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SHORT PAPER

Renal Dysplasia with Unilateral Renal Agenesis in a Dog

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Summary

This report describes a renal dysplastic lesion associated with renal agenesis in a 3-year-old dog with chronic renal failure. Haematological examination revealed non-regenerative anaemia, azotaemia, increased creatinine and hyperphosphataemia. At necropsy, the right kidney and right ureter could not be identified. The left kidney was slightly enlarged, with a reduced cortico-medullary ratio. Histologically, the medulla of the left kidney had persistent mesenchyme and primitive tubules (tall pseudostratified columnar epithelium), dilated collecting ducts lined by flattened epithelium, and adenomatoid proliferation of cuboidal epithelium; fetal or immature glomeruli could not be identified. To our knowledge, this is the first report of a renal dysplastic lesion with unilateral agenesis in animals.

Keywords: agenesis; dog; renal dysplasia

Renal dysplasia, which has been reported in some dogs (Picut and Lewis, 1987; Kerlin and Van Winkle, 1995; Lobetti *et al.*, 1996; Olenick, 1999; Hoppe and Karlstam, 2000; Ohara *et al.*, 2001) and human patients (Ordoñez, 1995), refers to a developmental disorder of renal parenchyma due to imperfect inductive interaction between the mesonephric duct and the metanephric blastema (Maxie, 1993). In dogs, the characteristic histological findings on which diagnosis is based include (1) persistent metanephric ducts surrounded by primitive mesenchyme, (2) fetal or immature glomeruli, (3) fetal or immature tubules, and (4) anomalous presence of interstitial fibrous tissue (Picut and Lewis, 1987; Maxie, 1993). In human beings, multicystic renal dysplasia is the most common cystic renal disease in the newborn period; it may be unilateral or bilateral, and abnormalities of the collecting system are common (Ordoñez, 1995). Renal agenesis has been reported in dogs (Brownie *et al.*, 1988; Diez-Prieto *et al.*, 2001; Agut *et al.*, 2002; Taney *et al.*, 2003) and is often associated with congenital anomalies of other parts of the urinary tract, such as the ureter and urinary bladder (Agut *et al.*, 2002). Unilateral renal agenesis is compatible with normal life if the other kidney is normal; however, if contralateral dysplasia, or hypoplasia is present, renal failure ultimately develops (Maxie, 1993). The present report describes canine renal dysplasia associated with unilateral renal agenesis, a combination not previously reported in animals.

A 3-year-old male Cavalier King Charles Spaniel dog with a clinical history of poor appetite and depression of several days' duration was brought to the veterinary clinic. Blood analysis revealed non-regenerative anaemia (PCV: 18%; normal range, 32–45%), azotaemia (blood urea nitrogen: 154 mg/dl; normal range, 10–25 mg/dl), increased creatinine (5.5 mg/dl; normal range, 0.5–1.5 mg/dl) and hyperphosphataemia (15 mg/dl; normal range, 2.6–6.2 mg/dl). In abdominal radiographs, the right kidney was not detected and diffuse high density in the left renal cortex was

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found. The clinical signs gradually progressed despite symptomatic therapy, and the dog was humanely destroyed by an intravenous overdose of pentobarbital because of a poor prognosis.

At necropsy, the right kidney and right ureter could not be identified (Fig. 1a). The left kidney was moderately enlarged, with a smooth surface. On section of the left kidney, the cortico-medullary

