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Opinion

Compartment syndrome

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Abstract

This is with the reference of the condition called compartment syndrome , a condition that involves the elevation of interstitial pressure in a compartment micro vascular compromise and may cause irreversible damage to the content of the space .

One of the most dreaded complication that ultimately leads to gangrene that is called ischemic necrosis of structure contain within the volar compartment of fore arm .

Keywords: Compartment syndrome, Ischemic necrosis

INTRODUCTION

TYPES OF COMPARTMENT SYNDROME

Acute compartment syndrome: acute chronic syndrome is a condition of medical emergency where in one needs immediate treatment .this syndrome accounts for 3 percent of those who have a mid shaft fracture of forearm, condition occurs more prominently in males. Acute compartment syndrome if not treated properly can lead to permanent damage.

Chronic compartment syndrome: it is also called chronic exertional compartment syndrome it is not a situation that may require medical emergency it involves the pain that arises with exercise but dissipates soon. This do not include permanent damage.

It can be caused by tight crude splints of traditional bone settler sometimes tight plaster bandages can also be the reason . it can also be caused after a severe injury such as car accident or broken bone and there are many more reason that include – more recently intra- articular injection in drug adduct who lie on their forearm for prolonged period . Occasionly fracture of both bones of fore aerm dislocation of elbow, vascular injury and sub fascial haemotoma may be the cause.

ABSTRACT OF COMPARTMENTAL SYNDROME

Basically when there is an inelastic and unyielding deep fascia surrounds the forearm muscles , there rises the intra compartmental pressure and that lead to vessel are compressed resulting in muscle ischemia and consequent fibrosis. The greatest damage is at the center and muscle commonly affected are:

1. Flexor digitorum profundus
2. Flexor pollicis longus

One suffering from compartment syndrome may experience pain , numbness , pallor , paralysis and pulse lessens.

In mild cases flexion contracture of flexor digit rum profundus and flexor policies longus develop but in severe cases all finger flexor are affected, the forearm is thin and fibrotic.

Extensive scar tissue may be prevented. Peripheral nerves may also be affected amongst them median is the most common one, they can sometimes include severe pain, poor pulse, decreased ability to move, numbness or pale colour of a particular limb.

Normal compartment pressure should be within 12 mm hg – 18 mm hg.

PATHOPHYSIOLOGY

1. External or internal constriction
2. Increase in arterial spasm and occlusion
3. Causes muscle ischemia
4. Increase in capillary permeability
5. Increase in intra articular edema
6. Increase in muscular pressure
7. Further arterial compromise
8. Muscle necrosis
9. Replaced by collagen
10. Contracture

These are stage wise occurrence of compartment syndrome.

COMPARTMENT SYNDROME

Compartments are basically groups of muscles, nerves, and blood vessels in ones arms and legs, covering the tissue is a target membrane called Fascia (Fascia basically plays the role of keeping the tissue in place and therefore fascia don't expand easily).

Compartment syndrome basically is developed when swelling or bleeding occurs within the compartment because fascia can not expand easily, this causes increase in pressure on capillaries, nerves and muscle in the compartment. blood flow to the muscle and nerve is disrupted without oxygen and nutrition, nerves and muscles can be damaged.

COMPARTMENT SYNDROME MORE COMMON IN MALES

Compartment syndrome mostly occurs in males and is very common in males. the incidence of acute compartment syndrome is estimated to be 7.3 per 100,000 in males and 0.7 per 1000,00 in female with majority of cases occurring after trauma.

Compartment syndrome is more common in males under the age of 35 years.

The reason may be due to Larger intra compartmental muscle and increased likelihood of being involved in energy trauma.

Typically occurs in legs, acute compartment syndrome of lower leg is most frequently encountered of any area of body. Greater than 1/3 of compartment syndrome cases are attributed to tibial shaft fracture. It can result from both high and low energy trauma or even atraumatic causes.

Sometimes besides the trauma and broken bone condition it can also be caused by crush injury.

Crush injury are localized crush injury with systemic manifestation, these systematic effects are caused by a traumatic rhabdomyolysis [rhabdomyolysis is basically muscle breakdown and the release of potentially toxic muscle cell components and electrolytes into the circulatory system.

Early symptom include progressive pain out of proportion to injury sign include tense swollen compartment and pain with passive stretching of muscle within the affected compartment.

Some type of symptom are numbness, difficulty using affected muscle and visible muscle bulging.

