



## A Unique Case of Bifid Left Testicular Artery Having its Anomalous High Origin from Renal Artery

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The testicular arteries are known to originate from the ventrolateral aspect of the abdominal aorta and descend obliquely to the pelvic cavity and supply the testis. An anatomical description of an uncommon variation of the left testicular artery is presented in this case report, highlighting its clinical implications. During routine dissection of a male cadaver, we found that the left testicular artery was bifid and it was arising from the left renal artery. After its origin, it then coursed behind the left renal vein, passed between the left testicular vein and left ureter and at the lower pole of the left kidney, this bifid testicular artery joined to form a single testicular artery which thereafter presented a normal course. Anatomy of the testicular artery has been studied in detail because of its importance in testicular physiology, as well as its significance in testicular and renal surgery. This vascular variation shows a major significance in renal surgery, partial or total nephrectomy, and renal transplant. In addition, this anatomical variation enhances the importance of arteriography or the Doppler ultrasound examination of the renal hilum before surgeries.

**Key words:** Bifid testicular artery, renal artery, renal vein, renal hilum, abdominal aorta

### INTRODUCTION

Testicular arteries are paired arteries that usually arise from the anterolateral surface of the abdominal aorta at the level of second lumbar vertebra, caudal to the renal arteries. Each artery after its origin passes obliquely downward and reaches the deep inguinal ring where it enters the spermatic cord as one of its contents and supplies the testis.<sup>1</sup> Variations in the number and course of the testicular arteries are reported to be less frequent. There are a few reports highlighting the variations in the origin, course, and pattern of the testicular arteries. The anatomy of the testicular arteries has gained importance because of the new advances in operative surgery within the abdominal cavity. During such procedures, the testicular arteries must be preserved to prevent possible testicular atrophy. Thus, awareness of variations of the testicular arteries that shown in this case report becomes very important during any such surgical procedures or interventions.

### CASE REPORT

During our routine dissections for undergraduate students, we found this unique variation in an adult male cadaver, approximately aged 70 years of South Indian origin. We found that the left kidney was placed higher up in the abdominal cavity than its usual position. Thus, the origin of the left testicular artery was also higher and it was bifid with both branches arising from the left renal artery [Figures 1 and 2]. After its origin, the testicular artery passed behind the left renal vein and descended downward. Because of its bifid origin, the artery had a very thin caliber. After that, it ran obliquely in the abdominal cavity between the left testicular vein medially and left ureter laterally. Near the lower pole of the left kidney about 7 cm from its origin, this bifid testicular artery joined to form a single testicular artery [Figure 3], which then followed

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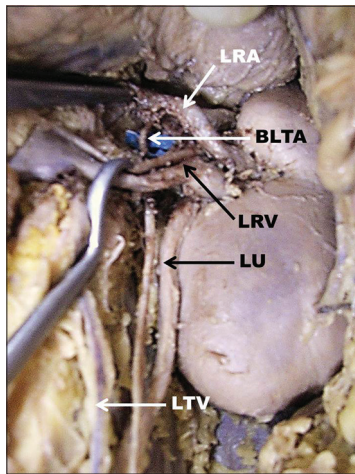
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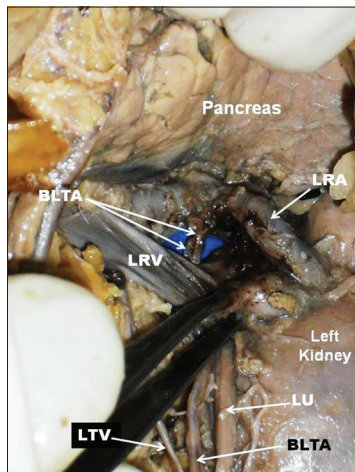
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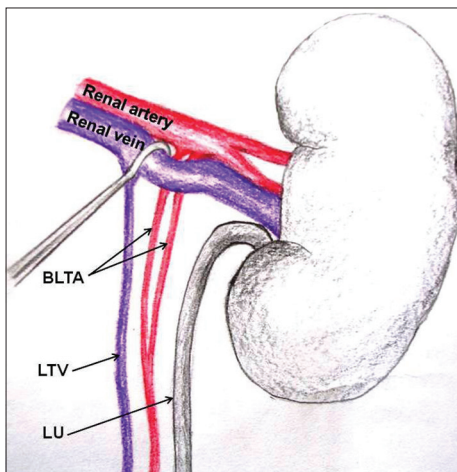
## Bifid testicular artery from renal artery



**Figure 1:** Origin of bifid left testicular artery from left renal artery. LTV = Left testicular vein, LU = Left ureter, LRV = Left renal vein



**Figure 2:** Closer view of bifid left testicular artery from left renal artery. LTV = Left testicular vein, LU = Left ureter, LRV = Left renal vein



**Figure 3:** Schematic diagram showing the origin of bifid left testicular artery from the left renal artery. LTV = Left testicular vein, LU = Left ureter

the normal course. The right testicular artery presented with its normal origin and course.

