University of Basrah
Al-Zahraa College of Medicine

Ministry of higher Education and Scientific Research

Academic 6th year 2025-2026

Approach to patients with multiple traumas in Orthopedics

Assist. Prof. Dr.Falih Waheed Hashim Alhasani

References:
Apley & Solomon's System of Orthopaedics and Trauma 10th Edition
ATLS -2018
Bailey's and Love's Short Practice of Surgery 28th Edition 2023

Complications of MSK injuries:

- Fat Embolism
- Crush syndrome
- Compartmental syndrome

Fat Embolism syndrome:

- A common phenomenon following limb fractures.
- The source of the fat emboli is probably the bone marrow, and the condition is more common in patients with multiple fractures.
- A small percentage of these patients develop clinical features.

Fat Embolism syndrome:

Clinical features:

- Early warning signs (usually within 72 hours of injury) are a slight rise of temperature and pulse rate.
- In more pronounced cases there is breathlessness and mild mental confusion or restlessness.
- **Pathognomonic signs are petechiae on the trunk and axillae and in the conjunctival folds and retinae.**
- In more severe cases there may be respiratory distress and coma, due both to brain emboli and hypoxia from involvement of the lungs: ARDS.

Fat Embolism syndrome:

- There is no reliable test for fat embolism.
- Urinalysis may show fat globules in the urine.
- Blood PO_2 should always be monitored; values below 8 kPa (60 mmHg or less) within the first 72 hours of any major injury must be regarded as suspicious.
- A chest X-ray may show classical changes in the lungs.

Fat Embolism syndrome:

Management

- Management of severe fat embolism is supportive.
- Symptoms can be reduced with the use of high inspired oxygen concentrations
- Incidence appears to be reduced by the prompt stabilization of long-bone fractures.
- Fixation of fractures also allows the patient to be nursed in the sitting position, which optimizes the ventilation-perfusion match in the lungs.

Crush Syndrome:

- When a limb is compressed for extended periods (e.g. following entrapment in a vehicle) or after prolonged use of a pneumatic antishock garment, tourniquet.
- The crushed limb is under-perfused and myone-crosis follows, leading to the release of toxic metabolites
- When the limb is freed, reperfusion injury, reactive oxygen metabolites create further tissue injury.

Crush Syndrome:

- Membrane damage and capillary fluid reabsorption failure result in swelling that may lead to a compartment syndrome, thus creating more tissue damage.
- Tissue necrosis causes systemic problems such as renal failure from free myoglobin.
- Myonecrosis may cause a metabolic acidosis with hyperkalaemia and hypocacaemia.

Crush Syndrome:

Clinical features:

- The compromised limb is pulseless and becomes red, swollen and blistered.
- The sensation and muscle power may be lost.

Crush Syndrome: Treatment

- **Prevention is the most important**
- Early high urine flow is encouraged with alkalization of the urine with sodium bicarbonate, which prevents myoglobin precipitating in the renal tubules.
- If oliguria or renal failure occurs, renal hemofiltration will be needed.
- If a compartment syndrome develops, and confirmed, then a fasciotomy is indicated.
- Excision of dead muscle must be radical to avoid sepsis.
- Amputation !?

Compartment Syndrome

Compartment syndrome develops when increased pressure within a musculofascial compartment causes ischemia and subsequent necrosis.

Common areas are the leg, forearm, foot, and hand.

Etiology:

1. Fracture: supracondylar, Leg, Forearm fractures.
2. Vascular: Ischemic-reperfusion injury, Hemorrhage
3. Iatrogenic: Constrictive casts
4. Soft tissue injury: Prolonged limb compression, Crush injury, circumferential burn

Compartment Syndrome

Signs and Symptoms:

- **P**ain greater than expected and out of proportion.
- **P**ain on passive stretch of the affected muscle is the hallmark sign
- Tense swelling of the affected compartment
- **P**aresthesia or altered sensation distal to the affected compartment
- **P**allor
- The absence of a palpable distal **P**ulse is an uncommon or late finding and is not necessary for diagnosis.
- Capillary refill times are also unreliable for diagnosing compartment syndrome.
- Weakness or **P**aralysis of the involved muscles in the affected limb is a late sign and indicates nerve or muscle damage.

Compartment Syndrome

Compartment Syndrome: Treatment

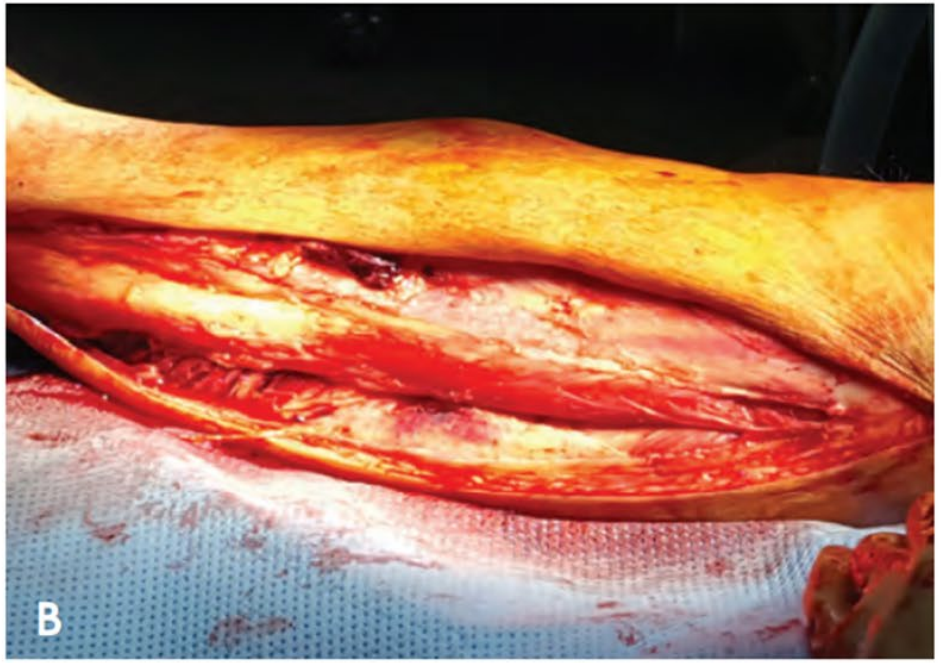
- The higher the compartment pressure and the longer it remains elevated, the greater the degree of resulting neuromuscular damage and resulting functional deficit.
- Delayed recognition and treatment is catastrophic and can result in neurologic deficit, muscle necrosis, ischemic contracture, infection, delayed healing of fractures, and possible amputation:
- Maintain a high index of suspicion in any patient with a significant musculoskeletal injury.
- Be aware that the syndrome can be difficult to recognize in patients with altered mental status.

Compartment Syndrome: Treatment

- **Prevention** is the main goal: fracture holding, limb elevation, active movements, correct hypotension
- If suspected, promptly remove all constrictive casts or dressings, administer supplemental oxygen, and place the affected limb at the level of the heart.
- Immediately obtain surgical consultation for suspected or diagnosed compartment syndrome

Compartment Syndrome: Treatment

- Functional outcomes are favorable when diagnosis and treatment occurs within 6 hours of its onset.
- Fasciotomy may be useless if tissue pressures have been elevated to 24 to 48 hours as permanent dysfunction may already be present.(Volkmann's Ischemic Contracture)



Compartment Syndrome: Volkmann's Ischemic Contracture

THANK YOU

Questions?