Acute Ilio-Femoral Thrombosis in a Patient with Chronic Infra-renal Inferior Vena Cava Occlusion Treated with Mechanical Thrombectomy Using a Rotational Catheter

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Abstract

Case Report: A 28-year-old man complained acute low-back pain three-day post-appendectomy. Computed tomography revealed thrombosis of both iliac veins and ascending lumbar vein in a patient with chronic occlusion of infra-renal inferior vena cava. Consequent lumbar and intraspinal epidural venous engorgements caused nerve root and thecal sac compression that simulated a spinal stenosis. Complete symptoms resolution was achieved after thrombectomy using a rotational catheter.

Keywords: Low-back pain; Deep venous thrombosis; Coagulopathy

Introduction

Deep Venous Thrombosis (DVT) in young patients below 30 years is an uncommon condition and is usually associated with secondary causes such as systemic coagulopathy, abdominal surgery, tumors, Budd-Chiari syndrome, infections, congenital or acquired malformation or rarely idiopathic [1,2]. The occurrence of DVT associated with minor abdominal surgery involving the abdominal wall or appendix is a very rare event with various and sometimes atypical clinical manifestations. Anomalies of Inferior Vein Cava (IVC) can increase the risk of bilateral ilio-femoral thrombosis [3,4]. Historically, medical treatment has been the first line therapy. Surgical therapy has been offered rarely, because of the complexity of such procedures [5,6].

Here we present the case of a 28-year-old man who presented acute low-back pain three-day post-appendectomy. Computerized Tomography (CT) scan showed thrombosis of bilateral iliac vein and ascending lumbar vein and chronic occlusion of infra-renal inferior vena cava. Consequent lumbar and intraspinal epidural venous engorgements caused nerve root and thecal sac compression that simulated a spinal stenosis [7,8]. Complete symptoms resolution was achieved after thrombectomy using a rotational catheter.

Case Report

A 28-year-old man presented to the emergency room with cramp, mid-abdominal progressive pain, later localized to the right iliac fossa. Pain was associated with nausea, vomiting, anorexia and mild fever. Physical examination revealed a low-grade fever (38°C), pain on palpation at right lower quadrant (McBurney's sign), and leukocytosis (12 × 10^9/L or 12,000/microliter) with 85% neutrophils. The ultrasound study showed a small amount of free fluid in the right lower quadrant and tenderness over a non-compressible structure above the iliac vessels, suggestive of acute appendicitis. An open appendectomy was performed without any complications. After three days, the patient complained the onset of low back pain radiating to both thighs. To exclude disc herniation or spondylodiscitis, a lumbar spine MRI without contrast was performed. Axial T2-weighted images showed IVC infra-renal tract hypoplasia with an extensive thrombosis, ascending lumbar vein thrombosis with dilatation of the spinal veins and perivascular inflammation signs (Figure 1). A CT scan venography of the abdomen-pelvis revealed chronic occlusion of infra-renal IVC with evidence of organized thrombus and fibrin bands, thrombosis of common iliac veins and left external iliac vein and a well-developed collateral pathway through lumbar and azygos, suggestive of long-standing cava obstruction, with left ascending lumbar vein thrombosis (Figure 2). Femoral veins Doppler ultrasound showed marked dilatation of both vessels without evidence of intra-luminal thrombus, but the flow pattern of the external and common iliac veins was monotonous and monophasic, without any respiratory variation.

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in all treated veins with flow restoration; then balloon angioplasty was
aspirated thrombus. Aspiration port at the catheter tip so that it macerates and removes
system owns a high-speed rotational coil (40,000-60,000 rpm) within
maneuvered into the thrombi on both femoral veins, both iliac veins,
wire and then a mechanical thrombectomy device (ASPIREX 10 Fr;
inch hydrophilic guide-wire was replaced with a 0.018 inch guide-
through using two 0.035 inch hydrophilic guides, one for each sheath.
veins, venography confirmed the obstruction of the IVC and iliac veins
full patency of the femoral-iliac-cava axis and of the left lumbar vein (C).
Figure 3: Aspirex 10 Fr in right femoral vein (A) and in iliac femoral vein (B). After
mechanical debulking and 72 hours of fibrinolysis, ascending venogram show the
extension of thrombus in the both common femoral veins.

