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Original Article

# Percutaneous Nephrostomy and Sclerotherapy with 96% Ethanol for the Treatment of Simple Renal Cysts: Pilot Study

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Abstract

**Introduction:** The objectives of this study was to evaluate the safety and efficacy of aspiration with percutaneous nephrostomy tube and sclerotherapy with 96% ethanol for simple renal cyst.

**Methods:** Between 2011-2014, 34 patients with symptomatic renal cysts were included in the study. Mean age was 52.3±4.6 years (range, 39-72 years). The patients had only flank pain. Procedure was performed with ultrasound guidance and under fluoroscopic control. After puncture with 18 G angiography needle, guide-wire was advanced to the collecting system. An 14Fr nephrostomy catheter was then advanced over the guide wire. After taking cystography 96% ethyl alcohol was injected into the cyst and drained amount 10%. We continued daily to inject same amount of alcohol postoperatively until the drainage was less than 50 mL. 6th months and yearly follow-up were performed with ultrasound..

**Results:** Percutaneous access was achieved in all patients. Cysts were unilateral, single and with a mean diameter 9.1±3.2 cm (range, 7-16 cm). Median drained volume was 212 mL (200-1600 mL) and median the injected ethanol volume was 54 mL (20- 160 mL). Radiological improvement at the end of the 6th month was amount 94.1% and 91.1% at the end of the 1st year while 83.3% of patients had symptomatic decline. There was no major complication after the procedure. 6 patients had minor complications resolved with medical treatments (pain).

**Conclusion:** Treatment of symptomatic simple renal cysts with aspiration with percutaneous nephrostomy tube and sclerotherapy with 96% ethanol was, efficient, cheaper, safer and minimally invasive treatment alternative.

**Keywords:** Simple renal cyst, percutaneous nephrostomy, sclerotherapy, ethanol

## Introduction

Simple renal cysts are those with a benign character, which are frequent and generally asymptomatic, and which involve columnar epithelium (1, 2). Their prevalence increases with age, and it has been shown in studies that they are seen at a rate of 40% in the 40-year-old age group and at a rate of 50% above the age of 50 years (2, 3). Although most of the renal cysts are asymptomatic, patients may have complaints of side pain and hematuria, and also findings such as cyst rupture, hemoperitoneum, and hypertension may be seen (4).

Renal cysts can be treated with various methods when they are symptomatic. As they may be symptomatic with pain, they may also be symptomatic with bleeding and superinfection (5). They can be treated with open, laparoscopic, endoscopic, or percutaneous methods (6, 7). Because there may be repeated effusion due to the live cyst wall as a result of cyst aspiration percutaneously, percutaneous methods are used mostly for diagnostic purposes (8). Sclerosing agent injection can be applied afterwards to decrease relapse. Endoscopically, marsupialization or excision of the cyst and removal of the cyst wall with laparoscopic methods are commonly applied treatment alternatives. Among these, percutaneous cyst aspiration and sclerotherapy performed with sclerosing agent injection are the most preferred treatment alternatives because they cause less pain and bleeding, involve a shorter hospitalization duration, and they can be applied even to outpatients (9). It has been demonstrated in previous studies that percutaneous sclerotherapy is practical, effective, and cost effective (10).

Sclerotherapy is the prevention of fluid production by destroying the epithelium lining the inside of the cyst and the provision of adhesion (9). Protein denaturation takes place in sclerotherapy performed with ethanol, and fibrous scar tissue forms after cell death (8). Bismuth phosphate, minocycline, ethanolamine oleate, povidone iodine, tetracycline, and iodized oil as sclerosing agents were used with cyanoacrylate, sodium tetradecyl, hypertonic saline, ethanol, and acetic acid (11). Apart from efficacy, showing the least systemic effects or local complications, having high availability, and being cost effective are important in sclerosing agent selection. The cyst fluid volume can be followed, and the sclerosing therapy can be continued by placing the percutaneous nephrostomy catheter for the purpose of increasing the efficacy of the sclerotherapy applied after aspiration of the cyst percutaneously.

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In this study, sclerotherapy is applied to patients whose cysts are aspirated by percutaneous access due to a symptomatic simple renal cyst, and sclerosing therapy is continued until a percutaneous nephrostomy catheter is placed and the fluid volume decreases significantly.

