Case Report: Four Extremity Compartment Syndrome Fasciotomy Resulting From Influenza A Viral Myositis; a Rare Complication

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Abstract

- Influenza A and B commonly cause benign respiratory disease in humans but can cause more severe illness in higher risk populations.
- Fora 2009-2015 there was one reported case in English literature with the formal diagnosis of compartment syndrome as a complication from influenza (3).
- We report an unusual case of a previously healthy adult patient who presented with myositis and severe rhabdomyolysis secondary to influenza A infection, which resulted in atrumatic compartment syndrome of all four extremities requiring emergent fasciotomy.
- The patient was subsequently managed with delayed primary closure and skin grafting in the operating room.
- Prompt recognition of this rare complication resulted in no limb amputations.
- On the patient’s first follow-up appointment one month after discharge, the patient had regained functionality. Both his hands and his feet were approximately 50% of baseline and improved with physical therapy.

Background

- Influenza A and B are RNA viruses of the Orthomyxoviridae family which typically cause benign respiratory disease in humans but can be associated with serious complications such as viral or secondary bacterial pneumonia, rhabdomyolysis, myositis and encephalitis (1).
- Annual influenza epidemics are estimated to result in 3 to 5 million cases of severe illness and 290,000 to 650,000 respiratory deaths worldwide (2); however, the frequency of complications such as rhabdomyolysis and compartment syndrome remains unclear.

Case Presentation

- A previously healthy 45-year-old male with a past medical history of ANA positive arthritis and smoking left work early with viral symptoms including cough, fever, myalgias, arthralgias, and chills on December 27, 2019.
- Patient did not receive his annual influenza vaccine, had no recent travel, and no sick contacts. Over the weekend he remained in bed due to diffuse weakness.
- December 30, 2019: patient presented to the local community hospital emergency department (ED) with worsening symptoms.
- Patient was given 2L of IV fluids and discharged home with the diagnosis of viral syndrome. Influenza testing was not done.
- January 1, 2020: patient was unable to stand in the shower and his wife called 911.
- At the local hospital, the patient's WBC was elevated at 18,000 and he was admitted to the ICU with a pulmonary embolism.
- The patient's respiratory status rapidly deteriorated and he was intubated at 7:00 AM.
- Later that afternoon the plastic surgery team was consulted for possible compartment syndrome as the primary team noted worsening discoloration and increasing tension in the bilateral upper extremities.

Investigation and diagnosis

- On initial presentation at HFH, patient's vital signs were 101/59 (pressors), HR 151, RR 42.
- The patient’s initial labs upon admission at 12:15 AM January 3 were notable for a creatinine (Cr) of 0.86 and CPK of 110,990 up from 6,400 two days ago.
- During the day, patient’s Cr increased rapidly to 1.31, 1.62, 1.74, and 2.50 by 5:00 PM.

Treatment

- Emergent fasciotomy was performed 6:00 PM on January 3, 2020.
- A sinusoidal volar incision was made in the bilateral upper extremities. The brachial artery was identified and the overlying fascia was incised. The muscles in this region were noted to be swollen with thrombosed veins which were nonresponsive to electrocautery. The pronator teres was identified, and adjacent fascial compartments were released. On the dorsal aspect, the incisions were made within the second and fourth metacarpal interphalanges. The interosseous muscles were released and also noted to be swollen and non-reactive to electrocautery. An incision was made over the thenar eminence and hypothenar eminence to release the compartments. After upper extremity compartmental release, the right radial and ulnar arteries did not produce an audible doppler signal. Therefore, Guyon’s Canal in the right hand was further decompressed the adjacent neurovascular bundle. The left brachial, ulnar and radial arteries did produce audible doppler signals however no signal was produced in the palmar region.
- For both lower extremities, a longitudinal incision was made along the medial surface of the calf. Once adequate decompression was achieved in the superficial and deep medial compartments, the lateral compartment was subsequently released. The medial incisions were meshed with vessel loops. The lateral incisions were primarily closed. The following day (January 4, 2020) the patient’s CPK peaked at 140,850 and began to rapidly decline reaching 54,087 on January 6, 2020 and 1,448 nearly a week after surgery.
- On post-op day one, the compartments were less tense and warm on exam. Audible doppler signals were noted to the palmar area, dorsalis pedis, and posterior tibial pulses bilaterally.
- Over the course of the next two weeks daily dressing changes were completed in addition to bedside closure of the hand incisions. Splints were placed on the upper extremities to minimize contracture.
- On January 17, the patient was taken to the operating room for delayed primary closure and skin grafting. The upper extremity fasciotomy sites were primarily closed with the exception of the volar forearm incisions which were covered with split-thickness skin grafts (figure 3). The left lower extremity fasciotomy was primarily closed. The right medial incision site was covered with a split thickness skin graft. Skin grafts were harvested from the thigh. Negative pressure dressings were placed on all graft sites.
- The wound vacs were removed on January 24, 2020 and patient was discharged home on February 3, 2020.

Discussion

- Research suggests the frequency of influenza causing rhabdomyolysis appears to be an uncommon occurrence (1-3).
- One study investigating 316 pediatric patients with influenza A or B found rhabdomyolysis occurring in only 3% of patients (10).
- Several studies have concluded that, as with our patient, rhabdomyolysis is seen more often with influenza A rather than B infections (10,11).
- The pathogenesis of influenza causing rhabdomyolysis is postulated to occur via three mechanisms: direct muscle invasion by the virus (13), immunologic reaction resulting in collateral muscle damage and viral toxins causing direct muscle injury (3,12).
- The death of muscle cells releases myoglobin and eosinophilic active cellular elements causing edema of the interstitial space which can result in compartment syndrome and the myoglobin can cause glomerular damage leading to acute renal failure (4).
- From our literature review, only three other cases requiring four limb fasciotomy from influenza infection have been reported (4,9,14).
- Influenza vaccination has been shown to modify disease severity, as one study found that vaccinated adults hospitalized for influenza were 75% less likely to die than unvaccinated patients (15). Although no studies to date have investigated the use of Oselemivir in modifying influenza induced rhabdomyolysis, our case does raise the question if the patient had been treated with Oselemivir at his initial presentation would his morbidity have been significantly reduced.

Conclusion

- Atrumatic compartment syndrome is a rare but possible complication from influenza induced viral myositis. Clinicians would benefit from having a high index of suspicion.
- The differential diagnosis for a patient with a renal failure (rising BUN, decreasing urine output) should prompt consideration of rhabdomyolysis and ordering of a CPK level.
- Prompt recognition and aggressive treatment of rhabdomyolysis (fluids, hemodialysis) in the setting of influenza can lower the risk of developing compartment syndrome.

References

2. Eric Chen, DPM, Arion Lochner, MD, Robert Cesaro, MD