


A Spontaneous Compartment Syndrome Associated with a Supratherapeutic INR: A Case Report

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MOUNTAIN VIEW
HOSPITAL
A Sunrise Health System Hospital

Introduction

- Compartment syndrome involves a fluid collection within a fascial compartment that increases compartment pressure to the point of inhibiting perfusion.
- This increased compartment pressure and decreased perfusion places muscle, nerve, and other tissues at risk of permanent damage, thereby risking the viability of the limb (or other body area) as a whole.
- Compartment syndrome can occur in any area of the body where fluid can accumulate in a fascial compartment. The anterior compartment of the leg is the most frequently involved area in compartment syndrome, however the other compartments of the leg are common as well.
- Acute compartment syndrome is most commonly seen secondary to fractures, however other forms of trauma, including—but not limited to—crush injury, penetrating trauma, vascular injury, and animal bites/stings have also been implicated. Anticoagulation, IV fluids, and Group A streptococcus are among some of the non-traumatic causes.
- Acute compartment syndrome commonly presents with pain and paresthesia, muscle weakness, a tense feeling in the affected compartment and pain upon stretching of the muscles within that compartment.

Patient Presentation

- 76 year old male with a history of warfarin anticoagulation due to bioprosthetic aortic valve, hypertension, CKD III, diabetes, liver cirrhosis, hepatocellular carcinoma status post chemo, and congestive heart failure with reduced ejection fraction was transferred from the VA hospital for concern of compartment syndrome in the left lower extremity after presenting to the VA with a 3-day history of increased swelling and pain in the area. A 39 x 7.8 x 5.1 cm fluid mass was visualized on CT. INR was 5.3. Patient denied history of trauma. While the patient experienced 7/10 pain that was worse with movement, he denied any paresthesia. The patient was also being treated for a LLE cellulitis.
- On physical exam the left calf measured 39 cm in circumference while the right calf measured 30 cm in circumference. The area of the medial and posterior left leg was noted to be tender, tense, hot, and erythematous. The patient experienced pain in the left leg with both plantarflexion and dorsiflexion. No gross motor or sensory deficits were noted and pedal pulses were palpable.

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Further Testing and Intervention

- Doppler ruled out DVT and visualized an 8.5 x 20 cm mass suspected to be a hematoma.
- Angiogram ruled out stenosis, occlusion, aneurysm, and active bleed.
- Left leg superficial posterior compartment fasciotomy was performed and a wound vac was placed.
- Hospital course was complicated by an acute kidney injury superimposed on chronic kidney disease, acute hypoxic respiratory failure, and a right thoracentesis.
- Patient was discharged to rehab 8 days after the procedure.
- Upon admission to rehab, the patient required max to dependent assistance for most activities.
- In addition to medical management in the rehabilitation unit, the patient received 15 hours per week of physical therapy, occupational therapy, and speech language pathology care to improve functional outcomes.
- At admission to rehab the goal was for the patient to be able to return home to live with his wife operating at an independent to supervision / touch assist functional capacity.
- While in rehab the patient required a bilateral lower extremity venous ultrasound to rule out DVT on account of a swelling of the left medial knee joint. Patient was found to have a 6.2 x 5.5 x 2.5cm complex cystic mass which was monitored during the rehab course.
- Patient also experienced dizziness and orthostatic hypotension while in rehab.
- Despite this, patient made considerable functional progress while in rehab as can be seen in the chart below.
- Patient required custom AFO for gait impairment, described next.

| Functional Activity | Admission Status | Interim Status |
|-------------------------------|----------------------|-----------------------|
| Toilet hygiene | Substantial/max (2) | Independent (6) |
| Toilet transfer | Dependent (1) | Setup or cleanup (5) |
| Eating | Not attempted (88) | Independent (6) |
| Shower/bathing | Not attempted (88) | Setup or cleanup (5) |
| Dressing upper body | Not attempted (88) | Setup or cleanup (5) |
| Dressing lower body | Not attempted (88) | Partial/moderate (3) |
| Transfer to/from bed to chair | Partial/moderate (3) | Independent (6) |
| Wheel 50ft w/ 2 turns | | |
| Wheel 150 ft | | |
| Walk 50 ft w/ 2 turns | | Supervision/touch (4) |
| Walk 150 ft | | Supervision/touch (4) |
| Four steps | | Supervision/touch (4) |

Anatomical Consideration

- The compartment affected in this patient was the superficial posterior compartment of the leg; injury to the tibial nerve was of concern.
- The tibial nerve innervates the muscles of both the superficial and deep posterior compartments. These muscles include the gastrocnemius, soleus, and plantaris in the superficial compartment, and the tibialis posterior, flexor digitorum longus, flexor hallucis longus, and popliteus muscle in the deep compartment.
- Plantar flexion, toe flexion, foot inversion, as well as stability and unlocking of the knee joint could be affected by a lesion of the tibial nerve.
- Many of the intrinsic muscles of the foot can also be affected, as branches of the tibial nerve also innervate the muscles of the plantar aspect.
- Sensory deficits can also be seen, as sensory branches of the tibial nerve also supply the skin of the posterolateral leg, lateral foot, and plantar aspect of the foot.

Gait Considerations

- When the tibial nerve is compromised unilaterally, the gastrocnemius and soleus may be weak to the point of non-function. The gait is impacted by loss of plantar flexion.
- Changes include bilateral decrease in step length with the reduction being greater on the side of the unaffected tibial nerve.
- The heel on the affected side will remain on the ground until the heel of the affected side makes contact.
- The heel on the unaffected side will make contact earlier.
- The hip on the affected side will lag.
- Appropriate AFO intervention will depend on individual circumstances. This patient received a custom model through the VA, and gait improved significantly.

References

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