Original Article

Prevalence of Left Common Iliac Vein Compression in Asymptomatic Thai People by 64 Slices Multidetector Computed Tomography (MDCT) Scan of Abdomen at Phramongkutklao Hospital

Wanvisa Charoenwat, Chutcharn Kongphanich and Supakajee Saengruangorn

Department of Radiology, Phramongkutklao Hospital

Background: *Compression of the left iliac vein against the fifth lumbar vertebra by the right iliac artery is a well-known anatomic variant. This anatomical variation is associated with acute venous thrombosis of the left iliac vein or May-Thurner syndrome. The prevalence of compression of the left iliac vein by right common iliac artery in asymptomatic people had not been established in Thailand.* ***Objective:*** *To determine the prevalence of left common iliac vein compression in an asymptomatic Thai people by 64 slices Multidetector Computed Tomography (MDCT) of abdomen.* ***Methodology:*** *A retrospective study of 280 abdominal MDCT scan from March 2011 to August 2011 at Phramongkutklao Hospital were done to determine the prevalence of anatomical variation of left common iliac vein.* ***Results:*** *Among 280 abdominal MDCT studies, the prevalence of compression of left common iliac vein by right common iliac artery was 20.7%. Mean diameter of left common iliac vein was 7.51 mm and standard deviation was 0.21. The minimal and maximal diameter of left common iliac vein in asymptomatic people were 1.50 mm and 17.30 mm, respectively.* ***Conclusion:*** *Sixty four slices MDCT provides a reliable method to evaluate the anatomical variation of left common iliac vein. Using only diameter of left common iliac vein may not be suitable for identifying possible of May-Thurner syndrome in Thai people.*

Key Words: ● *Anatomical variation* ● *Left common iliac vein* ● *DVT of left leg* ● *May-Thurner syndrome* ● *Multidetector computed tomography*

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Introdution

Basic knowledge of normal anatomy is significantly important in medical practice as one of the risk factor of patients with signs and symptoms of the deep venous thrombosis[1]. The normal anatomy of left common iliac vein[2] is medioposterior to the right common iliac. Anatomical variation includes compressed left common iliac vein by right common iliac artery.(Figure 1 and 2) In the previous study showed prevalence of this event 20 to 32 percent in the normal population, who do not have signs and symptoms of a clot-blood clots in the veins (Deep vein thrombosis: DVT)[3-7]. The anteroposterior diameter of the left common iliac vein that compressed by right common iliac artery was measured about 68 percent in asymptomatic people[8].

Conventional catheter angiography is a gold standard for study vascular structure[9]. However angiography is an invasive method and also has many limitations in assessment the anatomy of left common iliac vein. Recently new noninvasive method such as Multidetector Computed Tomography (MDCT) is used to evaluate the vascular structure because of

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Requests for reprints should be addressed to Wanvisa Charoenwat, MD., Department of Radiology, Phramongkutklao Hospital, Bangkok 10400, Thailand

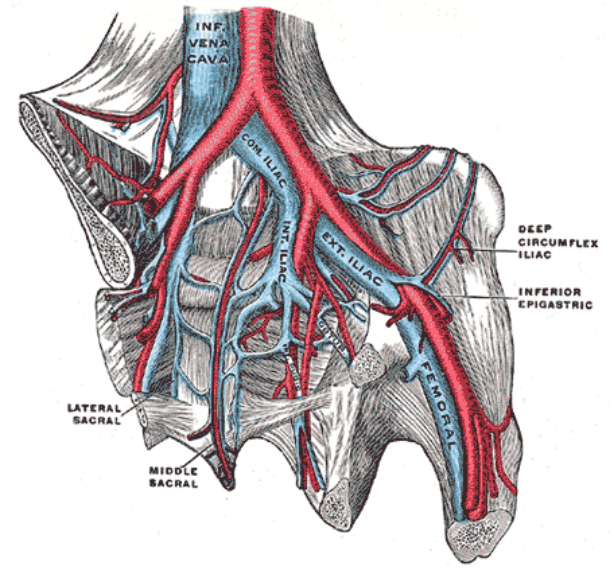

Figure 1 Anatomy of left common iliac vein and right common iliac artery[2]