## Methods

In our clinic, the data of 34 (19 female, 15 male) symptomatic renal cyst patients, with a mean age of 52.3±4.6 (39-72) years, to whom sclerosing therapy was applied through cyst aspiration and a percutaneous nephrostomy catheter by ultrasound-guided percutaneous access, were evaluated retrospectively between November 2011 and March 2014. All the patients had symptomatic simple renal cysts larger than 1.5 cm according to the Bosniak classification, which were revealed through ultrasonography and/or computed tomography (CT) when suspected to be associated with the collecting duct system. General information, possible complications, and alternative treatment methods were told to the patients before the operation. Written informed consents of the patients were obtained, and they were taken to the operation room after their hemorrhage parameters were checked.

The cyst was aspirated with ultrasound-guided percutaneous access under local anesthesia; sclerosing therapy was applied and sclerotherapy was continued until the liquid from the cyst fell below 50 mL/day by placing a percutaneous nephrostomy catheter. As mentioned in the literature before, the cyst volume was calculated as V=d3/6 (d=the largest diameter of the cyst accepted as spherical, and d=(length×width×depth)/3 for the cysts not spherically shaped) (12).

After the entry site of the patient lying in the prone position was detected with ultrasonography, local anesthesia was performed with lidocaine. Then, ultrasound-guided percutaneous cyst puncture was achieved with an 18-G angiography needle. It was ensured that the cyst was punctured with cyst fluid coming out of the needle. All the fluid volume coming out of the cyst was followed up and the initial 10 mL cyst fluid was taken both for cytological and biochemical examination. The additional 2 mL cyst fluid mixed with 95% ethanol was evaluated to know whether there was protein in the cyst fluid or not. Protein positive of the cyst fluid was accepted in case there was precipitation. The patients with no protein following in the cyst fluid were not taken to sclerotherapy, accepting that the content was associated with the renal collecting system and that the fluid may be urine. No precipitation was seen in any of the patients in our study. After this evaluation, 0.038 Fr sensor guide wire (Boston Scientific, Natick, MA) inside the needle was inserted into the cyst which was decided upon for sclerotherapy.

Then dilatation was performed with 8, 10, 12 Fr dilatators, and 14 Fr percutaneous nephrostomy catheter was placed inside the cyst. Then, with the catheter inside the cyst, the integrity of the cyst wall was checked by performing fluoroscopic cystography with nonionic contrast material, which was almost 10% of the fluid coming inside the cyst from the nephrostomy catheter diluted with 50% physiological saline solution. It was observed that the contrast material did not go out of the cyst and the margins of the cyst appeared clearly. Then the contrast material given was emptied completely from the nephrostomy catheter so that the sclerosing agent to be given was not diluted. Almost 10% of the fluid coming from the cyst with 96% ethyl alcohol was injected slowly inside the nephrostomy catheter. Then, alcohol was provided to be kept in the cyst for 20 minutes. All the alcohol was removed and the bag was connected to the percutaneous nephrostomy catheter. The patients were kept under observation for 2 h, and the patients without any problem were sent home to come back the next day. Then, the patients were followed up every day, and sclerotherapy was continued by giving 96% alcohol as much as the initial volume until the fluid coming from the cyst was below 50 mL/day.

### Statistical analysis

The patients were called for a follow-up in the 6$^{th}$ and the 12$^{th}$ months after the treatment was over, and the nephrostomy catheter was removed and the cyst was evaluated with ultrasonography. The results were given as the mean±standard deviation or median. The comparison with regard to success was performed using the chi-square test. The Stata 11 package program was used for statistical analysis. $P<0.05$ was accepted to be statistically significant.

## Results

In total, 14 of the cysts were in the lower pole, 13 of them were in the mid pole, and 7 of them were in the upper pole. The patients were followed up in a median of 10 (3–12) months. The data of the patients are summarized in Table 1. The mean cyst size was calculated as 9.1±3.2 cm (7.1–16 cm) before the treatment, and the median fluid volume was calculated as 254 mL (65–1380 mL). The median fluid volume aspirated from the cyst was measured as 212 mL (200–1600 mL). The cytological examination of the fluids taken from the cysts of the patients was found to be negative. It was also observed in the biochemical evaluation that the cyst content was the same as the serum. No complication was observed in the patients during the operation. Six patients had a pain complaint associated with the percutaneous nephrostomy in the postoperative period. These patients were treated with an oral analgesic.

