AN EMBRYOLOGICAL CORRELATION WITH THE INCIDENCE OF RETRO AORTIC LEFT RENAL VEIN

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ABSTRACT

A knowledge of the variations of renal vascular anatomy has importance in exploration and treatment of renal trauma, renal transplantation, renal artery embolization, angioplasty or vascular reconstruction for congenital and acquired lesions, surgery for an abdominal aortic aneurysm and conservative radical renal surgery.

The study was conducted on 86 adult cadavers during routine dissection at various medical colleges. Various morphometrical datas were collected regarding the length, breadth, caliber of retro aortic left renal vein and its draining pattern. In our study the incidence was about 2.4 %. The retro-aortic left renal vein is a malformation characterized by the presence of vessels that drain the left renal blood upto inferior vena cava crossing behind the aorta.

Key words: Renal vein, retro-aortic renal vein, malformation of inferior vena cava

INTRODUCTION

The highly complex embryological development of the left renal vein compared to its right counterpart results in greater variations which are clinically significant. Variations are clinically silent and remain unnoticed until discovered during venography, operation or autopsy. During transplant surgery, morphology acquires special significance, since variations influence technical feasibility of operation. (Satpal K.S. et al 1999)[1].

Anatomical variations and congenital anomalies of the left renal vein were well described by Gillot. C. (1978)[2], and amongst the numerous variations of this vein, the retro-aortic course is the most frequently reported anomaly. In normal candidates, the retro peritoneal vessels may vary markedly depending on the specimen, the left renal vein normally anterior and travel to the right side in front of the aorta (Radman H.C. 1979)[3]. The incidence of retro aortic left renal vein has been reported to be 0.5 to 3.7 % in the healthy population.

The development of the left renal vein becomes established at the 8th week of embryogenesis when the circum aortic renal venous collar or intersubcardinal anastomosis is already completed. From this primitive and symmetrical venous arrangement processes such as obliteration of the dorsal renal veins, anastomosis between the subcardinal and supracardinal veins on the left side, an intersupracardinal anastomosis and a left supracardinal vein, occur to establish the adult configuration (Fig. 1). Due to these events the most commonly noted anatomical variants are-

Retro-aortic left renal vein type I: obliteration of the ventral renal vein on the left side, persistence of the left sub supracardinal anastomosis, the intersupracardinal anastomosis and the left dorsal renal vein, which causes a single retro-aortic renal vein.

Retro-aortic left renal vein type II : persistence of the sub supracardinal anastomosis on the left supracardinal vein, along with obliteration of the intersubcardinal and intersupracardinal anastomosis forms a single retro-aortic left renal vein (A. Martinez Almagro et al 1992)[4].

MATERIALS AND METHODS

The study was done on 86 adult cadavers of both sexes. Human cadavers adequately fixed and were dissected during the dissection class for the teaching of human anatomy. Out of these, 3 were rejected due to previous retroperitoneal surgery. The renal vascular anatomy was thoroughly studied and the course of left renal vein in relation to the abdominal aorta was noted. The variations of left renal vein was studied in terms of its length, caliber, retro-aortic course, the angle of drainage into the aorta as well as its tributaries in the form of left suprarenal and left gonadal vein were also noted. The specimens were photographed.

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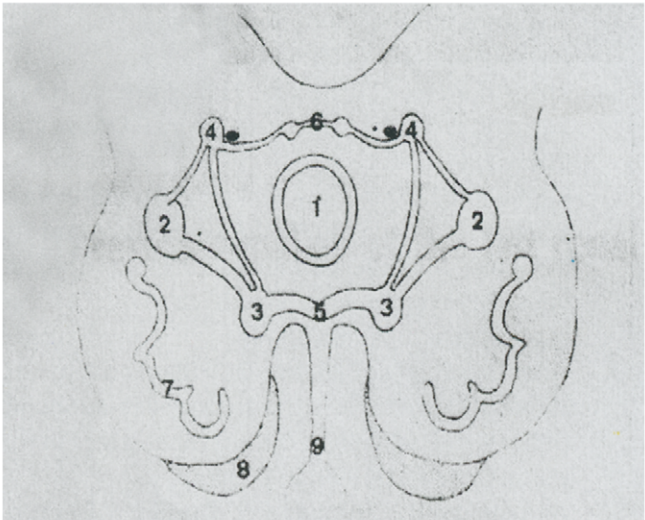

