Obstructive Renal Cyst in a Dog: Ultrasonography-Guided Treatment Using Puncture Aspiration and Injection with 95% Ethanol

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A 12-year-old, intact male, mixed-breed dog was evaluated after surgical removal of a mast cell tumor from the shoulder. Results of laboratory tests were within the reference ranges, but examination of urinary sediment identified epithelial cells of the upper urinary tract and microscopic hematuria. Abdominal ultrasound examination performed after a 12-hour fast identified a simple cyst in the left kidney. The cyst was approximately 26 mm in diameter, was anechoic, and had a thin, slightly hyperechoic wall with distal acoustic enhancement accompanied by dilatation of the caudal papillary duct and renal pelvis (Fig 1). Excretory urography with iopamidol contrast (800 mg/kg IV) confirmed the presence of dilatation of the left renal pelvis and collecting system (Fig 2).

Drainage and ultrasound-guided percutaneous injection of 95% alcohol into the cyst were performed. After a 12-hour fast, the dog was anesthetized with propofol (6.5 mg/kg IV, followed by 1 mg/kg as needed), placed in dorsal recumbency, and prepared for standard surgical intervention. A 23-gauge spinal needle was inserted into the cyst under ultrasound guidance and connected to a 50-cm extension set with a 3-way valve. A portion of the drained material was submitted for cytologic examination and another portion was placed in a sterile container for bacteriologic culture. Alcohol injection was performed via the spinal catheter by using a volume of 95% ethanol equal to approximately one half of the volume that had been drained. The alcohol was removed after 3 minutes and the injection was repeated with 2% lidocaine (10%, vol/vol) added to the alcohol solution. The liquid was left in place for 3 minutes and again drained.

Cytologic examination of the cystic liquid identified the presence of epithelial cells but no evidence of neoplasia or infection. Results of bacteriologic culture were negative. The animal was monitored for complications by clinical examination, CBC, and abdominal ultrasonography 24 and 48 hours after the procedure, and no evidence was found of short-term complications. Successive ultrasonographic and radiographic examinations with contrast medium by excretory urography after 20 days identified resolution of ectasia of the papillary duct and left renal pelvis (Fig 3). Examination of urinary sediment at this time showed no evidence of microscopic hematuria or epithelial cells of the upper urinary tract.

In both dogs and humans, simple renal cysts (SRCs) often are encountered during abdominal ultrasonography performed for unrelated reasons or upon postmortem examination. Unilateral or bilateral SRCs generally are clinically silent and consist of fluid-filled, epithelial-lined cystic structures within the renal cortex or medulla. On ultrasonographic examination, SRCs usually are observed as round or oval lesions with anechoic content, distal acoustic enhancement, and a thin hyperechoic wall. SRCs are variable in size and large cysts may deform the kidney, but the pathologic effects of unilateral or bilateral renal cysts remain unclear. The epithelium covering the internal surface of the cystic structures is responsible for fluid and solute transport between the adjacent interstitium and the cystic cavity, resulting in a progressive increase in the volume of the cyst.

In human medicine, the most frequently reported clinical symptoms resulting from SRCs include systemic hypertension and urinary tract obstruction. Hypertension occurs as a result of compression exerted by the cyst on the vascular structures of the surrounding parenchyma, which causes progressive ischemia and activation of the renin-angiotensin-aldosterone system. In humans, symptomatic renal cysts are treated by drainage and ultrasonography-guided percutaneous injection of alcohol. In the present case, the SRC caused dilatation of the papillary duct and renal pelvis, but renal function was not noticeably compromised. Drainage of the cystic fluid eliminated compression caused by the cyst on the surrounding renal parenchyma and urinary tract. Two alcohol injections were performed to induce sclerosis of the epithelial wall of the cyst without damaging the renal parenchyma, and to reduce the possibility of recurrence. The 2nd injection destroys the cystic epithelial cells because of prolonged contact with the sclerosing agent and reduces the rate of recurrence compared to aspiration alone or aspiration and a single injection with alcohol.

The possible risks associated with the technique include rupture or bleeding of the cyst. The latter is more likely with either rapid drainage or rapid injection of alcohol. Rupture of the cystic wall may occur in cases in which either too much alcohol is injected or if it is introduced too quickly. The use of the proper drainage-volume ratio (ie, 1:2) optimizes flow rate, whereas the quantity of ethanol injected, equivalent to one half of the drained liquid, reduces the possibility of rupture or bleeding and permits a good distension of the cystic wall.

The possibility of progression to neoplasia from an SRC has not been described in veterinary medicine. On the basis...
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Fig 1. Abdominal ultrasound examination showing a simple cyst in the left kidney, accompanied by dilatation of the caudal papillary duct (between calipers). The cyst is approximately 26 mm in diameter.

Fig 2. Excretory urography showing mild dilatation of the left renal pelvis and of a caudal papillary duct (arrow). The image was obtained 5 minutes after IV injection of Iopamidol at a dosage of 800 mg/kg.

Fig 3. Excretory urography performed 20 days after intervention (drainage and alcohol injection) of a simple cyst of the left kidney. No dilatation of the pelvis and collecting system is observed. The image was obtained 5 minutes after IV injection of Iopamidol at a dosage of 800 mg/kg.

of what has been reported in human medicine, cytologic evaluation of the drained fluid is necessary for early identification of neoplasia. Because of its capacity to induce sclerosis, ethanol reduces the risk of metastasis in the path of the spinal needle and also eliminates any eventual dissemination of bacteria in the event that an infected cyst was mistakenly diagnosed as an SRC during ultrasound examination. The minimally invasive nature of the technique, accompanied by its low cost and reduced hospitalization time, has made ultrasound-guided percutaneous alcohol injection the treatment of choice for SRCS in human medicine and also render it a valid alternative to traditional surgical intervention in veterinary medicine.

Footnotes

a Iopamiro 300, Bracco s.p.a, Milan, Italy
b Rapinovet, Schering-Plough s.p.a., Milan, Italy
c Spinal needle, Terumo, Tokyo, Japan

References