While radiologic recovery was 94.1% at the end of the 6$^{th}$ month and 91.2% at the end of the 1$^{st}$ year, 83.3% of the patients had symptomatic regression. When we examined further according to the regions, 6 of the cysts in the upper pole, 13 of the cysts in the mid pole and 14 of the cysts in the lower pole were not observed in ultrasonography at the end of the 6$^{th}$ month. It was observed that there was no difference with regard to success among the regions

**Table 1. Patient characteristics**

| Characteristics | |
|---|---|
| Number of patients (n) | 34 |
| Gender (male/female) | 15/19 |
| Side (right/left) | 16/18 |
| Location (upper/medium/lower) | 7/13/14 |
| Mean size (cm) | 9.1±3.2 |
| Median volume (mL) | 254 |
| Median volume of drained fluid (mL) | 212 |
| Mean number of sessions (n) | 2.7±1.3 |
| Success rate | |
| 6$^{th}$ month (%) | 94.11 |
| 12$^{th}$ month (%) | 91.17 |

(p=0.14). Although there was no change in the upper and lower poles in the first year follow-ups, it was observed that one of the mid pole cysts had begun to enlarge. Therefore, the success rate in all of the patients was 91.2%.

## Discussion

Simple renal cysts are benign masses and are mostly detected with ultrasonography or CT (1). Although the etiology of renal cysts is not known exactly, it is claimed that it may be caused by the obstruction and ischemia of distal convoluted tubule (13). Most of the cysts are asymptomatic, and their regular follow-up is sufficient with regard to detecting malignant transformation. Because some of them may cause pain, hematuria, hypertension, recurrent infection, and obstructive nephropathy, they may require treatment (14). Symptomatic renal simple cysts can be treated by various surgical and percutaneous endoscopic methods. Percutaneous aspiration with or without sclerotherapy, open or laparoscopic marsupialization, percutaneous endocytosis, and cyst excision may be counted among these treatments (15). Surgical interventions, particularly open surgical interventions, are not recommended, especially for old patients, because they may cause morbidity and mortality (16). Because renal cysts are localized as suitable for percutaneous aspiration, they are easily tolerated by patients as minimally invasive, and they can be aspirated safely and efficiently by the help of ultrasonography without any need for hospitalization (17). It is reported that aspiration recurs in approximately 30%–78% of patients when sclerosing agents are not used (18). Many sclerosing agents have been tried for preventing the recurrence and increasing the success rate of the intervention.

Sclerosing agents that are used for preventing the recurrence of simple renal cysts are bismuth phosphate, minocycline, ethanolamine oleate, povidone iodine, ethanol, tetracycline, iodized oil, cyanoacrylate, sodium tetradecyl, hypertonic saline, and acetic acid. These agents destroy the epithelium that covers the inner surface of the cyst and cause adhesion of the walls by creating local inflammation in the inner surface of the cyst (9). While choosing these agents, complications such as infection and hemorrhage, availability, and cost-effectiveness should be considered. Most studies of the agents have revealed that ethanol injection can yield successful results only compared to aspiration (4, 9, 14). However, the leakage of phenol or ethanol into the surrounding tissues can cause not only minor complications, such as local tissue corrosions, but also major complications, such as aseptic abscess and severe central nervous system depression (9). In our study, although we used ethanol for the treatment of our patients, no complication was observed in any of them. These complications might have been prevented by the facts that ethanol injection was not applied directly through a needle, but through a percutaneous nephrostomy catheter; the dose of ethanol was adjusted in such a way that it would not create high pressure in the cyst; and ethanol was withdrawn through the same catheter again. Moreover, higher success was obtained by keeping ethanol in the cyst for 20 min.

## Conclusion

Simple renal cyst treatment performed by the insertion of a nephrostomy catheter through the percutaneous entry is an efficient, low-cost, and safe method.

**Ethics Committee Approval:** Ethics committee approval was not received due to the retrospective nature of this study.

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Peer-review:** Externally peer-reviewed.

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