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CASE REPORT

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The complication of deep vein thrombosis — a case report of an adolescent with catheter-related thrombosis due to treatment of congestion of caustic substance at the age of 2, treated with stent implantation after 14 years

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Abstract

Introduction: *Deep vein thrombosis (DVT) is a type of venous thromboembolism, which is a global problem that affects not only adults but also children. Many risk factors are known; inherited or acquired ones caused by sepsis, malignancy, total parenteral nutrition, smoking, medications, or central venous line.*

Case presentation: *The case report presents a complicated medical history of a patient with long-term secondary DVT, finally treated with stent implantation at the age of 16. At the age of 2, he congested a caustic substance, and the treatment resulted in catheter-related thrombosis. Primarily, pharmacological treatment was ineffective. Only after 14 years, subsequently, many treatment attempts, balloon angioplasty, and stent implantation in the left external iliac vein and left common iliac vein were performed successfully via puncture of the right common jugular vein and common femoral veins. The patient was asymptomatic and regularly attended follow-up visits and also control computed tomography venography was performed two times.*

Conclusions: *This case report shows the successful management of DVT in a pediatric patient. In addition, the importance of a holistic approach and observation due to still unknown long-term complications should be emphasized.*

Keywords: secondary deep vein thrombosis; venous intervention; stent; adolescent; external iliac vein

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Introduction

Deep vein thrombosis is increasingly common in adults but rare problem in pediatrics, which remains a significant challenge for clinicians [1]. Studies show a rise in the incidence rate of 0.07 to 0.14 per 10,000 children per year in the general pediatric population and 4.9 to 21.9 per 10,000 children in the hospitalized pediatric population every year [2].

Treatment of thrombosis in the pediatric population due to physiological differences is complicated and requires further research. According to the ASH Clinical

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Practice Guidelines, it must be implemented soon. It should be based mainly on anticoagulant therapy in three-time frames: initial management for 5–21 days, the primary treatment for 3–6 months, and secondary prevention (groups of drugs: unfractionated heparin, low-molecular-weight heparin, oral vitamin K antagonists and direct oral anticoagulants) [3].

Thrombosis requires attention not only because of the increasing number of cases but also due to the possibility of associated complications, for example, post-thrombotic syndrome, infections, recurrence of thrombosis, some other embolic complications, or decreased availability of venous access in the future [4].

Case report

A 13-year-old patient was reported to the vascular surgery outpatient clinic due to edema of the left lower limb.

On admission, he did not take any medications chronically. The patient was congested with a caustic substance at the age of two. In connection with it, there was the presence of chemical burns of the gastrointestinal tract without perforation, chemical pneumonia, and central venous catheter-related thrombosis of the femoral vein (treated with nadroparin (100 μ/kg) every 12 hours/10 days) and after continued for secondary prevention). Due to adhesion between the tongue and the epiglottis, supraglottoplasty was performed at 12 without complications.

His development was proper until the caustic substance's congestion, after which difficulties with weight gain and speech problems appeared due to tongue scarring. There was no family history of genetic, autoimmune diseases, hematological disorders, or diseases associated with thromboembolic changes.

The magnetic resonance (MR) venography indirectly suggested segmental occlusion of iliac veins and the distal section of the left femoral vein with dilated paraspinal vessels and abdominal vessels on the right side with developed collateral circulation to the inferior vena cava (IVC) system (Fig. 1).

Based on these results, the patient was qualified for percutaneous transluminal angioplasty (PTA) of iliac veins from puncture of both femoral veins (Fig. 2). The left common iliac vein (CIV) was partially recanalized during the procedure. A year later (at the age of 14), the endovascular treatment of the CIV and the left external iliac vein (EIV) (from the left common femoral vein (CFV) and right common jugular vein (CJV) puncture) was tried. However, only a caudal part (about 5–7 cm) was recanalized. However, the catheter did not force through the IVC (Fig. 2).

