

The Effectiveness of Ultrasound-Guided Percutaneous Aspiration of Simple Renal Cysts in Hospitals of Aljof Region, Saudi Arabia

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ABSTRACT

Background: Percutaneous renal cyst aspiration and sclero-therapy are considered as single, a safe and minimally invasive procedure currently practicing by numerous uro-surgeons currently in the treatment of simple symptomatic cysts.

Objectives: This study was designed to assess the effectiveness and complications of ultrasound (US) guided percutaneous aspiration of renal cysts with 99% ethanol as sclerosing material in the treatment of simple symptomatic renal cysts.

Methodology: This observational prospective study was done among 42 patients who had a total of 47 symptomatic simple renal cysts. It was carried out during the period from 2014 to 2017 in the Outpatient Clinic of MOH. The patients' age ranged between 23-62 years including male (19) and females (23). An US guided ablation of renal cyst was done under local anesthesia. After that, an equal volume of contrast medium was injected through the needle into the cyst cavity to delineate the cyst wall. The sterile 99% ethanol, with one fourth of total cyst volume was injected into the cyst after complete aspiration of the contrast medium. After that, the ethanol was aspirated, and volume was measured.

Results: The complications were minimum including, hematuria in 8 patients (17%), low-grade fever in 7 patients (14.8%) and mild flank pain in 5 (10.6%) patients were observed. During the follow-up after the sclerotherapy, out of 47 cysts, 20 (42.5%) cysts with different sizes showed statistically significant ($P < 0.05$) complete resolution and not appeared again during the later follow-up sessions. The overall success rate in the current study procedure was 100%.

Conclusion: Percutaneous aspiration with a single injection of 99% ethanol sclerotherapy gave a high success rate in the treatment of simple renal cysts with good optimization of sclerosing material and effective aspiration skill of uro-surgeon.

Keywords: Renal cyst, percutaneous aspiration, sclerotherapy.

INTRODUCTION

Simple renal cysts are common, increase in incidence with age and are found in 27- 50% of the population over 50 years of age ⁽¹⁾. More complex cysts have a potential of being malignant. In 1986, Bosniak ⁽²⁾ introduced a classification system, which was modified later on, for defining renal cysts complexity based on computed tomography (CT) findings ^(3,4).

The diagnostics and management of renal cysts are closely intertwined based on radiological categorization and proper differentiation between benign and malignant lesions making it clinically important when determining which patients should be offered surgical intervention. Generally, most of the renal cysts are asymptomatic and discovered incidentally during some imaging studies. Patients with symptomatic and complicated renal cysts are undergoing for treatment. The symptoms of simple renal cysts include flank pain ⁽⁵⁾ hematuria ^(5, 6) and occasionally renal mass ⁽⁵⁾.

Percutaneous renal cyst aspiration and sclerotherapy are considered as single, a safe and minimally invasive procedure currently practiced by numerous urosurgeons in the treatment of simple symptomatic cysts ^(2,7).

Nowadays the role of sclerosing material plays an important role in the achievement of good cyst resolution as compared to simple aspiration of cysts methods without sclerosing material. Earlier studies reported that cyst drainage without sclerosing material may have less success rate of cyst resolution ranging from 30-80% ⁽⁸⁾.

However, there is an increased chance for the re-accumulation of fluid due to the secretory epithelium lining of the cysts ⁽⁵⁾.

In 1981, Bean ⁽⁴⁾ introduced the use of ethanol as sclerosing material in cyst drainage. Later on, several modifications with different contrast materials in sclerotherapy has been developed.

The good success rate will be achieved by only the use of optimum sclerosing material in sclerotherapy. In this regard, ethanol (95% or 99%) grabbed the attention as the best choice in the treatment of simple cyst by numerous urologists ^(5, 9, and 10).

Since, ethanol rapidly impaired the cyst secreting cells and slowly entered into the fibrous capsule of the renal cyst ⁽⁴⁾. Hence, the cyst can be easily removed without damage to the other area of the kidney ⁽¹¹⁾.

Many factors reflect the high success rate of ethanol sclerotherapy including, ethanol concentration, the cyst volume in relation with ethanol volume, the sclerotherapy duration per session, number of injections required in relation to cyst volume and duration of continuous aspiration before and after sclerotherapy ⁽¹²⁾.

The current study aimed to evaluate the effectiveness and complications of ultrasound (US) guided percutaneous aspiration of renal cysts with 99% ethanol as sclerosing material in the treatment of simple symptomatic renal cysts.

