Small Group MSK Worksheet

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A teenage patient presents to the ED late in the evening complaining of severe R lower leg pain. They endorse mowing the lawn and having their R leg get stuck between the lawn mower and a pole. Inquiring further about history they deny medications and have no allergies. They deny chronic medical problems. Family history unknown. On social history they deny tobacco and alcohol use. ROS pertinent for R leg pain.

1. What vitals would you expect? Why?

2. What further questions might you want to ask to gauge urgency of situation?

3. What are you going to pay attention to on physical exam?

The patient has a low grade fever at 99.5 F, BP of 152/96, HR 82, and RR of 17 with O2 sat of 96% on RA. On exam, they have severe tenderness, pain, and paresthesia described as burning on the dorsal toes and plantar foot. They also had overlying lacerations of the R lower extremity concerning for an open fracture.

4. What are the different types of fractures? Describe them.

5. What special interventions do you need to give when dealing with the an open fracture?

6. What sort of labs/imaging/further tests would you like to obtain? Why is each useful?

On imaging X-ray confirmed an open distal tibia diaphyseal fracture and medial malleolus fracture. Antibiotics were given prior to arrival in the ED the patient was then placed on topical bacitracin and IV cefazolin while inpatient. Labs were remarkable for leukocytosis at 20.5, normal coags, mildly elevated lactate and mild hyperglycemia. I&D was performed the night of presentation, as well as an intramedullary fixation and distal R tibia nailing was completed, while the malleolus was left to heal. The patient was then kept overnight in the hospital.

7. What could explain the mildly elevated lactate and hyperglycemia the night of the fracture?

Elevated lactate is likely secondary to vasculature damage and secondary tissue hypoxia, while mild hyperglycemia is likely a secondary stress response to the fracture. On POD 1, patient was seen by member of the orthopedic team at around 10 am. They were complaining of increased pain and increased paresthesia. On vitals, they remain hypertensive but HR is now up to 100. On exam, the R leg has brisk capillary refill, motor function is intact, and there is no pain with passive stretch of the R toes. Decided to trend clinical exam, encourage elevation, and continue post-op opiate pain regiment.

8. What is the importance of checking capillary refill in this patient?

The orthopedic surgeon then came to visit the patient around 11 am. At this point, the patient's vitals were unchanged. The patient's R lower leg dressing was taken down to examine the compartments. Compartments were swollen but not tense. At this point, there was now new pain with passive range of motion of the R toes. However, the patient appeared comfortable and was able to carry on a full conversation.

9. Why did the surgeon check the compartments of the lower leg? What is a "not-miss" diagnosis? What is your differential diagnosis?

The orthopedic surgeon then came back to visit the patient around 1 pm. Patient was now slightly more hypertensive, appeared more uncomfortable. Compartments of the leg were again checked. The posterior compartment was swollen but not firm. The anterior compartment, however, was now significantly more tense and firm. Motor function still intact, but had increase pain to passive stretch of the toes. R extremity continued to have brisk capillary refill, however, paresthesia and numbness now extended up to the knee.

10. Of your possibilities listed above, which do you believe is most likely now? What is the significance of pain on passive stretch of the toes?

11. Is this an emergency? Why or why not?

12. What is the next step in treatment?

The surgeon realized this patient was suffering from acute compartment syndrome and rushed the patient to the OR for an emergent fasciotomy which involves releasing the compartments of the lower leg. The patient has pain to passive stretch secondary to the displacement of the long flexors and extensors in the lower extremity compartment from pressure accumulation. In the OR, an intra-compartmental pressure monitor was used to measure the compartment pressures.

13. What are the four compartments of the lower leg?

The lower leg consists of four compartments, the anterior, posterior, lateral, and deep posterior compartments. ΔP, a measure of the pressure difference between diastolic and compartment pressure, is utilized when determining compartments susceptible to compartment syndrome. ΔP is obtained by the following equation:

$$\Delta P = \text{diastolic pressure} - \text{compartmental pressure}$$

Where if $\Delta P < 30$ it is strongly suggestive of compartment syndrome.

The compartment pressures obtained from the intra-compartment pressure monitor are seen below. Considering the patient's diastolic BP was 79 mmHg just prior to getting taken back to surgery, calculate the ΔP for each compartment:

15.

Compartment	***Compartment Pressure***	**Δ *P***
Anterior	*50*	
Lateral	*30*	
Posterior	*20*	
Deep posterior	*n/a – previously released in initial surgery*	*n/a*

16. Considering the physical exam and the Δ P values, which compartment are you most concerned about? Why?

The surgeon was most concerned about the anterior compartment, which had a Δ P < 30, meaning the compartment was not getting perfused, however the surgeon decided to release all compartments. They deferred the release of the deep posterior compartment as it had been previously released during the initial surgery on presentation, and it was easy to access during the fasciotomy case. After fasciotomy, the patient was kept in the hospital and then underwent a I&D with skin closure a couple days after the fasciotomy case.

14. What do you plan to do for outpatient follow up? What will you check on visits?

15. How long will you keep patient on antibiotics?

For follow up, the patient was seen weekly for the first month with particular interest in motor and sensory function changes. They were kept on antibiotics for two weeks post-op. One-month post-op they started therapy and were granted light weight bearing. Visits were gradually spaced out until two months post-op when the patient came to the office with an erythematous lower leg and purulent drainage coming from the incision site.

16. What do you think is going on?

17. How do you treat it?

The patient had an infection of the incision site and was placed on a seven-day course of TMP-SMX. The infection cleared up and since this visit, the patient has been doing well, continuing with therapy, and regaining their motor and sensory function.

This is the end of the case.