

Veterinary Anatomy Case Report

## A rare case of left additional renal artery in a Nigerian goat

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### Summary

The report of the occurrence of additional renal arteries in domestic animals is rare in the literature. We report a case of an additional renal artery in the left kidney found in a Red Sokoto goat cadaver. The additional renal artery originated from the abdominal aorta 3.80 cm cranial to the origin of the main renal artery. The additional renal artery was relatively long, being 6.30 cm from its origin to the cranial pole region of the kidney where it supplied the kidney. This to the best of our knowledge is the first report in the literature indexed in the Medline of an additional renal artery in a goat.

### Key words

Additional renal artery, kidney, red sokoto goat

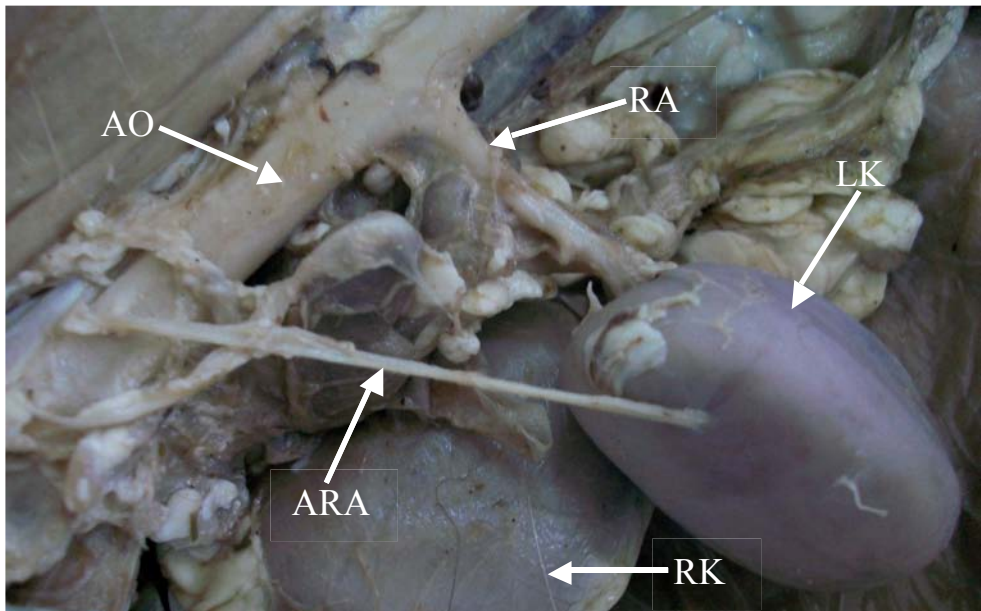
## INTRODUCTION

The kidneys of ruminants as in other domestic animals are typically supplied by a pair of renal arteries from either side of the abdominal aorta while the renal veins join the vena cava (Dyce et al., 2002). Accessory renal arteries have, however, been reported as variations in the blood supply of kidneys being hitherto variously named as either accessory, additional, aberrant, supranumerary, accessory aortic and polar (Loukas et al., 2005; Satyapal et al., 2001; Graves, 1956; Geyer and Poutasse, 1962; De Beer, 1966; Coen and Raftery, 1992).

Satyapal et al., (2002) however defined similar arteries arising directly from the aorta (i.e. abdominal aorta in domestic animals) as additional renal arteries and those arising from a branch originating from the aorta as accessory renal arteries; a distinction that we are adopting in this report.

In humans, numerous studies have shown that the polar regions (corresponding to cranial and caudal regions in animals) are the most frequent sites of possible variations of the renal vasculature. Polar variations occur in 25-40% of renal arteries usually on the left side, mainly as supernumerary renal arteries (Pereira-Correia et al., 2009; Anderson et al., 2007). There is however a dearth of information in the literature of the occurrence of renal vascular variations in domestic animals. We present here an occurrence of a rare case of additional renal artery on the left side of a Red Sokoto goat in Nigeria.

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**Fig. 1** – Internal viscera of the renal region of a Red Sokoto goat. Additional renal artery(ARA), main renal artery (RA), left kidney (LK), right kidney (RK), aorta (AO).

### Case report

During the course of the routine dissection in the introductory Veterinary Anatomy class at the University of Ibadan Veterinary Medical School in Nigeria, an anatomical variation was observed in a male Red Sokoto goat approximately 1.5 years old. On identifying the anomaly, the structures around the left kidney were clearly dissected to remove excess fat and display individual structures.