Methodology:

Observational prospective study that was done on 42 patients with 47 simple symptomatic renal cysts. They were treated with percutaneous aspiration sclerotherapy. This study was carried out from 2014 to 2017 in the Outpatient Clinic of Prince Mutteb Hospital with proper Ethical Committee approval. The study subject's age ranged between 23-62 years including male (19) and females (23). Signed informed consents regarding study protocols and possible complications were taken before the test procedure from all patients. All patients were evaluated by general and clinical history by an urologist followed by biochemical analysis such as serum creatinine, liver function tests, complete blood count, coagulation profile and urine analysis. The initial size of the cyst and its volume were determined by non-contrast CT and the pelviabdominal US.

The exclusion criteria in this study included patients with any urinary tract infections, coagulative bleeding disorders and obesity. In addition to this, we also excluded the patients with pelvicalyceal collecting system and renal cyst established communication. Pertaining to the patients' minimal discomfort & inconvenience and minimum post-procedure complications, this protocol was performed on an out-patient basis.

In this study, the renal cyst was ablated under local anesthesia (1% lidocaine hydrochloride) with the use of 15 cm, 18-gauge puncture needle with stylet (PBN Medicals, Denmark) under the US guidance, while the patient was placed in prone position. The cyst puncture followed by aspiration of 10-20 ml of fluid that was transferred to the laboratory for cytological examination. After that, an equal volume of contrast medium was injected through the needle into the cyst cavity to delineate the cyst wall. According to Seldinger protocol, a 30 cm, 5F polyethylene catheter was placed into the cyst and allowed to aspirate the remaining fluid from the cyst and its volume was measured. To ensure that the cyst was simple with no extravasation, radiographs were obtained after the injection of contrast medium.

One-fourth of the cyst volume of the sterile 99% ethanol was injected into the cyst after complete aspiration of the contrast medium. The ethanol volume should not be never more than 100 ml. the ethanol was left 20 min in the cyst. Meanwhile, the patient was subjected to a various side to side rolling positions with 5 min interval each time. After the treatment, the ethanol was aspirated and volume was measured. If the aspirated ethanol volume is < 100 ml the cyst was treated for two times, whereas if the volume is >100 ml the cyst was treated for three times during the same session⁽¹³⁾. All patients were subjected to the evaluation of blood and urine ethanol levels after the sclerotherapy procedure.

The follow-up of evaluation included clinical assessments of earlier symptoms and US of each patient

was done every 6 months intervals. The complete success was considered by the total absence of symptoms and renal cyst. Whereas, the patient with reduced cyst size with an absence of symptoms considered as a partial success. If the patient had persistent symptoms with cyst size more than half of this volume as before, treatment was considered as treatment failure⁽¹²⁾.

Statistical analysis

The random sampling method was applied in this study and the data were analyzed with Statistical Package for Social Science (SPSS) version 17. Parametric data values were expressed in mean \pm standard deviation. Chi-square test was used to analyze the relation between cyst volume and response to the treatment. $P < 0.05$ is considered as statistically significant.

Ethical approval:

The present study protocol was reviewed and approved by Research Ethics Committee, M.O.H, KSA (approval number: 031).

Informed consent was obtained by all subjects when they were enrolled.

RESULTS

The demographic characters of the study subjects were shown in table (1). Out of 47 symptomatic cysts, male patients with 13 cysts in the right kidney, 6 cysts in left kidney and 2 cysts present bilaterally. Whereas, female patients showed cysts in the kidney right, left and bilateral as 17, 6 and 3 cysts respectively. The mean age of the patients was 39 ± 8.63 years. The non-contrast CT and the pelviabdominal US showed the volume and cyst size prior to the ethanol sclerotherapy in the study subjects (Table 2).

The cytological and biochemical lab investigation were normal in all patients. In addition, the ethanol levels in blood and urine after the aspiration and ethanol sclerotherapy procedure as reported as almost zero in all patients with the variation from 0- 0.15 g/L and 0.02- 0.18 g/L respectively.

In our study, the post-sclerotherapy complications were minimum including, hematuria in 8 (17%) patients and low-grade fever in 7 (14.8%) patients and mild flank pain in 5 (10.6%) patients, which were treated by proper antibiotic therapy and conservative measures.

During the follow-up after the sclerotherapy out of 47 cysts, 20 (42.5%) cysts with different sizes showed statistically significant ($P < 0.05$) complete resolution and not appeared again during the later follow-up sessions. Partial resolution in 27 (57.5%) cysts with no failures (Table 3). The overall success rate in the current study procedure was 100% (47 out of 47) achieved with single – session 99 % ethanol sclerotherapy.

