



# What is compartment syndrome?

EMILY JHONSON

Thomas Jefferson University, Henry Avenue, Philadelphia, United States

© J ORTHOP TRAUMA SURG REL RES

19(9)2024

Perspective

Address for correspondence:

Emily Jhonson, Thomas Jefferson University, Henry Avenue, Philadelphia, United States

12345ejhonson@gmail.com

## Statistics

Figures	00
Tables	00
References	00

Received: 15.09.2024;

Manuscript No. jotsrr-24-

154717;

Editor assigned: 21.09.2024,

PreQC No. jotsrr-24-154717

(PQ);

Reviewed: 29.09.2024, QC No.

jotsrr-24-154717(Q);

Revised: 05.10.2024,

Manuscript No. jotsrr-24-

154717(R);

Published: 12.10.2024,

DOI.10.37532/18972276.2024.1

9(9).101

## Abstract

Compartment syndrome is a serious medical condition characterized by increased pressure within a confined muscle compartment, which can compromise circulation and tissue function. This article explores the two primary forms of compartment syndrome—acute and chronic—along with their causes, symptoms, and management strategies. Acute compartment syndrome, often caused by traumatic injuries, requires prompt surgical intervention to prevent irreversible damage. Chronic compartment syndrome, frequently exercise-induced, tends to be less severe but can impact physical activity. Understanding the mechanisms and clinical presentations of compartment syndrome is critical for timely diagnosis and effective treatment, minimizing potential complications.

Keywords: Compartment syndrome; Acute compartment syndrome; Chronic compartment syndrome; Muscle compartments; Fasciotomy; Tissue ischemia

## INTRODUCTION

Compartment syndrome occurs when elevated pressure within an enclosed muscle compartment restricts blood flow, depriving tissues of oxygen and nutrients. This condition can lead to severe complications, including permanent damage to muscles and nerves, loss of function, or even amputation if untreated. It is categorized into two primary types: acute and chronic compartment syndrome. Acute compartment syndrome typically arises from traumatic events such as fractures, whereas chronic compartment syndrome is often linked to repetitive physical activities. Both forms require a clear understanding of their pathophysiology and clinical manifestations for accurate diagnosis and appropriate management. Acute Compartment Syndrome (ACS) is the most common and severe form of the condition. It often develops rapidly over hours or days and is frequently triggered by traumatic injuries, such as fractures, crush injuries, or burns. Approximately 75% of ACS cases are associated with fractures of the leg or arm. The underlying mechanism involves swelling or bleeding within a compartment, leading to increased pressure. The fascia, a rigid connective tissue enclosing the compartment, has limited capacity to stretch. As a result, the rising pressure compresses blood vessels and nerves, causing tissue ischemia. Symptoms of ACS include severe pain disproportionate to the injury, tightness or swelling in the affected limb, paresthesia (tingling or numbness), and diminished pulses. In severe cases, untreated ACS can result in tissue necrosis, functional loss, or amputation. The definitive treatment for acute compartment syndrome is surgical intervention known as fasciotomy. This procedure involves making incisions in the fascia to relieve pressure and restore blood flow. Early diagnosis and prompt surgical management are critical to prevent long-term complications. Chronic Compartment Syndrome (CCS), also referred to as exertional compartment syndrome, is less severe and develops over days, weeks, or months. Unlike ACS, CCS is not a medical emergency and is

usually triggered by repetitive physical activities such as running, cycling, or swimming. It predominantly affects athletes and individuals engaged in high-intensity exercises. The pathophysiology of CCS involves temporary swelling within a compartment during exercise, leading to transient increases in pressure. Symptoms typically resolve with rest and include aching pain, cramping, or tightness during physical activity. Commonly affected areas include the lower legs, thighs, and buttocks. Diagnosis of CCS often involves measuring intracompartmental pressure before and after exercise. Management strategies include activity modification, physical therapy, and in some cases, surgical intervention through fasciotomy. Unlike ACS, CCS is rarely associated with permanent tissue damage. Muscle compartments are groups of muscles, nerves, and blood vessels enclosed by fascia. This strong, non-elastic tissue forms the walls of compartments, which are incapable of expanding significantly. When an injury or repetitive activity leads to swelling, bleeding, or fluid accumulation within a compartment, the pressure increases. Elevated intracompartmental pressure reduces perfusion, leading to ischemia and potential tissue damage. If the pressure remains unrelieved, the lack of oxygen and nutrients can result in cellular death, nerve damage, and muscle necrosis. The legs, arms, forearms, thighs, feet, hands, gluteal region, and abdomen are particularly susceptible to compartment syndrome due to their anatomical structure. The hallmark symptoms of compartment syndrome vary between acute and chronic forms. In ACS, symptoms develop rapidly and include:

- Severe, escalating pain disproportionate to the injury
- Swelling and tightness in the affected compartment
- Numbness or tingling (paresthesia)
- Weakness or paralysis
- Decreased or absent pulses in the affected limb

## DIAGNOSIS

Diagnosing compartment syndrome involves a combination of clinical evaluation and diagnostic tools. For ACS, measuring intracompartmental pressure using a needle or catheter is crucial for confirmation. A pressure reading above 30 mmHg is indicative of ACS. Imaging studies such as X-rays or MRIs may help identify underlying injuries contributing to ACS.

In CCS, a thorough history and physical examination are followed by pressure measurements taken at rest, during exercise, and post-exercise. Consistently elevated pressures confirm the diagnosis.

## MANAGEMENT

Acute compartment syndrome immediate intervention is essential for ACS. Fasciotomy is the gold standard treatment, where incisions are made in the fascia to alleviate pressure. Delayed treatment can result in irreversible tissue damage and complications, including infection, contractures, or amputation. Supportive care includes pain management, fluid resuscitation, and monitoring for systemic complications.

Chronic compartment syndrome treatment for CCS is less urgent and often begins with conservative measures. These include modifying exercise routines, physical therapy, and using orthotics or compression garments. If symptoms

persist and significantly impact quality of life, fasciotomy may be considered.

Preventing compartment syndrome involves minimizing risk factors, such as avoiding excessive exercise or ensuring proper management of traumatic injuries. Early recognition and treatment are vital to improving outcomes.

The prognosis for ACS depends on the timeliness of intervention. Delayed treatment can lead to long-term complications, including chronic pain, functional deficits, or amputation. CCS generally has a favorable prognosis, with most individuals resuming normal activities after appropriate treatment.

## CONCLUSION

Compartment syndrome is a potentially life-threatening condition that necessitates prompt recognition and management. Acute compartment syndrome, often associated with trauma, requires immediate surgical intervention to prevent irreversible damage. Chronic compartment syndrome, while less severe, can affect physical activity and quality of life. Understanding the differences between these forms, their clinical presentations, and treatment options is crucial for optimizing patient outcomes. Enhanced awareness among healthcare professionals and timely intervention are key to mitigating the serious consequences of compartment syndrome.