

Treatment of Simple Renal Cyst with Percutaneous Ethanol Sclerotherapy

Hazim R. Akal FICMS (uorol) *

Abstract

Purpose: To evaluate the efficacy of percutaneous sclerotherapy using 95% ethanol in the treatment of symptomatic simple renal cysts.

Patients and methods: From April 2004 to July 2007, a series of 33 patients 19 males and 14 females ranging in age between 40-72 years were treated for symptomatic simple renal cysts. The cysts varied between 6.5 and 13 cm. in diameter estimated by ultrasound and from 100 to 550 ml in volume. This technique consist of ultrasound guided and local anesthesia emptying of the cyst, and slowly inserting a quality of pure 95% ethanol, equivalent to about $\frac{1}{3}$ rd of the cyst volume (up to maximum 100 ml), into the cavity and retained for 2 h by clamping the curled drainage catheter, the clamp then released and the catheter maintained for 24-48 h, in suction, to ensure collapse of the cyst walls and avoid cyst recurrence. **Results:** The procedure was technically feasible and all the patients tolerate the procedure except one patient developed gross hematuria and she was excluded in the later statistical analysis. The results were evaluated by ultrasonography at 7 days postoperatively and then at 1, 3, 6, 9, months later. There was a further fallow up every 3 months lasting for 12 to 24 months. Of 33 patients treated, 21 (63.5%) patients were asymptomatic showing total remission of the cyst and did not have any recurrence. Nine patients (27%) developed marked regression with residual maximal diameter of les than 3-4 cm, which did not enlarge in subsequent check-ups and symptoms disappeared except 3 patients had persistent symptoms in spit of decrease cyst diameter <3-4 cm. We observed a recurrence which spontaneously reduce in volume, only in 3 patients one of them loss follow up, another one responding to further trial of sclerotherapy and the 3rd one treated surgically.

Conclusions: The procedure was simple to apply in an out patient setting and used low cost materials, which are easily obtained. Moreover, the results appear to confirm the validity of this technique.

Key words: Thi-Qar, Simple Renal Cyst, Percutaneous Ethanol Sclerotherapy

* Lecturer, Dept. of Surgery, Medical college, Thiqr University, 2007

Introduction

A simple cyst is a discrete finding that may occur well within a kidney or on its surface. It is usually oval to round in shape, has a smooth outline bordered by a single layer of flattened cuboidal epithelium, and is filled with transudate-like clear or straw-colored fluid (1, 2).

It is a non-neoplastic disease of the renal parenchyma frequent at more advanced ages, being eight times more common in patients in their 7th decade than in those younger than 40 years. Almost 40% of asymptomatic men in the 7th or later decade of life have at least one renal cyst, normally found during abdominal ultrasonography for some other indications (3). The cysts consist of cavities coated internally with cylindrical epithelium and filled with plasma like fluid. Most of them are <2 cm in diameter and usually cause no symptoms, and in these cases no treatment is required, regardless of the cyst size. In a few patients who have symptoms, flank pain is the commonest. A palpable flank mass, hematuria, hypertension, and increase in hematocrit may also occur. In symptomatic cases, the treatment of cyst is usually accompanied by remission of the symptoms (4, 5).

Histopathology:

Simple cysts vary considerably in size, ranging from less than 1 cm to greater than 10 cm. The

majority are less than 2 cm in diameter. The wall is fibrous and of varying thickness and has no renal elements. The cyst lining is a single layer of flattened or cuboidal epithelium (6).

Because cysts are increasingly common with age, they have been considered an acquired lesion. Studies found greater ectasia and cystic dilatation of the distal tubules and collecting ducts in patients older than 60 years of age and considered these changes to be precursors of macroscopic cysts (7)

Clinical features

In both children and adults, cysts rarely call attention to themselves. Instead, they are discovered incidentally on sonography, CT, or urography performed for a urinary tract or other pelvic or abdominal problem. However, cysts can produce an abdominal mass or pain, hematuria secondary to rupture into the pyelocalyceal system, and hypertension secondary to segmental ischemia. Cysts can cause calyceal or renal pelvic obstruction as well. They may or may not increase in size with time. Spontaneous or traumatic rupture of a simple renal cyst is rare events (8, 9).

Hypertension caused by cysts has been confirmed in several reports, and the blood pressure normalized after surgical decompression of the cysts (10).

