

## Case Report

# Rare variant origin of the right testicular artery associated with the right upper accessory renal artery: A case report



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## 1. Introduction

The testicular arteries usually originate from the anterolateral aspect of the abdominal aorta just inferior to the renal arteries. The arteries pass retroperitoneally in an oblique direction, crossing over the ureters and the inferior parts of the external iliac arteries to reach the deep inguinal ring, and enter spermatic cords to supply the testes.<sup>1</sup> The right testicular artery may also originate from the right renal artery,<sup>2,3</sup> right accessory renal artery.<sup>4</sup> I present a case of variant origin of the right testicular artery associated with the right upper accessory renal artery, which were different from the very rare cases found in the literature.

## 2. Case report

During posterior abdominal wall dissection of 48 cadavers for the undergraduate classes, a 82 year old male cadaver of Thais, in the Department of Anatomy, Faculty of Medicine, Khon Kaen University, Thailand, exhibited variation origin of the right testicular artery.

The right testicular artery originated from the right inferior suprarenal artery, there was a right upper accessory renal artery arising from the abdominal aorta (Figs. 1 and 2). The right inferior suprarenal artery arised from ventral aspect of the aorta, and ran obliquely in front of the upper accessory renal artery and renal artery to enter the suprarenal gland. The right inferior suprarenal artery, at its midpoint, gave off the right testicular artery to travel along the testicular vein to the testis. The left testicular artery originated from the ventral aspect of aorta, and descended down along with the testicular vein to the left testis in usual pattern.

## 3. Discussion

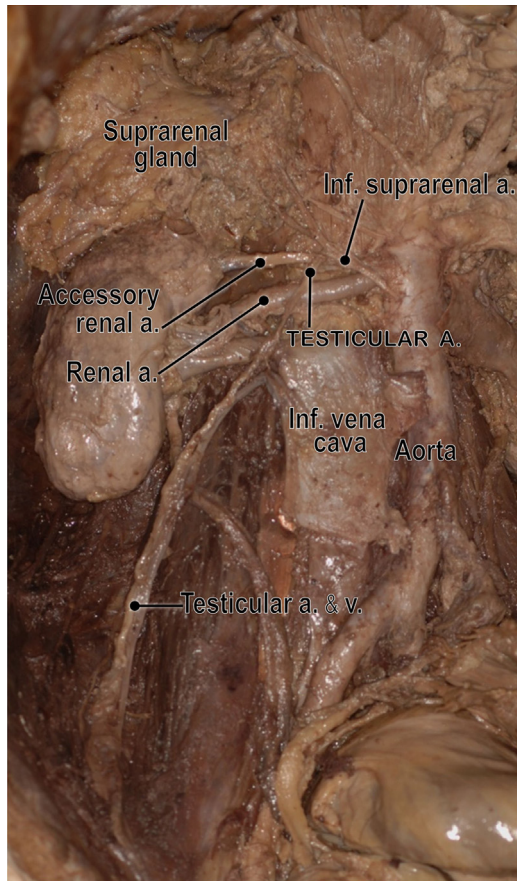
Because of the development of new operative techniques within the abdominal cavity for operations such as varicocele and undescended testes, renal transplantation, interventional radiologic process, and urologic operation increase, awareness of the possible variations of the testicular and renal arteries is necessary for surgical management.

Cicekcibasi et al.<sup>5</sup> classified variations of the origin of testicular artery into four types. Type I: Originating from the suprarenal artery. Type II: Originating from the renal artery. Type III: High-positional origin from the abdominal aorta close to the renal artery levels. Type IV: Duplication of the testicular arteries, originating from aorta or suprarenal artery.

