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Protein-S Deficiency Diagnosed Post-ACL Injury in a Collegiate Track and Field Athlete

Matthew Lewis

TA Weaver

ST King

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Protein-S Deficiency Diagnosed Post-ACL Injury in a Collegiate Track and Field Athlete



Lewis MD*, Weaver TA*, King ST†: *Messiah College Mechanicsburg, PA; †OSS Health York, PA.

OBJECTIVES

1. Summarize details of unique case involving undiagnosed clotting disorder in a collegiate athlete.
2. Present overview regarding mechanism and epidemiology of protein S deficiency.
3. Identify the role of the certified athletic trainer in the evaluation and treatment process, and as a patient advocate.
4. Emphasize importance of trust and communication between athlete, certified athletic trainer, and team physician throughout evaluation and treatment.

HISTORY OF PRESENT ILLNESS

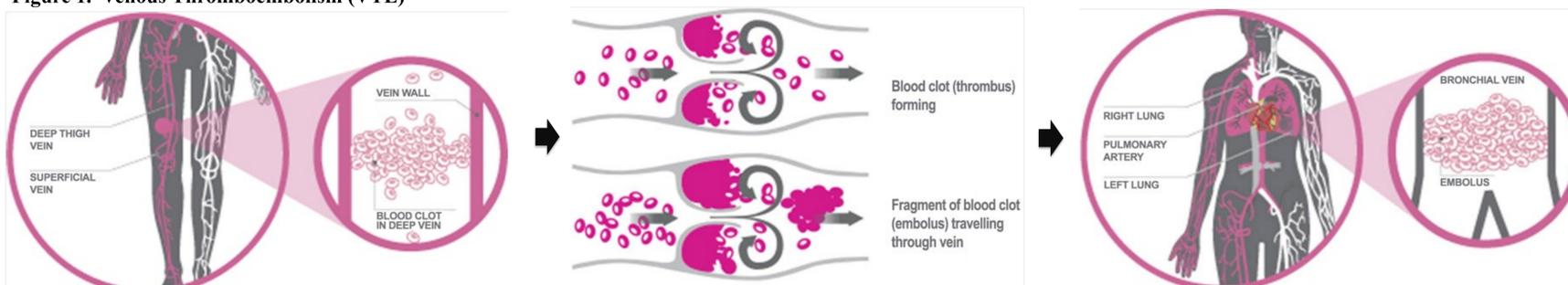
A 19-year old Chinese-American track and field athlete presented to certified athletic trainer (AT) in March 2016 with antalgic gait related to pain and edema in left calf two weeks post-injury ACL injury. Initial injury occurred during pole vault practice. Evaluation of initial knee injury by AT occurred on the day of injury and referral to team physician took place three days post-injury. MRI confirmed complete tear of ACL. Rehabilitation began immediately and surgery was scheduled. Two weeks post-injury, athlete presented with swelling, redness, warmth and tenderness to palpation of left calf and positive Homan's sign. Athlete reported onset of symptoms over period of prior three days and complained of intermittent shortness of breath with ADL.

DIFFERENTIAL DIGANOSIS: DVT, superficial thrombophlebitis, gastrocnemius strain, ruptured popliteal cyst.

Concerns related to a DVT resulted in consultation with team physician and subsequent referral to emergency department (ED). Initial ultrasound (US) was negative and athlete was sent home. Symptoms persisted and worsened over next week and follow-up ED referral occurred following AT advocating for repeat test with team physician. Second US was positive for a DVT. Athlete was given Lovenox injection and Warfarin Rx and sent home. Symptoms worsened over next three days and athlete was admitted to hospital after AT consultation with athlete's family doctor led to third ED visit. Additional testing confirmed DVT and identified multiple pulmonary emboli (PE), resulting in venous thromboembolism diagnosis. (Figure 1) Athlete was hospitalized five days for treatment and monitoring. Remaining treatment details available in Figure 2.

