Original Article

Percutaneous aspiration and single-session ethanol sclerotherapy for symptomatic simple renal cortical cysts

Semptomatik basit renal kortikal kistler için perkütan aspirasyon ve tek-seans etanol skleroterapisi

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ABSTRACT

Objective: To evaluate the effectiveness of single-session ethanol sclerotherapy in the treatment of symptomatic simple renal cysts.

Materials and methods: Between March 2006 and June 2011, 42 consecutive patients with 45 symptomatic renal cysts were treated with percutaneous aspiration and ethanol sclerotherapy. The volume of the cyst fluid ranged from 75 to 650 mL (mean 220 mL), and the cysts were categorized into three groups: <150 mL, 150-300 mL, and >300 mL. The cysts were aspirated under local anesthesia with ultrasound guidance using an 18-gauge 20 cm spinal puncture needle. After near-total cyst aspiration, volumes of 25 mL, 50 mL, and 75 mL of an ethanol sclerosing agent were used in the three cyst groups, respectively. The patients were reassessed at 1, 3, and 6 months.

Results: The procedure was technically feasible in all of the patients. The final assessment at 6 months showed that, of the 45 cysts treated, there was a complete response (symptomatic with complete cyst resolution) in 33 (73%) cysts and a partial response in 10 (22%); the procedure was unsuccessful for 2 (4%) cysts. There was a correlation between the initial cyst volume and the response to treatment. There were no major complications related to the procedure. Minor complications, including pain, fever, hematuria, and small perinephric hematoma were observed in 11 (26%) patients and were managed conservatively.

Conclusion: The treatment of symptomatic simple renal cysts using ethanol sclerotherapy under ultrasound guidance is a simple, safe, minimally invasive, and cost-effective outpatient procedure with satisfactory short- and mid-term results. The procedure can be performed with good efficiency and low morbidity, particularly in moderately sized cysts (<300 mL) and therefore should be considered as a feasible therapeutic option for the treatment of symptomatic simple renal cortical cysts. However, a longer follow-up period is needed to assess the long-term results of this procedure.

Key words: Aspiration; cysts; ethanol; sclerosing.

ÖZET

Amaç: Böbrek taşları olan seçilmiş olgularda sırt üstü pozisyonda tüpsüz PNL'nin güvenilirliği, uygulanabilirliği ve etkinliğini değerlendirmek.

Gereç ve yöntem: Mart 2006 - Haziran 2011 tarihleri arasında, 45 semptomatik böbrek kisti olan ardışık 42 hasta perkütan aspirasyon ve etanol skleroterapisi ile tedavi edildi. Kist sıvısının hacmi 75-650 mL arasındaydı (ortalama 220 mL) ve kistler <150 mL, 150-300 mL ve >300 mL olmak üzere 3 gruba ayrıldı. Kistler lokal anestezi altında, ultrason rehberliğinde, 18 G 20 cm spinal iğne kullanılarak aspire edildi. Tama yakın kist aspirasyonundan sonra, sklerozan ajan etanol, üç kist grubunda sırasıyla 25 mL, 50 mL ve 75 mL hacminde kullanıldı. Hastalar 1, 3 ve 6. aylarda yeniden değerlendirildi.

Bulgular: Teknik olarak işlem bütün hastalarda uygulanabilir durumdaydı. Altı aylık periyottaki son değerlendirmede, tedavi edilen 45 kistin 33'ünde (%73) tam yanıt (tam kist rezolüsyonu ile semptomatik), 10'unda (%22) kısmi yanıt vardı, buna karşın 2 (%4) kistte işlem başarısız oldu. Başlangıçtaki kist hacmi ve tedaviye yanıt arasında bir korelasyon vardı. İşlemle ilişkili büyük bir komplikasyon olmadı. Ağrı, ateş, hematüri ve küçük perinefrik hematomu içeren küçük komplikasyonlar 11 (%26) hastada görüldü ve konservatif olarak tedavi edildi.

