Unilateral aberrant gonadal venous anatomy coexistent with a distinct intrarenal cleft

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Abstract

Introduction

Testicular veins are the channels arising from the pampiniform plexus of veins which is formed at the upper pole of the testis by the smaller veins draining the testis. It then traverses through the spermatic cord and at the superficial inguinal ring, four veins are formed which course through the inguinal canal and at the deep inguinal ring, these coalesce and form two or three veins. In the lumbar region, these veins combine and form a single testicular vein on the respective sides. These testicular veins ascend along the posterior abdominal wall anterior to the psoas major muscle, ureter and behind peritoneum. The right testicular vein drains into the inferior vena cava (IVC) at an acute angle, whereas the left testicular vein drains into the left renal vein at right angles1. The anatomy of testicular veins has been associated with wide variations. These variations become significant during clinical cases of varicoceles and retroperitoneal surgeries. Varicocele affecting approximately 15% of the male population is the abnormal dilatation of veins of pampiniform plexus causing testicular atrophy and male infertility2,3.

Case report

During a routine educational study in Vardhman Mahavir Medical College, we encountered a variation in the topography of testicular vein unilaterally in a 50-year-old male cadaver. Two testicular veins (medial and lateral) were observed on the left side. Medial testicular vein was seen traversing along the medial border of left psoas major. Lateral testicular vein initially coursed anterior to the psoas major and eventually divided into two branches caudal to their termination into the left renal vein. Both the testicular veins coursed parallel to each other and drained separately into the left renal vein. The left renal vein also received a common venous trunk formed by union of left suprarenal and left inferior phrenic veins. This common venous trunk (phrenicosuprarenal trunk) drained into the left renal vein at an acute angle. The left renal vein was seen dividing into an anterior and a posterior division close to the renal hilum. The lateral left testicular vein was found draining into the left renal vein at its point of division into anterior and posterior divisions. The lateral testicular vein was seen draining into the anterior division of the left renal vein. The right testicular vein did not display any deviation from usual topography. The left kidney also exhibited a distinct and unusual intrarenal cleft extending across the anteroposterior surfaces of the left kidney (Figure 1).

Discussion

The asymmetric drainage pattern of testicular veins is based on their mode of development. The caudal part of the foetal body is drained by the posterior cardinal veins4. The posterior cardinal venous system is soon taken over by the newly developing subcardinal and supracardinal veins. All these three sets of veins undergo complex remodelling and form IVC draining the trunk and inferior extremities. During this phenomenon of vena caval formation, the subcardinal veins undergo subsequent phases of evolution and involution. The foetal subcardinal veins anastomose with each other.

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This anastomosis forms the left renal vein. This is followed by the disappearance of the left subcardinal vein and the only portion remaining is the most distal part that soon develops into the left testicular vein. The right subcardinal vein forms the renal segment of IVC and right testicular vein. Thus, the right testicular vein drains into the IVC. Any abnormality during embryogenesis may lead to the variations in their number, course and draining pattern.

Testicular vein variations have been extensively studied by Asala who classified these variations into four types. Totally, duplicated left veins belong to type 1 variation, partially duplicated left veins in type 2, beaded bilateral veins in type 3 and high drainage into the IVC on the left and termination in the right renal vein on the right come under type 4 variation. Although our case report conforms to the type 1 variation of the Asala classification, the uniqueness of our case report lies in the fact that the lateral testicular vein bifurcates into two branches near its termination into the left renal vein. Various other cases have been mentioned in the literature regarding the number and mode of drainage of these veins. Duplicated right testicular veins have been seen in 4% and left testicular vein in 15% of the population in different studies. Three left testicular veins have also been reported. Various cases of right testicular vein draining into the right renal vein, into the right subcostal vein, into the accessory renal vein and into the junction of IVC and right renal vein have been observed. Left testicular vein draining into the IVC, left suprarenal vein and left subcostal vein have also been reported.

These variations become important while considering the clinical cases of varicocele. Various aetiological theories have been hypothesised for varicocele. The differential pattern of drainage of testicular veins is one of them. Left testicular vein draining into the left renal vein at right angles raises the hydrostatic pressure of the left testicular vein which is transmitted to the pampiniform plexus of veins, leading to its abnormal dilatation. This factor constitutes one of the explanations for varicocele occurring more commonly on the left side. The surgical treatment of varicocele involves the effective obliteration of these dilated veins via open or laparoscopic surgery or sclerotherapy. The occurrence of multiple testicular veins not only predisposes the occurrence of varicocele but also could be responsible for the recurrence of this condition after surgery. These variations become even more important while performing retroperitoneal surgeries in order to avoid iatrogenic bleeding during or after the surgeries. The presence of left intrarenal cleft observed in the current investigation could possibly be viewed as a reflection of aberrant renal development, and to the best of our knowledge, such an observation has not been reported earlier.

**Conclusion**

A thorough knowledge of anatomical details of vasculature and variations thereof is imperative for clinicians performing interventional or reconstructive procedures involving blood vessels. During complex developmental phases of evolution and involution of multiple embryonic veins, defect at any stage can result in altered anatomy of venous trunks that later develop as congenital vascular malformations. The cause of the testicular venous variations including the present case can be attributed...
to the anomalous dysplasia of foetal subcardinal veins during embryonic life. We as anatomists humbly submit that awareness of anatomical variations pertaining to testicular veins is relevant for radiologists as well surgeons in their clinical practice.

Abbreviations list
IVC, inferior vena cava.

References

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