

## Intrarenal arterial patterns in the wolf (*Canis lupis*)

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**ABSTRACT:** Study of the intrarenal arterial pattern of kidney by a corrosion cast method was carried out on 10 kidneys of wolves. The left renal artery was longer than the right one. The renal arteries divided into two dorsal and one ventral branches. The dorsal branches were longer and thinner than the ventral one. Both dorsal and ventral branches gave off the interlobar, arcuate and interlobular arteries, respectively. The right dorsal branch gave off 5–7 segmental arteries, the right ventral branch 4–5 segmental arteries, the left dorsal branch 6–9 segmental arteries and the left ventral branch 7–8 segmental arteries. No anastomoses were observed between the renal arteries and their branches.

**Keywords:** renal artery; kidney; wolf

In the mammals, the right and the left renal artery supply kidneys (Nickel et al., 1981; Dursun, 1994). They both originate from the related side of the abdominal aorta (Nickel et al., 1981; Jain and Singh, 1987). They give rise to the dorsal and ventral branches before entering the hilus of the kidney. The dorsal and ventral branches respectively divide in turn into the interlobar, arcuate and interlobular arteries (Aslan and Nazli, 2001; Aksoy and Ozudogru, 2003; Aksoy *et al.*, 2004).

Although numerous papers were published on the segmentation of renal arteries in various species: cat (Marais, 1988; Aksoy and Ozudogru, 2003), dog (Shively, 1978; Christie, 1980; Aslan, 1995), rabbit (Sindel et al., 1990), goat and sheep (Aslan and Nazli, 2001; Aksoy et al., 2004), bovines (Jain and Singh, 1987), pig (Evan et al., 1996), monkey (Horacek et al., 1987) and some wild animals (Hadziselimovic and Cus, 1975), there are no reports on the details of the segmentation of renal arteries of the wolf. In this study, we aimed at demonstrating the intrarenal segmentation of renal arteries.

### MATERIAL AND METHODS

The kidneys of five adult wolves, regardless of their sex, were used in this study. A corrosion cast method

(Tompset, 1970; Nerantsiz et al., 1978) was applied to the materials. The vessels were washed with 0.9% saline solution. The kidneys were obtained along with the renal arteries, followed by the injection of takilon prepared in 20% powder monomethyl-methacrylate and 80% liquid polymethyl-methacrylate. They were kept at a room temperature for 24 hours for polymerization. They were corrosion casted in 30% KOH at 60°C for 24–48 hours, washed with tap water, and photographed. Anonymous (1994) was used for the terminology.

### RESULTS

Renal arteries originated from both sides of the abdominal aorta and ran towards the hilus of the kidneys. The right renal artery arose slightly cranially to the left one. The left renal artery was longer than the right renal artery. The right renal artery gave rise to the dorsal and ventral branches 2.5–3.5 cm from the hilus, and the left renal artery 3.5–4 cm (the average diameter 0.32 to 0.33 mm and 0.28 to 0.31 mm, respectively) (Figure 1). These arteries divided into two dorsal and one ventral branches before arriving at the hilus.

The right dorsal branches were about 0.19 to 0.21 mm in diameter and 1.9 to 2.0 cm in length. These



Figure 1. Ventral view of the intrarenal branches of the renal arteries: a = abdominal aorta; b = right renal artery; c = left renal artery



Figure 2. Dorsal view of the right renal artery: a = right renal artery; b = right dorsal branch; c = right ventral branch; d = right dorsal interlobar artery; e = right dorsal arcuate artery; f = right dorsal interlobular artery



Figure 3. Dorsal view of the left renal artery: a = left dorsal branch; b = left dorsal interlobar artery; c = left dorsal arcuate artery; d = left dorsal interlobular artery

vessels gave off 5–7 right interlobar arteries. The right ventral branch was about 0.26 to 0.28 mm in diameter and 1.5 to 1.6 cm in length and ramified

as 4–5 right interlobar arteries (Figure 2). The left dorsal branches were about 0.16 to 0.20 mm in diameter and 1.8 to 2.1 cm in length. These arteries