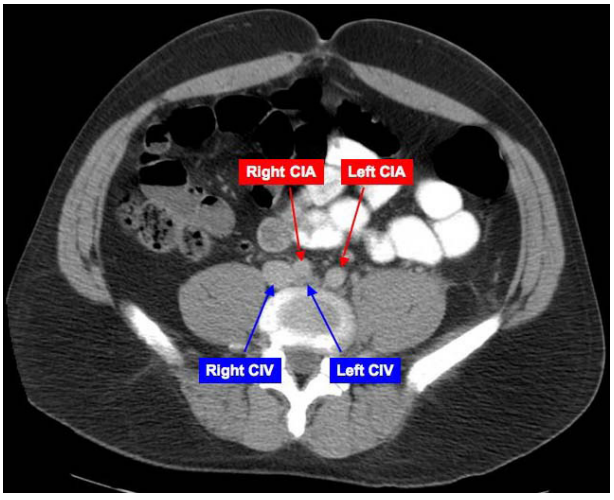

Figure 2: Axial plain abdominal CT reveals compression of left common iliac vein (left CIV) by right common iliac artery (right CIA)[12]

the better internal and external anatomical details. The additional information on adjacent structures and organs correlation provided by MDCT is considerably an advantage over the conventional angiography[9-11].

The prevalence of compression of the left iliac vein by right common iliac artery in asymptomatic people had not been established in Thailand. Prevalence data obtained from this study is used as the basic knowledge for the results of the anatomical variation and correlated with signs and symptoms of deep vein thrombosis at left leg (May-Thurner syndrome).

Objective

To determine the prevalence of left common iliac vein compression in asymptomatic Thai people by 64 slices Multidetector Computed Tomography (MDCT) scan of abdomen.

Methodology

A Cross-Sectional retrospective study of abdominal MDCT scans from March 2011 to August 2011 at Phramongkutklao Hospital was conducted to determine the prevalence of anatomical variation of left common iliac vein.

Inclusion criteria was MDCT scan of abdomen of patient at Phramongkutklao Hospital from March 2011 to August 2011. The sample size was calculated by estimate single proportion 95% CI of $\pi = p \pm d$, (π = True pop'n proportion, p = Expected proportion, q = 1-p, d = Margin of error in estimating p) and simple random sampling, drawing lots was perform.

$$n = \frac{(Z_{\alpha/2})^2 pq}{D^2}$$

$$n = \frac{1.962 \times 0.24 \times (1-0.24)}{0.052} = 280$$

Exclusion criteria were 1) previous diagnosis of left common iliac vein compression or May-Thurner syndrome, 2) any malignancy or adenophaty adjacent to left common iliac vein and 3) any intra-abdominal lesion that causing extrinsic compression to left common iliac vein.

All imaging studies were reviewed by an interventional radiologist who has experience more than 10 years. The anteroposterior diameter at crossing part and distal to crossing part of left common iliac vein that compressed by right common iliac artery were recorded and analyzed. (Figure 3, 4 and 5). The anteroposterior diameter of left common iliac vein at the proximal to middle part of the crossing level (area

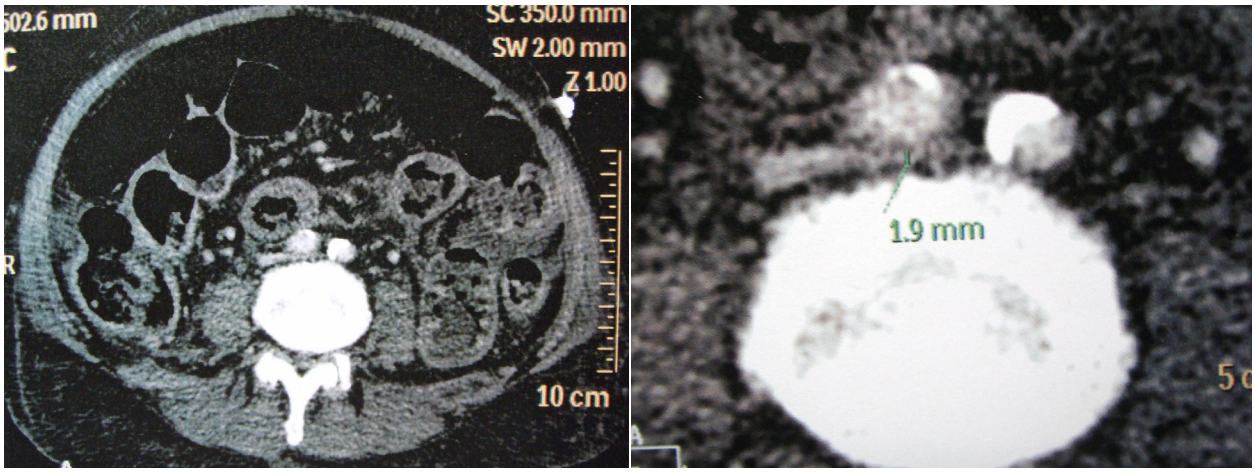

Figure 3 Axial portovenous phase of abdominal CT reveals compression of left common iliac vein (left CIV) by right common iliac artery (right CIA)