Evaluation

One can safely make the diagnosis of a classic benign simple cyst by sonography when the following criteria are met:

Absence of internal echoes;

Sharply defined, thin, distinct wall with a smooth and distinct margin;

Good transmission of sound waves through the cyst with consequent acoustic enhancement behind the cyst; and

Spherical or slightly ovoid shape

If all of these criteria are satisfied, the chance that malignancy is negligible.

When some of these criteria are not met—for example, when there are septations, irregular margins, calcifications, or suspect areas—further evaluation by CT or perhaps needle aspiration or MRI is indicated (11,12).

A cluster of cysts is another indication for further study, because they may be hiding a small carcinoma. CT is better than sonography in defining such a camouflaged lesion

The CT criteria for a simple cyst are similar to those used in sonography:

Sharp, thin, distinct, smooth walls and margins;

Spherical or ovoid shape; and

Homogeneous content. The density ranges from -10 to +20 HU, similar to the density of water, and no enhancement should occur after

the intravenous injection of contrast medium (13, 14).

Because cysts have no blood vessels and do not communicate directly with nephrons, they should not enhance; enhancement therefore implies vascular tissue or contrast medium mixing with fluid.

When sonographic or CT criteria are not met, such as when there is a thick wall, calcification, septation, nonhomogeneous or hyperdense fluid, or fluid with internal echoes, conditions other than simple cyst must be considered. Other possibilities are complicated cysts (i.e., those containing blood, pus, or calcification) and cystic neoplasm (15, 16)

Today, with the improvements in sonography and CT, cyst puncture is less likely to be needed. The remaining indications for cyst puncture are:

Suspected infection, in which case puncture may be therapeutic as well as diagnostic;

The presence of low-level echoes on sonography but a classic cyst on CT; and

A borderline lesion in a poor surgical candidate

MRI offers little information beyond that available from sonography and CT, although it is more specific in identifying the nature of the cyst fluid (17).

Treatment of simple renal cyst:



The majority of simple renal cyst are asymptomatic and is incidentally found by ultrasound (a, renal ultrasound showing cyst in the upper pole of kidney) or CT scan (CT scan without (b) and with (c) contrast demonstrating a simple renal cyst) (red arrowheads). Cysts are very common in the kidney. They occur in 24% of all individuals older than forty years and 50% of patients over the age of fifty. There is currently no data that exists on the percentage of cysts that will become symptomatic. However, simple renal inclusion cyst which lie adjacent to renal hilum can cause flank pain, abdominal pain, hematuria,

recurrent infections, hypertension or obstructive uropathy. Spontaneous, iatrogenic, or traumatic rupture of large renal cyst will also cause hematuria or pain. Rarely do these cysts require treatment intervention. Indications for surgical intervention include pain, hematuria, hypertension, recurrent infection, ischemia or obstructive uropathy. Treatment options for symptomatic simple renal cysts include (1) open surgery, (2) simple percutaneous needle aspiration of cyst with or without injection of a sclerosing agent, (3) retrograde marsupialization and flexible ureteroscopy-nephroscopy and (4)

laparoscopic marsupialization or excision (18, 19).

The work-up for patients with simple renal cyst should include a pre-operative CT scan to determine the precise number and locations of cyst (20).

Open Surgery:

Open surgical treatment may include nephrectomy, decortication or marsupialization of the renal cyst. Open surgery has been associated with a relatively high morbidity and these procedures have been replaced by other minimally invasive procedures (21).

Advantages:

An open procedure allows for direct visualization of the renal cyst. In addition, other urologic pathology can be addressed during the same procedure (22).

Disadvantages:

33% of patients undergoing open surgery for renal cyst will experience peri-operative complications including wound infection and morbidity associated with immobilization, urinary retention, atelectasis, pneumonia and venous thrombosis. Open operations are associated with significant post-operative pain and significant post-operative convalescence (22).

Laparoscopic cyst ablation:

Currently, laparoscopic ablation of a renal cyst is a safe and

effective alternative to open surgery. The laparoscopic approach can be done either from a transabdominal or from retroperitoneal approach.