The patient's condition continued to worse in terms of back
and leg swelling, despite thrombolytic therapy; so an attempt of
percutaneous recanalization was performed. After cannulation of both
femoral veins with an 11 Fr sheath, vena cava obstruction was forced
through using two 0.035 inch hydrophilic guides, one for each sheath.
A 4 Fr V vertebral catheter was advanced over the wire. The 0.035
inch hydrophilic guide-wire was replaced with a 0.018 inch guide-
wire and then a mechanical thrombectomy device (ASPIREX 10 Fr;
Straub Medical, Wangs, Switzerland) was introduced and repetitively
maneuvered into the thrombi on both femoral veins, both iliac veins,
inferior vein cava and left lumbar vein. This over-the-wire catheter
system owns a high-speed rotational coil (40,000-60,000 rpm) within
the catheter body that creates negative pressure through an L-shaped
aspiration port at the catheter tip so that it macerates and removes
aspirated thrombus. After thrombectomy, there was a substantial decrease of thrombus
in all treated veins with flow restoration; then balloon angioplasty was
performed with two 8/60 mm balloon catheter on bifurcation IVC-iliac
veins using kissing-balloon technique and with an 8/60 mm on the left
lumbar ascending vein. Follow-up venography showed the presence of
minimal residual thrombus with patency of the femoral-iliac-cava
axis and partial recanalization of the left lumbar vein, with no evidence
of angiographic or clinical embolic complications, then thrombolytic
treatment using Urokinase 100.000 U.I./h was continued for 72 hours.
Follow-up venogram performed after 72 hours showed the full patency of the femoral-iliac-cava axis and of the left lumbar vein. The patient’s symptoms subsided rapidly and he was asymptomatic within a few
hours after the thrombectomy procedure. The patient was discharged
from the hospital on 4th post-operative day without complications on

**Discussion**

IVC malformation is unusual with a 0.3-0.6% of incidence in
general population, but has been reported to occur in 5%-16.2%
of young patients presenting with lower limb DVT [3,9]. The classical
presentation of lower limb swelling associated with dilated superficial
veins occurs only in 50% of patient with IVC thrombosis; many patients
remain asymptomatic, although lower back pain, nephrotic syndrome,
hepatic engorgement, cardiac failure and pulmonary embolus have
also been described. The low-back pain occurrence was probably
relate to acute closure of the ascending lumbar veins and the resulting
epidural venous engorgements, because in patient with IVC chronic
occlusion, symptoms are closely dependent on the adequacy of the
collateral drainage and the ascending lumbar veins plexus is the most
important collateral route. These vessels also communicate extensively
with vertebral venous network and blood flows can drain through these
veins into the azygous or hemiazygous systems.

A possible explanation for thrombosis in our patient was the
association of anomalous IVC and the inflamed appendix with
associated inflammatory changes producing transient hyper-coagulable
states [10]. Conventional treatment of this condition has been directed
toward inhibiting clot propagation, thereby reducing the risk of fatal
pulmonary embolism. Current treatment options for IVC thrombosis
are medical management with anticoagulants and thrombolytic therapy
or mechanical with suprarenal vena cava filter placement. Proper
anticoagulation therapy, during and after endovenous intervention for
acute thrombotic occlusion, is essential to keep the vein patent [11].
The choice of Unfractionated heparin (UFH) has been guided by its
ease of administration, rapid onset, easily measurable efficacy and
reversibility. Subcutaneous administration of Low-molecular weight
heparins LMWHs in a fixed dose is a safe and efficacious alternative
to unfractionated heparin in patients with venous thrombosis [12].
Thanks to its excellent pharmacological profile—including long
half-life and high anti-Factor Xa/anti-Factor IIa activity ratio-
the second-generation LMWH like bemiparin, can be safely used in
special categories of patients (children, elderly, patients with renal
impairment and congestive heart failure) [13]. Absolute indications for
IVC filter placement are contraindication to anticoagulation therapy,
recurrent thromboembolic disease despite anticoagulation therapy or
complications of anticoagulation, so it was decided to do not implant
one, avoiding device related complications.

In our case the rationale behind aggressive management of DVT
and the use of mechanical thrombectomy was necessary for the
low-back pain worsening, for the evidence of the thrombus extension and in
order to avoid post-thrombotic syndrome in a young patient.

**Conclusion**

Mechanical debulking of the thrombus has the potential to
significantly improve the thrombolysis rate through lumen vessel restoration and flow reactivation, to increase the contact surface exposed to the thrombolytic agent, allowing it to reach higher concentrations inside the thrombus, making thrombolysis more effective in cases of extensive thrombosis with flow blockage and outflow absence. Moreover, mechanical thrombectomy can shorten fibrinolytic infusion duration and avoid fibrinogen and plasminogen depletion related issues, especially in case medical therapy alone appears to be insufficient.

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