Original Article

Occlusion of left common iliac vein by a distended urinary bladder in a male with paraplegia due to spinal cord injury

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Study design: A report of a male subject who sustained paraplegia at T-5 level due to spinal cord injury (SCI) 18 years ago, and in whom, occlusion of the left common iliac vein by a distended bladder was detected during a routine follow-up.

Objectives: To illustrate a rare complication of chronic distension of the urinary bladder *viz* occlusion of the left common iliac vein, which persisted even after providing adequate bladder drainage by intermittent catheterisation.

Setting: Regional Spinal Injuries Centre, Southport, UK.

Methods: As part of a routine follow-up, we performed intravenous urography by injecting 50 ml of Ultravist 300 in a vein over the dorsum of the left foot. Opacification of collateral veins in the pelvis was seen in the 5- and 10-min films, which suggested iliac venous occlusion. In order to confirm the diagnosis, contrast was injected intravenously in the left foot and venography was performed.

Results: Venography revealed a distended left common iliac vein with contrast flowing into the right internal iliac vein through collateral veins in the pelvis; the right common iliac vein and inferior vena cava were patent. Duplex Doppler sonography showed compression of left common iliac vein by the posterior wall of a distended bladder with absence of blood flow through the compressed segment. Computerised tomography (CT) confirmed the diagnosis of extrinsic compression of the left common iliac vein against the promontory of sacrum by a distended bladder. CT excluded other causes for iliac vein occlusion.

Conclusion: In a male subject with SCI, chronic bladder distension produced occlusion of the left common iliac vein. Health professionals caring for individuals with SCI should be aware that long-standing bladder distension could cause pressure effects upon adjacent structures in the pelvis.

Spinal Cord (2001) 39, 394–398

Keywords: urinary bladder; spinal cord injury; iliac vein compression

Introduction

We describe a spinal cord injury (SCI) subject in whom occlusion of the left common iliac vein by a distended bladder was discovered serendipitously during a routine follow-up. We searched Medline database, and were unable to find any report of permanent occlusion of the iliac vein by chronic over-distension of urinary bladder in persons with SCI.

Case report

A 22-year-old male fell from a height of 30 feet and sustained complete paraplegia at T-5 level in 1982.

He had been managing the neuropathic bladder by wearing a penile sheath. In February 1996, he presented with recurrent episodes of violent headache and sweating. Ultrasound of urinary bladder revealed a hugely distended bladder and he started self-catheterisation following this. In a routine follow-up in November 2000 he gave no history of swelling or venous thrombosis of lower extremities.

As part of the follow-up investigations, intravenous urography (IVU) was performed. Fifty millilitres of Ultravist 300 was injected in a vein over the dorsum of the left foot. X-rays of the abdomen were taken 5 and 10 min after completion of the intravenous administration of contrast. These X-rays showed contrast in pelvic collateral veins, suggesting left iliac vein

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Figure 1 Five-minute film of intravenous urography following injection of contrast in the dorsum of the left foot: veins in the pelvis are visualised, suggesting iliac vein obstruction

Figure 2 Close-up view of the pelvis in the 5-min film of IVU. Extensive collateral veins are seen through which, the contrast flows into the right iliac vein and the vena cava

Figure 3 Venography after injection of contrast in the left foot. Dilated left common iliac vein is seen with evidence of complete occlusion by an extrinsic lesion. Collateral veins are seen coursing across the pelvis through which the contrast eventually reaches the right common iliac vein and the inferior vena cava, which are patent

obstruction (Figures 1 and 2). The pelvic veins were seen, albeit faintly, in the 20-min film as well.

In order to confirm the diagnosis of the iliac vein obstruction, a contrast was injected intravenously in the left foot and venography was performed. The

venography showed dilated left common iliac vein, with evidence of complete occlusion by an extrinsic lesion (Figure 3). Collateral veins were seen across the pelvis through which the contrast eventually reached the right common iliac vein, and the inferior vena cava, which were patent. Duplex Doppler sonography of the pelvis revealed a distended bladder with its posterior wall compressing the left common iliac vein (Figure 4a,b). There was an absence of blood flow from the left common iliac vein to the inferior vena cava. There was no response to Valsalva manoeuvre in the dilated left common iliac vein.

