DOI 10.26724/2079-8334-2021-4-78-146-149
UDC 616.61-006.2–036.65:617–089.819

L.P. Sarychev, Y.V. Sarychev, A.L. Pustovoyt, S.M. Suprunenko, R.B. Savchenko, R.L. Ustenko, S.A. Sukhomlyn
Poltava State Medical University, Poltava

EFFICACY OF PERCUTANEOUS DRAINING OPERATIONS FOR SIMPLE RENAL CYSTS

urologypolt@gmail.com

The relevance of the work is due to the fact that the choice of the optimal method for minimally invasive treatment of simple renal cysts is controversial and there is no consensus. In order to assess the effectiveness of treatment, we carried out both a retrospective and prospective analysis of the documentation of 455 patients with simple renal cysts. Percutaneous draining operations performed in 402 (88.4 %) patients followed by sclerotherapy with 96 % ethanol have proven to be an effective treatment for progressive (>6 cm) and symptomatic simple renal cysts. Bosniak category II simple renal cysts are characterized by a significant increase in drainage time. Symptomatic parapelvical, multichambered, intraparenchymatous (Bosniak category IIF-III) and complicated (Bosniak category IV) simple renal cysts should be a subject for "open" surgical treatment.

Key words: kidney, cyst, ultrasonography, draining, surgery, sclerotherapy.

Л.П. Саричев, Я.В. Саричев, Г.Л. Пустовойт, С.М. Супруненко, Р.Б. Савченко, Р.Л. Устенко, С.А. Сухомлин

ЕФЕКТИВНІСТЬ ЧЕРЕЗШКІРНИХ ДРЕНУЮЧИХ ВТРУЧАНЬ ПРИ ПРОСТИХ КІСТАХ НИРОК

Актуальність роботи обумовлена тим, що вибір оптимального методу малоінвазивного лікування простих кіст нирок суперечливий і досі немає одностайної лікувальної тактики. Для оцінки ефективності лікування ми провели як ретроспективний, так і проспективний аналіз документації 455 пацієнтів з простими кістами нирок. Черезшкірні дренуючі операції, проведені у 402 (88,4 %) пацієнтів, з наступною склеротерапією 96 % етанолом, виявилися ефективним методом лікування прогресуючих (>6 см) і симптоматичних простих кіст нирок. Прості ниркові кісти категорія II за Bosniak характеризуються значним збільшенням часу дренування. Симптоматичні парапельвікальні, багатокамерні, паренхіматозні (категорія IIF-III за Bosniak) і складні (категорія IV за Bosniak) кісти нирок підлягають хірургічному лікуванню.

Ключові слова: проста ниркова кіста, ультразвукове дослідження, черезшкірний дренаж, пункція, склеротерапія.

The study is a fragment of the research project "Clinical and pathogenetic characteristics of urinary tract remodeling in the elderly and senile persons", state registration No. 0120U104459.

Cystic formations of the kidneys are a type of renal parenchyma dysplasia. The term "simple renal cyst" (SRC) itself emphasizes its benign nature. SRC are met in 3–5 % of the population. However, according to some authors, routine ultrasound (US) reveals small single (solitary) cysts of the kidneys in almost 25 % of persons after 40 and more than 50 % of persons after 60 years [2, 10].

There are congenital cysts of the kidneys, which develop from embryonic tubules that have lost contact with the urinary tract, and the so-called "acquired" cysts, formed as a result of focal renal ischemia after a small infarction, abscess or injury. SRC can have a single-chamber and multi-chamber structure, be unilateral and bilateral, located in the upper, middle or lower segments of the kidney. They can be subcapsular, intraparenchymal and parapelvical cysts. Peripelvical cysts of lymphatic origin occupy a special place [4].

More than two dozen classifications have been proposed to systematize this nosology. At the same time, none of them is universal. In clinical practice, the classification of Bosniak (1987) is the most widespread, which is based on the division of SRC depending on the severity of possible signs of malignancy [3, 4, 5].

Regardless of age, SRC are rarely clinically manifested, but are more likely to be found during routine US examination, computed tomography (CT) and magnetic resonance imaging (MRI) of the abdominal cavity and retroperitoneal space [9]. According to N.Terada [10], during one year, SRC increase by an average of 6.3 % in volume. In 20–30 % of cases, SRC can be manifested by pain, microhematuria, symptomatic hypertension, but rarely cause urostasis, stone formation, hemorrhagic complications, infection, rupture, malignancy. First of all, cystic formations of the kidneys should be differentiated from the cystic form of kidney cancer [6].

