Idiopathic Renal Hematuria in a Dog; The Usefulness of a Method of Partial Occlusion of the Renal Artery

Mika MISHINA, Toshifumi WATANABE, Naoko YUGETA, Hiroto MAEDA, Kouichi FUJII, Yoshito WAKAO, Mitsugi TAKAHASHI, and Hozumi YAMAMURA

Department of Surgery, School of Veterinary Medicine, Azabu University, 1–17–71 Fuchinobe, Sagamihara, Kanagawa 229, and 1Kitagawa Animal Hospital, 1–39–1 Minamitokiwadai, Itabashi, Tokyo 174, Japan

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ABSTRACT. Exploratory laparotomy was performed on a dog suspected of having idiopathic renal hematuria. Two catheters were inserted into the bilateral ureters, and hematuria from the left kidney was confirmed. The blood flow was occluded in the ventral and dorsal rami of the left renal artery in order to localize the site of hemorrhage. As hematuria disappeared when the dorsal ramus was occluded, the site of renal hematuria was localized to the area dominated by the dorsal ramus of the renal artery. As a result of ligating the dorsal ramus of the left renal artery in this dog, renal hematuria subsided, and the dog has shown a favorable course, to date, one year after surgery.

— KEY WORDS: canine, idiopathic renal hemorrhage.


An 11-month-old male mongrel weighing 14.5 kg was referred to the Azabu University Veterinary Hospital with persistent hematuria since 5 months of age. He had been diagnosed as having chronic cystitis at another veterinary hospital, and had been under antibiotic treatment. Prednisolone, hemostyptic and an iron preparation had also been administered for 6 months.

On initial examination, the dog’s general condition was favorable, and there were no findings indicating anemia in the visible mucosa. A blood examination revealed a PCV of 47.5%, red cell count of 7,980,000/mm³ and platelet count of 287,000/mm³. There was thus no evidence of either anemia or thrombocytopenia. Serum biochemical examinations revealed no clearly abnormal findings. Urinalysis demonstrated macroscopically marked hematuria (Fig. 1). Red blood cells were seen on the urinary sediment test, but no crystals or bacteria. Double contrast radiography of the bladder revealed no abnormal findings of the urinary vesical mucosa, thickening of the vesical wall, or filling defects of the bladder. Intravenous pyelography (IVP) revealed no evidence of enlargement or filling defects of the renal pelvis and ureter. These results suggested that the hematuria was derived from the kidney. The dog was tentatively diagnosed as having idiopathic renal hematuria. Renal arteriography was performed to identify abnormalities in the renal vascular system.

The dog was premedicated with atropine sulfate (0.025 mg/kg; SC). Anesthesia was induced by intravenous injection of ketamine hydrochloride (3 mg/kg) and flunitrazepam (0.1 mg/kg), and was maintained by the administration of Isoflurane. A catheter was inserted into the right renal artery up to the abdominal aorta, and selective arteriograms of the bilateral renal arteries were obtained. Neither the right nor the left renal artery showed marked changes such as stenosis, aneurysm or arteriovenous shunt.

Exploratory laparotomy was performed to identify the site of renal hematuria and for treatment. When the inside of the bladder was observed via a ventral incision, a median abdominal incision, the mucosal surface was found to be smooth and free of lesions. When size 3.5 French catheters were inserted into the right and left ureters from the ureteral openings, clear urine was observed in the right ureter while severe hematuria was observed only in the left ureter (Fig. 2). The hilum of the left kidney was separated in order to localize the site of hemorrhage, and the ventral and dorsal rami of the renal artery were temporarily occluded with bulldog forceps. While the dorsal ramus was temporarily occluded, no hematuria was observed, whereas hematuria was seen when only the ventral ramus was temporarily occluded. From these findings, the site of renal hematuria was localized to the area dominated by the dorsal...
ramus of the renal artery. The dorsal ramus of the left renal artery was permanently ligated as treatment. On this occasion, there were no apparent anatomical abnormalities in either kidney or the renal arteries. Subsequently, the bladder was routinely sutured and the abdomen was closed. To date, one year after surgery, the dog’s course has been favorable, and no hematuria has been observed.