Advantages:

The advantage for laparoscopic approach are similar to other laparoscopic cases including minimal post operative pain and scarring, decreased blood loss, short hospital stay, more rapid patient recovery and shorten time for resumption of usual activity. The incision is minimal. Bilateral and multiple cysts are treated under a single anesthesia and both peripheral and peri-pelvic cyst can be effectively and safely ablated. Laparoscopic cyst ablation has advantages over other minimally invasive modalities including no use of stents, tubes or drains. Laparoscopic approach can facilitate treatment in patients with bilateral and multiple cyst.

Disadvantages:

Disadvantages to laparoscopic cyst ablation include longer operative time, the use of expensive equipment, significant technical experiences in performing surgery; laparoscopic cyst ablation carries the risks of laparoscopic surgery including bowel injury and hemorrhage. The long-term results and complications have not been documented.



Strict criteria must be used in selecting patients for laparoscopic cyst ablation to reduce the incidence of unsuspected malignancy to an absolute minimum. Therefore, only lesions that clearly meet the ultrasound or CT criteria for simple cysts should be approached laparoscopically. The incidence of malignancy in radiographically proven simple renal cysts occurs in less than 0.7% of cases. Being mindful of the possibility of malignancy, a thorough intra-operative inspection of the renal cyst wall with the laparoscope should be performed to evaluate for occult tumor. The cyst wall should be sent for pathological analysis to exclude malignancy. Therefore, the theoretical risk of tumor seeding is a potential disadvantage of this approach and other minimally invasive procedures for symptomatic renal cyst. In one series, two of ten patients who were found to have unsuspected malignancy went on to have an early potentially curative radical nephrectomy (23).

Retrograde marsupialization and Flexible Ureteroscopy-nephroscopy

This approach utilizes a flexible uretero-scopy and nephroscopy in a select group of patients who have peri-pelvic cysts.

Advantages:

Flexible ureteroscopy is also used. Advantages of this procedure are that it is minimally invasive and requires a short hospital stay.

Disadvantages:

The disadvantage of retrograde marsupialization with flexible uretero-nephroscopy is that this procedure is technically difficult and limited to intrarenal peri-pelvic rather than exophytic cyst. There is a limited view of the interior of the cyst wall. This procedure requires a large nephrostomy tract and post-operative stent, which are placed under fluoroscopic guidance. Therefore, the patient has exposure to radiation. There is also discomfort and morbidity associated with the stent and nephrostomy tube. In addition, the patient has the potential for electrolyte disturbances secondary

to irrigant absorption. In addition, a second procedure for removal of an internal ureteral stent is required. Long terms are not available (24).

Percutaneous aspiration and injection of sclerotherapy:

Simple aspiration and sclerotherapy are minimally invasive procedures, and ethanol therapy had been widely used for the treatment of symptomatic renal cysts (24). The ideal sclerosing agent should be safe, painless during the procedure, have no significant side effects and minimize recurrence. However, various ethanol-related complications have been noted such as pain, fever and systemic reactions such as drunken state or shock; moreover, the recurrence rate has been reported to be 32% after a single-session alcohol sclero-therapy (24).

To overcome the drawbacks associated with the use of alcohol as a sclerosing agent, various other sclerosing agents have been employed for the complete single-session ablation of renal cysts, but no satisfactory long-term results have yet been documented (25). There have been several encouraging reports on the use of low-energy electron-emitting radionuclides in the local radiation treatment of small tumors and in radionuclide synovectomy (25). To the best of our knowledge, however, so far there have been no reports, which described the successful use of radionuclides for

the ablation therapy of renal cysts (26).

Aim of the Study

To evaluate the efficacy of percutaneous sclerotherapy using 95% ethanol in the treatment of symptomatic simple renal cysts
To present the results of a minimally invasive treatment of symptomatic simple renal cysts

Patients and Methods

From April 2004 to July 2007, a series of 33 patients 19 males and 14 females ranging in age between 40-72 years were treated for symptomatic simple renal cysts. The cysts varied between 6.5 and 13 cm. in diameter (mean diameter 7.2 cm) estimated by ultrasound and from 100 to 550 ml in volume (mean volume 315 ml). This technique consist of ultrasound guided and local anesthesia after complete aspiration of the cystic fluid , and slowly inserting a quantity of pure 95% ethanol, equivalent to about 1/3rd of the cyst volume (up to maximum 100ml), into the cavity and was retained for 2 h. The technique also include positioning curled drainage catheter, for 24-48 h, in suction, to ensure correct collapse of the cyst walls and avoid cyst recurrence. The ablated cysts were evaluated by ultrasonography at 7 days postoperatively and then at 1, 3, 6, 9, months later. There was a

further follow up lasting from 12 to 24 months.