Delta pressure is found by subtracting the compartment pressure from diastolic pressure many clinicians use delta pressure of 30 mm hg to determine the need for fasciotomy; while other use a difference of 20 mm hg.

It is predominantly affects anterior compartments representing up to 70 percent of cases in some series, other reports cites the anterior and deep posterior compartment are frequently affected 2.5 each and simultaneous anterior and deep posterior involvement can happen in 8 percent to 10 percent.

These are reports of bilaterial limbs involvement in 37 percent to 82 percent of symptomatic athlete.

Compartment syndrome linked to:

1. Heart rate
2. Muscular condition
3. Stroke
4. Tight clothes

HEART RATE

Typical symptom of abdominal compartment syndrome include abdominal bloating, abdominal distension, difficulty in breathing and increased heart rate, less urine production and low blood pressure other sensation may include burning sensation of skin.

TIGHT DRESSING

Most of the acute compartment syndrome may develop after severe injury such as fracture, but they can be iatrogenic, secondary to tight dressing or tight dressing casts or splints. However the most common cause is the tibial fracture.

STROKE

Basically stroke patient are more likely to experience a fall or an accident

, this intern makes them more vulnerable to hematoma [hematoma also called spelled haematoma or blood suffusion is a localized bleeding outside of blood vessels due to either disease or trauma], which can lead to compartment syndrome, if not treated properly it may be fatal.

TRAUMA

Trauma is directly linked to compartment syndrome as in a particular trauma or an accident pressure lasts longer the muscles may die and the arm or the leg will no longer work.

MANAGEMENT

Management for acute chronic syndrome require emergent fasciotomies, otherwise chronic compartments syndrome is typically managed non operatively for 1 to 3 month duration and surgical management may be often delayed as it is not fatal.

Firstly we should always go for conservative management which would include rest, activity and modification, stretching orthotics and physical therapy but there are generally ineffective, these may boost up the confidence in an individual.

Non operative modalities include:

1. Non steroid anti-inflammatory drug
2. Gait training

In refractory cases, or following at least a multiple month trial of non-operative management modalities , operative management is discussed, keeping in mind the patient or the athlete expectation to return to baseline activity and sports.

Open fasciotomy is predominantly technique however one may also have option for invasive endoscopic technique, the latter may include smaller incision by comparison.

In general for (lower limb) lower leg: Dual incision method.

Lateral method: Anterior and lateral compartment access for release 12 to 15 proximal to lateral malleolus.

Medial method: superficial and deep posterior compartment for release.

Release at middle of tibia along posterior border.

DIFFERENTIAL DIAGNOSIS

It may be quite broad:

1. Vascular pathologies –intermittent claudiction
2. Popliteal artery impingement Tibial stress fracture tendon pathologies.
3. Nerve entrapment

CURRENT TRENDS IN COMPARTMENT SYNDROME

Current trends basically means new practices that are developed to make surgical procedure more easy and prominent. Surgical procedures basically include fasciotomy.

Fasciotomy that basically involves opening of skin and fascia down to a compartment. Surgical procedure where fascia is cut to relieve tension or pressure commonly to treat resulting loss of circulation to the tissue. Fascia is the thick sheets of connective tissue that surrounds muscle compartments.

A small incision is made in fascia of anterior compartment, midway between septum and tibial rest. Fascia is opened proximally and distally respecting any visible superficial nerve. lateral compartment fasciotomy is in line with fibular shaft.

Other alternative: botulinum toxin is a safe and cost effective alternative for fasciotomy.

Low impact work out routine including swimming and cycling are effective way to maintain fitness without risking elevated pressure in muscle compartment .

It may take weeks or month for symptom of compartment syndrome to disappear.

Fasciotomy may provide significant improvement in pain and satisfaction in over 3 quarter of patient and return to sports in 84 percent of patient however 56 percent returned to competitive running activity with subset 19 percent leading in revision surgery.

LAYERS OF SKIN

Skin is the largest organ in the body and covers the body's entire external surface . it bis made of three layers:

1. Epidermis
2. Dermis
3. Hypodermis

STAGES OF FASCIOTOMY

1. Lateral
2. Anterior
3. Superficial
4. Posterior
5. Deep posterior.

PHYSIOTHERAPY MANAGEMENT

Under this we expect the therapist to have a basic knowledge of compartment syndrome and its affect on health. The basic therapeutic measures are:

1. Rest
2. Release of pressure
3. Elevation
4. Application of crape bandage

Application of pillow and related exercises are its basic components . however if the pressure is more or there is [trauma associated with CS] the first and foremost thing is release of pressure.