Asian Journal of Medicine and Biomedicine
eISNN: 2600-8173
https://journal.unisza.edu.my/ajmb

PENERBIT Universiti Sultan Zainal Abidin

Asian Journal of Medicine and Biomedicine, Vol 4:2.

Case Report

Open Access

Retro-Aortic Left Renal Vein as an Uncommon Cause of Left Sided Varicocele and Haematuria

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Abstract

Retro-aortic left renal vein [RLRV] is a congenital anomaly characterised by a left renal vein passing posterior to abdominal aorta. It has been suggested that RLRV may cause varicocele and haematuria. The urological symptoms are probably due to the increased pressure in the left renal vein secondary to posterior nutcracker phenomenon. The diagnosis of RLRV is usually radiological. We report a case of a 53-year old man who presented with left scrotal swelling which was then confirmed to be varicocele by Doppler ultrasound. Two months later, the patient had microscopic haematuria and computed tomography [CT] abdomen and pelvis scan was done. CT showed presence of RLRV.

Keywords: Retro-aortic left renal vein; varicocele; haematuria; computed tomography (CT).

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Received (July 9th, 2020), Accepted (Sept 2nd, 2020) & Published (Oct 25th, 2020)

Cite as: Norhasiza M.J., Cheah W.H., Yasrul Izad A.B., & Mohd Nor G.H. (2020). Retro-Aortic Left Renal Vein as an Uncommon Cause of Left Sided Varicocele and Haematuria. *Asian Journal of Medicine and Biomedicine, 4(2), 43–46.*

DOI: https://doi.org/10.37231/ajmb.2020.4.2.364

Introduction

Retroaortic left renal vein [RLRV] is a vascular anomaly resulting from errors in the embryological development of left renal vein. It is one of the most common congenital anomalies involving renal veins [1]. RLRV is located between the abdominal aorta and the lumbar vertebral body instead of in front of abdominal aorta in normal left renal vein. RLRV anomalies, although are not rare but it is usually overlooked and only small minority of cases show clinical symptoms [1-3]. Patients' with RLRV may present with non-specific urological manifestations including gross or microscopic haematuria, left flank pain, inguinal pain, dysuria and proteinuria.

It has been suggested that RLRV is one of the aetiological factors that can lead to left sided varicocele. However, because it is usually asymptomatic or presents with nonspecific urological symptoms, RLRV is usually overlooked and undiagnosed [2]. Failure to diagnose RLRV may lead to severe renal damage. Recognition of RLRV is also surgically important when retroperitoneal or left renal surgery is considered. It also has clinical implications in staging of testicular tumours and placement of caval filters. We report this case to create awareness among radiologists and clinicians regarding the existence of RLRV and more important to highlight its possible association with varicocele and haematuria. Therefore unnecessary investigations for the latter may be avoided. CT scan is a reliable non-invasive tool for diagnosis of RLRV [2].

Case Report

A 53-year old male presented with history of left scrotal swelling for 3 years. The swelling was not associated with gastrointestinal, urological or fertility problems. He is married with five children and has no other medical illness. He denied any history of preceding scrotal or testicular infection or trauma. Examination of the patient revealed a non-tender swelling of the left scrotum. Other physical examination findings were unremarkable.

Ultrasonography [US] of the left scrotal swelling revealed dilated tortuous vessels abutting the left epididymis. The dilated vessels extended along the left inguinal canal and reflux is demonstrated during Valsalva manoeuvre, consistent with the diagnosis of left varicocele. Both testes appeared normal and there was no hydrocele. Laboratory studies including urine analysis were normal. Patient was then regularly follow up to monitor the progress of the disease.

Two months later, his urine analysis revealed microscopic haematuria. However, there was no proteinuria or pus cells. He denied any history of trauma, urinary tract infection or urological problem during the last 2 months. The complete blood cell count, serum biochemistry and coagulation profile were within normal limits.

Computed tomography [CT] abdomen and pelvis was performed to exclude renal tumour or calculus. It revealed a dilated left renal vein located between the abdominal aorta and the vertebral body in the normal position [Fig. 1]. These features confirm the diagnosis of Type 1 RLRV. There was no thrombus within the RLRV. The right renal vein and both main renal arteries were normal in calibre and anatomical position. Both kidneys were normal without mass or calculus. Patient was treated conservatively. After one year of follow up, the microscopic haematuria has resolved spontaneously. However, the left varicocele was persistent and patient underwent varicocelectomy.

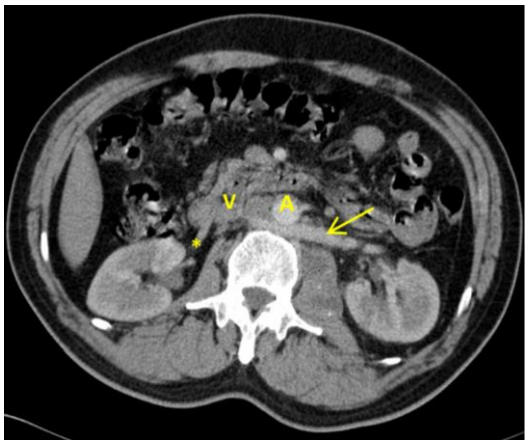

Fig. 1. The RLRV [arrow] joins the IVC at the level of normal anatomical position of renal vein. [**V**: inferior vena cava; **A**: abdominal aorta; **arrow**: retro-aortic left renal vein; *****: right renal vein]