Results :

The procedure was technically feasible and all the patients tolerated the procedure except one patient developed gross hematuria and she was excluded in the later statistical analysis. The results were evaluated by Itrasonography at 7 days postoperatively and then at 1, 3, 6, 9, months later. There was a further follow up lasting from 12 to 24 months. Of 33 patients treated, 21 (63.5%) patients were asymptomatic showing total remission of the cyst and did not have any recurrence.

9 patients (27%) developed marked regression with residual maximal diameter of less than 3-4 cm, which did not enlarge in subsequent check-ups and symptoms disappeared except 3 patients had persistent symptoms in spite of decrease cyst diameter <3-4 cm.

We observed a recurrence which spontaneously reduce in volume, only in 3 patients one of them loss follow up, another one responding to further trial of sclerotherapy and the 3rd one treated surgically.

*pain recurrence is observed in 6 patients.

*hemorrhage occurs in 2 patients it was mild and stop spontaneously.

*fever occur in 4 patients and responding to antibiotic and analgesia, there was no systemic

reaction or shock observed in our study.

Discussion

Management of symptomatic renal cysts can be accomplished by several methods. Surgical resection is still be used for the treatment of simple renal cysts. Recently, laparoscopic decortication or marsupialization of Recently, laparoscopic decortication or marsupialization of simple renal cysts was introduced to reduce the procedure related morbidity. However, both modalities are invasive, requiring general anesthesia with the accompanying operative morbidity and complications that this brings. Thus, they have been replaced by minimally invasive approaches that are based on percutaneous needle aspiration or sclerotherapy (26). Aspiration of renal cysts under ultrasonographic guidance has previously been performed for diagnosis and treatment, but renal cysts treated by simple aspiration frequently recur because the secretory epithelial lining remains. In such cases, the recurrence rate after 2 years was reported to be as high as 80%.

Many sclerosing agents have been used to destroy the secretory epithelium and so prevent cyst recurrence following aspiration. Ethanol has generally been viewed as a safe and effective sclerosing agent, and it has shown good initial results (27).

Simple aspiration and ethanol sclero-therapy as a minimally invasive procedure had been widely used for the treatment of symptomatic renal cysts because:- it is relatively safe and painless procedure.

easily performed under local anaes-thesia on an outpatient bases and can be completed in a single session.

the procedure is highly successful, has no significant side effect, and low morbid-dity.

The ideal sclerosing agent should be safe, painless during the procedure, have no significant side effects and minimize recurrence. However, various ethanol-related complications have been noted such as pain, fever and systemic reactions or shock; moreover, the recurrence rate has been reported with the use of alcohol sclerotherapy (28).

To overcome the drawbacks associated with the use of alcohol as a sclerosing agent, various other sclerosing agents have been employed for the complete ablation of renal cysts, but no satisfactory long-term results have yet been documented. There have been several encouraging reports on the use of low-energy electron-emitting radionuclides in the local radiation treatment of small tumors and in radionuclide synovectomy (28).

Holmium-166 may also be appropriate for the radionuclide sclerotherapy of renal cysts. The emitted beta particles ablate the

lining epithelium of the cysts however, unlike in the case of external beam irradiation in which the much higher energy gamma radiation is used, only a negligible dosage attains the perilesional structures and the adjacent renal parenchyma is not damaged (29).

In some studies, 90% of the cysts had a complete or near complete regression at the final follow up after the single-session sclerotherapy using the holmium-166. These studies believe the holmium-166 radionuclide to be a valuable new painless sclerosing agent, which can be used for the treatment of renal cysts without significant complications (30, 31).

*the result of our study were comparable to other studies, such as those carried by A.A. Okeke et al and that done by Paananen I. et al, with slightly higher rate of recurrence in our study which may be attributed to the usage of conventional ultrasonographic machine because the proper specialized machine with special guidance arrow is unavailable at our center that may lead to unsuitable puncture site with incompletely emptying of the cystic content which by its dilution effect lead to decrease the concentration and the ablation power of the sclerosing substance and increase recur-ence rate of the cyst.