Due to the availability, informativeness and safety of ultrasound in the "gray scale" mode it is widely used as a routine procedure in the diagnosis of cystic kidney disease. In complicated cysts, CT with

contrast enhancement is more informative. MRI is effective in cases where peri- and parapelvic cysts of the kidney have to be differentiated from hydronephrotic transformation [7, 8].

Modern imaging methods have much expanded the indications for drainage operations, and subsequent sclerotherapy dramatically reduces the risk of recurrence of SRC compared with "traditional" ignipuncture [9, 10].

Unsatisfactory results of drainage operations are associated with calcification of the cystic wall, intraparenchymal location, multichambered structure [1].

Symptomatic parapelvic, multichambered, intraparenchymal and complicated cysts are subject to surgical treatment, including the use of laparoscopic techniques.

At the same time, the question of expediency of drainage operations at SRC less than 6 cm, a choice of a sclerosant, exposure, frequency of introduction, duration of drainage of a cyst cavity, frequency and the reasons of recurrence remains open. Opinions on medical tactics in SRC of Bosniak categories IIF-III differ.

The purpose of the study was to assess the efficacy of percutaneous drainage operations in simple renal cysts of different structure and location.

Materials and methods. The study included 455 patients with SRC who were treated in the urology department of the Poltava M.V. Sklifosovsky Regional Clinical Hospital during 2011–2020. There were 208 men (45.7 %) and 247 women (54.3 %). The age range of the patients was 25–77 years (57.06±2.55). Localization of the process in right kidney was seen in 223 (49.0 %) patients, in left kidney – in 213 (46.8 %) patients, bilateral process – in 19 (4.2 %) patients.

During the study, local and international ethical principles were strictly observed, the group of researchers followed the Declaration of Helsinki of the World Medical Associations, informed consent was obtained from each patient.

All patients underwent clinical and laboratory examination, that included general blood count, urinalysis, blood chemistry and coagulology. Each patient was evaluated with ultrasound in the "gray scale" mode followed with Doppler ultrasonography (both in Power Doppler mode and color Doppler mapping). All ultrasound examinations were performed with Sonoscape SL20 Diagnostic Ultrasound Complex.

CT was performed with Siemens SOMATOM Emotion 6 and CANON Aquilion Prime SP160 diagnostic systems. For the purpose of intravenous contrasting, patients were injected with iohexol or iopromide intravenously bolus in a dose of 1–1.5 ml per kg of body weight. After native, a scan of the retroperitoneal space and the abdominal cavity was performed in the arterial, venous phase with sequential CT urography after 10 minutes with emptying the urinary bladder for the most complete visualization of the urinary tract. If necessary (in cases of impaired urodynamics), delayed scans were performed. To prevent the onset of contrast-induced nephropathy in a bolus-enhanced study, a normal serum creatinine level was a mandatory criterion for patient selection. All patients underwent adequate hydration before the study (mainly oral, if indicated - parenteral). After the study, patients were recommended to be high orally hydrated with alkaline mineral waters, accompanied with intake of 600 mg of acetylcysteine twice a day.

Clinical trial data was statistically processed by the method of variation statistics. We performed the statistical analysis for the obtained scientific data using standard software package "Data Analysis" in Microsoft Excel for Windows 2010. We calculated the following arithmetic mean values – arithmetic mean (M), mean arithmetic error (m), and differences probability (p). Interpretation of the obtained data reliability was performed by the conventional parametric method according to the Student's t-test. Reliability was determined when its value was at least 95 % (0.05).

Results of the study and their discussion. In ultrasound examination, simple renal cyst was visualized as a round, thin-walled, anechogenic formation with clear contours. Hemorrhage into the cyst cavity, inflammatory complications were accompanied by increased echogenicity. Calcinosis of the cyst wall was manifested by thickening, uneven contours, presence of parietal nodes of increased echogenicity. According to the results of power Doppler and color Doppler mapping cystic formations of the kidneys did not have independent vascularization. In large cyst size and intraparenchymal localization in 57 patients (12.5 %) there was an impairment of renal blood flow, which can be explained by high pressure of the cystic liquid and compression of main or segmental renal vessels.

The multichambered structure of the cyst, changes in the thickness and contours of the wall or septum, as well as the appearance of color signals in the cyst wall were indications for performing CT with contrast enhancement (fig. 1, 2).

