

Distal Deep Vein Thrombosis Causing Pulmonary Embolism after Outpatient Plastic Surgery: A Case Report

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Summary: A distal deep vein thrombosis is generally believed to be clinically unimportant because of a low incidence of pulmonary emboli. To the author's knowledge, a symptomatic pulmonary embolism has not been reported in association with an isolated calf deep vein thrombosis in a plastic surgery outpatient. This case report provides the clinical details of a pulmonary embolism occurring after routine ultrasound detection of a distal deep vein thrombosis. Proximal deep venous thromboses originate in the calf and are dangerous because they frequently embolize. Ultrasound surveillance provides early detection of subclinical distal deep vein thromboses. Anticoagulation is initiated, suppressing propagation of the thrombosis to the deep veins of the thigh, and reducing the risk of a catastrophic pulmonary embolism. (*Plast Reconstr Surg Glob Open* 2020;8:e2803; doi: 10.1097/GOX.0000000000002803; Published online 24 April 2020.)

INTRODUCTION

Approximately 50% of patients with an untreated proximal deep venous thrombosis develop a symptomatic pulmonary embolism within 3 months.¹ The risk of a pulmonary embolism associated with a distal deep vein thrombosis (distal to the popliteal vein) is much lower (<5%).²⁻⁴ Although an isolated calf deep vein thrombosis is often considered innocuous,^{1,5} a recent case suggests that this diagnosis can be clinically important.

CASE REPORT

A 36-year-old woman underwent a breast reduction in combination with an abdominoplasty and liposuction. Her body mass index was 32.0 kg/m². The patient had no personal or family history of venous thromboembolism. The 4-hour surgery was performed under total intravenous anesthesia using a propofol infusion and a laryngeal mask airway, and no paralysis. Sequential compression devices were not applied.

The patient returned in follow-up the day after surgery. There were no complications. A Doppler ultrasound scan of the lower extremities was normal. Six days after

surgery, the patient had no asymmetric swelling of the lower extremities and no respiratory symptoms. An ultrasound scan revealed a deep venous thrombosis of the left posterior tibial veins (Figs. 1, 2) with no proximal extension. She was prescribed rivaroxaban 15 mg by mouth bid and instructed to report any increased leg swelling, chest pain, or shortness of breath.

Three days later (9 days after surgery), the patient called the office to report chest pain and shortness of breath. She and her husband were instructed to proceed directly to the hospital. Her vital signs and oxygen saturation (99%) were normal. A computed tomography angiogram revealed emboli in the right lower and middle lobe pulmonary arteries and a small embolus in the left lower lobe. An ultrasound scan at the hospital showed a thrombosis in the left posterior tibial veins. The patient was heparinized and discharged 3 days later on the same dose of rivaroxaban. Her chest pain resolved during her admission, but she remained short of breath.

On the same day she was discharged from hospital, the patient developed recurrent chest pain. She returned to the emergency department, where she was observed overnight and released in the morning. Her vital signs remained normal, and her chest pain resolved spontaneously. The patient was seen in the plastic surgery office the same day, 13 days after surgery. An ultrasound scan showed a much smaller volume of thrombus in the left posterior tibial veins. The veins were clear on a repeat ultrasound scan (Figs. 3, 4) the next week (3 weeks after surgery), and she was no longer short of breath. Subsequent scans were negative. The patient continued rivaroxaban 20 mg po daily for 3 months. Assays for clotting disorders were negative.