Computerised tomography (CT) of the pelvis was performed to confirm the diagnosis of extrinsic compression of the left common iliac vein by a distended bladder and to rule out other causes for iliac vein obstruction. CT of the pelvis showed a dilated left common iliac vein containing contrast. The contrast was flowing across the pelvis via reflux into the internal iliac vein and through pre-sacral collateral veins leading to opacification of the right iliac vein (Figure 5). The CT films taken at a more cephalad level showed that the bladder was displaced to the left, and there was extrinsic compression of the left common iliac vein by the posterior wall of the distended urinary bladder (Figures 6 and 7).

With hindsight, we reviewed the X-rays of IVU performed in July 1995. On this occasion also, the urographic contrast was injected in a vein over the dorsum of the left foot. The 20-min film of IVU showed opacification of the pelvic collateral veins. The visualisation of collateral veins in the pelvis, after intravenous injection of contrast in the ipsilateral pedal vein, suggested that the patient had had a left common iliac vein obstruction since at least July 1995, with the distended bladder being discovered in February 1996. It is likely that this massive distension of urinary bladder produced compression of the left common iliac vein to begin with and this long-standing distension eventually resulted in permanent occlusion of the left common iliac vein. Since compression of the iliac vein had occurred gradually over a period, there was adequate time for development of alternative channels for blood flow through pelvic collateral veins, therefore, this patient did not develop symptoms and signs of venous obstruction, e.g. oedema of the lower limb and scrotum, venous claudication, or deep vein thrombosis. Indeed, this patient had been participating in a RGO programme with no adverse effect upon venous circulation of the left lower extremity.

Discussion

A distended urinary bladder can cause pressure effects on adjacent structures in the pelvis. Pseudo-stenosis of the recto-sigmoid colon due to compression by a dilated urinary bladder has been described.¹ Urinary bladder distension may cause sub-acute intestinal obstruction as well, albeit very rarely. A chronically distended bladder occurring in a 91-year-old male

Figure 4 (a) Transverse plane; (b) Longitudinal plane. Duplex Doppler sonography of pelvis. The distended urinary bladder is seen compressing the left common iliac vein. There is absence of blood flow through the compressed segment of iliac vein

suffering from long-standing diabetes mellitus and a prostatic adenoma, produced sub-acute bowel obstruction due to compression of the recto-sigmoid junction.²

A distended urinary bladder may cause compression of the right, the left, or both external iliac veins.³ Ducharme and associates⁴ described an 81-year-old man who presented with a 4-day history of right leg swelling. A markedly enlarged urinary bladder that was compressing the right external iliac vein against the psoas muscle was confirmed by means of a computed tomography scan. After decompression of the distended bladder by a Foley catheter, a repeat venography showed a normal right external iliac vein with no evidence of compression. Jennings *et al*⁵ reported a 60-year-old female diabetic patient with autonomic neuropathy who gradually developed a warm swollen left leg over a period of 12 days. She was found to have chronic retention of

urine due to a neuropathic bladder. Venography did not reveal thrombus but showed compression of the ipsilateral external iliac vein by the bladder. No other cause for her warm swollen leg was found. Following the introduction of a bladder catheter, her leg gradually returned to normal. Large diverticulum of the urinary bladder may also cause compression of iliac vessels, as evidenced by a case reported by Colombeau *et al*.⁶

In many of the reported cases of venous obstruction caused by acute distension of the urinary bladder, *pari passu* with the relief of bladder obstruction, there was resolution of pelvic vein compression and peripheral oedema, and compression of the iliac vein was reversible.⁷ In contrast to these observations, our patient had long-standing bladder distension, which resulted in permanent and complete occlusion of the left common iliac vein.

Figure 5 CT of the pelvis following intravenous injection of contrast in the left foot. Note the dilated left common iliac vein containing contrast; contrast flows across the pelvis via reflux into the internal iliac vein and through presacral collateral veins leading to opacification of right common iliac vein

Figure 6 CT of the pelvis. Note the urinary bladder is displaced to the left and compresses the left common iliac vein

Since compression of the common iliac vein by a distended bladder had probably been present for a considerable time, chronic over-distension of the neuropathic bladder resulted in permanent occlusion of the common iliac vein. Therefore, venous obstruction persisted even after establishing improved drainage of the urinary bladder by an intermittent catheterisation regime. Further, compression of the iliac vein by a distended bladder occurred gradually over a period, hence there was adequate time for the development of collateral circulation in the pelvis to provide satisfactory drainage for venous return from the lower limb (Figure 2). Therefore, this patient did not develop symptoms and signs of venous obstruction,

Figure 7 CT of the pelvis. Note the left common iliac vein is almost occluded by the posterior wall of distended urinary bladder, which is displaced to the left

tion, eg oedema of the lower limb and scrotum, venous claudication, or deep vein thrombosis.