Sonuç: Semptomatik basit böbrek kistlerinin ultrason rehberliğinde etanol skleroterapisi kullanılarak tedavisi, tatmin edici kısa ve orta dönemli sonuçları ile, basit, güvenli, minimal invaziv ve maliyet-etkin bir ayaktan hasta işlemidir. İşlem, özellikle orta boylu kistlerde (<300 mL), iyi bir etkinlik ve düşük morbidite ile gerçekleştirilebilir ve bu nedenle semptomatik basit böbrek korteks kistlerinin tedavisi için yapılabilirliği uygun bir tedavi seçeneği olarak düşünülmelidir. Bununla birlikte, bu işlemin uzun dönemli sonuçlarını değerlendirmek için daha uzun süreli bir takibe gerek vardır.

Anahtar sözcükler: Aspirasyon, kistler, etanol, sklerozan.

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Submitted:
23.01.2012

Accepted:
21.03.2012

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Available online at
www.turkishjournalofurology.com

Turkish Journal of Urology 2012; 38(3): 149-53
doi:10.5152/tud.2012.032

Introduction

Simple renal cysts are the most common renal lesions, accounting for approximately 70% of all asymptomatic renal masses.[1] Benign renal cysts may be solitary or multiple. Their incidence increases with age. These cysts can be observed in more than 50% of adults over 50 years of age.[2] There is an increased incidence in males (13% vs 5.8%) and an increased association with hypertension.[3] With advancing age, the cysts grow in size and number.[4] These cysts are thought to arise from the diverticulae in the distal convoluted tubules and then accumulate fluid from the epithelial cells in the cyst wall.[5] The characteristic appearance of a simple renal cyst on radiological imaging, including abdominal ultrasonography, CT, or MRI allows for an accurate diagnosis. Ultrasonography is typically used to differentiate benign from malignant pathology because the kidney is readily accessible for ultrasonographic examination.[6]

A simple renal cyst is usually asymptomatic and discovered incidentally. However, treatment is indicated in symptomatic patients. The most common symptom is pain, followed by hematuria, pelvicalyceal obstruction, and hypertension.[7] Large cysts may produce mechanical effects similar to a space-occupying lesion. Symptomatic benign cysts can be treated by percutaneous aspiration with or without sclerotherapy or open/laparoscopic surgery.[8,9] The classical treatment of cyst decortication can be performed by open or laparoscopic surgery. Other less commonly employed options include endoscopic marsupialization and percutaneous endoscopic resection. Surgical treatment is associated with some morbidity and even mortality at times, particularly in high-risk elderly patients.[10] Laparoscopic decortication, though effective, is again an invasive method. Recently, a new technique, a cystoretroperitoneal shunt (CRS), has been reported for the treatment of simple renal cysts.[11] The technique involves the placement of a percutaneous CRS catheter under ultrasound guidance and catheter maintenance for a period of 3 months. Although the initial results are encouraging, larger, controlled studies are needed to evaluate the value of this technique. Percutaneous cyst aspiration without sclerotherapy is minimally invasive but has a high incidence of recurrence. Aspiration with sclerotherapy has been reported to have better results with a much lower recurrence rate.[12,13] We report our experience with 95% ethanol sclerotherapy for the treatment of symptomatic simple renal cortical cysts.

Materials and methods

Between March 2006 and June 2011, 42 patients with 45 symptomatic simple renal cysts who reported to our center, were treated with percutaneous aspiration and ethanol sclerotherapy. Patients with complex renal cysts, coagulation disorders, or other severe co-morbid conditions were not treated by this aspiration/sclerotherapy method. However, there were no exclusion criteria based on the location of the cyst in the kidney. All patients were treated on an outpatient basis. Various clinical parameters of these patients are shown in Table 1.

There were 27 (64%) male and 15 (36%) female patients; 16 patients had cysts in the right kidney, 23 had cysts in the left kidney, and 3 patients had cysts in both kidneys. In patients with bilateral cysts, the largest cyst on either side was treated and included in the present series. The cyst volume ranged from 75-650 mL, with a mean of 220 mL. In 14 patients, the cyst volume was <150 mL, 20 patients (23 cysts) had a cyst volume of 150-300 mL, and 8 patients had a cyst volume >300 mL. All of the patients presented with variable degrees of flank discomfort/pain. However, pain was the main clinical presentation in 26 (62%) patients, followed by microscopic hematuria in 9 (21%) and a renal mass in 6 (14%). In 3 (7%) patients, hypertension was the main presentation.

