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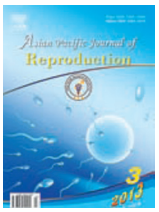

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Double vena cava inferior: A report of three cases

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ABSTRACT

Congenital anomalies of the vena cava inferior (VCI) develop as a result of the persistence of the embryonic venous system. The majority of cases is clinically silent and is diagnosed in routine dissection studies, in retroperitoneal surgeries, or through imaging for other reasons. We report three cases with a double VCI. We outline our operative policy, summarize the embryological development of the VCI and present these cases as a reminder of this rare anatomical variation.

1. Introduction

Retroperitoneal vascular anatomy shows multiple variants because of its complex embryological development. Anomalies of vena cava inferior (VCI) are not common. Double VCI is one of the most common anomalies affecting VCI with a population prevalence of 1%-3% [1,2].

Pelvic and paraaortic lymphadenectomy is an essential part of staging surgery done for most gynecological malignancies. Therefore it is a necessity for a gynecological oncologist to be master of the retroperitoneal anatomy and to be aware of the high incidence of vascular anomalies of this region. This is important to increase safety of the surgery.

Here is presented surgery results of three cases with a double VCI encountered in bilateral pelvic and paraaortic lymphadenectomy.

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2. Case reports

Retroperitoneal major vascular anomalies encountered during staging surgery are reported specifically from September 2006 in our clinic. Anomalies illustrated specifically in operation notes or the chief surgeon described them. Only in special cases photos were taken. Anatomic variations of retroperitoneal major vascular structure were determined in 62 patients from September 2006 to December 2012. Three of them (4.8%) had double VCI.

In the preoperative evaluation for gynecological cancer, computed tomography and magnetic resonance imaging is not performed routinely in our clinic. However abdominal ultrasonography is standard for ovarian cancer. The patient with cervical cancer is staged by bimanual examination under general anesthesia according to FIGO criteria. Magnetic resonance imaging, computed tomography or intravenous pyelography is used when necessary. We don't use routinely any imaging methods especially advanced technique for endometrial cancer.

Bilateral pelvic lymphadenectomy was performed complete skeletonization of all lymphatic tissue of the common, external and internal iliac vessels and obturator

fossa after visualization of the obturator nerve. The superior surgical margin of dissection for the pelvic nodes was aortic bifurcation and the anterior distal surgical margin was the circumflex iliac vein. The lymphatic tissue of the presacral was also harvested separately. The paraaortic lymphadenectomy was performed by mobilizing the paracolic peritoneum along the lateral border of the ascending and descending colon, permitting identification of the proximal ureters and high division of the ovarian vessels. This allowed visualization of the whole retroperitoneum up to the superior borders of the renal veins. All lymphatic tissue was then harvested from the lateral, anterior, and medial aspects of the vena cava and aorta up to the renal veins in all patients.

2.1. Case 1

We described double VCI encountered during the surgery of 65 years-old woman with endometrial carcinoma in November 2012. Since the myometrial invasion of tumor ≥1/2 on the frozen section analysis, systematic pelvic and paraaortic lymphadenectomy was performed. Retroperitoneal dissection revealed the presence of a double VCI (Figure 1). The common iliac veins were climbing on the both sides of the aorta forming VCI without a bifurcation at the level of the 5th lumbar vertebrae. Right renal vein joined the right VCI and the left renal vein joined the left VCI. The two VCI were approximately of equal caliber. Both kidneys were normal size and both ureters located in normal positions. In addition, there was a precaval renal artery on the right site. No other anatomical anomalies were encountered. 74 retroperitoneal lymph nodes were removed, of which 17 were dissected from paraaortic region. Operation time was 360 minutes. Blood loss was 500 cc. There was no vascular injury during the surgery associated with this vascular abnormality.

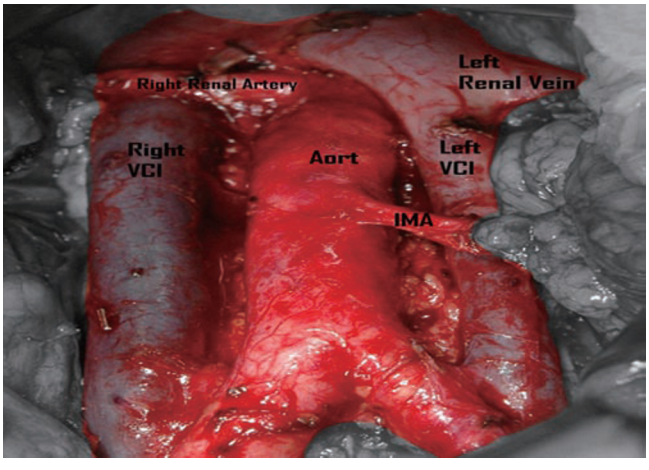

Figure 1. Double vena cava inferior with precaval right renal artery. VCI: Vena cava inferior, IMA: Inferior mesenteric artery.