The next revascularization attempt was made at the age of 16. Puncture of the CJV and CFVs were used again as vascular access to the EIV and the CIV on the

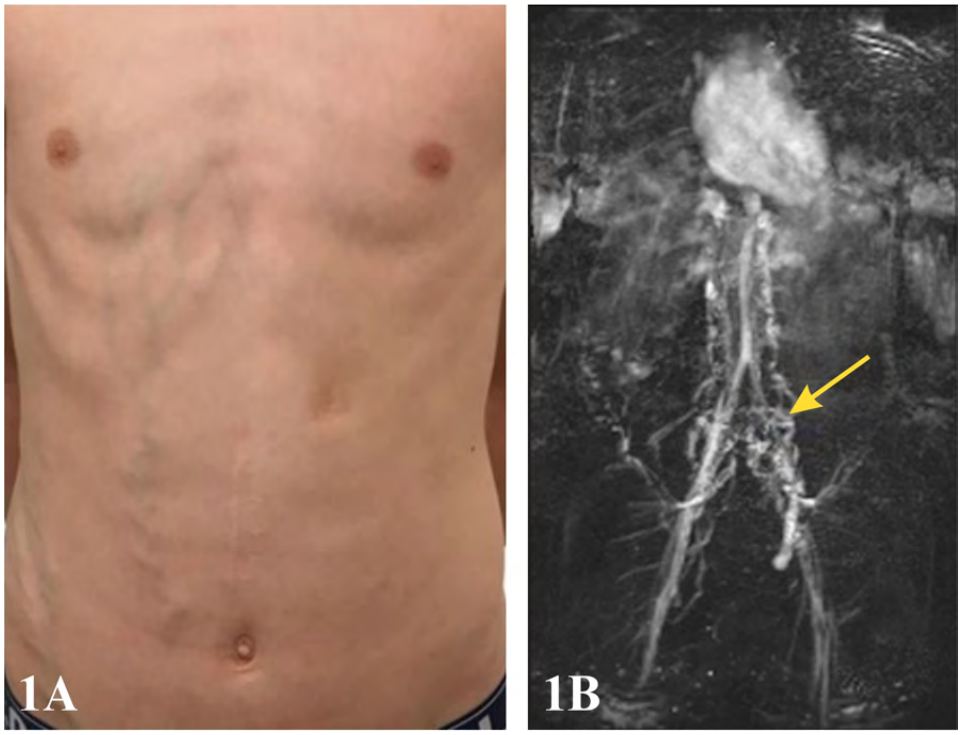

Figure 1. Presence of the patient before treatment; **1A.** Picture of the abdomen with collateral circulation; **1B.** MR venography presenting occlusion of left iliac vein (yellow arrow)

