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First Experience in Endovascular Stenting in Patients with both May—Thurner and Pelvic Congestion Syndromes

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ABSTRACT

Objective — to assess endovascular stenting (ES) of the iliac veins in the treatment of the May—Thurner syndrome (MTS) in patients with pelvic congestion syndrome (PCS) and varicocele.

Material and methods. Endovascular stenting of the iliac veins was performed in 7 female patients PCS and 1 male patient with varicocele. All patients underwent duplex ultrasound and computed tomography of the pelvic veins, as well as pelvic phlebography. Self-expanding stents were inserted in all cases. Pelvic pain was assessed by visual-analogue scale before and 4 to 7 days after procedure.

Results. Technical success, i.e. restoration of normal patency of the left common iliac vein, was achieved in 8 patients. In 2 patients, stent was displaced towards the inferior vena cava (IVC), which required implantation of a second stent using the stent-in-stent technique. Dislocation of the stent into the IVC at 6 months after the intervention was found in 1 patient, but did not result in any complications during further follow-up. All the patients reported reduction of pelvic pain within 4 to 7 days after procedure. The PCS severity score was decreased from 7.2±1.3 to 6.2±0.4 at 1 month after the procedure. However, no further decrease was observed in female patients. At 1 month after ES, the male patient noted a complete disappearance of discomfort in the left inguinal region and left testicle during and after intercourse.

Conclusion. Stenting of common iliac vein in patients with MTS leads to decrease of pelvic pain in patients with PCS.

Keywords: May—Thurner syndrome, pelvic congestion syndrome, venous pelvic pain, endovascular stenting.

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Compression of the iliac veins, also known as May—Thurner syndrome [MTS] or Cockett syndrome, is a pathological condition characterized by the narrowing of the left or, rarely, right common iliac vein (CIV) due to the compression by the overlying right common iliac artery (CIA), which is manifested by edema of the lower extremities, venous claudication, pelvic varicose veins and chronic pelvic pain [1—4]. The syndrome is diagnosed in 2 to 5% patients with chronic venous diseases (CVD) [5]. Despite the low detection level of this pathology in the clinical practice, numerous patho-anatomical and radiological studies indicate a relatively high prevalence of MTS. Hameed M. et al. (2017) reported the detection of MTS in 30% of cadavers examined during autopsy [6]. In the retrospective analysis of computed tomography data from asymptomatic patients, M. Kibbe et al. (2004) found that 24% of patients had greater than 50% narrowing of the left CIV, and 66% had less than 25% narrowing of this vessel [7]. In patients with thrombosis of the left ilio-femoral venous segment, the MTS rate ranges from 18 to 49% [8, 9].

Taking these into account, it may be speculated that restoration of the blood flow through the iliac veins may be useful in the treatment of pelvic congestion syndrome (PCS) and prevention of acute venous thrombosis in patients with verified MTS.

In this article, we present our experience with iliac vein stenting of MTS in patients having PCS and varicocele.

Material and methods

We stented eight patients aged from 32 to 44 years (seven female, one male man). All patients had left-sided MTS and underwent treatment at the Savelyev University Surgical Clinic in 2010—2018. All women were presented with symptoms and signs of PCS, such as venous pelvic pain (VPP), heaviness or discomfort in the hypogastrium, coital and post-coital pain. Two women had also developed vulvar varicose veins. The male patient hade grade I varicocele (Lopatkin's classification). He complained of pain in the left inguinal area and in the left testicle during physical exertion and sex. No lower limbs

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CVD signs, such as varicose veins, swelling, trophic disorders were registered. No venous pain in legs was reported by patients.

All patients underwent duplex ultrasound of pelvic and lower extremities veins. All patients didn't have primary reflux or post thrombotic changes in deep or superficial veins.

Left CIV compression was verified by multi-slice computed tomography (MSCT) or pelvic phlebography (PV). The indications to perform these diagnostic techniques were signs of PCS and varicocele, as well as results of the duplex ultrasound (DUS) of the pelvic veins showing the dilation of the ovarian (testicular in men), parametrial, or uterine veins with the blood reflux in them.