All patients were evaluated by a complete blood count, urine analysis, renal function test, coagulation profile, and a renal ultrasound (Figure 1). Eight (19%) patients required a contrast-enhanced CT scan to rule out a complex renal cyst. Three patients presenting with hypertension were further evaluated by a renal color Doppler ultrasound.

The procedure was performed in a prone position under local anesthesia using 2% lidocaine hydrochloride. An 18-gauge spinal needle (20 cm) was used for cyst puncture under ultrasound guidance, taking all aseptic precautions (Figure 2). The initial 10 mL of the cyst fluid was sent for cytological examination and biochemical analysis. After near-total aspiration of the cyst fluid, a 95% ethanol solution was injected into the collapsed cyst cavity through the same puncture needle (Figure 3). Ultrasound imaging was continuously used to ascertain the position of the needle inside the cyst cavity and to detect any ethanol leakage. Totals of 25 mL, 50 mL and 75 mL of ethanol solution

Table 1. Clinical parameters.

Parameters		No. (%) of patients
Sex	Male	27 (64)
	Female	15 (36)
Laterality	Right	16 (38)
	Left	23 (54)
	Bilateral	03 (07)
Cyst volume	<150 mL	14 (31)
	150-300 mL	23 (51)
	>300 mL	08 (18)

were injected into cysts with volumes of <150 mL, 150-300 mL and >300 mL, respectively. The ethanol solution was left in the cyst cavity, and the puncture needle was removed. All patients were observed for at least 4-6 hours after the procedure, and any complications were noted. Oral antibiotics and analgesics were prescribed for 3-5 days. The patients were initially examined at one-week intervals, primarily to assess any procedure-related complications. Subsequently, the patients were re-assessed at one month, three months, and six months after the procedure. The follow-up assessment included a general physical examination, a renal ultrasound to assess the status of the treated cyst, and an assessment of any complications.

All of the findings and results were serially recorded. The final results were assessed at 6 months. Complete success was considered when the symptoms and the cyst completely disappeared. Symptom relief with a reduction of >50% of the initial cyst volume was considered as a partial success. A recurrence of >50% of the initial cyst volume and/or the persistence of symptoms was considered as failure to treatment.

