient basis under cover of prophylactic antibiotics, and each patient was placed either in the prone or lateral decubitus position depending on the location of the cyst, however local anesthesia was achieved by 2% lidocaine hydrochloride that was applied to the puncture site after sterile preparation. An 18 gauge needle was inserted into the cyst under ultrasonic guidance.

When the two thirds of the estimated volume cystic fluid had been aspirated, 5-10ml of diluted contrast medium was instilled into the cyst to ensure that there was no communication with the pelvicalyceal collecting system, and to exclude any leakage from the puncture site, after that almost all cystic fluid was aspirated, about 5-10 ml of 2% lidocaine was injection followed by instillation of 95% ethanol alcohol. The amount of ethanol injected was equal to 25-30% of aspirated fluid from the cyst and left inside the cyst for about 30-40 minutes where the patient changes his or her position to supine, prone, and both lateral positions successively for about 5 minutes in each position to facilitate adequate contact of alcohol with all parts of the of the cystic wall. The alcohol was then completely aspirated and then ciprofloxacin 500mg is given orally twice daily for 5 days however oral analgesics are taken on need.

The patients were instructed to come at 3, 6 and 12 months for follow up ultrasound study and assessment of subjective and objective improvement. Re-accumulation of the fluid within the cyst requires other trial of aspiration and injection of sclerotherapy. The complete and partial success was defined as symptoms resolution with either total cyst ablation or more than 70% reduction of cyst size; however failure was defined as reoccurrence more than 30% of cyst size and / or persistent of symptoms.

Statistical analysis:

Data analysis was performed using **the software programme SPSS 17.0 for Windows XP**. The *t*-test and **Mann-Whitney test** were used for comparison of the numerical variables. The categorical variables were compared using the chi-square and **Fisher exact test**. Significance was considered as a *p*-value <0.05.

Results:

The patients (60) were divided into two categories (according to the management plan):

Category 1: aspiration of cyst only includes 30 patients with symptomatic cyst (50%).

Category 2: aspiration and sclerotherapy (ethanol injection) in 30 patients with symptomatic cysts (50%).

All patients included in the study underwent an active surveillance of follow up at 3, 6, and 12 months for the assessment of subjective improvement (improvement of symptoms) and objective improvement (ultrasonic evidence disappearance or decrease in the size of renal cysts). The complete and partial success was defined as symptoms resolution with either total cyst ablation or more than 70% reduction of cyst size.

Category 1: complete disappearance of cyst was noticed in 20 cysts out of 30 (66.6%) and partial reduction in size was recorded in 10 cysts (33.3%) USS abdomen was done to all patients at 3 months post aspiration of cysts (Table 10);

Number of cysts	Complete reduction	Partial reduction
20	20	--
10	--	10
Total	30	20

In patients with partial reduction of cysts (10), a second session of aspiration was done; complete reduction of cyst noted in 7 patients while recurrence was noted in 3 patients within 3 months. (Table 11);

In this category (1), complete disappearance of symptoms was noted in 25 patients (83.3%) while 5 patients show no improvement of symptoms (16.6%) the maximum follow up period is 12 month. (Table 12);

Number of cysts	Complete disappearance of symptoms	No improvement
25	25	--
5	--	5
Total 30	25	5

Category 2: (aspiration of cyst and sclerotherapy); complete disappearance of cyst was noticed in 25 patients out of 30 (83.3%) and partial reduction in size was recorded in 5 cysts (16.6%), table 13:

Number of cysts	Complete reduction	Recurrence within 3 months
25	25	--
5	--	5
Total 30	25	5

In category 2; improvement in symptomatic patients was noted in 28 patients (93.3%) and only 2 patients show no improvement in symptoms (6.6%).

Number of cysts	Complete disappearance of symptoms	No improvement
28	28	--
2	-	2
Total 30	28	2

Discussion and Literature review:

Simple renal cysts are common and occur in about 50% of persons older than 50 years old on whom autopsies are performed. The sex incidence is almost equal where there is no hereditary tendency. Such cysts are frequently multiple, of various sizes and their cause is uncertain, but tubular obstruction and ischemia in the obstructed area have been postulated. Most simple renal cysts are asymptomatic and are discovered incidentally on excretory urographic, sonographic, and computed tomography examinations performed for other reasons. However, such cysts can become symptomatic as a result of infection or obstruction of the pelvi-ureteral junction or

infundibulum, or because of pressure effect due to their large size however it is rarely causing local ischemia that induce excess renin production and then renin induced hypertension (Ozgur1988).

Most symptomatic renal cysts can be treated by percutaneous drainage or by a combination of the drainage and sclerotherapy. Simple drainage is associated with recurrence rate of 30-87% (Stevenson 1971). A combination of drainage and sclerotherapy reduces the rate of recurrence. The sclerosing agents used to prevent recurrence include iophendylate, 95% alcohol solution, tetracycline solution, and morrhuate sodium and minocycline hydrochloride (Okahawa, 1993). Aspiration without sclerosis is known to be of little therapeutic value; although the results obtained using these sclerosing agents have been satisfactory (Lin 2005).

However, with aspiration alone, in our study, only 33.3% of the cysts showed no reduction (**category 1**) while 66.6% showed a complete reduction on the other hand; (**category 2**); partial reduction in size was recorded and recurrence was noted in 16.6% while complete disappearance of cyst was noticed in 83.3% of patients.

The recurrence of renal cysts after aspiration with or without sclerotherapy is probably caused by incomplete ablation of the cystic wall (Bean 1981). Chung and colleagues (2000) noted 95% complete regression of simple cysts with two sclerotherapy sessions compared with only 19% complete regression with single-session percutaneous sclerotherapy. Long-term data supporting the durability of sclerotherapy to 5 years or beyond, however, are not available. In our study, 5 cysts larger than 10 cm needed 2 sessions of sclerotherapy.

Because low incidence of ; the aspiration of symptomatic renal cysts with or without sclerotherapy is recommended to be the one of the reasonable option of treatment of symptomatic simple renal cysts however; huge cysts (more than 10 cm) needs more than one session of sclerotherapy. For those patients who fail sclerotherapy, have cysts in communication with the collecting system, or have cysts deemed too large to be adequately treated with aspiration and sclerotherapy, percutaneous resection should be considered (Ozgur 1988).

Conclusion:

Aspiration of simple renal cysts with or without sclerotherapy is safe, simple, minimally invasive, and cost effective and should be recommended as an option in the treatment of symptomatic simple renal cyst. Because of low incidence of complications, the aspiration of simple renal cyst can to be the first option in treating selected patients; however, huge cysts (more than 10 cm) may needs more than one session of aspiration with sclerotherapy.

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