

Comparing the Effects of Age, Biological Sex, and Extremity Fracture Location on Continuous ICP Measurements in Trauma Patients

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Purpose: Baseline data for extremity compartment pressure after trauma have only been looked at in small cohorts with historically inaccurate technology. Newer technology has allowed accurate continuous pressure monitoring specifically for diagnosis of acute compartment syndrome (ACS). This study used data from prospective cohort trials using modern pressure sensors to look at baseline pressure values. Particularly, there was a comparison of the effects of age, sex, and fracture location on continuous trend behaviors in patients with extremity trauma.

Methods: 18 hours of intracompartmental pressures (ICP) from 129 non-ACS trauma patients with lower extremity fractures were examined. The trends in patients were analyzed with respect to age, biological sex, and anatomic fracture location.

Results: Younger patients exhibited higher mean ICPs compared to older patients at all time points. Both groups experienced the same rates of decline in pressure over time from trauma. Both older and younger patient groups experienced a steady linear decrease in pressure over the course of monitoring. The younger age group had a decrease of 0.202 mmHg/hour ($y = 26.4 - 0.202x$); the older age group had a decrease of 0.202 mmHg/hour ($y = 23.9 - 0.202x$). Males and females initially had similar ICPs, but females showed a steeper decline over time, with the pressure in the female group decreasing at a mean rate of 0.303 mmHg/hour compared to 0.163 mmHg/hour in the male group. Tibia fractures were associated with a higher initial pressure and steeper declines in ICP compared to forearm fractures.

Conclusion: There are variances for continuous ICP measurements associated with age, sex, and fracture location in trauma patients in whom ACS does not develop. Continuous ICP monitoring offers a better understanding of pressure trends, allowing for more accurate and individualized assessments. Recognizing these trends are crucial in ACS assessment.