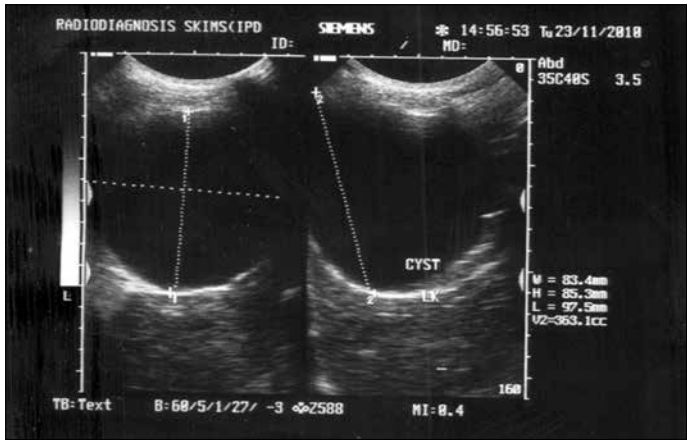

Figure 1. Ultrasound assessment of renal cyst parameters

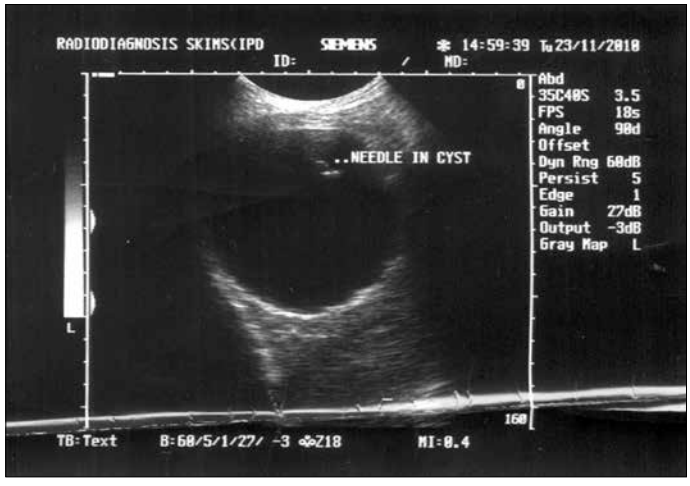

Figure 2. A puncture needle inside a cyst cavity during aspiration

Results

All the post-procedure findings were recorded at 1 month, 3 months and 6 months, and the final results were assessed at the 6-month follow up. There were no major complications and no signs of ethanol intoxication. There were minor complications in 7 patients; 4 patients developed microscopic hematuria, and 3 had low-grade fever within the first week of treatment. These minor complications were treated by oral antibiotics, analgesics, and high fluid intake. For all of the patients, the cytological examination was negative for neoplastic cells. Biochemical analyses of the cyst fluid showed electrolytes, urea, and creatinine levels similar to those in plasma.

The final assessment at 6 months after the initial procedure showed that, of the 45 cysts treated, 33 showed a complete resolution, 10 showed a partial response, and the procedure was unsuccessful for 2 cysts. There was a correlation between the initial cyst volume and the response to treatment, as shown in Table 2.

Among 14 cysts of <150 mL volume, 12 cysts disappeared completely with complete resolution of symptoms. Two cysts showed a partial response in this group. Eighteen cysts in the 150-300 mL group showed a complete response, 4 cysts showed a partial response, and 1 cyst persisted with a volume of >50% compared to the initial cyst volume at the 6-month follow up,

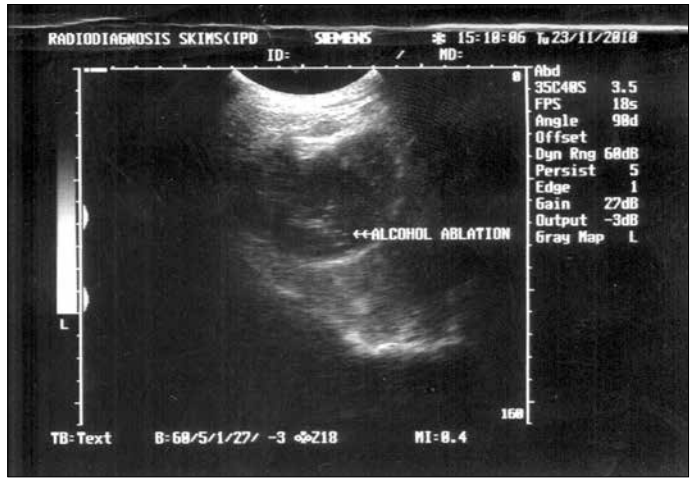

Figure 3. Ethanol instillation into a collapsed cyst cavity

Table 2. Treatment outcome

Response	Volume & No. of cysts		
	<150 mL (n=14)	150-300 mL (n=23)	>300 mL (n=08)
Complete	12	18	03
Partial	02	04	04
Failure	None	01	01

Turkish Journal of Urology 2012; 38(3): 149-53
doi:10.5152/tud.2012.032

amounting to treatment failure. In the >300 mL group, 3 cysts showed a complete response, 4 had a partial response, and 1 cyst had failure to treatment. Among the 10 cysts showing a partial response, 6 required a second session of aspiration/sclerotherapy, 2 cysts required alternate treatment modalities, and 2 cysts did not require any additional treatment as there was total remission of symptoms. Two cysts with failure to treatment finally required alternate treatment to achieve the desired results.

Discussion

Simple renal cysts usually occur in an otherwise normal kidney and have an epithelial lining that is devoid of any renal elements. By definition, these cysts are unilocular and do not communicate with the collecting system. Most of the simple renal cysts are asymptomatic and may not require any treatment. Symptomatic cysts, however, require some form of treatment. Flank pain/discomfort is the most common presenting symptom. Other symptoms include persistent hematuria, a renal mass, and hypertension.[12] In the present series, some degree of flank discomfort/pain was observed in all patients. Renal mass, persistent hematuria, and hypertension were the main presenting features in 9 (21%), 5 (12%), and 3 (7%) patients, respectively.