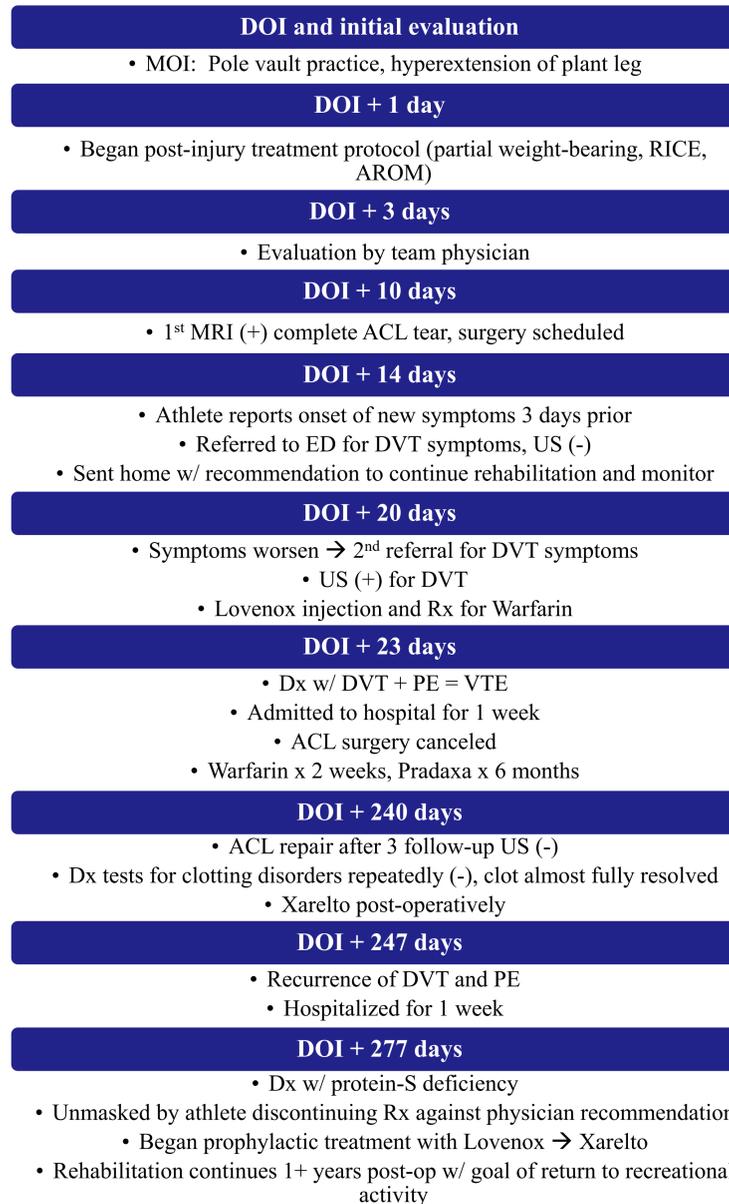
Prior to start of season, athlete received clearance for full physical activity. No pertinent personal or family history reported. Athlete's medical history did not include any major soft-tissue trauma, surgery or hereditary clotting disorders.

Figure 1. Venous Thromboembolism (VTE)



<http://www.daiichisankyo.com.hk/DiseaseInformation/VenousThromboembolism>

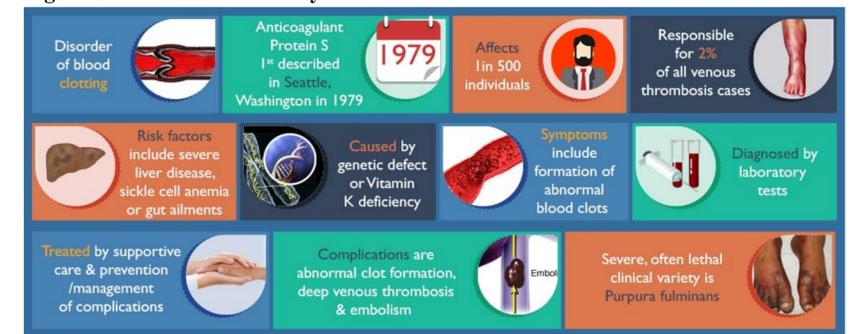
Figure 2. Treatment Timeline



PROTEIN S DEFICIENCY

Protein S acts to regulate chemical reactions in blood to prevent disproportionate clotting. Deficiency of this protein occurs in two forms – either a decrease in level or overall function.^{1,2} This is often hereditary, but may occur secondary to vitamin K deficiency or liver disease.^{1,2} Limited data suggest deficiency occurs in less than 2% of the general population with a higher occurrence rate in individuals of Asian descent.^{1,3} Although the occurrence of a DVT is rarely caused by sport-related trauma, the presence of a clotting disorder such as protein S deficiency increases the risk of occurrence from both sport-related soft-tissue trauma and surgical procedures.¹

Figure 1. Protein S Deficiency



<https://www.xpertdox.com/disease-description/Protein%20S%20Deficiency>

CONCLUSIONS

The ACL injury and subsequent repair served as two traumatic events, triggering initial and secondary DVT and PE. Presence of blood thinners appears to have initially prevented accurate diagnosis. Athlete continues rehabilitation with AT status-post ACL repair. There are no activity restrictions at this time. However, physician recommendations include delayed return to athletic competition due to complications in post-op ACL rehab and long-term prophylactic use of blood thinners.

Athletic trainers should be aware of signs and symptoms of DVT and PE and advocate for additional diagnostics in the best interest of their patient if warranted. Clearance for athletic participation does not guarantee absence of medical conditions that may result in life-threatening situations. Screening for clotting disorders is not common practice and athletes may be unaware of inherited clotting disorders.

CITATIONS

1. Grabowski, G, Whiteside, WK, Kanwisher, M. Venous Thrombosis in Athletes. *J Am Acad Orthop Surg.* 2013;21: 108-117. <http://dx.doi.org/10.5435/JAAOS-21-02-108>
2. D'Angelo, A, D'Angelo, SV. Protein S Deficiency. *Haematol.* 2008; 93(4), 498-501.
3. Protein S Deficiency. Medscape web site. <https://emedicine.Medscape.com/article/205582-overview#a6>. Published August 5, 2017. Accessed 11/1/2017.