A 20 year old female collegiate soccer player presented with a 2 day history of right arm swelling and discoloration. She had no known trauma, did not use birth control, supplements, or other medications. She is a non-smoker. No family history of clotting disorders.

**Musculoskeletal:** Right upper arm and shoulder showed slight purple discoloration. Obvious visual size discrepancy in right upper arm versus left. Measurements as followed:

- Wrist: Right- 16 cm Left- 15.5 cm
- Elbow: Right- 25 cm Left- 22.5 cm
- Inferior Deltoid: Right- 26 cm Left- 25 cm.

**Vascular:** Ulnar and radial pulses equal. Negative Adams and Roos tests.

**Osteopathic Exam:** Fullness of right thoracic inlet and elevated right first rib.
Physical Exam

View of student athlete at second physician appointment. Note the asymmetric size of right arm.

Differential

- Cellulitis
- Arterial Insufficiency
- Deep Vein Thrombosis
- Hematoma
- Trauma
- Muscle Strain
- Tendonitis
- Lymphedema
Initial upper extremity venous doppler ultrasound performed on the day of initial exam was negative for deep vein thrombosis (DVT).

Seven days later soft tissue ultrasound of the right axilla was positive for a thrombus of the right axillary and subclavian veins.
Background

Effort Thrombosis eponymously known as Paget-Schroetter syndrome.

Described in 1878 (Paget) and 1884 (Schroetter)

Associated with athletes who perform strenuous effort of the upper extremity combined with anatomic abnormalities such as:
- muscle hypertrophy
- cervical ribs
- mechanical compression to venous structures.

Follows sporting activities which involve vigorous and sustained upper extremity movements in abduction.

Diagnosis of acute deep vein thrombosis (DVT) by clinical examination has a sensitivity of 11% and a predictive value of 25%.

Hospital Course

Admitted to the ICU for removal of thrombi.

Hypercoagulability and pregnancy labs were negative.

Targeted intravascular thrombolysis

- Repeat angioplasty with dilation of stenotic right subclavian vein
- t-PA during a three day ICU stay for successful removal of DVT.

Placed on two days outpatient anticoagulation with rivaroxaban (Xarelto) on discharge.

Imaging

Venogram of right upper extremity. Axillary, subclavian and insertions of cephalic and internal jugular veins. Thrombus noted at the subclavian level in image.
Post-Thrombectomy

The student-athlete was allowed to return to play with daily follow-up. She played a pivotal role in the continued success of her team and helped them to an appearance in the Final Four of the Women’s College Cup.

At season’s end, she was sent to Johns-Hopkins for evaluation by vascular surgery and scheduled for right first rib resection and scalenectomy two months after initial diagnosis.

Surgery

Bilateral upper extremity venous duplex with arterial and venous Thoracic Outlet Syndrome (TOS) maneuvers revealed chronic non-occlusive thrombi in the right subclavian and axillary veins. An occlusive thrombus was found in the right basilic vein.

The student-athlete underwent the scheduled procedure and discharged on subcutaneous enoxaparin (Lovenox) 60 mg every 12 hours and a Zimmer sling.

<table>
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<th>Venous</th>
<th>Right Shoulder</th>
<th>Neutral</th>
<th>Abduction</th>
<th>Left Shoulder</th>
<th>Neutral</th>
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<td>118 cm/s</td>
<td>114 cm/s</td>
<td>47.8 cm/s</td>
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</table>
Follow-Up

Seventeen days after hospital discharge, underwent a planned follow-up venogram.
- Patient’s basilic vein and subtotal occlusion of the right subclavian vein.
- Venoplasty using a Rival balloon was successful in providing wide patency of this vein.

Plan for repeat venogram and enoxaparin until no abnormal findings in vessels.

Conclusion

Effort Thrombosis needs to be considered early in any differential diagnosis involving edema of the upper extremity in any athlete.

Due to a lack of clear consensus on a treatment protocol, there remains questions on the timing and aggressiveness of treatment.

This student-athlete benefitted from aggressive early thrombolysis and continues to improve with rehabilitation and athletic conditioning. She is on course to rejoin her team for the start of spring soccer practices.

Questions?
References


