A Hockey Check Gone Wrong!

Robert S. Green, MD, FRCPC(EM), DABEM

A previously healthy 40-year-old man presents to the emergency department (ED) with severe thigh pain. He was struck on the anterior portion of his right thigh during a hockey game. He noted increasing pain and swelling in his thigh, but no abrasion, laceration, or discolouration. Although he was initially able to ambulate with little discomfort, the pain progressed until he couldn't move the leg without producing severe discomfort. He denies any change in sensation or motor function. He also denies any previous injury or medical problems, and is not taking any medications.

The patient's exam is unremarkable, except for the diffuse swelling of his right thigh (Figure 1).

Figure 1. Diffuse swelling of right anterior thigh.

Questions:

1. *What is the ED approach to extremity trauma?*
2. *What is an acute compartment syndrome?*
3. *How is an acute compartment syndrome diagnosed in the ED?*
4. *How is acute compartment syndrome managed in the ED?*

Answers:

1. What is the ED approach to extremity trauma?

The patient should be systematically evaluated following the Advanced Trauma Life Support primary and secondary survey guidelines, as the traumatic insult may not be limited to the extremity.

After excluding other serious injuries, a detailed history and physical exam should be performed. The initial complaint, the mechanism of injury, and any change or progression of symptoms should be determined. Pain, loss of function, and any parathesias are important factors to inquire after. Any deformity should also be noted.

The extremity in question should be put through a full range of active and passive motions, and a thorough neurovascular exam should be completed. Particular attention to areas of tenderness is important.

Table 1
Possible complications of extremity trauma

- Abrasions/lacerations
- Hematomas
- Penetrating injury
- Vascular injury
- Fractures
- Dislocations
- Ligamentous injury
- Neurologic injury
- Vascular injury
- Compartment syndrome

Extremity trauma has many potential complications (Table 1). These complications require thorough assessment so that they may be appreciated and managed appropriately.

2. What is an acute compartment syndrome?

A compartment syndrome occurs when there is an increased pressure in a non-expandable space, therefore compromising circulation to tissues within the compartment. When the intracompartmental pressure reaches 20 mmHg to 30 mmHg, there is a significant decrease in the arteriovenous pressure gradient and blood flow is seriously reduced. This reduction may result in hypoxic conditions for muscles and nerves. Depending on the absolute pressure rise and its duration, tissue necrosis may ensue.

Acute compartment syndrome can occur in many locations. Most commonly, it occurs in the lower extremities, where there are four compartments (anterior, lateral, superficial posterior, and deep posterior). Another common location is the forearm, with its volar and dorsal compartments. Acute compartment syndrome has also been described in the hands, buttocks, and thighs. The causes of the syndrome are listed in Table 2.

3. How is an acute compartment syndrome diagnosed in the ED?

Pain out of proportion to physical finding combined with a mechanism of injury consistent with an acute compartment syndrome is very important. The need for increasing amounts of narcotic analgesia is another good clue.

On exam, pain on passive stretching of the muscle groups within the suspected compartment is a characteristic finding. Active flexion of the muscles by the patient will also produce excruciating pain. If there is compression of nerves, then there may be associated parathesia or loss of motor function, but this may be a later finding. Tenderness and a sense of fullness within the compartment may also be found.

Table 2

Causes of acute compartment syndrome

- Increased compartment content (*e.g.*, trauma, bleeding, burns, increased capillary leak)
- Decreased compartment volume (*e.g.,* excessive traction on fractures)
- External pressure (*e.g.,* clothing, dressing, casts)

The five Ps—pain, pallor, pulselessness, parathesia, and paralysis—have traditionally been associated with an acute compartment syndrome. However, these symptoms are more in keeping with a disruption in arterial flow, and should not be relied upon for the diagnosis of increased compartmental pressure.

4. How is acute compartment syndrome managed in the ED?

A patient with findings consistent with an acute compartment syndrome should consult with an orthopedic surgeon.

The role of the ED physician is to provide adequate analgesia, remove any potential external compression, and place the extremity at a level below the heart. Elevation of an extremity above the heart will not increase venous return or decrease compartment pressure, but will decrease arterial flow and possibly make the situation worse.

Compartment pressure may be measured by invasive devices. However, the decision about the timing of surgical intervention is controversial, so early surgical assessment is essential.

More on our patient...

You are suspicious that the patient has an anterior thigh compartment syndrome. Morphine is administered intravenously for discomfort. All restricting clothing is removed and the thigh is placed in a position below the patient's heart. The orthopedic surgeon measures the pressure in his anterior thigh compartment (34 mmHg) and arranges to perform an emergency fasciotomy. The patient recovers uneventfully, and is discharged from the hospital in four days. Dx

This department covers selected points to avoid pitfalls and improve patient care by family physicians in the ED. Submissions and feedback can be sent to diagnosis@sta.ca.

Dr. Green is an assistant professor, Dalhousie University, and an emergency physician and intensivist, Queen Elizabeth II Health Sciences Centre, Halifax, Nova Scotia.