## DISCUSSION

Variations in the origin and varied course of testicular arteries have been reported in the past, but the variations described here are unique and provide very significant information to surgeons dissecting and operating the abdominal cavity.

Lippert and Pabst have reported the prevalence of right testicular artery originating from the right renal artery in 6% of the cases.<sup>2</sup> Asala *et al.* have found testicular arterial variations only on the right side in 4.7% of cases studied by them. In 4 (2.6%) of these cases, testicular arteries branched from the renal artery.<sup>3</sup> The variation observed in our case is unique as studies have shown that the origin of left testicular artery from left renal artery is very rare and there are no reports of the presence of bifid left testicular artery.

Machnicki and Grzybiak in their extensive study of vascular pattern by adult and fetal testes categorized variant testicular arteries based on their site of origin into four types.<sup>4</sup> In Type 1, single testicular artery arises from aorta. In Type 2, it originates from renal artery. Type 3 presents double testicular arteries arising from the aorta and in Type 4, single testis is supplied by two arteries - one from aorta and another from renal artery. It has to be noted that the variation of testicular artery that we have found cannot be classified into any of the above said types. Ciçekcibasi *et al.*<sup>5</sup> classified the gonadal artery originating from the renal artery as Type II, with the frequency of 5.5%. In their study, all five cases in Type II had inferior polar origin whereas in our case, the left testicular artery had a hilar origin.

If renal origin of the testicular arteries is overlooked, it might lead to drastic clinical consequences as reported by Siniluoto *et al.* in a case who suffered from left testicular infarction due to palliative transcatheter ethanol embolization for intermittent gross hematuria. Later, when the reevaluation of patient's arteriography was done, it showed that the left testicular artery originated from the renal arteries.<sup>6</sup> This indicates the importance of the arteriography or Doppler ultrasound examination of the renal hilum before any surgical procedure within and around the renal hilar region.<sup>7</sup>

The embryologic explanation of these variations has been presented and discussed by Felix.<sup>8</sup> According to him, the developing mesonephros, metanephros, and gonads are supplied by nine pairs of lateral mesonephric arteries arising from the dorsal aorta. Among them, the middle group gives rise to the renal arteries. He has stated that although anyone of these nine arteries may become the gonadal artery, it usually arises from the caudal group. In the present case, since the left

testicular artery is arising from left renal artery, we believe that they have been derived from the middle group as well.

Variations of the testicular artery should be kept in mind to prevent acute hemorrhage resulting from their injury in renal hilar dissections and retroperitoneal surgical explorations.<sup>9</sup> Testicular artery could be avulsed at its origin from the renal artery during dissection of the later because its presence may not be anticipated and may lead to troublesome bleeding. Resection of retroperitoneal tumors and sarcomas could also result in bleeding if variations in the testicular arterial origin are present, especially if the tumor is large.<sup>10</sup> Varicocelectomy is the most commonly performed surgical treatment for male infertility. The incidence of arterial injury during microsurgical varicocelectomy procedure has been estimated to be 0.9%.<sup>11</sup> During varicocelectomy, testicular artery must be preserved. It has been opined that injury to testicular artery has limited clinical significance in varicocelectomy as testis is supplied by three sets of arteries (testicular, cremasteric, and vasa). Hence, accidental ligation of testicular artery would not affect sperm production or lead to testicular atrophy except if the cremasteric and the vasa arteries were compromised by hernia repair.<sup>12</sup>

Thorough knowledge of this atypical anatomical presentation is important in avoiding the complications in operative surgery. Awareness of such variations is clinically important due to their influence on the blood flow to the testis as it is the only artery which supplies the testis.

## CONCLUSION

An unusual origin and course of the testicular artery are worth reporting as it helps clinicians, vascular surgeons, and urologists and greatly contributes to the success of surgical invasive and radiological procedures in the renal hilar region and retroperitoneal region. Awareness of such variations is of paramount importance during surgeries of the male abdomen and pelvis to reduce the complications arising due to unfamiliar anatomy in the operative field.

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## Conflicts of interest

There are no conflicts of interest.

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