

HARD, SOFT, & IRRELEVANT: HEMORRHAGIC & ISCHEMIC SIGNS BETTER DISTINGUISH IMPORTANT CHARACTERISTICS OF EXTREMITY VASCULAR INJURIES

Anna N. Romagnoli, MD; Joseph J. DuBose, MD; David S. Kauvar, MD, MPH; & the AAST PROOVIT Study Group, Brooke Army Medical Center
Invited Discussant: Mark Seamon, MD

Introduction: Hard & soft signs, developed decades ago to guide management decisions in the setting of potential extremity vascular injury, fail to distinguish optimal evaluation or management in an era of advanced imaging and capabilities. A hemorrhagic vs. ischemic distinction may be more useful in guiding the management of extremity vascular injuries.

Methods: Femoral and popliteal arterial injuries with recorded hard/soft & hemorrhagic (HEM-overt hemorrhage, expanding hematoma, hypotension)/ischemic (ISC-absent/diminished pulses, frank ischemia) signs, were compiled from the AAST PROSpective Observational Vascular Injury Treatment database. Presentation, pathology, treatment, & outcome variables from records with any HEM signs were compared with those with only ISCH signs. Workups of those with any hard and only soft signs were examined.

Results: Hard signs were documented in 386 records; 35% had diagnostic CTA. Only soft signs were present in 175; 39% had operation for diagnosis w/o imaging. Of 521 eligible (284 femoral, 237 popliteal), 310 had one or more HEM; 211 had only ISC signs. HEM & ISC had distinct mechanism (Penetrating: HEM 69% vs ISC 41%, $P<.0001$), SBP (112 ± 35 mmHg vs 127 ± 29 , $P=.005$), fracture (37% vs 53%, $P<.0001$), concomitant vein (50% vs 33%, $P=.001$) & nerve injuries (16% vs 8%, $P=.008$), & arterial pathology (Transection: 63% vs 39%; Occlusion: 16% vs 37%, $P<.0001$). HEM went to intervention sooner (20% vs 12% <1h from injury, $P=.001$) & more likely without imaging (63% vs 46%, $P<.0001$). HEM more likely to undergo damage control ligation (19% vs 9%, $P=.002$) & primary repair (18% vs 10%); less likely endovascular repair (3.5% vs 6.2%, $P=.05$). HEM used more PRBC/24h (4 vs 2u, $P<.0001$). Amputation similar (12%); mortality was higher in HEM (8.9% vs 1.9%, $P=.001$). ICU, hospital LOS, graft-related outcomes similar.

Conclusion: Hard & soft signs no longer effectively guide evaluation & management of extremity vascular injuries. A new paradigm distinguishing hemorrhagic & ischemic signs is more appropriate to guide early workup and treatment decisions in the modern era.