

Quantifying Muscle Compressibility as a New Decision Support:

When Pressure Readings & Clinical Signs Diverge

Presented at OTA 2025 by Andrew H. Schmidt, MD Chief Orthopedic Surgery Hennepin Healthcare Minneapolis, MN, USA

INTRODUCTION

Conventional diagnostic criteria for compartment syndrome have shown limited reliability in capturing evolving tissue compromise. Recent investigations have shown that static pressure thresholds and one-time measurements provide limited diagnostic value, with substantial variability across techniques and poor correlation to actual tissue ischemia. Pressure alone has been shown to be an unreliable surrogate for microvascular compromise, while the classic “P” signs offer low predictive accuracy. These findings reveal a gap between static pressure data and the dynamic state of tissue health [1,2].

CASE PRESENTATION

- A 40-year-old female sustained a displaced tibial plateau fracture (fig.1) with marked soft-tissue swelling, conferring ~50% ACS risk.
- Temporary stabilization was achieved using an external fixator.
- Continuous invasive Intracompartmental Pressure (ICP) monitoring was initiated.



Figure 1. Comparative radiographic views of the proximal tibia.

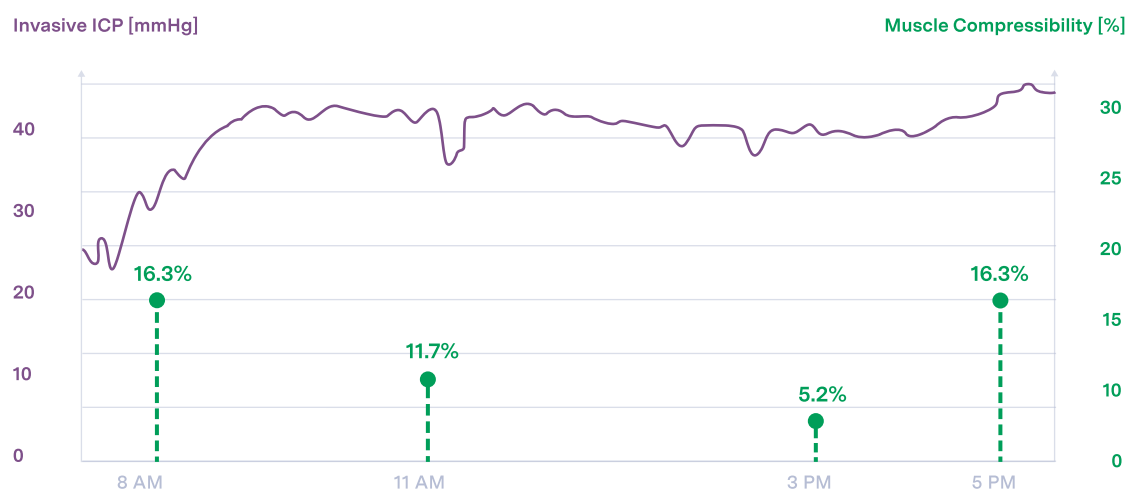


Figure 2. Intracompartmental pressure and muscle compressibility trends over time.

This figure presents simultaneous ICP measurements (Purple line, left y-axis; mmHg) and intermittent muscle compressibility assessments (green markers, right y-axis; %) collected across the clinical observation period.

ICP Trend: Initial pressure 30 mmHg, rising to 45 mmHg within 2 hours, remaining elevated for ~20 hours.

Clinical Status: ICP values were not correlated with the clinical examination. The patient showed no progressive pain, neurological deficit, or tense compartment.

Quantis ST Measurements: During this period, non invasive soft-tissue compressibility measurements were performed using Compremium Quantis® ST. Compressibility values dropped from 16.3% to 5.2% within 6 hours, followed by a recovery to the baseline of 16.3% after ~2 hours.

OUTCOME & CONCLUSION

- ICP remained high; treating doctors could not correlate the values with clinical findings.
- Compressibility measurements provided a more accurate reflection of clinical assessment and patient outcomes.
- Based on these findings, no prophylactic fasciotomy was performed.
- The patient remained stable and achieved full functional recovery without complications.

REFERENCES

1. Bouklouch, Yasser et al. Rethinking the Paradigm of Using Ps for Diagnosing Compartment Syndrome. JBJS Open Access 10(2):e24.00065, April-June 2025. | DOI: 10.2106/JBJS.OA.24.00065
2. Yasser Bouklouch, Theodore Miclau, Edward Harvey, Diagnosis of acute compartment syndrome: current diagnostic parameters, Injury, Volume 56, Supplement 1, 2025, 112773, ISSN 0020-1383, <https://doi.org/10.1016/j.injury.2025.112773>

CE-approved intended use

The CPMX1 Software is intended for real-time and intermittent measurement and monitoring of relative compartment compressibility.

FDA cleared intended use

The Compartmental Compressibility Monitoring System (CPM#1) is intended for real-time and intermittent monitoring of relative compartment compressibility. The relative compartment compressibility (CP Value) is not meant for trend analysis.
510(k) Number: K223509.