Discussion

Diagnosis of RLRV is not easy and straightforward. In this case, the patient presented with asymptomatic left scrotal swelling for the past three years. The most common differentials based on the symptoms are hydrocele, hernia and testicular tumour. Ultrasound scrotum should be the first investigation for this patient in order to rule out any testicular pathology. Despite the testis showing normal parenchyma, the presence of varicocele warrants further investigation for its underlying cause. Although most varicoceles are primary, secondary causes of varicocele such as renal vein thrombosis from renal tumour, obstruction by pelvic mass or portal hypertension should be excluded. Therefore, patient should be subjected to a contrasted CT scan of abdomen and pelvis.

The anatomy of left renal vein is more complicated than the right because of its complex development during embryogenesis and its close relation to the abdominal aorta [1]. In normal condition, the left renal vein is longer than the right and it passes in front of abdominal aorta, just below the origin of superior mesenteric artery and finally joins the inferior vena cava [IVC]. The development process of left renal vein occurs at 6-8 weeks of intrauterine life. The left renal vein is developed from the anastomosis of subcardinal and supracardinal vein.

Anastomosis of these vessels at the level of kidneys forms the circum-aortic venous ring. A RLRV forms when the ventral instead of dorsal component of the venous ring regresses [4]. RLRV is one of the most common left renal vein congenital anomalies [1]. It is seen in 0.5 to 6.8% of healthy population [5]. Left renal vein [LRV] anomalies can be divided into 4 types. In type 1, the RLRV joins the IVC in the normal position. In type II, the RLRV lies lower, often at the level of L4-L5. Type III RLRV is the circum-aortic or collar renal vein in which the LRV encloses the abdominal aorta. In type IV, the RLRV joins the left common iliac vein instead of IVC [2]. The incidences of LRV type I, II, III and IV are 0.3%-1.9%, 0.4-0.9%, 1.5-8.7% and 0.16% respectively [6].

The diagnosis of RLRV is usually overlooked since it is uncommon and only small minority of cases presented with signs and symptoms.[3] Clinical symptoms of RLRV include gross or microscopic haematuria, left flank pain, inguinal pain, dysuria and proteinuria. Haematuria is the most common presentation of RLRV [7]. A minority of patient had left renal vein hypertension. Nam et al reported that 5 [55%] out of 9 patients with RLRV presented with haematuria [2]. Karazincir et al reported that among 13 patients with both RLRV and varicocele, three presented with haematuria [7].

The clinical symptoms and problems due to RLRV are secondary to the compression of RLRV between the abdominal aorta and vertebrae which result in increase pressure in the renal vein that is known as posterior nutcracker phenomenon [8]. It is postulated that compression of the left renal vein leads to haematuria because of elevated pressure in the vein, resulting in congestion of the left kidney and the venous communications. The gonadal, ascending lumbar, adrenal, ureteral, and capsular veins are potential collateral venous pathways in cases of renal vein compression or obstruction. These anomalous communication channels are responsible for haematuria. It appeared that the microscopic haematuria continued in long-term follow-up and not resolved with conservative management. A small percentage of patient developed gross haematuria which led to nephrectomy.

In addition, it has been suggested that RLRV is associated with development of left sided varicocele [2]. Arslan et al have evaluated 1125 abdominal CT scan studies and discovered
7 out of 9 [77%] RLRV patients presented with varicocele. Nam et al reported 2 out of 5 male patients with RLRV had left sided varicocele [2]. Karazincir et al reported 13 [9.3%] out of 140 varicocele patients had RLRV [7]. The incidence of RLRV was found to be significantly higher in patients with varicocele compared to control patients.

Varicocele is the venous dilatation of the pampiniform plexus. It is the cause for 20-30% of infertility and is the most common surgically correctable cause of infertility. The pathogenesis is again possibly related to the nutcracker phenomenon. In this patient, the varicocele developed late after he already completed his family. His varicocele persisted and finally went for varicocelectomy. Clinicians and radiologists should always consider RLRV in the differential diagnoses in patients who present with persistent haematuria and left sided varicocele. These two signs may indicate left renal vein hypertension syndrome secondary to the compression of RLRV. Suspected RLRV cases should be further confirmed with abdominal CT or MRI [5, 9]. US and colour Doppler US can be done as intermediate examination but it may be sub-optimal especially in overweight patients [5].

Failure to recognize RLRV may lead to severe complications such as ureteropelvic junction obstruction, non-functional atrophied kidney and severe renal damage [10]. It is also important in placement of IVC filter, uroradiology and gonadal Doppler US imaging [1]. RLRV is critical when aortic, renal or retroperitoneal surgery is considered. Failure to recognise this variation can result in severe intra-operative haemorrhage and renal damage [2]. It is also crucial in renal transplant as surgeons prefer the longer left renal vein.

Conclusion

There should be a high index of suspicion for RLRV in cases of left sided varicocele with persistent haematuria of unknown cause. RLRV can be recognised easily on CT abdomen and pelvis. Male patients with incidental finding of RLRV should be examined with scrotal Doppler US for varicocele.

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