Differential diagnosis for iliac vein compression is called Cockett's syndrome.⁸ The term Cockett's syndrome stands for a lower limb dysfunction with venous stasis originating from the left common iliac compression by the right common iliac artery at the pelvic inlet level.⁹ Clinical symptoms only develop in cases with marked compression; they consist of functional disorders predominant in the left lower limb and, frequently, recurrent oedema. The compression may be revealed by complications such as thrombosis of the iliac vein or veins of the calf, or pulmonary embolism.

In our patient, CT of the pelvis was performed after the injection of a contrast into a left foot dorsal vein. The CT scan together with the duplex Doppler sonography, confirmed that compression of the left common iliac vein was indeed caused by a distended bladder. Computer tomography of the pelvis also helped to exclude Cockett's syndrome or, variants of May–Thurner syndrome as the cause of iliac vein occlusion in this patient. The variants of May–Thurner syndrome are obstruction of the left common iliac vein as a result of compression by the left internal iliac artery,¹⁰ and a tortuous left common iliac artery compressing the left common iliac vein.¹¹

In the patients with acute extensive ilio-femoral deep venous thrombosis (DVT) due to May–Thurner syndrome, thrombolysis may be indicated. After ascending venography, an infusion catheter system is placed and urokinase is infused locally into the thrombus burden. After near complete clot dissolution (> or = 95%) or lytic stagnation, the residual left common iliac vein narrowing is treated by means of angioplasty and/or placement of Wallstent endoprosthesis. All patients continue to receive oral warfarin.

Patel *et al*¹² concluded from their clinical experience of treating 10 symptomatic women with acute extensive ilio-femoral DVT due to May–Thurner syndrome, that catheter-directed thrombolytic therapy was an effective method for restoring venous patency and provided relief of the acute symptoms. The underlying left common iliac vein lesion invariably needed to undergo stent placement.

O’Sullivan *et al*¹³ evaluated the feasibility of endovascular techniques in treating venous outflow obstruction resulting from compression of the iliac vein by the iliac artery of the left lower extremity (May–Thurner syndrome) in patients presenting with acute and in those with chronic symptoms. In a retrospective analysis of 39 patients (29 women, 10 men; median age, 46 years) with iliac vein compression syndrome, 19 patients presented with acute deep vein thrombosis (DVT) and 20 patients presented with chronic symptoms. All patients presented with leg oedema or pain. In the acute group, patients were treated with catheter-directed thrombolysis and angioplasty followed by stent placement. In the chronic group, patients were treated with the use of angioplasty and stent placement alone ($n=8$), or in combination with thrombolysis ($n=12$). The 1-year patency rate for patients with acute symptoms who received stents was 91.6%; for patients with chronic symptoms who received stents, the 1-year patency rate was 93.9%. Acute iliac vein re-thrombosis (<24 h) requiring re-intervention ($n=2$) occurred in two patients.

The patient reported here does not have oedema of the left lower extremity, and has no symptoms of venous obstruction to the lower extremity even when he participates in RGO programmes. Therefore, for the present, we decided against any endovascular intervention such as thrombolysis and stent placement. If this patient develops symptoms of either venous obstruction in the lower extremity, DVT, or pulmonary embolism, he will be considered for endovascular treatment of iliac vein occlusion.

This case illustrates that subjects with spinal cord injury may develop unusual complications due to neuropathic bladder, which are not usually encountered in able-bodied individuals.¹⁴ Further, the clinical symptoms and signs of these clinical events may be unique or even absent in the individuals with SCI, as exemplified by this case.

Acknowledgements

Our gratitude to Tyco Healthcare UK Ltd, Gosport, Hampshire, UK for sponsoring the printing of colour illustrations.

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