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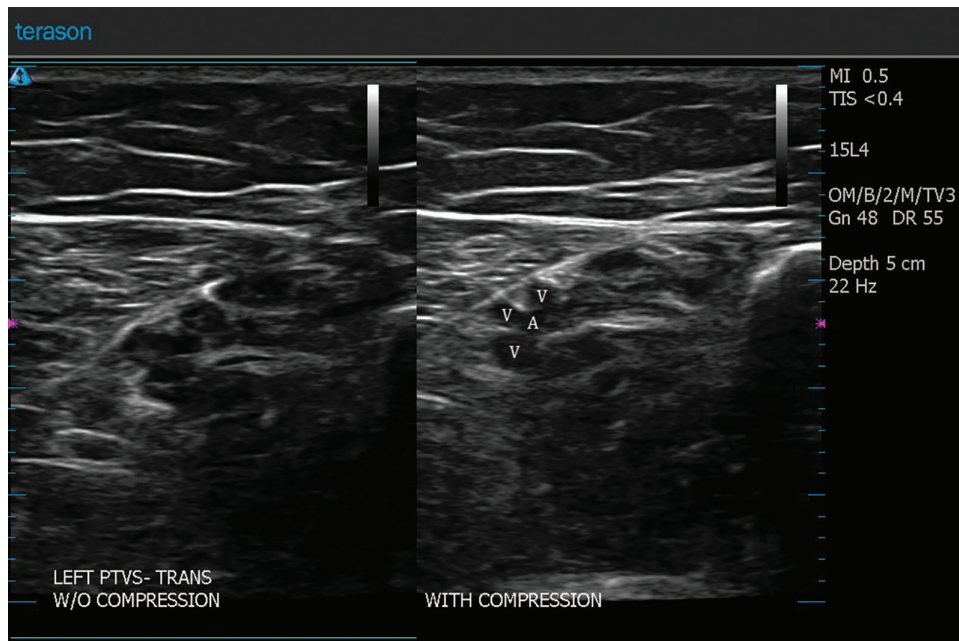


Fig. 1. An ultrasound scan was performed 6 days after surgery in this asymptomatic 36-year-old woman. She underwent a breast reduction in combination with an abdominoplasty, liposuction of the abdomen, flanks, inner thighs, arms, and axillae. The left posterior tibial artery and 3 posterior tibial veins (usually there are 2 veins) are visible in this axial image (left). On compression (right), the veins do not collapse, signaling a deep venous thrombosis present in all 3 veins. MI, mechanical index; TIS, thermal index setting; Gn, gain; DR, dynamic range; PTVS, posterior tibial veins; TRANS, transverse; V, vein; A, artery.

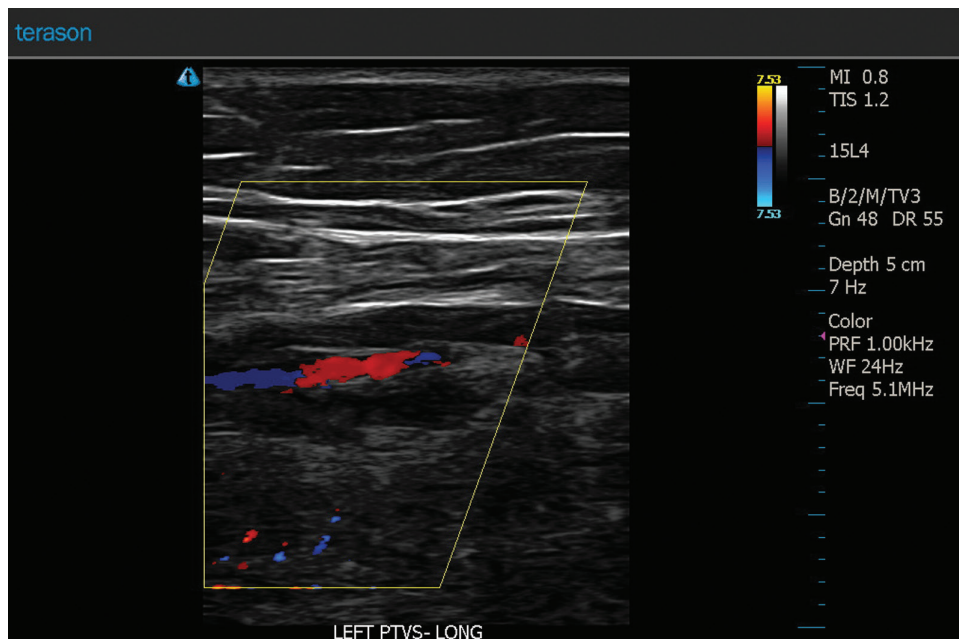


Fig. 2. This longitudinal color-flow image shows flow in the posterior tibial artery, but no blood flow in the posterior tibial veins. MI, mechanical index; TIS, thermal index setting; Gn, gain; DR, dynamic range; PRF, pulse repetition frequency; WF, wall filter; PTVS, posterior tibial veins; LONG, longitudinal.

