



“VARIANT ANATOMY OF THE ILIAC VENOUS SYSTEM: A STUDY LINKED WITH LAPAROSCOPIC HERNIA REDUCTION AND PELVIC SURGERIES”

Clinical Anatomy

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ABSTRACT

Background: Haemorrhage, whether retroperitoneal or intraperitoneal, is one of the most unwanted complications in any laparoscopic hernia reduction surgery or pelvic surgery, thus making variant anatomy of iliac venous system important as intraoperative injury to these venous channels can be one of its major causes. **Aims and objectives:** To study the existing communications between the external and internal iliac venous system and perform its morphometric analysis. **Material and Methods:** 24 formalin fixed human hemi pelvises were dissected, internal (IIV) and external iliac veins (EIV) along with their tributaries were identified. Major venous anomalous communications were noted and measured accordingly. Results: 33.33% of all the observed pelvic halves had major anomalous venous communications between EIV and IIV. **Conclusion:** Knowledge anatomy of the pelvic venous system is vital to a surgeon especially in laparoscopic surgeries and even in the post-operative outcome of the patient.

KEYWORDS

Retroperitoneal Haemorrhage; Intraperitoneal Haemorrhage; Internal Iliac Vein; Laparoscopic Pelvic Surgery; Laparoscopic Hernia Reduction Surgery

INTRODUCTION

Pelvic venous drainage is rich and includes a large number of veins draining both pelvic walls and pelvic viscera including thigh, gluteal region and hip and shows considerable variations.^[1]

Knowledge of anatomy of the pelvic venous system is essential for surgeons performing high sacrectomies, lateral pelvic compartment exenteration, uterine transplantation, reconstructive procedures of the aortoiliac system, bilateral salpingo-oophorectomy, lymphadenectomy, laparoscopic hernia repair and other pelvic surgeries.^[2-7]

Classically IIV is formed by a number of tributaries converging above the greater sciatic foramen and then it progresses upwards posteromedial to the internal iliac artery to merge with EIV thus, forming CIV in front of the sacroiliac joint. Known tributaries of IIV are internal pudendal, gluteal and obturator veins, lateral sacral and middle rectal as well as uterine, vesical and vaginal venous plexuses.^[1]

The femoral vein continues proximally as EIV which begins at the level of the inguinal ligament and ends at the level of sacroiliac joint where it joins with the IIV and forms the CIV. EIV lies medial to the external iliac artery on the right side and gradually tends to be posterior as it ascends. While on the left side it is completely medial to the corresponding artery. Tributaries of the EIV are the deep circumflex iliac, pubic and inferior epigastric veins.^[1]

MATERIALS & METHOD

After receiving permission from the Institutional Ethics Committee (IEC), IIV and EIV were identified and dissected in 24 formalin-fixed hemi pelvises of adult cadavers at the Department of Anatomy, Goa Medical College, Goa, irrespective of sex. The present descriptive cross-sectional study was conducted within a duration of 6 months from January to June 2020. Evaluation of anomalous venous communications between IIV and EIV system were identified and its morphometric analysis was performed which included measurement of its length, distance from the major trunk and external diameter. Along with the communications, IIV and EIV with its tributaries were also measured and evaluated. Photographs were taken using a sony alpha camera with zoom lens.

RESULTS

Table 1: Morphometric parameters of the communicating channels

S No.	Length of EIV (cm)	Length of IIV (cm)	Communicating channel Length (cm)	Diameter (cm)	Side of hemi pelvis
1.	8.42	3.01	NA	0.76	left
2.	9.41	3.51	3.61	0.93	right
3.	10.24	4.41	5.61	0.54	left
4.	7.61	2.71	1.62	0.72	right

5.	8.21	Damaged	5.11	0.89	right
6.	9.86	4.12	1.75	0.52	right
7.	7.71	3.26	4.51	0.63	left
8.	7.81	1.65	3.71 1.63	1.71 0.42	left

*EIV – External Iliac Vein, IIV – Internal Iliac Vein

Mean length of IIV- 3.23 ± 1.42 cm

Mean length of EIV- 8.65 ± 1.03 cm

Confidence Level (95.0%), $z=1.19$

Length of anomalous venous communication ranges from 5.61 – 1.62 cm.