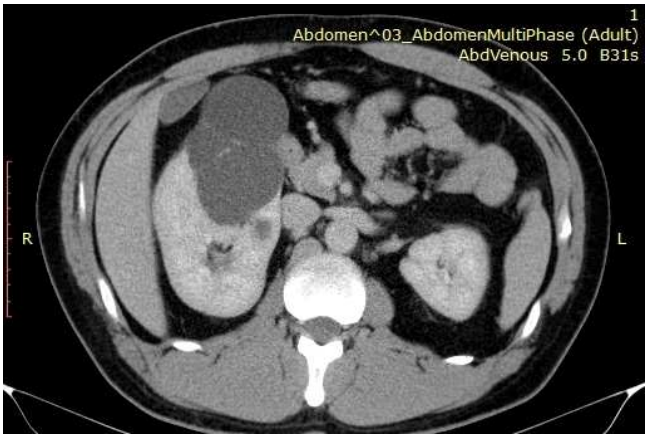

Fig.1 Subcapsular cyst of the right kidney upper segment; Bosniak III category (CT, venous phase).

Fig.2 Intraparenchymatous renal cyst; Bosniak IIF category (CT, excretory phase).

In patients, who demonstrated the accumulation of contrast medium in the cystic wall (in 3 observations) it was regarded as an indirect sign of malignancy.

According to cyst size, quantity, location and accompanying nosologies the cohort was divided onto such groups:

375 patients (82.4 %) with SRC of subcapsular location with size ≥ 6 cm (7.33±0.79): in the upper segment – 91 (24.3 %), the middle segment – 154 (41.1 %), lower segment – 130 (34.7 %) (Bosniak category I-II);

22 patients (4.8 %) with multiple (2–5) subcapsular SRC, 5–8 cm in size (Bosniak category I-II);

9 patients (4.2 %) with subcapsular SRC, 6-9 cm in size in both kidneys (Bosniak category I-II);

12 patients (2.6 %) with parapelvical symptomatic SRC (of which in 7 patients – with impaired urodynamics, in 5 patients – accompanied with nephrolithiasis), 6–11 cm in size (Bosniak category IIF);

11 patients (2.4 %) with multichambered symptomatic SRC (3 patients had previously undergone percutaneous drainage operations), 7–9 cm in size (Bosniak IIF category);

13 patients (2.9 %) with intraparenchymal symptomatic SRC, 7–8 cm in size (Bosniak category IIF-III);

3 patients (0.7 %) with SRC 6–19 cm in size, with presence of indirect signs of malignancy (Bosniak category IV).*adrained cavity with the collecting system of the kidney during sclerotherapy can lead to irreversible damage to the urothelium. Iopamide-240 is a preferrable agent for filling the cyst cavity during cystography. The volume of injected iopamide was individual, but usually it does not exceeded half of the primary cyst volume. The next day after cystography, 96 % ethanol (up to one third of the cyst volume) was injected into the cyst cavity with exposure for up to 5 minutes. The condition of the patient during sclerotherapy and three hours after it was thoroughly controlled by medical personnel in order to prevent or promptly stop potential adverse events.

In 290 cases, sclerosant was administered once, in 69 cases twice, and in 43 cases three times. The drainage tube was removed the day after the cyst wall secretion stopped. The benefits of longer than 5 minutes exposure sclerotherapy were not identified.

In 339 cases (Bosniak category I), the duration of drainage was 4.09±1.13 days, in 56 cases (Bosniak category II) – 6.73±1.59 days ($p<0.05$). In tense cysts (the content after the puncture was released under significant pressure), with an increase in the thickness, density, presence of calcification of the cystic wall, a significant increase in the duration of drainage was observed.

In 7 patients (in 5 cases with subcapsular cysts in the area of the anterior lip and in 2 cases – in the area in the posterior lip of the kidney) in the postoperative period a prolonged excretion of urine through the cystostomic drainage was seen. Cystography revealed leakage of a contrast agent into the renal cavity system. In all patients, urinary fistulas closed independently within 3 weeks.

In 14 cases, the localization of the cyst in the upper pole of the kidney limited the prolonged drainage with Foley catheter or "pigtail" catheter, thus, the puncture of the cyst in the X-XI intercostal space with evacuation of the contents and a single injection of sclerosant with 3 minutes exposure was performed. Follow-up showed no statistical difference in long-term treatment results.

At ultrasound control in terms from 3 to 6 months in 306 patients, which accounted for 73.6 % of all draining operations, no residual cystic cavities were detected, in 89 patients (21.4 %) – the residual volume of the cyst did not exceed 1/10 of the initial volume and in 21 patients (5.0 %) – 1/5 of the initial

volume. In this group, 17 patients during 3 months underwent repeated puncture of the cyst with evacuation of residual contents. None of the patients showed residual cavities after repeated punctures.