Table (1): The demographic characteristics of patients with simple renal cysts

Characteristics	N (%) of patients
Male	20 (47.7)
Laterality	
Right	13 (65)
Left	6 (30)
Bilateral	2 (10)
Female	23 (64.3)
Laterality	
Right	17 (62.9)
Left	6 (22.2)
Bilateral	3 (11.1)

Table (2): The volume and size of the cyst before the percutaneous aspiration and sclerotherapy

Variable	N (%) of patients
Cyst volume	
Less than 100 ml	16 (30.04)
100-150 ml	14(29.78)
150-200 ml	12(25.53)
Cyst size	
Less than 50 mm	11(23.4)
50-100 mm	21(44.68)
More than 100 mm	15(31.91)

Table (3): The success rate cysts with various sizes after the percutaneous aspiration and sclerotherapy

Variable	N (%) of patients
Complete	
≥50 mm	11(23.4)
50-100 mm	3(6.3)
≤ 100 mm	6(12.7)
Partial	
≥50 mm	0(0)
50-100 mm	18(38.2)
≤ 100 mm	9(19.1)
Failure	
≥50 mm	0(0)
50-100 mm	0(0)
≤ 100 mm	0(0)

DISCUSSION

In our study, the single injection of 99% ethanol sclerotherapy showed a significant complete and partial resolution (100%) of cyst in all patient with no failures. Our study results are supported by the earlier studies where 71-97% of the cyst resolution occurred in single/multiple sessions (10, 14, 15).

The complete resolution of cysts in our study patients reported as 42.5%. This success rate agrees with some current reports where the complete resolution rate ranged between 10-68% with single ethanol injection

sclerotherapy (6, 14). This variation between our study success rates with other recent studies may be due to the difference in the follow-up duration after the sclerotherapy. However, good results depends on the rate of aspiration (16) and the ethanol content with cyst wall and type of sclerosing material during the procedure (10).

This study showed a significant relationship between renal cyst size and the degree of response to a single session injection. In the present study cysts > 50 mm showed complete resolution (23.4%) with single ethanol injection followed by ≤ 100 mm (12.7%) and 50-100 mm (6.5%) cysts sizes. On the other hand, partial cyst resolution significantly occurred in 50-100 mm cyst size (38.2%) although none were failure in the current study.

The complete resolution and disappearance of the cyst do not necessarily need to depend on pain relief. In our study the sclerotherapy 5 patients (10.6%) were associated with pain irrespective of complete or partial cyst resolution and it was treated with some analgesics. However, some studies reported the persistence of pain with a complete resolution (9, 17) and absence of pain without complete resolution of cyst (9, 18).

The presence of hematuria in 8 (17%) patients in our studies may be due to the cyst rupture associate with the pelvicalyceal system (18), which was simply resolved with simple treatment (6, 17).

We had no major complications after percutaneous renal cyst aspiration and sclerotherapy in the present study. Previous studies also reported no major complications during this procedure (9, 10, 19). Despite, some minor complications may have chance to appear such as minimum instant pain during cyst filling with contrast material (16) and bleeding during percutaneous puncture (11).

In our study, the good resolution was achieved by the use of 99% ethanol as a sclerosing material for cyst ablation. However, other sclerosing material may show various degree of resolution of cysts such as, povidoneiodine (20), NBCA (21), acetic acid (22), 166 Ho-chitosan complex, β -emitting radionuclide (19) and polidocanol (23).

Prolong exposure of cyst to the ethanol destroy the epithelial cell lining resulting in the impairment of epithelial cells viability followed by the simple cyst disappearance (24). Our study results are supported with other reports regarding the high success rate of percutaneous renal cyst aspiration and sclerotherapy in the treatment of simple cyst (2, 25).

The limitation of percutaneous renal cyst aspiration and sclerotherapy included those who are not suitable as with malignant cysts or with a calcified cystic wall or if the patient is suspected to be infected. In addition, less number of cysts, a short follow-up period in this study and the US skills of the urologist may also play a role in the limitation of the current study results.

CONCLUSION

Ultrasound-guided single injection percutaneous aspiration with 99% ethanol is simple, effective, fast, safe and inexpensive. Thus, it is the first therapeutic option in the cases of simple renal cysts. There was no major complications pre- or post-treatment. In this method, patients did not need general anesthesia and it can be performed as an outpatient basis. Patients with giant renal cyst with complicated symptoms needed multiple injection sclerotherapy or laparoscopic decortication. We conclude that percutaneous aspiration with a single injection of 99% ethanol sclerotherapy can give a high success rate in the treatment of simple renal cysts with good optimization of sclerosing material and effective aspiration by skilled urourgeon.

Conflicts of interest: None.

