



Interdisciplinary Management of Deep Vein Thrombosis During Rehabilitation of Acute Rupture of the Anterior Cruciate Ligament: A Case Report

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Abstract

Objective: The purpose of this case report is to describe a patient who experienced deep venous thrombosis (DVT) during pre-operative rehabilitation of an acute rupture of an anterior cruciate ligament (ACL) reconstruction graft, to increase awareness of DVT occurring in a healthy individual after periodic immobilization, and to describe the interdisciplinary management for this patient.

Clinical features: A 30-year-old male was referred to a chiropractic clinic for presurgical treatment of a left ACL rupture and medial meniscus tear confirmed at magnetic resonance imaging. During the course of preoperative rehabilitation, the patient became limited in ambulation and presented for a routine rehabilitation visit. During this visit, he experienced increased leg swelling, pain and tenderness. The patient was assessed for DVT and was referred to the local emergency department for further evaluation where multiple DVTs were found in the left popliteal, posterior tibial, and peroneal veins.

Intervention/outcome: The patient was treated with a 17-week course of warfarin during which time the clinical signs and symptoms of DVT resolved. Meanwhile, the patient completed the rehabilitation treatment plan in preparation for ACL reconstruction without further complications.

Conclusions: This case raises awareness that DVT may occur in a healthy individual after periodic immobilization. While there may be controversy regarding the appropriate application of pharmaceutical anticoagulants in patients with DVT of the leg, the most risk averse strategy is for a short duration prescription medication with compression stockings. Through interdisciplinary management, the patient experienced a successful outcome.

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Introduction

Deep vein thrombosis (DVT) is a common disorder that occurs within the spectrum of venous thromboembolism (VTE).¹ DVT is especially common in older individuals and in certain predispositions such as

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thrombophilic disorders and malignancy.² DVT is often clinically asymptomatic,^{1,3,4} can masquerade as musculoskeletal conditions, and are known to occur after trauma and immobilization.

There is a high incidence after acute rupture of the Achilles tendon and after major orthopedic surgery.^{3,5-7} Occurrence during preparation for surgical repair of anterior cruciate ligament (ACL) has, to the best of our knowledge, not been reported. DVT have a penchant for chronicity and may have dire complications, such as post-thrombotic syndrome, pulmonary embolism (PE), or death,¹ if left inappropriately managed. Death occurs in approximately 6% of DVT cases and 12% of PE cases within 1 month of diagnosis.¹ Idiopathic DVT is particularly problematic as they are often perpetual and require extended and sometimes indefinite anticoagulation therapy.^{1-4,8} The paradigm for treating various forms of DVT has undergone a radical change since the late 1990s as it is recognized that different forms of venous thromboembolism can accompany different risk factors.⁸ For instance, isolated distal DVT (IDDVT) is not associated with the existence of thrombophilic disorders and some authors question the value of anticoagulation therapy in these cases.⁴

At present, there are no known case reports of interdisciplinary management including chiropractic care of DVT during pre-surgical treatment of an ACL rupture. Therefore, purpose of this case is to describe the occurrence of DVT in a healthy individual after a history of episodic immobilization, describe the importance of timely urgent care, present risk factors, and current management schemes.

Case Report

A 30-year-old male was referred to a chiropractic clinic for pre-surgical treatment of a left ACL rupture and medial meniscus tear confirmed at magnetic resonance imaging. The injury was sustained after jumping from a boat onto a stable platform. On presentation 2 weeks after incident the knee was drained by an orthopedist for extensive effusion (3+). The patient complained of considerable left knee discomfort, swelling, and reduced range of motion. Pain was reported to radiate inferiorly and superiorly along the left calf and rated 7/10 on Numerical Pain Scale. The patient was ambulating with crutches and maintained a leg flexion angle of 25°. He denied nausea, vomiting, dyspnea, and back and/or chest pain. The patient had a 10 pack-year history of tobacco use and arthroscopic ACL repair 10 years prior. Medication included Vicodin for pain relief. The clinical

exam revealed an effusion of the left knee and moderate ankle swelling without warmth or erythema. Active range of motion (AROM) was 10° of extension and 70° of flexion with pain at both end ranges. The patient reported significant tenderness at the medial knee joint line. Neurovascular deficits were not present. Active contractibility of the quadriceps was minimal (grade 1) with notable diffuse quadriceps atrophy. There was no calf atrophy noted. Straight leg raise (SLR) revealed significant hyperextension lag. Patellofemoral glide was within normal limits and tolerated without pain or restriction. Orthopedic exam was not performed due to his confirmed diagnosis of medial meniscus tear and ACL rupture. The chest was clear without wheezes, rales, or rhonchi.

Chiropractic treatment consisted of 4 visits in which low load long duration (LLLD) extension stretches were employed to achieve terminal extension, decrease effusion and return quadriceps neuromuscular control. LLLD stretches were performed with the heel propped and an 8-lb weight placed on the quadriceps for 10 to 12 min. Pulsed electric muscle stimulation on the quadriceps with short arc biofeedback contractions and icing were also provided. Joint mobilization techniques such as low-grade femorotibial AP/PA glide, internal/external rotation and multiplanar patellofemoral glides were employed to reduce adhesions and prevent infrapatellar contracture syndrome. No high-velocity low amplitude was utilized on the knee joints. He was placed on a home care exercise plan that included straight leg raises (SLRs) × 4, supine isometric quadriceps activation, gluteus sets (clams, side-lying hip abduction, prone hip extension) (Fig 1), heel props, ankle pumps, and icing. He was encouraged to reduce his usage of crutches as tolerated. His AROM by the fourth visit had improved to 5° of extension and 80° of flexion. After LLLD stretch terminal extension (0°) was obtained and 90° of passive flexion was obtained with joint mobilization techniques as described previously. His quadriceps contractibility had improved to grade 3. SLR was performed without lag post treatment. The patient continued to use crutches for ambulation. He had begun working again, however, remained as sedentary as possible. His job required him to sit for prolonged periods, up to 6 hours per day. On his fifth visit he presented with significant discomfort in his knee and entire leg/ankle. Upon inspection he continued to demonstrate a knee effusion but also had signs of left ankle and leg effusion as well. He denied any new injury or incident. He did not display erythema or visible hypervascularity. Left-sided posterior tibial and dorsalis pedis pulses were 1+. Homan's and Pratt's signs were positive on the left. Suspicion for DVT was noted and the patient was immediately referred to the orthopedic

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