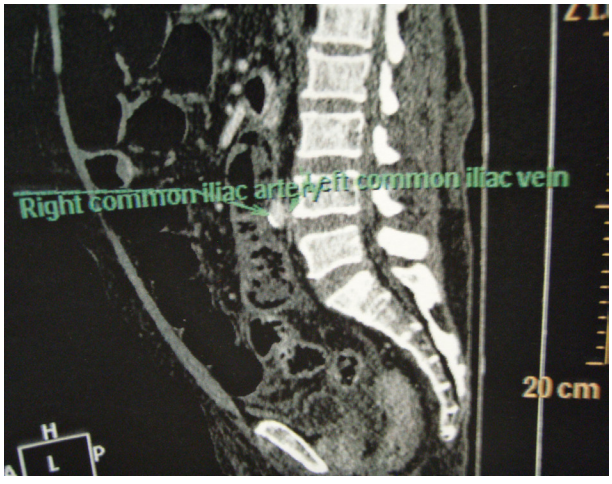

Figure 4 Sagittal portovenous phase of abdominal CT reveals compression of left common iliac vein (left CIV) by right common iliac artery (right CIA)

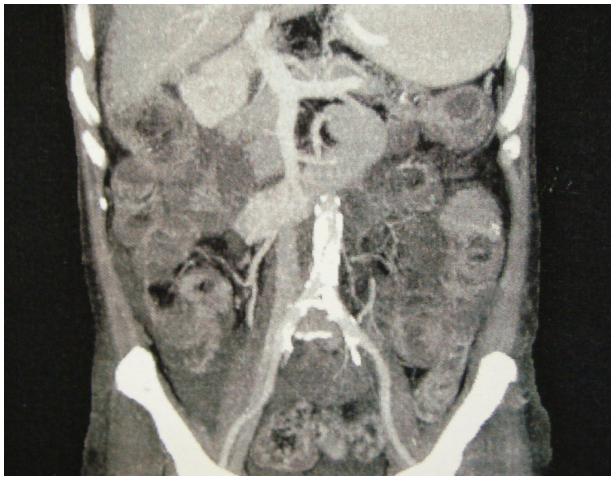

Figure 5 Coronal reconstruction of portovenous phase of abdominal CT reveals compression of left common iliac vein (left CIV) by right common iliac artery (right CIA)

that right common iliac artery crosses left common iliac vein) more than 70% is meaning of compression of left common iliac vein.

Results

Prevalence of left common iliac vein compression by right common iliac artery is 20.7%. (Table 1) Mean diameter is 7.51 mm with standard deviation 0.21 (Table 2). Minimal and maximal diameter 1.50 mm and 17.30 mm, respectively. Mean age of the asymptomatic subjects was 59.3 years (range, 15-95 years). Female and male are equal, 50.7% (n = 142) and 49.3% (n = 138), respectively.

Discussion

May-Thurner syndrome is an anatomic variant that causing development of "spurs" in the left common iliac vein which changes in elastin and collagen content development of three types of spurs with the propensity to cause partial venous obstruction[3], a consequence of compression of the left common iliac vein by the right common iliac artery against the lumbar vertebra. Patients with symptoms of left iliofemoral deep venous thrombosis due to common iliac vein compression tend to be young women, in the second to fourth decade of life, after period of

Table 1 : Prevalence of left common iliac vein compression by right common iliac artery

Left common iliac vein	Prevalence
Compression	58 (20.7%)
No compression	222 (79.3%)
Total	**280 (100%)**

Table 2: Mean diameter and standard deviation of left common iliac vein (mm)

Part of left common iliac vein	Mean diameter (mm)	Standard deviation
Middle part	7.51	3.56
Distal part	10.54	2.90

prolonged immobilization or pregnancy. Symptoms typically include persistent left leg edema, with or without other stigmata consistent with venous hypertension. Virchow's triad are hypercoaguability, endothelial injury, and stasis. The anatomic variant is in conjunction with altered coagulation potential that may predispose to the formation of thrombus.

Nearly one fifth of people in this study (58 peoples, 20.7%) had greater than 50% anteroposterior diameter compression (anatomical variation)[8] and our results are well correlated with previous studies, which reported in 20% to 32%[3-7].