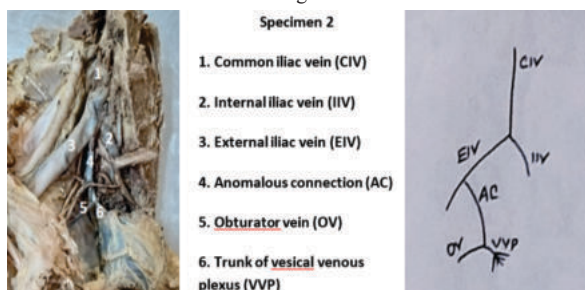
Diameter of the anomalous communication ranges from 1.71-0.42 cm. In total 24 pelvic halves were taken into consideration and 8 (33.33%) pelvic halves showed anomalous communication between IIV and EIV. The description of the anomalous communications is elaborated below:

1st specimen: In the first specimen shows anomalous drainage of superior gluteal vein draining into I/L EIV at a level 1.53 cm distal to the formation of left CIV.



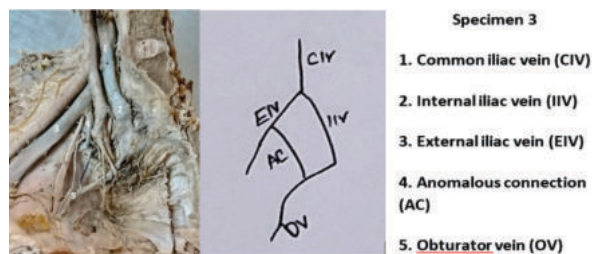
Figure/chart 1: 1st specimen of left hemi pelvis

2nd specimen: In the second specimen vesical venous plexus and obturator vein forms a common trunk and drain into I/L EIV at a level 0.65 cm distal to the formation of right CIV.



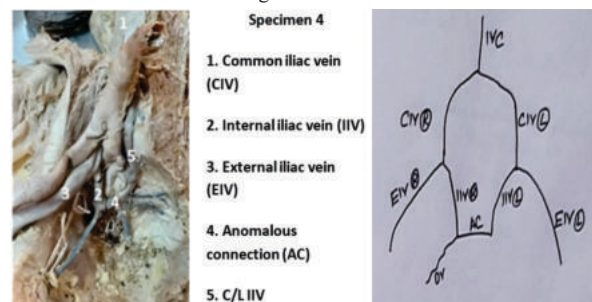
Figure/chart 2: 2nd specimen of right hemi pelvis

3rd specimen: Obturator vein draining into I/L IIV and EIV at a level 2.21 cm distal to the formation of left CIV.



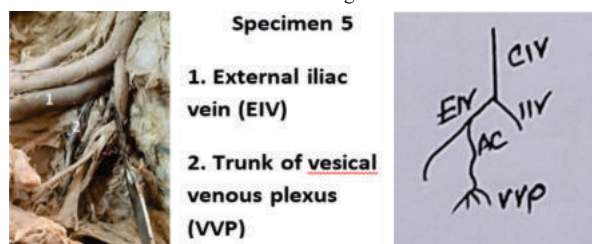
Figure/chart 3: 3rd specimen of left hemi pelvis

4th specimen: IIV connecting with the contralateral IIV at a level 1.64 cm distal to the formation of right CIV.



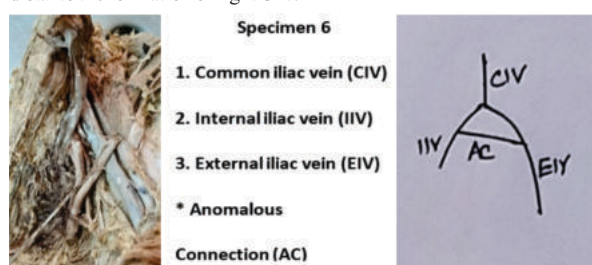
Figure/chart 4: 4th specimen of right hemi pelvis

5th specimen: In this specimen vesical plexus drains into the EIV at a level 1.51 cm distal to the formation of right CIV.



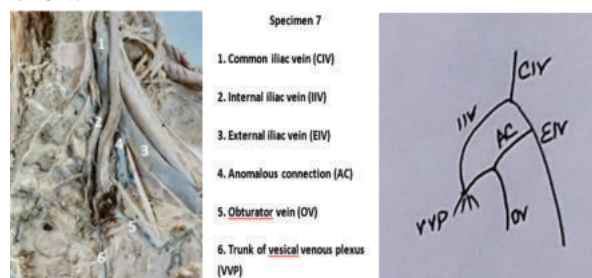
Figure/chart 5: 5th specimen of right hemi pelvis

6th specimen: Connection between IIV and EIV at a level 1.25 cm distal to the formation of right CIV.



