January 2010 Case Study-Severe Anemia

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Chief Complaint: Shin Pain

Case History: JS is a 19-year-old runner with increasing bilateral shin pain for 2-3 months. She is in college and usually runs on a treadmill. She has increased her mileage over the last 4-6 weeks from 30 to 45 miles/week. She has been running outdoors more over the last 6 weeks, since she has been home from school for the summer. She has been using a stability type shoe for years, but recently was fitted for new shoes and has been using a shoe that she was told would better control her pronating issues. Despite this change in shoe her pain has continued to increase. She denies numbness, tingling, radicular symptoms, skin changes, weakness, or foot drop. In addition to her anterior shin pain, she also has a feeling of her calves feeling very tight and painful when she runs. She is returning to college in one week and would like to get any necessary work-up done before that time.

Past Medical History:

1. stress fracture right foot 2 years ago
2. broken right thumb
3. allergic rhinitis
4. Severe gastrointestinal illness this spring. She had a detailed viral work-up and upper GI scope. Prior to this illness she did not restrict her diet in any way, but has had intolerance for meat products since the illness and has only recently began to reintroduce meat products.
5. Cardiac condition (patient unsure of name of diagnosis) but describes that she takes longer to increase her heart rate with exercise and recover after exercise than normal. She has had an ECHO, ECG, Exercise Stress Test and Holter Monitoring in the work-up of this condition. She was told that it is safe for her to exercise and participate in all physically activity and was dismissed from cardiology.
6. Prior pulmonary consult for exertional dyspnea diagnosed as exercise induced bronchospasm after exercise testing.
7. Menstrual history: Age of menarche 13. Never had abnormal periods. 12 periods in the last 12 months. Period length 3-5 days.
8. No hospitalizations
9. Medications: Loestrin 24 FE, no other supplements except rare multivitamin

Allergies: NKDA

Family History

1. Thyroid and prostate cancer in grandparents
2. Hereditary hemorrhagic telangiectasis and anemia related to iron deficiency in her mother. Both the patient and her sister have had genetic testing and neither carries the gene.

Social History: Attends college, lives with mom and sister when at home. Drinks alcohol occasionally, denies tobacco use. When at home she works as a server at a restaurant.
Review of systems:

1. occasional dizziness, palpitations and racing of heart early in exercise and immediately after exercise
2. Coughing after exercise
3. Minor ankle sprains

Physical Exam:

General Appearance: pale
Height: 5ft 6 in
Weight: 123 pounds
Heart rate: 65
Temperature: 99.6
Blood Pressure: 108/52

Detailed exam of the lower extremities:

Visual Inspection: no bony or soft tissue deformity. Mild pitting edema over the anterior tibial border, bilaterally.

Palpation: tenderness to palpation diffusely over the anterior and posterior tibial borders, bilaterally. She has focally increased tenderness to palpation at the proximal tibial on the right side only.

Flexibility: With the knee in extension, she dorsiflexes to 10 degrees past neutral bilaterally. Hamstring popliteal angle is – 10 degrees bilaterally.

Strength:

1. Ankle: excellent (5/5) strength with dorsiflexion, plantarflexion, inversion and eversion without pain
2. Knee: excellent (5/5) strength with flexion and extension of the knees.
3. Hip: decreased hip abduction strength compared to adduction strength, bilaterally. Excellent (55) flexion and extension strength.

Ankle ligament testing: Anterior drawer, talar tilt, external rotation tests negative bilaterally.

Mild anterior tibial pain with hop test bilaterally.

Neurological exam: normal DTR and sensation throughout the lower extremities.

Cardiovascular:

1. 2/6 holosystolic murmur best heard over the Left sternal border. No radiation to the carotids. Normal S1 and S2
2. apex fifth intercostal space mid clavicular line
3. normal distal pulses and capillary refill
4. no change in posterior tibialis pulses with active or passive
dorsiflexion/plantarflexion of the foot

Abdomen: soft, nontender, nondistended, no hepatosplenomegaly

Imaging Studies:
AP/LAT bilateral Tibia/Fibula: normal

Differential Diagnosis:
1. Medial tibial stress syndrome
2. Tibial stress fracture
3. Chronic Exertional Compartment syndrome
4. Anemia

Clinical Course:

At the initial visit we discussed the differential diagnosis with the patient. She wanted to pursue compartment pressure testing and laboratory testing prior to return to school. MRI or other imaging study to evaluate for stress fracture was not performed due to the bilateral nature of her pain.

Due to insurance issues, it was better for her to have the laboratory studies drawn at the same office location that the compartment pressure testing would be performed, so she planned to have both performed on the same day, two days from the time of the initial visit.