DISCUSSION

As part of venous thromboembolism prevention, the author uses ultrasound surveillance in all adult patients undergoing outpatient plastic surgery under total intravenous anesthesia without muscle relaxation. Patients are scanned before surgery, the day after surgery, and

approximately 1 week after surgery.⁶ Sequential compression devices are not applied because of a lack of proven benefit in plastic surgery outpatients.^{6,7}

Individual risk stratification and chemoprophylaxis are widely recommended to reduce venous thromboembolism risk.⁸⁻¹⁰ The author has challenged this practice.^{6,11-13} Caprini

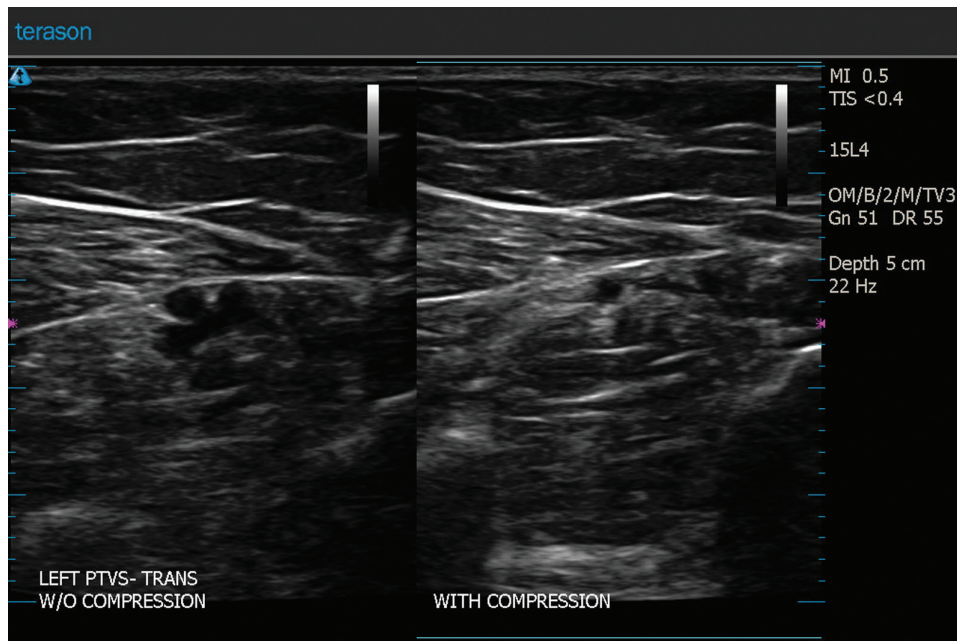


Fig. 3. Two weeks later, on a follow-up ultrasound scan, the posterior tibial artery and 3 veins are seen without compression (left) and with compression (right). The veins compress fully, indicating resolution of the thrombosis. MI, mechanical index; TIS, thermal index setting; Gn, gain; DR, dynamic range; PTVS, posterior tibial veins; TRANS, transverse.