All patients underwent endovascular balloon angioplasty and stenting of the left iliac veins. Interventions were performed under local anesthesia. Left common femoral vein was punctured, a 0.035" guide was introduced into the inferior vena cava (IVC). Then 10F introducer was inserted. Using the guide wire, the 12×40 mm balloon was introduced into left CIV and balloon dilation was performed at a pressure level of 2 atm. Then a delivery system was introduced using the guide wire and positioned at the area of stenosis of left CIV. The a stent was implanted. To improve its fixation in the venous lumen and to prevent its displacement and migration, the post-stent balloon (comparable to the diameter of the stent — 14 or 16 mm) dilation of the stented vessel was performed. In one case, 16×80 mm OptiMed self-expanding stent with dimensions of was used. In seven patients 14×60 and 16×90 mm Wallstent self-expanding stents were used. Six patients required one stent and two patients required two stents to eliminate stenosis.

After procedure all patients received low-molecular-weight heparins (sodium enoxaparin or calcium suproparin at a dose of 1 mg per 1 kg of body weight subcutaneously into the abdominal wall once daily) for 3 months and antiplatelet agents (clopidogrel 75 mg or pentoxifylline 1200 mg daily) for 1 month after the intervention.

The follow-ups were at 1, 6, 12 and 36 months. The VPP severity was assessed using the VAS. Duplex ultrasound was performed at every visit. MSCT was performed at 6 and 12 months after surgery and then once a year.

The criteria for the efficacy of endovascular treatment were elimination or reduction of the PCS and the restoration of the patency of stented veins in the short-term period.

Results

During procedure we observed shifting of self-expanding stent towards the IVC in two patients (Wallstent, 14×60 mm). Additional fixation of the stents by balloon dilation was not successful, therefore, the implantation of the second stent using the stent-in-stent technique was required. In one female patient, dislocation of the stent into the IVC was detected at 6 months after the intervention, which was not associated with any complication throughout the rest of follow-up.

No other complications were reported during and after interventions. At first day after procedure, patients were under supervision in the hospital. They underwent duplex ultrasound of lower extremities and pelvic veins, which showed no thrombosis of the stented vein in all patients.

At the end of first day after stenting, the clinical effect of endovascular intervention could not be assessed, as the patients were unable to confidently report changes in their conditions, including the changes in pelvic pain and other signs of PCS. All patients were discharged from the hospital on the 2nd day after the procedure.

Pelvic pain severity measured by VAS at follow-ups is presented in the **table**. The number of patient, who has been reporting symptoms and signs of PCS is also shown in this table. The mean VPP was 7.2±1.3 before the stenting. It decreased at one month after procedure and remained stable during one year without a tendency to further improving. At 1 month after stenting, the male patient reported complete disappearance of discomfort in the left inguinal region and left testicle during and after intercourse.

Duplex ultrasound revealed presence of varicose transformation and valvular incompetence of pelvic veins (parametric, uterine, ovarian/testicular). However, despite a significant narrowing (from 70 to 93% according to MSCT and TV), it failed to identify any iliac veins diameter and blood flow changes **(Fig. 1)**. With MSCT and TV, it is possible to calculate the narrowing degree left CIV, detect prestenotic vessel dilation and to detect confirmed dilatation of pelvic veins and collateral blood flow, which is typical for MTS **(Fig. 2)**.

Technical success, i.e. the restoration of patency of left CIV, was achieved in 8 patients **(Fig. 3)**. Duplex ultrasound at 1 and 3 months demonstrated venous dilation and blood reflux persistence in the gonadal, parametrial,

Symptoms and signs of PCS at baseline and during follow-up (n=8)

Symptom	Visits				
	Baseline	Month 1	Month 3	Month 6	Months 12
Pelvic pain (VAS, mean and standard deviation)	7.2±1.7	5.9±1.1	5.7±1.3	6.0±0.8	5.8±1.2
Discomfort in hypogastrium, n	8	7	7	7	7
Dyspareunia, n	8	7	7	7	7
Vulvar varicosities, n	2	2	2	2	2

***Fig. 1.* Compression of the left common iliac vein by the right common iliac (arrows indicate).**
Computed tomography (CT) imaging, frontal (a) and transverse (b) projections.

or uterine veins in females. In male patient, the reflux in the left testicular vein also persisted, and its duration did not exceed 0.6 s. No signs of stent thrombosis were found at duplex ultrasound and MSCT in all patients during follow-up **(Fig. 4, 5).**

Due to the persisting signs of PCS, 7 women underwent various surgical interventions on gonadal or vulvar veins within 3 to 6 months after stenting (5 patients underwent resection, 2 underwent left gonadal vein embolization, and 2 underwent varicose veins avulsion in perineal area).