Fig. 1 Drawing of the peri-aortic venous collar in the embryonic period. *1*, aorta; *2*, inferior cardinal vein; *3*, subcardinal vein; *4*, supracardinal or lateral sympathetic vein; *5*, inter-subcardinal pre-aortic anastomosis; *6*, inter-supracardinal retro-aortic anastomosis and subcentral veins; *7*, mesonephros; *8*, genital eminence (gonadal swelling); *9*, mesentery

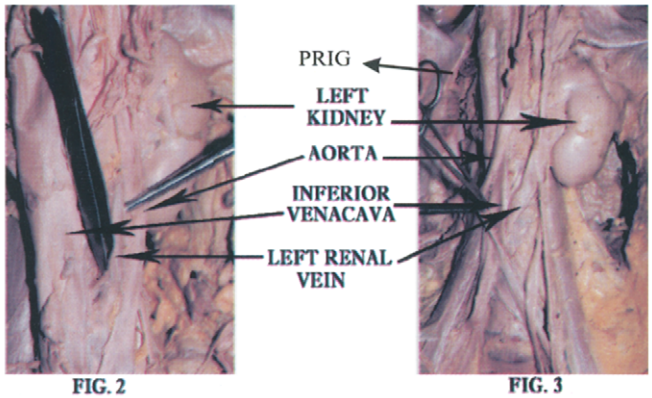

FIG. 2

Retro aoritc Lt,renal vein seen in 54 years old female

FIG. 3

Retro aortic Lt renal vein seein in 50 years old male

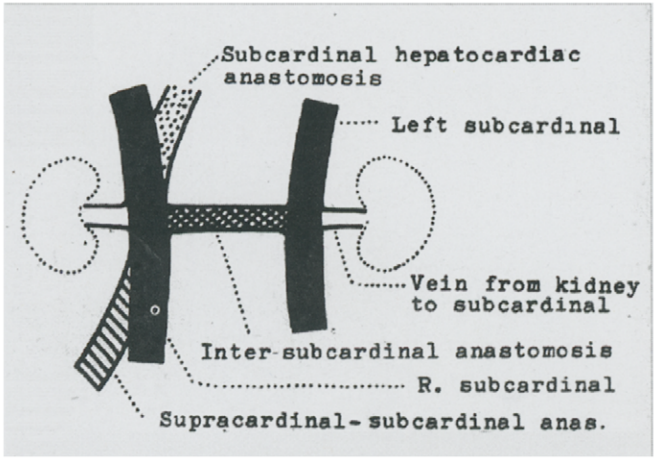

Fig-4: Shows development of renal veins

Table 1

- Following authors reported the incidence of retro aortic left renal vein

Reference	Sample size	Retro-aortic vein (%)
Zumstein (1896)	220	1.8
Eissndrath (1920)	218	4.1
Scib (1934)	176	1.7
Pick & Anson (1940)	215	3.4
Davis,et al (1958)	100	2.0
Anson & Dascier (1961)	100	1
Davis & Lundberg (1968)	270	1.8
Royster, et al (1974)	387	1.3
Gillot (1978)	322	2.5
Satyapal, et al (1997)	1008	0.5

OBSERVATIONS

Case I: - The retro-aortic left renal vein was seen in about 54 years old female (Fig. 2). The left renal vein passed behind the aorta obliquely downward and join the inferior vena cava just above the joining of common iliac vein. The length of this left renal vein was about 7.4 cm. and caliber 1.2 cm. The left suprarenal vein join the left renal vein 1.5 cm. from the hilum and the ovarian vein was draining into left renal vein obliquely about 4.5 cm. from the hilum. The left renal artery was normal in position and caliber. from the hilum of left kidney. No other anomalies appear and the left renal artery was normal in position and caliber.