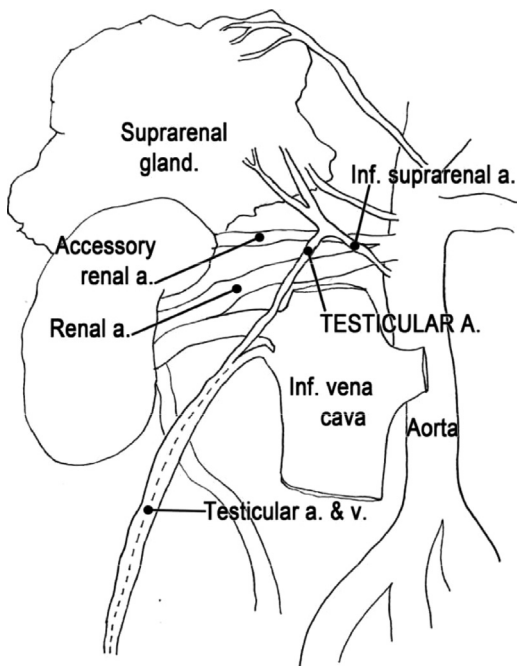
Regarding the embryologic basis, explanation for combined variations of testicular and renal arteries has been related to the embryological development of both vessels from the lateral mesonephric branches of the dorsal aorta. The embryologic explanation of these variations has been presented and discussed by Felix.<sup>6</sup> He stated that the nine lateral mesonephric arteries are divided into three groups; viz cranial, middle and caudal. The persistence of a cranial lateral mesonephric artery results in a high origin of the gonadal artery, probably from the suprarenal or from a more superior aortic level.

Ozkan et al.<sup>7</sup> stated that in his angiographic evaluation of renal arteries, the additional renal arteries on the right side were found in 16% and on the left side in 13% of cases. Additional renal arteries are frequently present and may be looked on as branches of persistent lateral splanchnic arteries.<sup>8</sup> After the induction of angioblasts, sonic hedgehog, secreted by the notochord, induce surrounding mesenchyme to express vascular endothelial growth factor (VEGF). In turn, VEGF expression induces the Notch pathway (a transmembrane receptor pathway), which specifies arterial development through expression of ephrinB2 (ephrins are3

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**Fig. 1.** The photograph of the posterior abdominal region showing the right upper accessory renal artery, and the right testicular artery arising from the right inferior suprarenal artery.



**Fig. 2.** The diagram of the of the posterior abdominal region showing the right upper accessory renal artery, and the right testicular artery arising from the right inferior suprarenal artery.

ligands that bind to Eph receptors in a pathway involving tyrosine kinase signaling).

Misexpression of one or more transcription factors as mentioned above may lead to aberration in the arterial development.<sup>9</sup>

In our study we found the right testicular artery originating from the inferior suprarenal artery, and right upper accessory renal artery. This report should be recognized in fields of surgical and interventional radiological practices to minimize unexpected complication. In laparoscopic surgery in which operative field and view are limited, knowing variation in vasculature is one of the important factors determining success in operations.<sup>10</sup>

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### References

1. Moore KL, Dalley AF, Agur AMR. Abdomen. *Clinically oriented anatomy*. 7th ed. Philadelphia: Lippincott: Williams and Wilkins-Wolters Kluwer; 2014 210.
2. Acar HI, Yazar F, Ozan H. Unusual origin and course of the testicular arteries. *Surg Radiol Anat*. 2007;29:601–603.
3. Sharma P, Salwan SK. Anomalous right testicular artery and vein: embryologic explanation and clinical implication. *J Clin Diagn Res*. 2011;5(8):1631–1633.
4. Singh R, Jaiswal A, Shamal SN, Singh SP. Variation in the origin of the testicular arteries and drainage of the right testicular vein. *Int J Morphol*. 2011;29(2):614–616.
5. Cicekcibasi AE, Salbacak A, Seker M, Ziylan T, Buyukmumcu M, Uysal II. The origin of gonadal arteries in human fetuses: anatomical variations. *Ann Anat*. 2002;184:275–279.
6. Felix W. Mesonephric arteries. Keibel F, Mall FP, eds. *Manual of human embryology*, 2 Philadelphia: Lippincott; 1912.
7. Ozkan U, Oguzkurt L. Renal artery origin and variation: angiographic evaluation of 855 consecutive patients. *Diagn Interv Radiol*. 2006;1:183–186.
8. Standring S, Ellis H, Healy JC, Johnson D, Williams A, eds. *Gray's anatomy*. 39th edn Philadelphia: Churchill Livingstone; 2005 1042.
9. Sadler TW. *Langman's Medical Embryology. Third to eight weeks: the embryonic period*. 11th ed. Philadelphia: Lippincott, Williams and Wilkins-Wolters Kluwer; 1994:81–82.
10. Kawamoto S, Montgomery RA, Lawler LP, Horton KM, Fishman EK. Multi-detector row CT evaluation of living renal donors prior to laparoscopic nephrectomy. *Radiographics*. 2004;24(2):453–466.