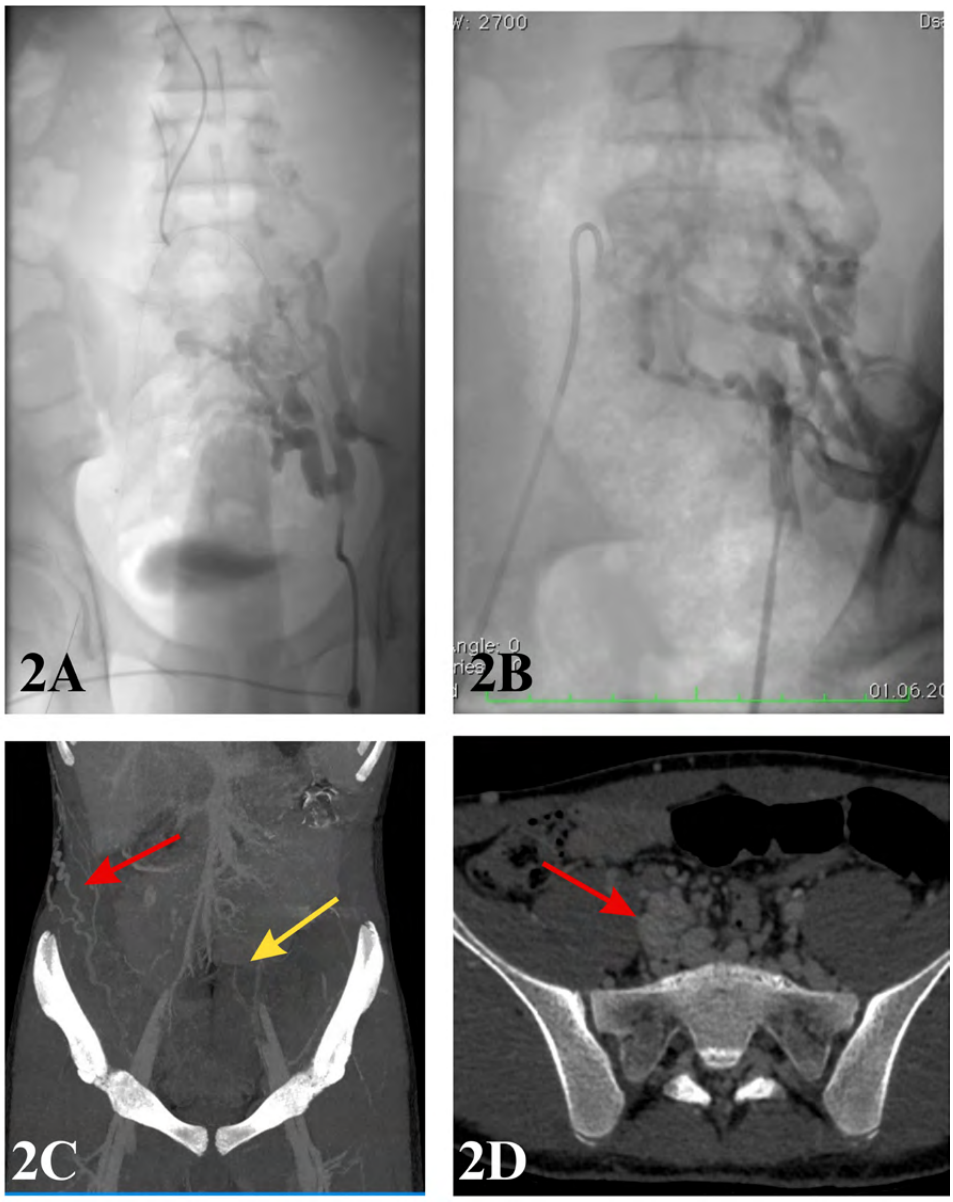

Figure 2. Imaging results. The first (at the age of 13) and the second (at the age of 14) attempt at endovascular treatment of occluded iliac veins presenting collateral circulation **(2A, 2B)**; **2C.** Sagittal CTV showing occlusion of CIV (yellow arrow) collateral circulation (red arrow); **2D.** Axial CTV presenting venous collateral circulation (red arrow) in the pelvis

left side, with good results. At first balloon angioplasty was performed (Saber 2.5 × 30 mm, Mustang 10 × 80 mm, Armada 35 5 × 100 mm, Mustang 12 × 40 mm, PowerFlex 5 × 40 mm, XXL/16-4/5.8/120, Armada 35 5 × 100 mm), then Sinus Venous 18 × 80 mm and Venovo 16 × 120 mm stents were successfully implanted (Fig. 3).

At the hospital discharge, rivaroxaban (15 mg/day p.o. 2 x/day for three weeks, then 20 mg 1 ×/day up to 6 months) and acetylsalicylic acid (ASA) (75 mg/day permanently) were recommended. The patient was mobilized early (on the first postoperative day) and compression therapy was recommended (2nd degree).

The patient regularly attended follow-up visits at the vascular surgery outpatient clinic, and during this time, computed tomography venography (CTV) was performed two times at the ages of 17 and 18 (Fig. 4C, 4D).

In the latest physical examination at the age of 19, he presented with normal vital signs and denied any gastrointestinal complaints. There were no anomalies apart from tongue hypertrophy. The only complaint reported by the patient was the heaviness of the left lower limb during long-time immobility. He denied any problems with movement, self-service, or simple activities and reported slight anxiety and discomfort.

