INTRODUCTION

- Acute compartment syndrome is a surgical emergency and is caused by raised pressure within a closed fascial space reducing capillary perfusion below a level necessary for tissue viability.
- Most compartment syndromes are associated with traumatic insults such as those that cause fractures but the condition also occurs after reperfusion following a period of ischemia, burns, and hemorrhagic conditions.
- The authors present a case of a multiple myeloma (MM) patient with an atraumatic cause of acute compartment syndrome of the volar forearm which was treated with a multidisciplinary approach.

CASE REPORT

- A 63-year-old female who 2 months prior to admission complained of swelling, bruising, and pain over the right calf with no apparent history of trauma. She was being worked up for MM.
- Seven days prior to admission, she lifted her 25 kg dog from the car. She was asymptomatic until the next day when she noted pain and swelling of her right forearm. Three days after, patient noted pain and swelling now involving both forearms. Fourteen hours prior to admission, she noted increase in severity of swelling and pain of the left forearm which was unrelenting.
- On physical examination, patient displayed a swollen and tense volar aspect of the left forearm, mostly on the proximal half. Hematoma on the medial aspect of the left forearm was also seen. She was able to flex and extend fingers but with pain. Intense pain felt on passive extension of the fingers; no pain on passive flexion. She noted 30% numbness and paresthesia over the fingertips. She had a pale left palm but with good capillary refill.
- Brachial and radial artery pulses were appreciated and Allen's test was negative. Radiographs of the left forearm showed neither fracture nor dislocation. She was diagnosed with compartment syndrome of the volar left forearm and was admitted.

PATIENT COURSE

- Patient underwent an emergency volar fasciotomy of the left forearm and there was note of an intramuscular hematoma of the flexor digitorum superficialis (FDS) and the flexor pollicis longus (FPL). Negative pressure dressing was placed over the wound but was later discontinued due to significant output.
- Over the course of the next 10 days, the patient underwent two rebridement surgeries to investigate for an anatomic cause of bleeding but no specific source was seen. She would have wet-to-dry dressing changes every 3 hours due to continuous bleeding. She was losing an average of 1400 mL of blood per day.
- A multidisciplinary meeting was held and it was decided that she needed to undergo plasma exchange of which she had two cycles on the 11th and 12th hospital days.
- After the plasma exchange, bleeding was controlled. Blood picture and bleeding parameters improved. Patient underwent four more rebridement surgeries to remove the non-viable palmaris longus (PL), flexor carpi radialis (FCR), pronator teres (PT), FDS, FPL, portions of the supinator, and portions of biceps brachii. Viability was assessed considering muscle color, consistency, contractility, and capacity to bleed. Negative pressure dressing was reinstalled affording good granulation and bed for the eventual split-thickness skin grafting.
- Throughout admission, she required 34 units of packed RBC, 31 units of fresh frozen plasma, and 25 units of platelet concentrate.

OUTCOME AND FOLLOW-UP

- At 12 weeks post-surgery, patient is able to flex her metacarpophalangeal joints up to 70°, do finger abduction and adduction. She can also do thumb abduction, adduction, opposition, and interphalangeal joint extension. She can do wrist ulnar deviation and weak radial deviation. Supination is full with pronation up to 60°. Elbow ROM is at 10-140°. Sensation is full on the small finger and ulnar border of the ring finger with residual numbness over the thumb, index, and long, radial half of the ring finger.
- She has since been able to return to managing her photography business.
- The results of the bone marrow aspiration (BMA) done by Hematology confirmed the diagnosis of MM and she is currently under treatment.

DISCUSSION

- According to McQueen and Gaston, injury to soft tissues without fracture is the second most common cause of compartment syndrome and one-tenth of the patients in their study had abridged disorder or were taking anticoagulant drugs.
- Hope and McQueen demonstrated that in cases without a fracture, there was a significantly greater delay to fasciotomy compared with those with a fracture. At fasciotomy, 20% of patients without a fracture had muscle necrosis requiring debridement compared with 8% of patients with a fracture.
- The direct cause of this patient’s hemorrhage into her volar forearm compartment is unknown but we may correlate this to a bleeding disorder brought about by MM.
- Although rigorous prospective studies are lacking, bleeding is not usually considered a frequent presenting symptom of MM but there are studies and reviews reporting bleeding rates involving up to 36% of MM patients. The rare occurrence of M proteins with specific inhibitory activities against coagulation factors (particularly von Willebrand factor and factor VIII) or platelet glycoproteins, resulting in overt acquired bleeding disorders, may explain some cases complicated by severe hemorrhages.
- Plasmapheresis or plasma exchange is very effective when hyperviscosity is the major cause of symptoms, as reported in MM with high M protein concentrations.

CONCLUSION

- Recognizing compartment syndrome requires having and maintaining a high index of suspicion, particularly in cases with a non-classical history and presentation.
- The physician must be vigilant when a patient presents with the combination of increased pain, severe pain with passive stretch, palpable tense compartments, and neurologic findings, particularly when the patient has a bleeding disorder.
- A multidisciplinary approach addressing all medical conditions should be taken to ensure that the patient receives holistic care.

REFERENCES