Renal cyst aspiration with or without sclerotherapy has been used for symptomatic renal cysts for quite some time with variable results. The use of a sclerosing agent is necessary because aspiration alone results in cyst recurrence to its original volume in nearly 90% of cases.[14] Percutaneous aspiration with sclerotherapy has been advocated because it is cost-effective with a low complication rate.[15] The mechanism of action of the sclerosant is to injure the cyst wall cells that produce the cyst fluid. Subsequent adhesion of the cyst wall then occurs and reduces the chances of fluid reaccumulation. Several sclerosing agents have been used for sclerotherapy, including ethanol, povidone-iodine, acetic acid, minocycline hydrochloride, hypertonic saline, and tetracycline. A novel agent, OK-432, is emerging as a sclerosing agent for renal cortical cysts. It is a combination of a low-virulence strain of type III group A *Streptococcus pyogenes* with penicillin G.[16] It has immunotherapeutic and antitumor properties. However, there is a need for further assessment, and the long-term benefit and side-effect profiles have not been well established. Ethanol (95-99%) has been the most commonly reported sclerosing agent for treating renal cortical cysts. Hanna et al.[13] suggested that this is a suitable sclerosing agent as the epithelial cells in the cyst wall become fixed and non-viable after 1-3 minutes and the cyst capsule is completely penetrated in 4-12 hours. Additionally, there is a reduced risk of injury to the surrounding parenchyma. Although ethanol is known to be relatively safe and effective, there are side effects including neurological depression due to absorption and fever, which is usually temporary. After several decades of experimenting with new agents, ethanol remains the most established sclerosant for the treatment of symptomatic renal cysts, usually in multiple injections. More recently, larger studies have added to the experience of using this agent.[17]

Several treatment approaches with conflicting outcomes have been reported, varying according to the number of sessions, single or multiple, and drainage or retention of the sclerosing agent.[13, 18-20] We used single-session 95% ethanol sclerotherapy without drainage of the sclerosing agent in 42 patients with 45 renal cortical cysts. There was complete cyst resolution in 33 (78%) of these cysts. Similar results have been reported by other authors, using single or multiple sessions with or without drainage of the sclerosing agent, with success rates ranging from 70-95%.[8,13,21] Ozgur et al.[22], in 1998, reported a similar success rate with aspiration and a single sclerotherapy injection. However, more recent studies reported lower rates of complete resolution with single-session sclerotherapy, which could partly be due to the longer follow-up period in these studies.[23,24] In our series, the final results were assessed at six months post-procedure and hence reflect only the short- and mid-term results of this procedure. A longer follow-up period is needed to assess the long-term results.

Single-session sclerotherapy with drainage of the sclerosing agent has been reported to be less effective than multisession sclerotherapy, with rates of 57% vs. 95%, respectively.[23] However, multisession sclerotherapy involves the insertion of a pig-tail catheter in the cyst cavity, which could increase the cost and morbidity of the procedure. Our series has shown a reasonably good success rate with aspiration and single-session sclerotherapy (complete response in 73% cysts), which could be due to complete cyst fluid drainage before sclerotherapy and leaving the sclerosing agent inside the collapsed cyst cavity. Removal of the sclerosing agent could result in a poorer outcome as reported in some other series.[23,25] Drainage of the sclerosing agent may result in insufficient damage to the cyst epithelial cells and, hence, low success rates, as reported in single-session sclerotherapy with sclerosing agent drainage. However, leaving the sclerosing agent inside the collapsed cyst cavity could result in better success rates, as observed in our series.

Complications due to the procedure are rare and usually self-limited. The most frequently observed complications include pain, fever, hematuria, and small perinephric hematoma.[12,25,26] Similar minor complications were observed in 11 (26%) patients and were managed conservatively.

In conclusion, the treatment of symptomatic renal cortical cysts using ethanol sclerotherapy under ultrasound guidance is a simple, safe, minimally invasive and cost-effective outpatient procedure with satisfactory short- and mid-term results.

Single-session ethanol sclerotherapy can be performed with good efficiency and low morbidity, particularly in moderately sized cysts (<300 mL) and should therefore be considered as a feasible therapeutic option for the treatment of symptomatic simple renal cortical cysts. However, a longer follow-up period is required to assess the long-term results of this procedure.

Conflict of interest

No conflict of interest was declared by the authors.

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