In this study we found that 4.29% (n=12) are asymptomatic 70% compression of left common iliac vein by right common iliac artery. The recent study reported that the compression excess than 70% of diameter on CT found in patient with left lower extremity deep vein thrombosis[8]. The degree of compression of the left iliac vein may be a normal anatomic finding and does not increase risk for development of deep venous thrombosis in this study.

However this study had some limitations such as scanning time that was obtained during the portovenous phase. In some case with cardiovascular disease, could not perform true portovenous phase. This limited the type of vessel reconstruction and analysis. We could not control the volume status of the patient at the time of image acquisition, such as over emphasis of the degree of compression of the left common iliac vein in a dehydrated patient.

Conclusion

In this study the degree of compression of the left iliac vein may be a normal anatomic finding and does not increased risk for development of deep venous thrombosis. This study shows that only diameter of left common iliac vein may not be suitable for identifying possible of May-Thurner syndrome in Thai people, further study with large population should be considered.

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การศึกษาความชุกของการกดทับเส้นเลือดดำข้างซ้าย (Left Common Iliac Vein) ในคนไทยโดยใช้เครื่องเอกซเรย์คอมพิวเตอร์ความเร็วสูง 64 สไลด์ของช่องท้อง ณ โรงพยาบาลพระมงกุฎเกล้า

วันวิสา เจริญวัฒน์ ชัชชาญ คงพานิช และ ศุภชจี แสงเรืองอ่อน
กองรังสีกรรม โรงพยาบาลพระมงกุฎเกล้า

ความเป็นมา: *ภาวะความหลากหลายทางกายวิภาคในประชากรที่มีการกดทับเส้นเลือดดำ (left common iliac vein) โดยเส้นเลือดแดง (right common iliac artery) เป็นที่รู้จักกันดีในปัจจุบันว่ามีความสัมพันธ์กับโรคลิ่มเลือดอุดตันในเส้นเลือดดำของขาซ้าย (deep vein thrombosis: DVT) หรือ may-thurner syndrome ซึ่งยังไม่เคยมีการศึกษาความชุกของการกดทับเส้นเลือดดำข้างซ้าย (left common iliac vein) โดยเส้นเลือดแดง (right common iliac artery) ในคนไทยมาก่อน* ***วัตถุประสงค์:*** *เพื่อศึกษาความชุกของการกดทับเส้นเลือดดำข้างซ้าย (left common iliac vein) ในคนไทยโดยใช้เครื่องเอกซเรย์คอมพิวเตอร์ความเร็วสูง 64 สไลด์ของช่องท้อง ณ โรงพยาบาลพระมงกุฎเกล้า* ***วิธีการศึกษา:*** *ใช้วิธีการศึกษาย้อนหลังด้วยชุดภาพถ่ายเอกซเรย์คอมพิวเตอร์ความเร็วสูง 64 สไลด์ของช่องท้องจำนวน 280 ชุดภาพ จากโรงพยาบาลพระมงกุฎเกล้า ในช่วงเดือนมีนาคมถึงสิงหาคม พ.ศ. 2554* ***ผลการศึกษา:*** *ความชุกของการกดทับเส้นเลือดดำข้างซ้าย (left common iliac vein) โดยเส้นเลือดแดง (right common iliac artery) เท่ากับร้อยละ 20.7 ค่าเฉลี่ยของเส้นผ่าศูนย์กลางของเส้นเลือดดำข้างซ้าย (left common iliac vein) คือ 7.51 มิลลิเมตร ค่าเบี่ยงเบนมาตรฐานคือ 0.21 โดยมีขนาดเส้นผ่าศูนย์กลางตั้งแต่ 1.50 มิลลิเมตร ถึง 17.30 มิลลิเมตร* ***สรุป:*** *ในการศึกษาครั้งนี้พบว่าการใช้เพียงค่าขนาดเส้นผ่านศูนย์กลางของเส้นเลือดดำข้างซ้าย (left common iliac vein) เพียงอย่างเดียวนั้นไม่เหมาะสมในการประเมินความเป็นไปได้ของโรคลิ่มเลือดอุดตันในเส้นเลือดดำของขาซ้าย (deep vein thrombosis: DVT) หรือ may-thurner syndrome ในคนไทย*

Key Words: ● *ความหลากหลายทางกายวิภาค* ● *เส้นเลือดดำข้างซ้าย* ● *โรคลิ่มเลือดอุดตันในเส้นเลือดดำ* ● *เครื่องเอกซเรย์คอมพิวเตอร์ความเร็วสูง*

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