2.2. Case 2

We described double VCI encountered during the surgery of 59 years-old woman with endometrial carcinoma in December 2012. Since the frozen section analysis of the hysterectomy material revealed tumoral invasion more than half of the myometrium, systematic pelvic and paraaortic lymphadenectomy was performed. Retroperitoneal dissection revealed the presence of a double VCI. The anatomic variation was as same as the first case, except for right precaval renal artery. No other anatomical anomalies were encountered. We removed 58 retroperitoneal lymph nodes, 24 were dissected from paraaortic region. Operation time was 240 minutes. Blood loss was 300 cc. There was no vascular injury during the surgery associated with this vascular abnormality.

2.3. Case 3

We described double VCI encountered during the surgery of a 50 year-old woman with endometrial carcinoma in February 2007. Since the frozen section analysis of the hysterectomy material revealed endocervical invasion, systematic pelvic and paraaortic lymphadenectomy was performed. Retroperitoneal dissection revealed the presence of a double VCI. The left common iliac vein was splitting into two branches. The left branch was climbing on the left side of the aorta as the left thinner aberrant VCI and the right branch was combining with the right common iliac vein forming the right VCI on the right side of the aorta. No other anatomical anomalies were encountered. All removed 66 retroperitoneal lymph nodes, 18 were dissected from paraaortic region. Operation time was 315 minutes. Blood loss was 800 cc. There was a vascular injury on the aberrant VCI during the surgery was primary repaired and provided vascular continuation.

3. Discussion

VCI develops between the 6th and 8th weeks of embryonic life. This is a complex multistep process involving the formation of anastomosis between three pairs of embryonic veins; the posterior cardinal veins, the subcardinal veins, and the supracardinal veins [3,4]. Persistence or regression of these embryonic veins can lead to a lot of variations that can result in anomalies. Double VCI results from persistence of both left and right supracardinal veins. Usually, the left VCI ends at the level of the left renal vein, crossing over to join the right sided VCI.

Anomalies of major retroperitoneal vascular structure are frequently asymptomatic and they were reported with a prevalence of 2.4% to 30% [5-11]. They are mostly diagnosed either during surgery or by imaging techniques. We previously reported in the study by Kose *et al*. that the anomaly of major retroperitoneal vascular structure was observed in 17% of the patients during staging surgery [12]. In that study anomalies were related to more than one vascular area in 8.3% of the patients. Double VCI is one of the most common anomalies affecting VCI with a population prevalence of 1%-3% [1,2].

This abnormal vascular structure is important because of the possible increased injury during the retroperitoneal surgery. Benedetti-Panici *et al*. reported 7.1% of vascular complications during retroperitoneal lymphadenectomy in 42 patients with vascular anomalies [9]. Klemm *et al*. reported the risk of injury of anomalous vessels during laparoscopic lymphadenectomy is 7.7% [10]. Shindo *et al*. reported during laparotomy 1 of 4 vascular anomalies encountered was injured [11]. Kose *et al*. reported the rate of injury of anomalous vessel was 10.3% in the patients with anomalies of major retroperitoneal vascular structure [12]. However none of the vascular complications seen in the patients with anomaly of major retroperitoneal vascular structure did cause an undesirable result. All of the vascular complications were repaired primarily. None of the patients required a second laparotomy because of hemoperitoneum. In addition to, there was no difference between patients with anomaly and those without anomaly regarding for intraoperative bleeding and red blood cell transfusion. On the other hand, the number of removed lymph node was similar in two groups.

It is important for surgeons, it must be remembered that any patient who is scheduled for an operation may have a vascular anomaly. Therefore, to prevent complications during retroperitoneal lymphadenectomy, vascular anatomy must be visualized individually.

There was no vascular injury during the surgery associated with these retroperitoneal vascular anomalies in first and second case. Conversely, in third case, there was a vascular injury on the aberrant VCI during the surgery was primary repaired and provided vascular continuation. No blood transfusion needed any of the cases after surgery.

Declare of interest statement

We declare that we have no confict of interest

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