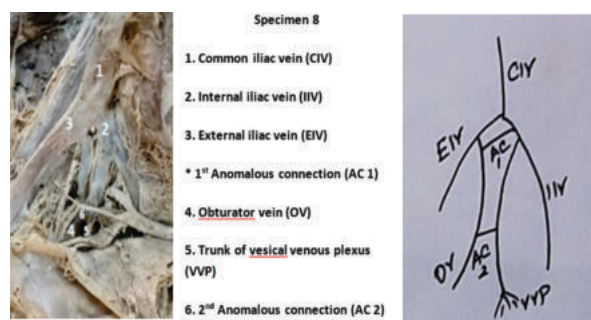
Figure/chart 6: 6th specimen of right hemi pelvis

7th specimen: Obturator and vesical venous plexus forming a common trunk and draining into EIV at a level 1.11 cm distal to the formation of left CIV.



Figure/chart 7: 7th specimen of left hemi pelvis

8th specimen: Formation of a common trunk by obturator vein and vesical venous plexus and draining separately into IIV and EIV. On EIV it drains at a level 1.26 cm distal to the formation of left CIV. There was a 2nd anomalous communication between the IIV and EIV at the level of 0.34 cm distal to the formation of left CIV.



Figure/chart 8: 8th specimen of left hemi pelvis

DISCUSSION

Knowledge of variant anatomy of pelvic venous system is vital for both surgeons and gynaecologists. There have been many incidents in the past where intraoperative and postoperative venous haemorrhages are reported that played an important role in patient's outcome.

Especially in laparoscopic hernia repair where the positive pressure due to pneumoperitoneum may delay the venous bleed until the pneumoperitoneum is released at the end of the surgery. This can lead to post-operative complication like retroperitoneal haematoma. Catheter embolization and venous stenting procedures also require a good knowledge about the anatomy of veins and its anomalous communications.

In an earlier study describing venous corona mortis and its significance as well as higher incidence as compared to its arterial counterpart i.e. it was found in 40% of the observed specimen. Classification of the venous corona mortis by Rusu et al is as follows: "Type I-OV drains into EIV", "Type II-OV drains into inferior epigastric vein (IEV)" and "Type III-OV anastomoses with EIV". The study concluded that knowledge of variant draining pattern of the obturator vein and the presence of anomalous communications is of utmost importance to a laparoscopic surgeon while performing pelvic surgeries.^[8]

Nusrath et al in 2020 described a study done by Shin et al about variations of the pelvic venous system which are as follows:

Type I – normal.

Type II – high draining of the IIV to ipsilateral (I/L) EIV.

Type III – the IIV draining into contralateral (C/L) CIV.

Type IV a – IIVs constituting a common trunk.

Type IV b – IIVs constituting a common trunk and communicating tributary between I/L EIV and the IIV.

Type V (a,b) – a communicating tributary from the IIV to the C/L CIV.

Type V (c,d) – a communicating tributary from the IIV to the C/L IIV.^[9]

Taking into consideration the above classification done by Shin et al about the variations in the pelvic venous system, the present study 16 (66.66%) hemi pelvises were type I i.e. the normal type in which the CIV formed by union of IIV and EIV which in turn are formed by union of their respective tributaries. Tributaries of IIV are superior gluteal veins, inferior gluteal veins, obturator vein, lateral sacral veins and middle rectal vein. Tributaries of EIV are inferior epigastric vein, deep circumflex iliac vein and pubic vein. Type II which is the high draining of the IIV to I/L EIV was found in one specimen whereas type V(c,d) was found in one specimen. Other anomalous venous communications as described by Shin et al were not detected in the examined hemi pelvises but other type of anomalous venous communications were detected like dual venous communications between IIV and EIV, tributaries of IIV draining into EIV and sometimes also in EIV.

This study proves that about 33.33% of examined pelvic halves had major abnormal venous communications, which can play a vital role in many surgeries. In view of catheterisation and venous stenting evaluation of radiological reports requires a thorough knowledge of variant anatomy of pelvic venous system. For a successful pelvic surgery the operating surgeon requires in depth knowledge of the pelvic venous system.

CONCLUSION

Anatomy of pelvic venous system is important for surgeons and gynaecologists especially with vast variations. Variation includes anomalous drainage of either trunk of vesical venous plexus or obturator vein in the EIV, abnormal communications between IIV and EIV, communication between IIV and C/L IIV and even dual anomalous venous communications between IIV and EIV. About 33.33% of examined pelvic halves had the above mentioned communication. Pelvic venous system drains the major pelvic organs and is important for surgeries in general surgery, surgical oncology and gynaecology. Hence a thorough knowledge about pelvic venous system and its abnormal communication is necessary for better surgical outcome.

Conflict of Interest: None.

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