Conclusions and Recommendations

Treatment of simple renal cyst with Percutaneous injection of sclerotherapy using 95% ethanol is highly successful and the results appear to confirm the validity of

this technique. The procedure is an easily performed and can be done under local anesthesia on an outpatient bases. It has low morbidity and used low cost materials, which are easily obtained.

Table (1): Incidence of Complications

%	No. of Complicated Cases/Total	Complication(s)
18%	6/33	Pain recurrence
0	0	PUJ obstruction Extravasation of sclerosing agent
6%	2/33	hemorrhage
12%	4/33	Fever
0	0	Systemic reaction
0	0	Shock
9%	3/33	Recurrence rate
0	0	hematuria
47%	15/33	Total

References

1. Kenneth I. Glassberg, Renal dysplasia and cystic disease of the kidney. In: Campbell's Urology (8th edition). Edited by Patric C. Walsh; Alan B. Retik; E. Darracott Vaughan, Jr; Alan J. Wein; Louis R. Kavoussi; Andrew C. Novick; Alan W. Partin; Craig A. Peters. Philadelphia: W.B. Saunders Company, Vol. 2, chapter 59 pp. 2284-2327, 2003.
2. Jack W. McAninch: Disorders of the kidneys. In: Smith, General Urology, 16th edition. Edited by Emil A. Tanagho; Jack W. McAninch. New York: Lang Medical Books/ McGraw-Hill. Chapter 38, pp. 513 -516, 2004.
3. Giannakopoulos X, Charalabopoulos K, Charalabopoulos A, Golias C.H., Peschos D, Sofikitis N, Giant simple renal cyst complicated with hypertension, Int J Clin Pract Suppl, (147), 2005, pp 69-71
4. Koji Shiraishi, Satoshi Eguchi, Jun Mohri and Yoriaki Kamiryo. (2006) Laparoscopic decortication of symptomatic simple renal cysts: 10-year experience from one institution. BJU International 98:2, 405–408
5. Ahmet Tefekli, Fatih Altunrende, Murat Baykal, Omer Sarilar, Sahin Kabay and Ahmet Yaser Muslumanoglu. (2006) Retroperitoneal laparoscopic decortication of simple renal cysts using the bipolar Plasma Kinetic scissors. International Journal of Urology 13:4, 331–336
6. Tarek Mohsen and Mohamed A. Gomha. (2005) Treatment of symptomatic simple renal cysts by percutaneous aspiration and ethanol sclerotherapy. BJU International 96: 9, 1369 – 1372
7. Narmada P. Gupta, Rajiv Goel, Ashok K. Hemal, Rajeev Kumar, M.S. Ansari. (2005) Retroperitoneoscopic Decortication of Symptomatic Renal Cysts. Journal of Endourology 19:7, 831
8. Renato Falci-Junior, Antonio Marmo Lucon, Luciana M. Oliveira Cerri, Alexandre Danilovic, Paula C. Dias Da Rocha, Sami Arap. (2005) Treatment of Simple Renal Cysts with Single-Session Percutaneous Ethanol Sclerotherapy without Drainage of the Sclerosing Agent. Journal of Endourology 19:7, 834
9. Devrim Akinci, Burcak Gumus, Orhan S. Ozkan, Mustafa N. Ozmen, Okan Akhan. (2005) Single-session percutaneous ethanol sclerotherapy in simple renal cysts in children: long-term follow-up. Pediatric Radiology 35:2, 155
10. A.A. Okeke, A.E. Mitchelmore, F.X. Keeley Jr and A.G. Timoney. (2003) A comparison of aspiration and sclerotherapy with

laparoscopic de-roofing in the management of symptomatic simple renal cysts. *BJU International* 92:6, 610–613

11. Michal Peyromaure, Bernard Debr, Thierry A. Flam. (2002) Sclero-therapy of a Giant Renal Cyst with Povidone-Iodine. *The Journal of Urology* , 2525

12. A.A. Okeke, A.E. Mitchelmore and A.G. Timoney. (2001) Comparison of single and multiple sessions of percutaneous sclerotherapy of simple renal cysts. *BJU International* 87:3, 280–280

13. M. Lezrek, H. Fassi-Fehri, L. Badet, J.M. Marechal, X. Martin, Remission of erythrocytosis and hypertension after treatment of a giant renal cyst. *Urology* 60(1), 2002, pp 164

