

Compartment Syndrome: What Will Help Make the Diagnosis?

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Objectives:

- Review new concept about pathophysiology - Role of inflammatory response
- Describe new ideas about monitoring and treatment
 - NIRS
 - Continuous pH
 - Tissue ultrafiltration

New Insights into Pathophysiology of Acute Compartment Syndrome: The Role of Inflammation

- Does leukopenia confer protection against microvascular dysfunction during ACS?
- Although tissue perfusion was similar, leukopenic animals, muscle injury was significantly decreased.
 - Rat model: 24 animals
 - Marked elevation of inflammatory markers (IL-1 β , GRO/KC, TNF- α levels).
 - Neutropenic rats have 50% less muscle injury than controls.
 - Treatment with indomethacin during the acute phase almost completely mitigated the effects of the elevated muscle pressures.

Is compartment pressure monitoring helpful?

METRC study:

150 patients with continuous muscle pressure monitoring data for at least 2 hours.

Independent determination of diagnosis performed by an expert panel.

Approx 40% false positive rate using current “McQueen” criteria

New Approaches to Diagnosis

Tissue pressure is not itself a direct marker of muscle injury

Does oximetry work?

- Direct O₂ measurement
- Transcutaneous O₂ (NIRS)

Could one sample biomarkers from the injured muscle?

Near-Infrared Spectroscopy

- Measures tissue oxygenation.
- Preliminary work shows that trauma is associated with a rapid hyperemic response.
- Sudden drop in tO₂ may reflect sudden compromise in perfusion.

Predicting Acute Compartment Syndrome (PACS) using Optimized Clinical Assessment, Continuous Pressure Monitoring, and Continuous Tissue Oximetry

- Usable NIRS data only obtained about one-third of expected minute using “best-case” scenario (cases with possible user error removed)

Biomarkers

- Candidate markers
 - Muscle injury: CPK, LDH, troponin, other
 - Markers of ischemia: glucose, lactate, pyruvate
 - Cellular injury: Ca, K, pH

Metabolic monitoring

- Compare intramuscular pH with intracompartment pressure + / or regular clinical assessment

<u>Criteria</u>	<u>Results - Critical levels</u> (Sustained for 60 minutes)	
	<u>Sensitivity</u>	<u>Specificity</u>
pH < 6.4	95%	80%
ICP > 40mmHg	65%	60%
dP < 20mmHg	53%	60%

