

Avoiding Diagnostic Overshadowing: A Case Report of ACL Rupture and Concurrent Thromboembolism

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Abstract

Magnetic Resonance Imaging (MRI) plays an integral role in the evaluation of musculoskeletal injuries, especially in the context of acute knee injuries. However, relying solely on imaging studies and not incorporating clinical evaluation may result in missed diagnoses of other important and potentially fatal conditions. We present a case of a 45-year-old male patient with an anterior cruciate ligament (ACL) tear and meniscal tears who, upon careful clinical examination, was incidentally discovered to have deep vein thrombosis (DVT) along with bilateral pulmonary embolism (PE). This case highlights the importance of a comprehensive physical examination and evaluation in conjunction with advanced imaging techniques.

Keywords: deep vein thrombosis, anterior cruciate ligament tear, pulmonary embolism, musculoskeletal imaging, clinical examination, cognitive errors.

Introduction

Knee injuries are a common presentation in primary and emergency care, particularly among physically active individuals. MRI is often used for diagnostic clarification when ligamentous or meniscal injury is suspected. However, clinicians must remain vigilant for complications beyond the musculoskeletal system, especially in the presence of risk factors such as reduced mobility [1].

DVT is a known complication of lower limb trauma, with risk of progression to pulmonary embolism (PE), which can be fatal if unrecognized [2]. This report illustrates a case where MRI findings of an anterior cruciate ligament (ACL) rupture diverted initial clinical focus, but physical examination revealed signs of deep venous thrombus (DVT). The subsequent diagnosis of PE highlights the importance of integrating imaging findings with a comprehensive clinical approach.

Case Presentation

A 45-year-old previously healthy, physically active male presented one week after sustaining a twisting injury to his right knee during recreational football. He felt a "pop" followed by immediate pain and swelling. He attended an urgent care clinic the following day, where plain radiography and ultrasound revealed joint effusion

but did not visualize ligamentous structures adequately. He was referred for an outpatient MRI and was fitted with a knee brace.

The patient presented to his general practitioner (GP) one week post-injury, after receiving the MRI results, which showed a complete ACL rupture and meniscal tears. The GP noted that the patient had minimal residual knee pain but intermittent right calf soreness. Given the discordance between his relatively mild knee symptoms and the expected severity of ligamentous injury, the GP proceeded with a focused physical examination, revealing focal calf tenderness distal to the knee. A venous Doppler ultrasound was ordered.

MRI Findings: The MRI confirmed a complete ACL rupture with associated medial and lateral meniscal tears. There was also evidence of a pivot-shift bone contusion and capsular swelling. A large joint effusion and fluid extravasation from a posterior capsular tear were noted.

Doppler Ultrasound Findings: The scan showed an occlusive thrombus within the popliteal vein extending into the posterior tibial vein (18 cm in length), and an additional thrombus in the soleal vein (5 cm in length).

The patient was immediately referred to the emergency department. A computed tomography

pulmonary angiogram (CTPA) revealed extensive bilateral pulmonary emboli with mild right heart strain. He was commenced on apixaban and admitted for inpatient management. His hospital course included transient fever and right-sided pleuritic chest pain, attributed to PE-related inflammation. Intravenous antibiotics were administered for elevated inflammatory markers (CRP 158), though no alternative source of infection was identified. He improved with conservative therapy and was discharged on anticoagulation with outpatient follow-up planned with orthopaedics.

Discussion

The Value of Clinical Examination in the Age of Advanced Imaging

While modern imaging technologies have significantly enhanced diagnostic capabilities, this case exemplifies that they must be viewed as adjuncts—not replacements—for clinical assessment. MRI, although the gold standard for ligamentous and meniscal injuries, focuses on a localized anatomic region and provides no insight into systemic or vascular complications. A comprehensive clinical examination remains vital, especially when symptoms fall outside the immediate scope of the imaging findings.

"Diagnostic overshadowing" is a phenomenon where initial imaging abnormalities create a cognitive bias, leading clinicians to prematurely close the diagnostic process and disregard evolving or discordant symptoms [3]. This is particularly problematic in acute trauma settings where imaging is rapidly prioritized, sometimes at the expense of a detailed physical evaluation. Graber et al. found that failure to conduct or interpret the physical exam accurately was a major contributor to diagnostic errors in over 60% of internal medicine cases [4]. In our case, it was the physical finding of calf tenderness, distinct from the MRI-documented knee pathology, that prompted investigation for DVT, a diagnosis not even considered initially. Furthermore, MRI findings, especially in musculoskeletal radiology, are not always clinically significant in isolation. As Boden et al. demonstrated, MRI-detected abnormalities are common even in asymptomatic individuals [5], reinforcing the risk of "pathology chasing" without contextual clinical correlation. This case encourages clinicians to remain skeptical of imaging dominance and reaffirms the

clinical value of the history and physical examination.