Trauma, malignant tumor, calculus, urinary tract infection, cystic disease of the kidney, nephritis and idiopathic renal hematuria are causes of hematuria. Idiopathic renal hematuria is a symptomatic designation for intermittent or continuous macroscopic hematuria, the etiology of which remains unknown, in cases with hematuria derived from the kidney. The diagnosis of idiopathic renal hematuria is based on blood and serum biochemical examinations, general clinical tests including urinalysis, and diagnostic imaging techniques including retrograde urography, IVP, and renal arteriography. All factors possibly causing hematuria must be excluded, such that the cause of renal hematuria is confirmed to be unknown. In human cases, the site of hemorrhage and the cause are further investigated using a ureteropyeloscopy as a follow-up diagnostic procedure [7].

Stone et al., Hitt et al., and Batamuzi et al. have reported a total of 15 canine cases of idiopathic renal hematuria [1, 5, 6, 9]. One dog with hematuria due to chronic pyelonephritis was included among those reported by Stone et al. [9]. This case does not fit the criteria for idiopathic renal hematuria. According to the reports of the aforementioned investigators, most (14) of the dogs were relatively large (2 Weimaraners, 2 Great Danes, 3 Labrador Retrievers, 4 Boxers, 1 Old English Sheepdog, 1 Beagle and 1 Cavalier King Charles Spaniel) [1, 5, 6, 9]. Their ages ranged from 2 months to 11 years (average 2.5 years), and hematuria had occurred at relatively early ages, 2 months to 3 years, in 11 of these animals. In canine cases, whether the hemorrhage is right or left sided is confirmed by inserting catheters into the right and left ureters during exploratory laparotomy [1, 5, 6, 9]. Nine cases showed hematuria from only the left kidney, 3 hematuria from both kidneys, and one hematuria from the right kidney. Thus, the incidence of hematuria from the left kidney was clearly high. The dog reported herein also had hematuria from the left kidney, at 11 months of age. This case is thus consistent with those of past reports. In human cases as well, the incidence of idiopathic renal hematuria from the left kidney is high, and “the nutcracker phenomenon” has been reported to account for this high incidence: the left renal vein between the aorta and the superior mesenteric artery is compressed by the arteries [2]. Because of the position of the anterior mesenteric artery, it is impossible to attribute the high incidence in dogs to the same etiology as that in humans. The left renal artery is longer than its counterpart on the right, leading to a higher frequency of left renal artery compression by surrounding tissues and organs. This appears to be a major etiologic factor in canine cases. However, there was no indication of such a situation in this case. For the treatment of idiopathic renal hematuria, in human cases, injection of silver nitrate [3] and partial nephrectomy [4, 8] are applied when the site of hemorrhage...
is clarified, since nonsurgical therapies are minimally effective. In canines with lateral renal hematuria, the kidney on the hemorrhagic side is excised, and the prognosis has been reported to be relatively favorable [1, 5, 6, 9]. Bilateral cases are not indicated for surgery, and the prognosis has been reported to be poor [6]. Since this case had unilateral idiopathic renal hematuria, lateral nephrectomy was the procedure of choice according to previous reports. In this case, we performed this new approach with the aim of preserving as much renal function as possible; i.e., the area of renal hematuria was confirmed by temporarily inducing ischemia in the rami of the renal artery, and the rami were then permanently occluded to produce ischemia which led to cessation of the renal hematuria. The site of renal hematuria in this case was localized, and this technique was utilized, to the dorsal ramus of the renal artery. Thus, the renal hematuria ceased with preservation of three-quarters of the function of the left kidney. When Kumon et al. [7] used a ureteropyeloscope in patients diagnosed as having idiopathic renal hematuria, the local site responsible for hemorrhage was confirmed. They reported that all lesions were localized in one calix. These results suggest that nephrectomy should be applied with caution in unilateral renal hematuria and that the site of hemorrhage should be located precisely prior to the initial treatment, as was done in this case.

REFERENCES