Discussion

Rudolf Virchow was the first who described in 1851 the influence of the disturbance of blood outflow through the iliac veins on the development of acute deep vein thrombosis. He pointed out 5-fold higher incidence of thrombotic lesions in left ilio-femoral venous segment compared to the right one [10]. Later published papers, such as written J. McMurrich (1908) confirmed an association between «congenital adhesions» in the common iliac vein and thrombosis of the femoral and iliac veins [11]. R. May, J. Thurner (1957) and F. Cockett (1965) provided evidenced obvious role of «venous spurs of the iliac vein» in the formation of venous thrombosis and proposed a method of surgical treatment of this disorder [1, 2]. According to S. Carr et al. (2012), the narrowing of the left CIV by 1 mm is accompanied by a 1.5 times higher risk of venous thrombosis development of the left lower limb [12]. M. Nazzal et al. [13] noted that MTS is more prevalent among women. Despite the fact that the overwhelming number of researchers consider MTS as a factor in the development of venous thrombosis, as well as symptoms and signs of CVD, a number of researchers indicate that MTS is the cause of such an often unidentifiable condition as PCS [3, 4, 14, 15]. Endovascular intervention in such cases is considered as one of the steps in PCS treatment, leading to pelvic pain decrease.

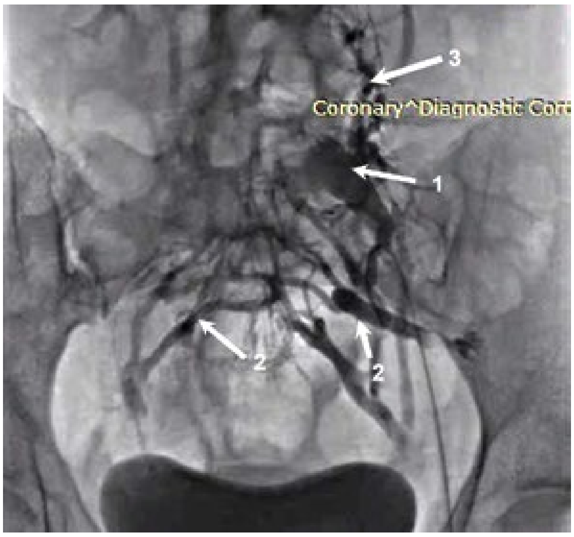

***Fig. 2.* Prestenotic dilation of the left common iliac vein (1); Dilated collateral intrapelvic (2) and iliolumbar (3) veins. Pelvic phlebography, frontal projection.**

In the present study, we also used endovascular stenting as the first step of patient management, which was aimed to eliminate etiological factor of varicose transformation of intrapelvic veins and the PCS. The study showed that restoration of normal blood flow in the left iliac veins was associated with some reduction in the VPP severity in women with PCS and with complete disappearance of varicocele symptoms in the male patient. This may indicate a possible positive effect of iliac vein stenting on blood outflow from pelvis. However, complete regression of the PCS signs was not achieved, which we can