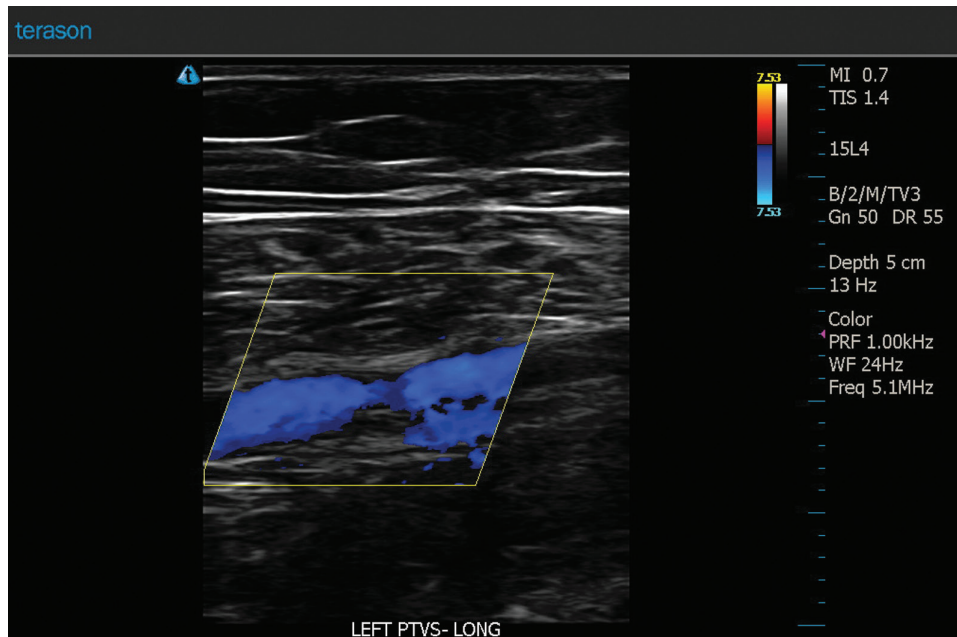


Fig. 4. This longitudinal color-flow image taken on the same date as the images in Figure 3 shows restoration of blood flow in the posterior tibial veins. MI, mechanical index; TIS, thermal index setting; Gn, gain; DR, dynamic range; PRF, pulse repetition frequency; WF, wall filter; PTVS, posterior tibial veins; LONG, longitudinal.

scores do not correlate significantly with relative risk values.¹³ Routine anticoagulation (chemoprophylaxis) is of questionable effectiveness and increases the risk of bleeding.^{6,11–13}

Among 1,000 patients in the author's series,⁶ only 2 ultrasound scans were positive the day after surgery. Seven of the 9 deep venous thromboses were detected ≥ 1 week after surgery. In 6 of the affected patients, the thromboses affected only

the distal veins. None developed a pulmonary embolism. The only pulmonary embolism in this series occurred in association with a (more proximal) popliteal vein thrombosis.⁶

Palareti² reported that >90% of untreated distal thromboses monitored by serial compression ultrasound go on to complete resolution. According to a 2012 literature review, 8% of distal thromboses propagate to the

popliteal vein in patients treated with surveillance only.¹⁴ A multicenter study and 2 recent meta-analyses report a significantly lower incidence of proximal propagation and pulmonary embolism in patients with a distal deep vein thrombosis who receive anticoagulation.^{15–17}

Deep venous thromboses originate in the calf.^{1,2} Detection of an isolated calf deep vein thrombosis serves as an early warning (“canary in a coal mine”) for a more dangerous proximal thrombosis, which frequently (50%)¹ embolizes. This patient was alerted by her positive scan and was prepared when she developed symptoms of a pulmonary embolism. She had already taken rivaroxaban for 3 days when her pulmonary embolism occurred. Early detection and anticoagulation may have prevented her distal deep vein thrombosis from propagating into a larger, potentially life-threatening proximal vein thrombosis.

Unfortunately, advocates for risk stratification and chemoprophylaxis not only oppose ultrasound surveillance but also consider this method to be outside the standard of care in esthetic patients.¹⁰ On the contrary, ultrasound surveillance informs the surgeon of a problem that will likely otherwise go undetected (clinical signs being unreliable).⁶ Alarming, 10% of symptomatic pulmonary embolisms present with sudden death.¹ Serial ultrasound scans are recommended to detect propagation before embolization.⁵ Ultrasound surveillance also avoids needless anticoagulation and additional bleeding risk in patients who are not destined to develop a deep venous thrombosis.^{11–13} Deep venous thromboses resolve, on average, 5 weeks after initiation of anticoagulation in plastic surgery outpatients.⁶ Chemoprophylaxis is usually prescribed for 1 week after surgery, a course of treatment too early and too short to be effective.⁶

This patient’s 2005 Caprini score¹⁸ was 3. She would not have been a candidate for chemoprophylaxis (usually reserved for patients with Caprini scores >8).^{8–10} Keyes et al¹⁹ found that 67.5% of patients developing venous thromboembolisms after outpatient abdominoplasty had a Caprini score of ≤5, further evidence against the practical value of risk stratification. Indeed, plastic surgeons cannot predict which patients will be affected by a venous thromboembolism.^{11–13} Ultrasound surveillance provides this capability. The cost of 3 ultrasound scans performed in the author’s office is approximately \$200 and is absorbed by the practice without reimbursement. Patients are not charged.

CONCLUSIONS

Ultrasound surveillance allows early identification of subclinical distal deep vein thromboses.⁶ With early anticoagulation, proximal propagation may be avoided, reducing the risk of a catastrophic outcome.

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