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REFERENCES

1. **Ackerman LV (1968):** Surgical Pathology, 4th ed, C. V. Mosby, St. Louis, Pp: 397-399
2. **Akinci D, Akhan O, Ozmen M et al. (2005):** Long term results of single-session percutaneous drainage and ethanol sclerotherapy in simple renal cysts. *Eur. J. Rad.*, 54(2):298-302.
3. **Akinci D, Gumus B, Ozkan OS, Ozmen MN, Akhan O (2005):** Single-session percutaneous ethanol sclerotherapy in simple renal cysts in children: Long-term follow-up. *Pediatr Radiol.*, 35: 155–8.
4. **Bean WJ (1981):** Renal cysts: treatment with alcohol. *Radiology*, 138:329–331.
5. **Okeke AA, Mitchelmore AE, Keeley FX, Timoney AG (2003):** A comparison of aspiration and sclerotherapy with laparoscopic de-roofing in the management of symptomatic simple renal cysts. *BJU Int.*, 92 : 610–3
6. **Chung BH, Kim JH, Hong CH, Yang SC, Lee MS (2000):** Comparison of single and multiple sessions of percutaneous sclerotherapy for simple renal cyst. *BJU Int.*, 85: 626–74.
7. **Lin YH, Pan HB, Liang HL et al. (2005):** Single session alcohol-retention sclerotherapy for simple renal cysts: comparison of 2- and 4-hr retention techniques. *Am J Roentgenol.*, 185: 860–866.
8. **Sterenson JJ, Sherwood T (1971):** Conservative management of renal masses. *Br J Urol.*, 43: 646–647.
9. **Paananen I, Hellström P, Leinonen S et al. (2001):** Treatment of renal cysts with single session percutaneous drainage and ethanol sclerotherapy: long-term outcome. *Urology*, 57: 30–33.
10. **Gasparini D, Sponza M, Valotto C, Marzio A, Luciani LG, Zattoni F (2003):** Renal cysts: can percutaneous ethanol injections be considered an alternative to surgery? *Urol Int.*, 71: 197–200.
11. **Fontana D, Porpiglia F, Morra I, Destefanis P (1999):** Treatment of simple renal cysts by percutaneous drainage with three repeated alcohol injection. *Urology*, 53: 904–715
12. **Mohsen T, Gomha M (2005):** Treatment of symptomatic simple renal cysts by percutaneous aspiration and ethanol sclerotherapy. *BJU Int.*, 96: 1369–1372.
13. **Paananen I, Pekka HM, Sami L, Jukka M, Jukka PL, Nsalo M, Olavi L (2001):** Treatment of renal cysts with single-session Percutaneous drainage and ethanol Sclerotherapy: long-term outcome. *Urology*, 57 (1): 30-33.
14. **Touloupidis S, Fatles G, Rombis V, Papathanasiou A, Balaxis E (2004):** Percutaneous drainage of simple cysts of the kidney: a new method. *Urol Int.*, 73 : 169–72
15. **Delakas D, Karyotis I, Loumbakis P, Daskalopoulos G, Charoulakis N (2001):** A Long-term results after percutaneous minimally invasive procedure treatment of symptomatic simple renal cysts. *Int Urol Nephrol.*, 32: 321–610
16. **De Dominicis C, Ciccariello M, Peris F et al. (2001):** Percutaneous sclerotization of simple renal cysts with 95% ethanol followed by 24–48 h drainage with nephrostomy tube. *Urol Int.*, 66: 18–2111.
17. **Yoder BM, Wolf JS (2004):** Long-term outcome of laparoscopic decortication of peripheral and peripelvic renal and adrenal cysts. *J Urol.*, 171: 583–78
18. **Papanicolaou N, Pfister RC, Yoder IC (1986):** Spontaneous and traumatic rupture of renal cysts: diagnosis and outcome. *Radiology*, 160: 99–10319
19. **Kim JH, Lee JT, Kim EK et al. (2004):** Percutaneous sclerotherapy of renal cysts with a beta-emitting radionuclide, holmium-166-chitosan complex. *Korean J Radiol*, 5: 128–3322
20. **Phelan M, Zajko A, Hrebinko RL (1999):** Preliminary results of percutaneous treatment of renal cysts with povidoneiodinesclerosis. *Urology*, 53: 816–7
21. **Tamer A, Mohamed A, Ashraf E, Yasser A (2016):** Ultrasound-guided percutaneous sclerotherapy of simple renal cysts with n-butyl cyanoacrylate and iodized oil mixture as an outpatient procedure. *Urol Ann.*, 8 (1): 51–55.
22. **Seo TS, Oh JH, Yoon Y et al. (2000):** Acetic acid as a sclerosing agent for renal cysts: comparison with ethanol in follow-up results. *Cardiovasc Intervent Radiol.*, 23: 177–8121
23. **Ohta S et al. (1997):** Fused H. Polidocanol sclerotherapy for simple renal cysts. *Urol Int.*, 58: 145–720
24. **Porpiglia F, Morra I, Rocca A et al. (1996):** Percutaneous alcoholization of simple serous cysts of the kidney. *Arch Ital Urol Anrol.*, 65 (5): 197–199.
25. **Falci-Junior R, Lucon AM, Cerri LM, Danilovic A, Da Rocha PC, Arap S (2003):** Treatment of simple renal cysts with single-session percutaneous ethanol sclerotherapy without drainage of the sclerosing agent. *J Endourol.*, 92: 610–3.