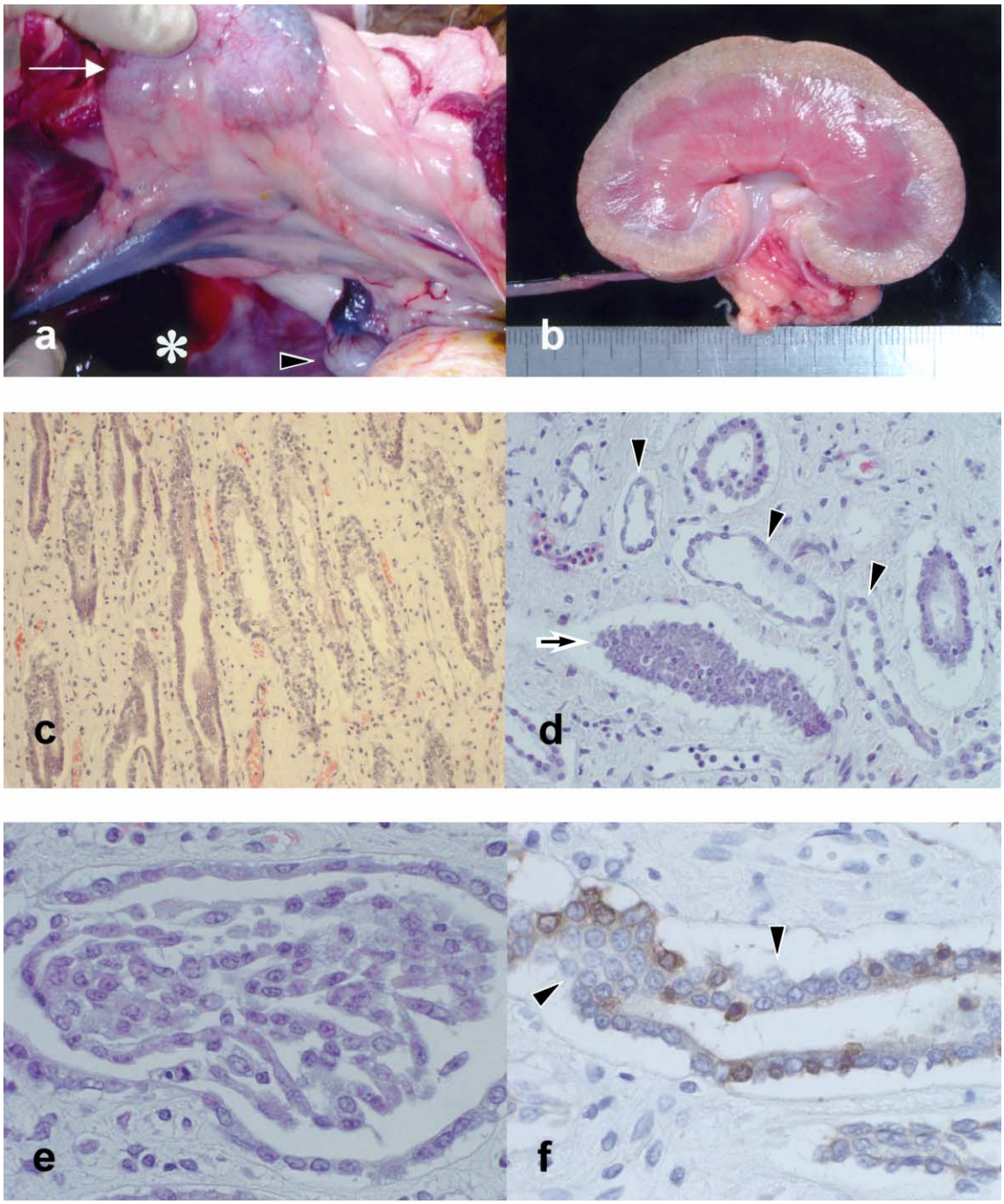

Fig 1. a–f. (a) Right kidney and right ureter are not identifiable (*). Left kidney (arrow) and right testis (arrowhead) can be seen. (b) Cut surface of the left kidney. The cortico-medullary ratio in the kidney is moderately reduced. No focal lesions are observed throughout the renal parenchyma. (c) The medulla of right kidney shows persistent mesenchyme and many primitive tubules lined by a pseudostratified tall columnar epithelium. HE. ×95. (d) Many dilated collecting ducts lined by flattened epithelial cells are seen (arrowheads). These ducts are surrounded by loose mesenchyme. An accumulation of epithelial cells without tubule formation is illustrated (arrow). HE. ×190. (e) Adenomatoid proliferations of cuboidal epithelium are frequently present in the collecting ducts of the outer medulla. HE. ×380. (f) Some but not all epithelial cells (arrowheads) of primitive tubules are labelled by cytokeratin antibody. Immunohistochemistry. ×380.