Surgical interventions were performed in 39 patients: resection of the free wall of the cyst with marginal sheathing – in 36 patients (in 12 observations - in parapelvical cysts, in 11 observations – in multichambered cysts, in 13 observations – in intraparenchymal cysts; enucleation of the cyst in 1 patient with partial renal resection and in 2 patients with indirect signs of malignant transformation of the cyst. Histological examination in 2 cases revealed highly differentiated renal cell carcinoma. Further follow-up for 5 years did not reveal the progression of the oncological process in the form of local recurrence or distant metastases.

Despite the interest of researchers to the problem of simple kidney cysts, there is still no unified approach to both understanding their pathogenesis and choosing the best treatment modality with the minimal likelihood of recurrence and complications [1, 2]. Undoubtedly, the use of modern highly informative imaging methods in urology (ultrasonography with dopplerography, CT, MRI) has significantly improved both diagnosis and subsequent planning of effective treatment methods [4, 5, 6]. At the moment, puncture drainage with sclerotherapy is the "gold standard" of treatment due to its technical simplicity, high efficiency and good patients' tolerance. In our study, we observed the best results with minimal hospitalization duration in patients with Bosniak category I cysts. Similarly to O.O. Liulko[1], our data proove that Bosniak category II cysts require much longer drainage, which necessitates further study of the problem with the searching ways to reduce hospital stay duration. In addition, reducing the traumatic level of "open" surgical treatment of Bosniak category IIF-III and category IV renal cysts, the search for highly specific markers of malignization for this category of cysts with the purpose of early diagnosis of the oncological process remains an actual problem.

Conclusions

Percutaneous draining operations followed by sclerotherapy have proven to be an effective treatment for progressive ($\geq$6 cm) and symptomatic SRC.

Tense, of increased thickness and density, with presence of calcifications in the walls (Bosniak category II cysts) are characterized by a significant increase in drainage time.

Symptomatic parapelvical, multichambered, intraparenchymatous (Bosniak category IIF-III) and complicated (Bosniak category IV) SRC are a subject for "open" surgical treatment.

References

1. Liulko OO, Varvashenia MV. Novye podkhody k prognozirovaniyu retsydiva prostoy kisty pochki. Visnyk morskoyi medytsyny. 67(2). 2015. 94–101. [in Russian]

2. Sarychev LP, Parkhomchuk PA, Kuriachyi YV, Afanasiev IE. Ekstrarenalna endoskopichna khirurhiya kist nyrok velykykh rozmiriv. Urolohiya. 7(3). 2003. 19–23 [in Ukrainian]

3. Bosniak MA. The Bosniak renal cyst classification: 25 years later. Radiology. 2012. 262(3). 781–785.

4. Hélénon O, Crosnier A, Verkarre V, Merran S, Méjean A, Correas JM. Simple and complex renal cysts in adults: Classification system for renal cystic masses. Diagn Interv Imaging. 2018. 99(4). 189–218. doi:10.1016/j.diii.2017.10.005.

5. Hwang JH, Lee CK, Yu HS, Cho KS, Choi YD, Ham WS. Clinical Outcomes of Bosniak Category IIF Complex Renal Cysts in Korean Patients. Korean J Urol. 2012. 53(6):386–390. doi:10.4111/kju.2012.53.6.386

6. Lee CT, Yang YC, Wu JS. Multiple and large simple renal cysts are associated with prehypertension and hypertension, Kidney Int. 2013. 83.924–930. doi: 10.1038/ki.2012.481

7. Park H, Kim CS. Natural 10-year history of simple renal cysts. Korean J Urol. 2015. 56(5). 351–356. doi: 10.4111/kju.2015.56.5.351

8. Simms RJ, Ong AC. How simple are 'simple renal cysts'? Nephrol Dial Transplant. 2014. 29. Suppl 4. iv106–iv112. doi:10.1093/ndt/gfu106

9. Skolarikos A, Laguna MP, de la Rosette JJ. Conservative and radiological management of simple renal cysts: a comprehensive review. BJU Int. 110. 2012. 170–178.

10. Terada N, Arai Y, Kinukawa N, Terai A. The 10-year natural history of simple renal cysts. Urology. 2008 Jan;71(1). 7–11; discussion 11-2. doi:10.1016/j.urology.2007.07.075.

Стаття надійшла 17.12.2020 р.