The kidneys of the goat did not show any gross abnormality while the structures at the hilar regions were all in an anatomically normal spatial orientation.

The additional left renal artery was smaller than the normal left renal artery (Fig. 1) but was relatively longer being 6.30 cm from its origin to its insertion near the cranial pole of the left kidney. The distance between the origins of the additional and normal renal arteries was 3.80 cm with the additional artery being cranial. No extra branching was seen on the additional renal artery.

### Discussion

Renal vascular anatomy presents great variability in terms of vessel emergence and ramification levels (Saldarriaga *et al.*, 2008). Authors have reported that accessory renal arteries occur in 30% of cases with preponderance on the left side. The occurrence of cranial (superior, upper) polar arteries in the kidneys (which may be additional or accessory based on origin) has been reported (Merklin and Michels 1958)

Although researchers have reported that most anatomical variations in vascular anatomy of the kidney do not generally have pathophysiological significance (Gupta and Tello 2004), its occurrence remains unique for anatomists and helpful for surgeons. The continuous investigation by human anatomists may not be unconnected with the fact that urologists need the basic information to familiarize themselves with inherent morphological variations and thereby increase the safety of surgical interventions on the kidney, improve uro-radiological procedures and understand radiological results.

Although the study of the topographical organisation of the renal vascular structures have been more popularly documented in human studies, the incidence of such variations in domestic animals may have been under reported. This to the best of our knowledge is the first report in literature indexed in the Medline of an additional renal artery in a goat. Veterinary anatomists, morphologists and clinicians need to be more aware and report these observations in domestic animals so as to estimate at a more accurate level the occurrence of renal vascular variations in animal species.

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### References

- Anderson J.K., Kabalin J.N., Cadeddu J.A. (2007) Surgical anatomy of the retroperitoneum, adrenals, kidneys and ureters. In: Wein A.J., Kavoussi L.R., Novick A.C., Partin A.W., Peters C.A. (Eds). Campbell-Walsh Urology. 9<sup>th</sup> edition. Saunders, Philadelphia. Pp. 24-32.
- Coen L.D., Raftery A.T. (1992) Anatomical variation of renal arteries and renal transplantation. *Clin. Anat.* 5: 425-432.
- De Beer P.M. (1966) The renal arteries in the South African Bantu-Speaking Negro. *S. Afr. J. Med. Sci* 31: 67-81.
- Dyce K.M., Sack W.O and Wensing C.J.G. (2002) Textbook of Veterinary Anatomy. 3<sup>rd</sup> edition, Saunders, Philadelphia.
- Geyer J.R., Poutasse E.F. (1962) Incidence of multiple renal arteries on aortography. Report of a series of 400 patients, 381 of whom had arterial hypertension. *JAMA* 182: 118-125.
- Graves F.T. (1956) The aberrant renal artery. *J. Anat.* 90: 553-558.
- Gupta A., Tello R. (2004) Accessory renal arteries are not related to hypertension risk: a review of MR angiography data. *AJR* 182: 1521-1524.
- Loukas M., Aparicio S., Beck A., Calderon R., Kennedy M. (2005). Rare case of right accessory renal artery originating as a common trunk with the inferior mesenteric artery: A case report. *Clin. Anat.* 18: 530-535.
- Merklin R.J., Michels N.A. (1958) The variant renal and suprarenal blood supply with data on the inferior phrenic, ureteral and gonadal arteries. A statistical analysis based on 185 dissection and review of the literature. *J. Int. Col. Surg.* 9: 41-76.

- Pereira-Correia J.A., Valentim L.S., Castro K.F., Gasque G.P, Celina A.F., Rosário C.A.F., Prinz, R.A.D. (2009) Analysis of renal hilum extraparenchymal structures in Brazilian adult human cadavers. *Eur. J. Anat.* 13: 145-153.
- Saldarriaga B., Pinto S.A., Ballesteros L.E. (2008) Morphological expression of the renal artery. A direct anatomical study in a colombian half-caste population. *Int. J. Morphol.* 26: 31-38.
- Satyapal K.S., Haffejee A.A., Singh B., Ramsaroop L., Robbs J.V., Kalideen J.M. (2001) Additional renal arteries incidence and morphometry. *Surg. Radiol. Anat.* 23: 33-38.