Case II: - The retro-aortic left renal vein was seen in a 50 years old male (Fig.3). The renal vein passed behind the aorta obliquely downwards and joined the inferior vena cava between L3 and L4. The length of left renal vein was about 7.6 cm. and caliber 1.4 cm. The left suprarenal vein joins the left renal vein obliquely 1.8 cm. from the hilum of left kidney. The left testicular vein drain into the left renal vein about 4.3 cm. from the hilum of left kidney.

RESULTS

In this study out of 83 adult cadavers only 02 cases showed the presence of retro-aortic left renal vein. So this study shows 2.4 % incidence of occurrence of retro-aortic left renal vein.

DISCUSSION

A. Martinez Almagro et al (1992)[4] found the left renal vein taking a retro-aortic course and joined the IVC above the junction of common iliac vein. F.M. Andrade et.al (2005)[6] also during routine dissection found a variant drainage pattern of the left renal vein

going retro-aortic in its course as seen in the present study. B. Senecail et al (2003)[5] reported two cases of retro-aortic vein. K.S. Satyapal et al (1999)[1] reported a 0.5 % incidence in 153 pairs of kidney. Jetti (2008)[7] reported a case of retro-aortic left renal vein opening into left common iliac vein.

In a study of 57 cadavers Valentine R.J. (1990)[8] reported two cases of retro-aortic left renal vein.

Other authors Weinstein B.B. et. al (1942)[9] and Yelin G. (1940)[10] state that the left renal vein can be retro-aortic in approximately 2% of cases.

Some other authors also reported the incidence of retro-aortic renal vein (table 1).

Embryologically the kidney develops in a highly complex plexiform vascular arrangement. The left renal vein is derived from the mesonephric vein (that originally drains into the left subcardinal vein), a small part of left subcardinal vein and the intersubcardinal anastomosis (Fig. 4).

The abnormal persistence of intersupracardinal retro- aortic anastomosis associated with regression of the intersubcardinal pre-aortic anastomosis leads to development of retro aortic ectopic left renal vein (B. Senecail et al 2003)[5].

CONCLUSION

In our study we noted 02 cases of retro-aortic left renal vein out of 83 cadavers. It is about 2.4% of total sample. The incidence of retro-aortic left renal vein in the present study as well as in the available literature may not be significant but the awareness of this anatomical variation is absolutely essential from surgical point of view.

REFERENCES

1. K.S. Satyapal, J.M. Kalideen, A.A. Haffejee, B. Singh and J.V. Robbs
   Left renal vein variations. Surg Radiol Anat 1999; 21(1): 77-81
2. Gillot C the left renal veins: anatomical study, angiographic aspects and surgical approach. Anat Clin 1978; 1: 135-156
3. Redman H.C., Fisch AE Advanced excercises in diagnostic radiology: computed tomography of the body, WB Saunders, Philadelphia. 1979
4. Martinez- Almagro A. Almenar- Garcia V, Martinez-Sanjuan V. Hernandez Gil de Tejada T, Lorente- Montalvo P Retro-aortic left renal vein: a report of six cases. Surg Radiol Anat 1992; 14: 361-366.
5. Senecail, B.; Bobeuf. J.; Forlodou, P.;Nonent, M. Two rare anomalies of the left renal vein. Surg, Radiol. Anat. 2003; 25: 465-7.
6. F.M. Andrade, R.P. Rocha; H.M. Pereira; R.M.P. Fernandes & M.A. Babinski Int. J. Morphol. 2005; 23(1): 5-8
7. Raghu jetti, P.S. jevoor, Venkata Ramana Vollala, Bhagath Kumar Potu, MV Ravishankar and RD Virupaxi, Multiple variations of the urogenital vascular system in a single cadaver: a case report cases. J.2008; 1-344.
8. Valentine RJ, McGillivray DC, Blankenship CH, Wind GG Variations in the anatomic relationship of the left renal vein to the left renal artery at the aorta. Clin Anat. 1990; 3: 249-255.
9. Weinstein BB, Countiss EH, Derbes VJ, Retro-aortic renal vein, Irp; cutan Rev 1942; 46: 17-19.
10. Yelin G, Retro-aortic renal vein, J Urol. 1940; 44: 406-410.