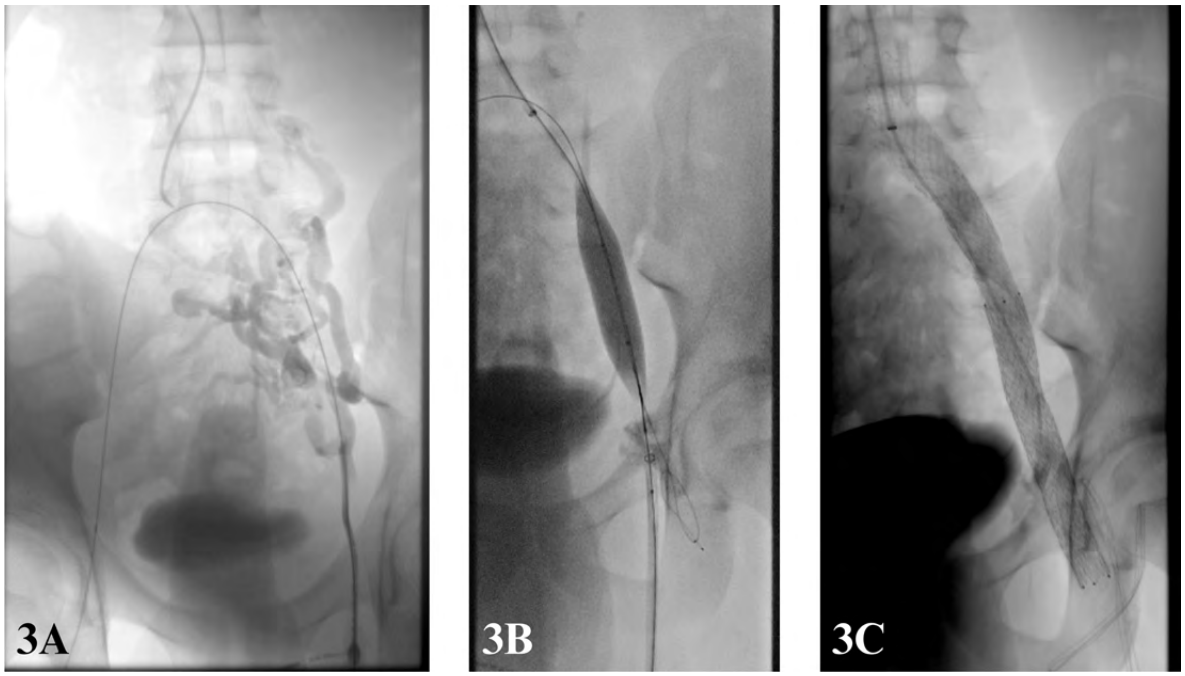

Figure 3. Revascularization treatment steps. **3A.** Initial procedural venography demonstrates occlusion of CIV; **3B.** The balloon in CIV during revascularization; **3C.** Final venography with two stents in CIV and EIV