Cognitive Errors in Diagnostic Reasoning

Cognitive biases play a pivotal role in diagnostic missteps, particularly in time-pressured or algorithm-driven environments like acute care or primary care triage. Among these, anchoring bias, the tendency to fixate on an early or prominent diagnosis, is especially insidious. In this case, the presence of a clearly defined orthopedic injury (ACL tear with meniscal pathology) risked diverting attention from new clinical signs that did not align with that diagnosis. This form of cognitive anchoring may lead to premature diagnostic closure, where other possibilities (e.g., DVT, PE) are dismissed without proper evaluation. Croskerry emphasized that diagnostic reasoning is inherently vulnerable to cognitive shortcuts, and that error-reducing strategies such as metacognition, reflective practice, and structured reassessment are essential safeguards [6]. Academic medicine must continue to teach clinicians how to recognize and challenge their own thought processes, particularly in cases where the clinical trajectory deviates from the initial working diagnosis. This case is a compelling example of how maintaining diagnostic flexibility and actively seeking to falsify assumptions, hallmarks of good clinical reasoning, can uncover life-threatening conditions in time.

Limitations of Imaging in Capturing Systemic Complications

MRI, as a powerful yet focused imaging modality, inherently lacks the ability to detect broader systemic disease processes such as thrombosis, embolism, or infection. As in this case, a patient with knee trauma underwent MRI that detailed substantial intra-articular and periarticular damage but failed to capture the developing DVT distal to the injury site. This highlights the principle that while imaging offers high-fidelity structural insights, it must be ordered and interpreted within the context of a broader diagnostic strategy. Imaging does not "see" outside its window of focus. MRI of the knee will not alert clinicians to early signs of PE, nor can it identify thrombosis in the calf musculature. These limitations make clinical surveillance essential in cases of evolving or incongruent symptomatology. In this context, relying solely on imaging without reassessing

physical symptoms risks narrowing diagnostic possibilities, especially when patient symptoms are dynamic. This reinforces the need to “look beyond the scan” and maintain a system-wide diagnostic lens—particularly in trauma patients who are immobilized or have new symptoms inconsistent with initial findings.

Reinforcing Bedside Examination in Modern Clinical Practice

The clinician’s skill in recognising abnormal clinical phenomena still underpins the medical diagnosis. Although we are in the era of rapid-access imaging and electronic diagnostics, the desk-side examination continues to demonstrate its value in both primary diagnosis and the early detection of complications. In this instance, the general practitioner’s (GP) decision to extend the examination beyond the knee was prompted by the GP’s imaging-clinical symptom dissonance and proved to be critical. Isolated calf tenderness allowed the GP to reengage the diagnostic loop, leading to the ordering of a DVT-confirming Doppler ultrasound. Absent this step, the patient would risk progressing to a fatal pulmonary embolism prior to the feasible treatment window. This illustrates how bedside examination is not merely a ritualistic tradition but a dynamic and evidence-based tool for risk stratification and decision-making. Calf tenderness, swelling, and asymmetry remain among the most sensitive physical indicators for DVT [7]. The “Choosing Wisely” campaign has urged clinicians not to bypass physical findings in favor of blanket imaging, but rather to let clinical examination guide appropriate use of technology [8]. Modern clinical practice must balance innovation with tradition. As illustrated in Figure 1, while imaging is indispensable, this case confirms that even the most sophisticated scan cannot replace the insight gained from a careful, thoughtful, and attentive physical examination.

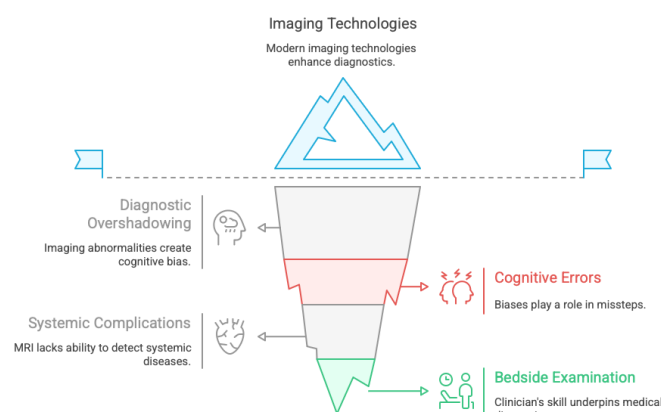


Figure 1. The importance of clinical examination beyond imaging

Conclusion

Injury-related imaging, such as MRI, provides detailed anatomical insights but cannot replace comprehensive clinical evaluation. This case underscores the risk of overlooking systemic complications like DVT and PE if imaging is used in isolation. Clinicians must correlate imaging with current and evolving clinical signs. Anchoring bias, diagnostic overshadowing, and overreliance on imaging can be mitigated through methodical physical examination and risk-based evaluation. Ultimately, integrating technology with bedside medicine ensures safer, more effective care.

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