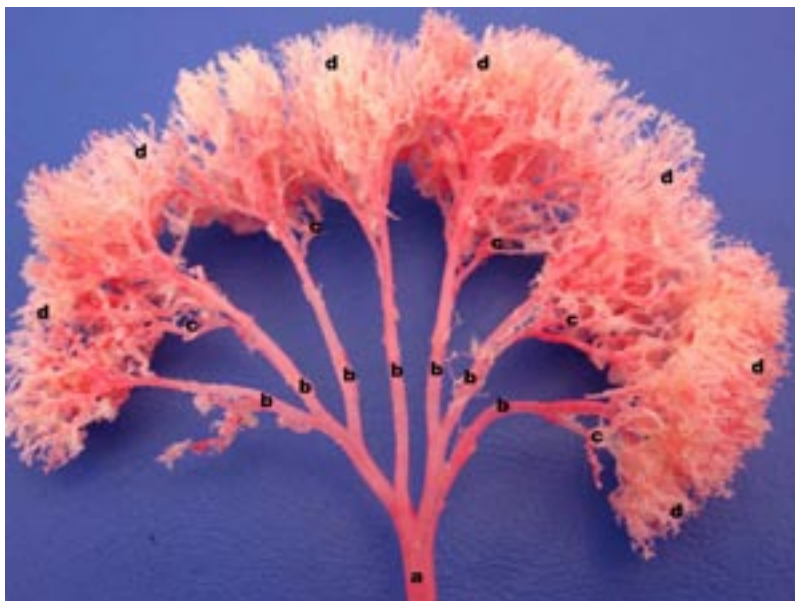


Figure 4. Ventral view of the left renal artery: a = left ventral branch; b = left ventral interlobar artery; c = left ventral arcuate artery; d = left ventral interlobular artery

gave off 6–9 left interlobar arteries (Figure 3). The left ventral branch was about 0.24 to 0.26 mm in diameter and 1.6 to 1.7 cm length and ramified as 7–8 left interlobar arteries (Figure 4).

At the medulla-cortex junction, the right interlobar arteries and the left ones gave off arcuate arteries that arch over the bases of the medullary pyramids (Figures 2, 3, 4). The arcuate arteries gave rise to a number of right interlobular arteries and the left ones with a larger number than the arcuate arteries, and they were distributed all over the kidney. No anastomoses were present between any of the subbranches of the renal arteries.

## DISCUSSION

In this study, the renal arteries originated from either side of the abdominal aorta, in agreement with the literature (Nickel *et al.*, 1981; Jain and Singh, 1987; Aksoy and Ozudogru, 2003). On the other hand, Ghoshal (1975) reported their origins to be from the ventral surface of the aorta.

The renal arteries divide into two or more branches in the dog (Reis and Tepe, 1956), cat (Rieck and Reis, 1953) and guinea pig (Shively and Stump, 1975). Fuller and Huelke (1973) demonstrated that the dorsal and ventral branches divided into four branches in the cat and two branches in the dog although some researchers (Aslan, 1995; Aksoy and Ozudogru, 2003) determined that there was a third branch that was observed in some materials. The

renal arteries were observed to divide into two dorsal and one ventral branches in the present study.

Aslan (1995) and Aksoy and Ozudogru (2003) observed in their study that the dorsal branch gave off two interlobar arteries for the ventral surface and the ventral branch sent one interlobar artery for the dorsal surface. Our study revealed no interlobar artery of the ventral branch going to the dorsal surface, though.

Aslan and Nazli (2001) reported an anastomosis between the dorsal and ventral branches in one material and two interlobar arteries originating directly from the renal artery in two materials. We have not encountered such findings in the study.

In this study it was found that the right dorsal branches gave off 5–7 segmental arteries, the right ventral branch 4–5 segmental arteries, left dorsal branches 6–9 segmental arteries and the left ventral branch 7–8 segmental arteries. Aksoy and Ozudogru (2003) demonstrated that the right dorsal branch gave off 3–5 segmental arteries, the right ventral branch 4–6 segmental arteries, the left dorsal branch 3–6 segmental arteries, and the left ventral branch 3–4 segmental arteries in the cat. However, Fuller and Huelke (1973) stated that 4 segmental arteries emerged from both the dorsal and ventral branches in the cat.

At the medulla-cortex junction we observed the right interlobar arteries and the left ones gave off arcuate arteries. Each of the arcuate arteries gave rise to a number of right interlobular arteries and the left ones, in agreement with the literature

(Martini, 1992; Marieb, 1995; Aksoy and Ozudogru, 2003; Bahadir and Yildiz, 2005).

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