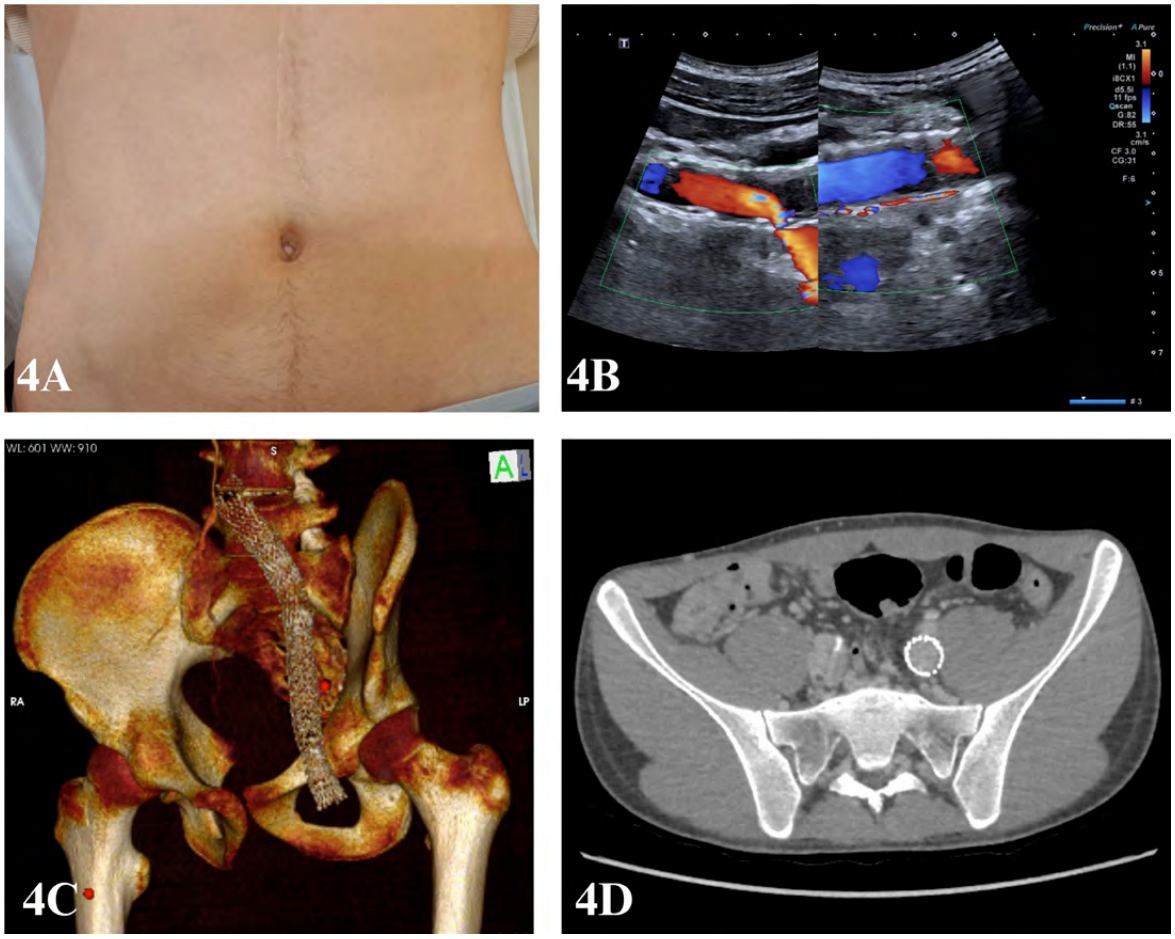

Figure 4. Presence of the patient after treatment; **4A.** The picture shows no signs of collateral circulation on the patient's abdomen. Patent stents in CIV and EIV without any signs of strictures and fractures in two imaging techniques: **4B.** DUS; **4C.** CTV reconstruction; **4D.** Axial CTV

In addition, in the Polish version of the quality-of-life SF-36 Questionnaire, he did not claim that his life was worse than his peers. He denied smoking, alcohol, and drug use. The patient took chronically ASA 75 mg. Examination via Doppler ultrasound (DUS) of the lower limbs and iliac veins was patent on both sides, without visible thrombus. The patient's stents had no signs of fracture or stricture (Fig. 4B).

Moreover, there was no apparent collateral circulation in the patient's abdomen (Fig. 4A).

The patient was aware of his chronic diseases. He was advised to lead a healthy and active lifestyle and used compression therapy during long periods of immobilization.

Discussion

This case illustrates the problem's complexity of secondary DVT, with a catheter-related source (located in the femoral vein) that arose during long-term hospitalization due to complications treatment of caustic ingestion. Prolonged immobilization (hospitalization for 68 days) and inflammation may also increase this risk [3, 5].

The importance of long-term complications of caustic substance ingestion should also be emphasized. It is a rare event, but potential damage is significant [6], and life-saving by a multidisciplinary team is crucial [7]. Complications can be from mild to severe degrees, which depend on the type and form of ingested agent (it determines the pattern of damage, not only for the gastrointestinal tract) [8]. Due to the development of medicine, the survival rate of this kind of patient has risen, which is why we are learning now about long-term complications: strictures (the most common complication), pulmonary complications, fistula formations, malignancy, or thrombosis [6, 8]. This case shows the opportunities for recanalization of long-term deep vein occlusions also in a pediatric population. According to the authors' knowledge, this is the first case of such recanalization after 14 years from the presence of thrombosis. Further research and observations are necessary to answer what ages to perform deep vein recanalization procedures in a group of minors and what kind of treatment to use after such procedures.

Article information and declarations

Ethics statement: Attached below.
Author contributions: Julia Dzierla — research concept and design, collection and/or assembly of data, data analysis and interpretation, writing the article, final approval of the article; Jolanta Tomczak — research concept and design, collection and/or assembly of data, data analysis and interpretation, writing the article, critical revision of the article; Justyna Kaczewiak — collection and/or assembly of data; Marta Powel — collection and/or assembly of data; Zbigniew Krasiński — research concept and design, final approval of the article.
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Conflict of interest: None declared.
Supplementary material: Figures attached below.

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