Compartment Pressure Testing Results:

Right leg pre-exercise: anterior 13  posterior 14
Right leg post-exercise: anterior 25  posterior 25
Left leg pre-exercise: anterior 16  posterior 17
Left leg post-exercise: anterior 25  posterior 23

Testing was not considered optimal. After the pre-exercise testing the patient felt very nauseous, dizzy and ill and looked significantly paler than on arrival. She took about one hour to recover before being able to perform exercise. Once on the treadmill she was only able to perform 5 minutes of exercise.

We discussed that her results were borderline and that the test was suboptimal. She understood and agreed to perform physical therapy at school and if she did not have improvement in her leg pain she would consider re-testing in the spring. She then left for laboratory testing.

Initial Laboratory testing:
CBC: WBC: 3.6, (normal differential) HGB: 4.2, g/dl %HCT: 15.6, PLT 274, 000, %RDW: 16.4. microcytosis present, mild polychromasia. Marked hypochromasia. Few RBC fragments, few ovalocytes, few tear drops, basophilic stippling present.

Vitamin B12: 195pg/ml (normal 211-911)
Serum folate: 21.6 ng/ml (normal >5)
Iron: 11 ug/dl (normal 35-150)
TIBC: 580 ug/ml (normal 240-445)
% saturation: 2% (normal 25-45)

After brief telephone consult with hematology, it was determined that it would be safe for the patient to forgo an emergency room visit if it would be possible to obtain hematology consultation the next morning. Fortunately, due to her prior work-up and mother’s condition we were able to arrange for consultation with her/her mother’s hematologist for the next morning.

Because she was tolerating her anemia so well the hematologist did not transfuse immediately. She was given IV iron at her initial visit and an LDH was checked and was normal.

She was re-evaluated by the hematologist 3 days later and her labs were as follows:

WBC 3.7
HGB 5.1 g/dl
HCT 19.1%
PLT 238,000

She had an improvement in her fatigue at that visit and a normal exam.

At that time the hematologist continued to feel that her anemia was related to dietary insufficiency. He did recommend a repeat upper GI (she plans to have this performed over winter break) and follow up with the gastroenterologist.

She received 8 IV iron infusions prior to return to college and was paced on oral iron supplementation.

Four months after her initial visit repeat laboratory work showed the following:

WBC 5.6, HGB 12.7 g/dl, HCT 39%, PLT 296000, MCV 92, RDW 15.7 % (normal 11.5-14.5)

Normal appearance of RBC
Iron 169 ug/dl (nl 35-150)
TIBC 470 ug/dl (nl 240-445)
% saturation: 36% (nl 25-45)
Ferritin 10ng/ml (nl 20-120)

She has returned to light exercise but has not been running. If she has persistent pain when she returns to running she will consider repeat compartment pressure testing, given her borderline results.

**Discussion:**

While nutritional iron deficiency anemia is common, particularly in menstruating females, this case represents a severe case of iron deficiency anemia (Alleyne M 2008).

Iron deficiency anemia is present in 2% of adult men and 9-20% in adult women (Killip 2007).

Iron deficiency can occur due to **increased iron loss**, as in GI losses, menstrual losses and other bleeding, **decreased iron in the diet**, as in vegetarian diets and malnutrition, **decreased iron absorption**, such as patients on antacid therapy or with celiac or inflammatory bowel disease, and in situations of **increased iron requirements**, such as pregnancy and lactation.

Men and non-menstruating women lose about 1 mg of iron each day and menstruating women can lose 10-40 mg each menstrual cycle (Wintrobe 1999).

In this patient, she appeared to have iron losses with her menstrual periods and decreased iron in her diet due to food intolerance after her illness several months earlier.

Transfusion is considered in patients with fatigue or dyspnea on exertion or hemoglobin less than 10g/dl and IV iron for severe bleeding, malabsorption, intolerance to oral iron or hemoglobin less than 6g/dl (Killip 2007).

Oral iron is the first line of treatment in most patients, a typical daily dose is 150-200 mg of elemental iron. Taking vitamin C with iron can enhance absorption. In moderate, uncomplicated iron deficiency hemoglobin will usually correct after 4 weeks of therapy (Alleyne 2008). Many, up to 20-30%, of patients have GI discomfort, such as nausea and constipation, severe enough to limit compliance with iron therapy (Alleyne 2008).

This case is a reminder that medical illnesses may cause musculoskeletal symptoms and that possible medical causes for musculoskeletal pain should be investigated.

**References:**


Wintrobe MM, Lee GR. Wintrobe’s clinical hematology. 10th ed. Baltimore, Md: Williams & Wilkins, 1999