Trauma Triage and Interventional Radiology / Pelvic Packing Strategy

Effective Date: 11/12/2025

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Summary

High-probability trauma patients requiring urgent IR or transfer include pelvic fractures with persistent hemodynamic instability after initial stabilization, and high-grade solid-organ injuries with active arterial bleeding (AAST IV–V, contrast extravasation, or large transfusion needs). (EAST/WSES/AAST)

Triage Categories (Practical Bedside Rules)

High Probability — Immediate Transfer / IR Required
Transfer promptly if any of the following are present. Send CT images and consult IR/trauma simultaneously.

Scenario	Clinical Indicators	Evidence / Notes
Pelvic fracture	Persistent hemodynamic instability despite resuscitation and binder/external fixation/PPP	AE indicated in ~3–10% of pelvic fractures; combined PPP + AE may be required (Aoki 2020, PMC)
Solid-organ injury	Contrast “blush” / active extravasation on CT from spleen, liver, or kidney	Consider urgent AE even if initially stable (EAST 2012; WSES 2020)
High-grade organ injury	AAST IV–V splenic or hepatic injury with ongoing bleeding, falling Hb, or expanding hematoma	SAE effective adjunct to NOM (~92% success for spleen) (Crichton 2017; Ruangvoravat 2024)

Scenario	Clinical Indicators	Evidence / Notes
Early large transfusion requirement	≥4 units PRBC in first 24 h	Predicts failure of NOM; signals likely need for IR/OR (Bankhead-Kendall; WSES)
Expanding or pulsatile hematoma	Signs of peritonitis, hemodynamic instability unresponsive to resuscitation	Positive FAST → OR; if isolated retroperitoneal/pelvic → IR often required (AAST/EAST)

Intermediate Probability — Consider IR if Available
Transfer if IR unavailable or patient borderline.

Scenario	Management Considerations	Evidence
Moderate-grade solid-organ injury (AAST III–IV)	With contrast blush but clinically improving → NOM can be attempted if IR available; otherwise transfer	EAST / systematic reviews
Pelvic fracture	CT extravasation, initially responsive to resuscitation → consider immediate transfer if ongoing transfusion or substantial blush	Pelvic AE literature
Renal injury	Pseudoaneurysm or contrast extravasation → AE effective; transfer if IR not available or deterioration	Renal trauma reviews

Low Probability — Local Observation / NOM

These patients can be safely observed locally with monitoring, OR access, blood bank availability, and emergent transfer capability.

- AAST Grade I–II solid-organ injuries, no contrast blush, hemodynamically stable, minimal transfusion need. (TSACO+1)
- Stable pelvic fractures without CT extravasation or major transfusion needs. Routine admission/observation.

Key Objective Thresholds ("Triggers")

Trigger	Action / Threshold	Evidence
CT contrast blush	Strongly consider AE if hemodynamically stable for CT	EAST/WSES
AAST IV–V splenic injury	High probability for SAE or operative management; ~20% undergo SAE	Ruangvoravat 2024
PRBC ≥4 units in first 24 h	Predicts NOM failure → IR/OR evaluation/transfer	Bankhead-Kendall; WSES
Pelvic fracture + hypotension despite binder & 2 units PRBC	Proceed to PPP/AE or transfer urgently	Aoki 2020

Outcomes / Performance Metrics

Intervention	Notes / Literature Data
Pelvic AE	Required in ~3–10% of pelvic fractures (Aoki)
Splenic AE	~92% NOM success; early high transfusion predicts failure (Bankhead-Kendall 2021)
SAE in high-grade spleen injuries	Used in ~20% of Grade IV–V injuries as NOM adjunct (Ruangvoravat 2024)
Hepatic AE	Success 80–100%; monitor for necrosis/abscess (Gilyard 2020; Green 2016)
Renal AE	Success ~63–100% depending on injury and center (Lee 2024; AUA)

Predictors of NOM Failure / IR Requirement

- Early high transfusion requirement (≥4 units in first 24 h)
- Shock index >0.9 or persistent hypotension despite resuscitation
- High AAST grade (V), age, high ISS, multiple organ injuries

Transfer / IR Decision Algorithm (One-Page Usable)

- **Hemodynamically unstable (SBP <90, signs of shock) + positive FAST / peritonitis:**
  → OR (laparotomy) unless pelvic/retroperitoneal source → PPP then AE.
- **Hemodynamically stable or transient responder:**
  → CT abdomen/pelvis with contrast.
    - Contrast extravasation, expanding hematoma, pseudoaneurysm, or Grade IV–V injury → Urgent IR consult; transfer if IR unavailable or patient deteriorates.
- **Grade I–II injury without blush, stable:**
  → Admit for observation, serial Hb, bedrest per local protocol.
- **Pelvic fracture + hypotension unresponsive to binder & fluids:**
  → Apply pelvic binder, tranexamic acid, external fixation/PPP if available → urgent IR or transfer if IR unavailable.

Transfer Package Essentials

- Brief history & mechanism of injury, mental status, vitals, vasopressor use
- Blood products administered in first 24 h (e.g., “PRBC x 6 in 6 h”)
- Imaging: full DICOM CT abdomen/pelvis (arterial & venous phase), radiology dictation
- FAST result, initial Hb, lactate, base deficit
- Operative status (peritonitis, prior laparotomy, PPP applied)
- Transport and stability information

Centers Without 24/7 IR

- High-probability patients (pelvic arterial bleeding, contrast blush + ongoing bleeding, AAST IV–V with large transfusion) → Transfer early **after initial resuscitation**. Delayed transfer increases mortality.
- PPP is a lifesaving alternative endorsed by WSES when IR is delayed or unavailable.

PPP vs AE — Evidence-Based Notes

Metric	PPP	AE	Notes
Time to intervention	~44–45 min	100–130+ min	PPP faster, lifesaving in unstable patients
Early PRBC (24h)	↓ ~1 unit vs AE	Higher	Early transfusion reduction
Mortality (crude)	23%	32%	Adjusted studies show no significant difference
Subsequent AE requirement	20–30%	–	Hybrid PPP → AE strategy
Indications	Hemodynamically unstable, IR delay >60–90 min	Active arterial blush	Complementary interventions

Key Takeaways

- PPP addresses predominantly venous/bony pelvic bleeding (80–90%)
- AE targets arterial sources (10–20%)
- Sequential or hybrid PPP → AE strategy achieves hemostasis in >90% of unstable pelvic fractures

Bottom Line / Cheat Sheet

- **CT blush → IR consult** (even if stable)
- **AAST IV–V spleen/liver → high probability IR or OR**
- **Pelvic fracture + persistent hypotension despite binder / 2 units PRBC → PPP/IR or transfer**
- **PRBC ≥4 units in 24 h → call IR / consider transfer**
- **PPP is safe, effective, and guideline-endorsed when IR unavailable**

Version Control Record			
Version	**Date**	**Author/Reviewer**	**Description of Changes**
1	11/12/25	Paul Wisniewski, D.O.	Initial review and update to reflect latest evidence/practice

References

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