14. Adam J. Singer, Samuel K. Lee, Simple renal cysts causing loss of kidney function and hypertension, *Urology* 57(2), 2001, pp 363-364

15. Paananen I, Hellstrom P, Leinonen S, Merikanto J, Perala J, Paivansalo M, Lukkarinen O, Treatment of renal cysts with single-session percutaneous drainage and ethanol sclerotherapy: long-term outcome, *Urology*, 57 (1), 2001, pp 30-33

16. Gasparini D, Sponza M, Valotto C, Marzio A, Luciani L.G., Zattoni F. Renal cysts: can percutaneous ethanol injections be considered an alternative to surgery? *Urol Int*, 71(2), 2003, pp 197-200

17. Delakas D, Karyotis I, Loumbakis P, Daskalopoulos G, Charoulakis N, Cranidis A, Long-term results after percutaneous minimally invasive procedure treatment of symptomatic simple renal cysts, *Int Urol Nephrol*, 32(3), 2001, pp 321-326

18. Martino P, Annunziata G, Saracino G.A., Palazzo S, Macchia M, de Ceglie G, Ricapito V, Selvaggi F.P., Aspiration versus aspiration plus ultrasonography-guided alcohol administration for simple renal cysts: recurrence and complications, *Arch Ital Urol Androl*, 74(4), 2002, pp 216-218

19. Nascimento AB, Mitchell DG, Zhang X-M, Kamishima T, Parker L, Holland GA. Rapid MR imaging detection of renal cysts: age-based standards. *Radiology* 2001; 221:628-632

20. Terada N, Ichioka K, Matsuta Y, Okubo K, Yoshimura K, Arai Y. The natural history of simple renal cysts. *J Urol* 2002; 167:21-23

21. Chung BH, Kim JH, Hong CH, Yang SC, Lee MS. Comparison of single and multiple sessions of percutaneous sclerotherapy for simple renal cyst. *BJU International* 2000; 85:626-627

22. Seo TS, Oh JH, Yoon Y, et al. Acetic acid as a sclerosing agent for renal cysts: comparison with ethanol in follow-up results. *Cardiovasc Intervent Radiol* 2000; 23:177-181

23. Phelan M, Zajko A, Hrebinko RL. Preliminary results of percutaneous treatment of renal cysts with povidone-iodine. *Urology* 1999; 53: 816- 827
24. Song J, Suh CH, Park YB, et al. A phase I/IIa study on intra-articular injection of holmium-166-chitosan complex for the treatment of knee synovitis of rheumatoid arthritis. *Eur J Nucl Med* 2001; 28:489-497
25. Ofluoglu S, Schwameis E, Zehetgruber H, et al. Radiation synovectomy with (166)Ho-ferric hydroxide: a first experience. *J Nucl Med* 2002;43:1489-1494
26. Chung JI, Han GH, Lee JT, et al. Percutaneous intratumoral injection of DW-166 HC in patients with hepatocellular carcinoma: phase I and II study. *Korean J Gastroenterol* 1998;32:120-125
27. Lee JT, Kim EK, Won JY, et al. Experimental and clinical studies on the intraarterial injection of holmium-166 chitosan complex in the treatment of hepatocellular carcinoma. *J Korean Radiol Soc* 2001; 44:441-451
28. Nijsen F, Rook D, Brandt C, et al. Targeting of liver tumour in rats by selective delivery of holmium-166 loaded microspheres: a biodistribution study. *Eur J Nucl Med* 2001;28:743-749
29. Nijsen JF, Zonnenberg BA, Woittiez JR, et al. Holmium-166 poly lactic acid microspheres applicable for intra-arterial radionuclide therapy of hepatic malignancies: effects of preparation and neutron activation techniques. *Eur J Nucl Med* 1999;26:699-704
30. Lee JD, Yang WI, Lee MG, et al. Effective local control of malignant melanoma by intratumoural injection of a beta-emitting radionuclide. *Eur J Nucl Med Mol Imaging* 2002;29:221-230
31. Dunn MD, Clayman RV. Laparo-scopic management of renal cystic disease. *World J Urol* 2000;18:272-27

Treatment of Simple Renal Cyst with Percutaneous Ethanol Sclerotherapy