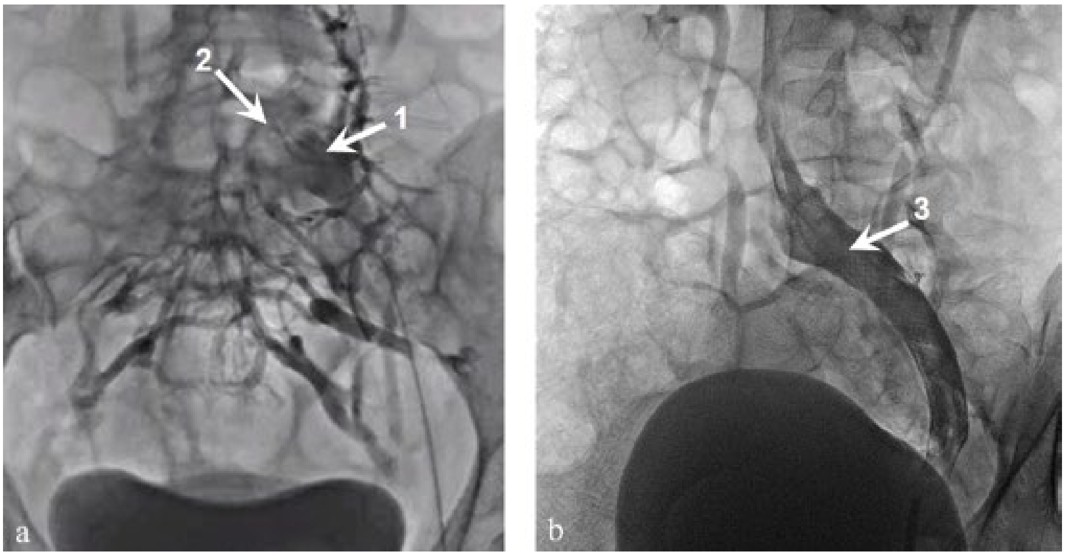

***Fig. 3.* Pelvic phlebography, frontal projection.**
a — before stenting; b — after stenting. 1 — left common iliac vein; 2 — right common iliac artery; 3 — stent is implanted, and the normal blood flow in the left common iliac vein is restored.

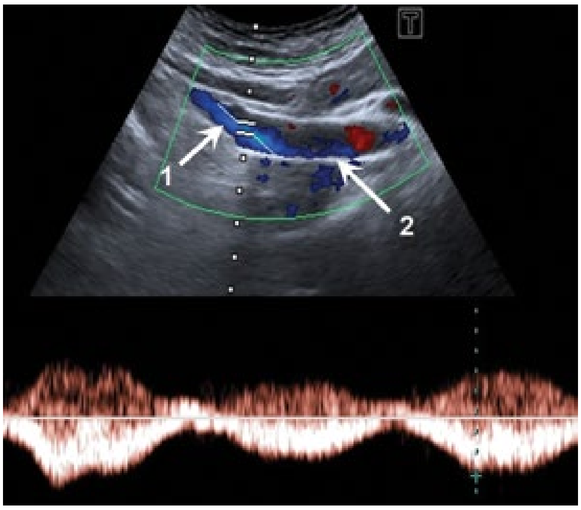

***Fig. 4.* Blood flow in the stented vein at 12 month registered by duplex ultrasound.**
1 — spontaneous blood flow in the left common iliac vein; 2 — stent in the lumen of the vein. Dopplergram shows monophasic.

***Fig. 5.* Stent in the left common iliac vein (arrow) is patent but displaced towards the inferior vena cava. Computed tomography at 12 months.**

is explain by persistence of blood stagnation in the pelvic veins, due to valvular incompetence of the parametrial, uterine and gonadal veins. Subsequent interventions on the gonadal veins were aimed to treat pathological reflux in these vessels in order to relief PCS symptoms.

Stent dislocation was observed in 3 patients, including one female, in whom the displacement of stent into the lumen of the inferior vena cava was detected only at 6 months after procedure. Observed disclocations may be due to suboptimal diameter of the venous stent and its improper fixation to the vein wall. P. Neglen et al. (2000) and S. Raju, et al. (2018) suggested that the size of the stent for the iliac veins should be 14—16 mm, and the stent should exceed the diameter of a targeted vein by no less than 2 mm [16, 17]. In our study, we applied these principles also. It should be mentioned that dislocation of the proximal segment of the stent by 1.5 cm in the IVC did not cause any clinically manifested complications. P. Neglen et al. [18] reported that stent deployment in the lumen of the IVC should not be considered as a significant procedural fault, as in such cases the thrombosis of the contralateral iliac vein is observed in less than 1% of patients.

The patency of stents in the immediate and long-term post-implantation periods was 100%. No cases of in-stent thrombosis were registered. This can be explained by the fact that stenting was performed in vessels with intact endothelium, in contrast to post-thrombotic occlusion of the iliac veins, where the primary and secondary patency of the stent varies from 87-91% to 83-90%, respectively [19, 20]. In addition, anticoagulant therapy for 3 months after the intervention also helped to minimize risk venous venous thromboembolism.

Conclusions

Stenting of common iliac vein in patients with MTS leads to decrease of pelvic pain in patients with PCS. The procedure may be considered as the first step of of PCS caused by the May—Thurner syndrome.

Roles of authors
Study concept and design — SG
Writing a manuscript — SG, MM
Statistical analysis — EM, GK
Reviewing the draft — SG

Conflict of interests
Nothing to declare.

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