ALBANIAN JOURNAL OF TRAUMA AND EMERGENCY SURGERY
Volume 10 | Issue 2 | July 2026
Pages: 2170-2175
DOI: https://doi.org/10.32391/ajtes.v10i2.507

OPEN ACCESS JOURNALS

CASE REPORTS

Effective Non-operative Treatment of Grade III–IV Splenic Trauma via Selective Arterial Embolization. A Case Report.

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Received: 17 May 2026 • Accepted: 30 June 2026 • Published online: 20 July 2026

ABSTRACT

Introduction: The most frequent solid organ injury in blunt abdominal trauma (BAT) is splenic injury, and it is typically a result of road traffic accidents or falls. While operative management was the standard practice, the trend today is increasingly towards nonoperative management (NOM), including in hemodynamically stable patients with even moderate-to-high-grade injuries. This shift has been facilitated through advances in interventional radiology and imaging that have played a pivotal role in expanding the indications for NOM, keeping medical personnel familiarized and up-to-date.

Case presentation: Here, we report a case of a 21-year-old male with Grade III+ splenic injury with moderate-to-large hemoperitoneum following a road traffic accident on a motorcycle. After initial resuscitation, the patient remained a transient responder. CT with IV contrast showed no indication of ongoing bleeding. With a progressive hemoglobin drop in the background, the patient was successfully treated by selective splenic artery embolization in a private institution, reaffirming the efficacy of the intervention. The patient recovered completely without any requirement for surgery and was discharged on the seventh day.

Conclusion: Selective splenic embolization is an effective and safe adjuvant to NOM in high-grade splenic injuries with transient responders, reducing requirements for splenectomy and preserving immunologic function.

Keywords: Blunt abdominal trauma; Splenic injury; Embolization; Interventional radiology; NOM

How to cite this article:
Dogjani, A., Haxhirexha, K., Rroji, A., Bulku, B., Dhima, A., Blloshmi, A., Ibrahimi, A., Bregaj, E., Doci, K., & Geci, D. (2026). Effective nonoperative treatment of Grade III–IV splenic trauma via selective arterial embolization: A case report. *Albanian Journal of Trauma and Emergency Surgery, 10*(2), 2170-2175. https://doi.org/10.32391/ajtes.v10i2.507

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INTRODUCTION

Splenic injury is the most frequent solid organ trauma in blunt abdominal trauma (BAT), often resulting from road traffic accidents or falls. While operative management was once the norm, the paradigm has shifted toward nonoperative management (NOM), particularly in hemodynamically stable patients—even with moderate-to-high-grade injuries. (1,2) Advances in imaging and interventional radiology have played a pivotal role in extending the indications of NOM (3,4). First reported in the trauma setting in the 1980s, SAE offers targeted vascular control, enabling the management of active bleeding, pseudoaneurysms, and high-risk vascular injuries while preserving functional splenic tissue. (5)

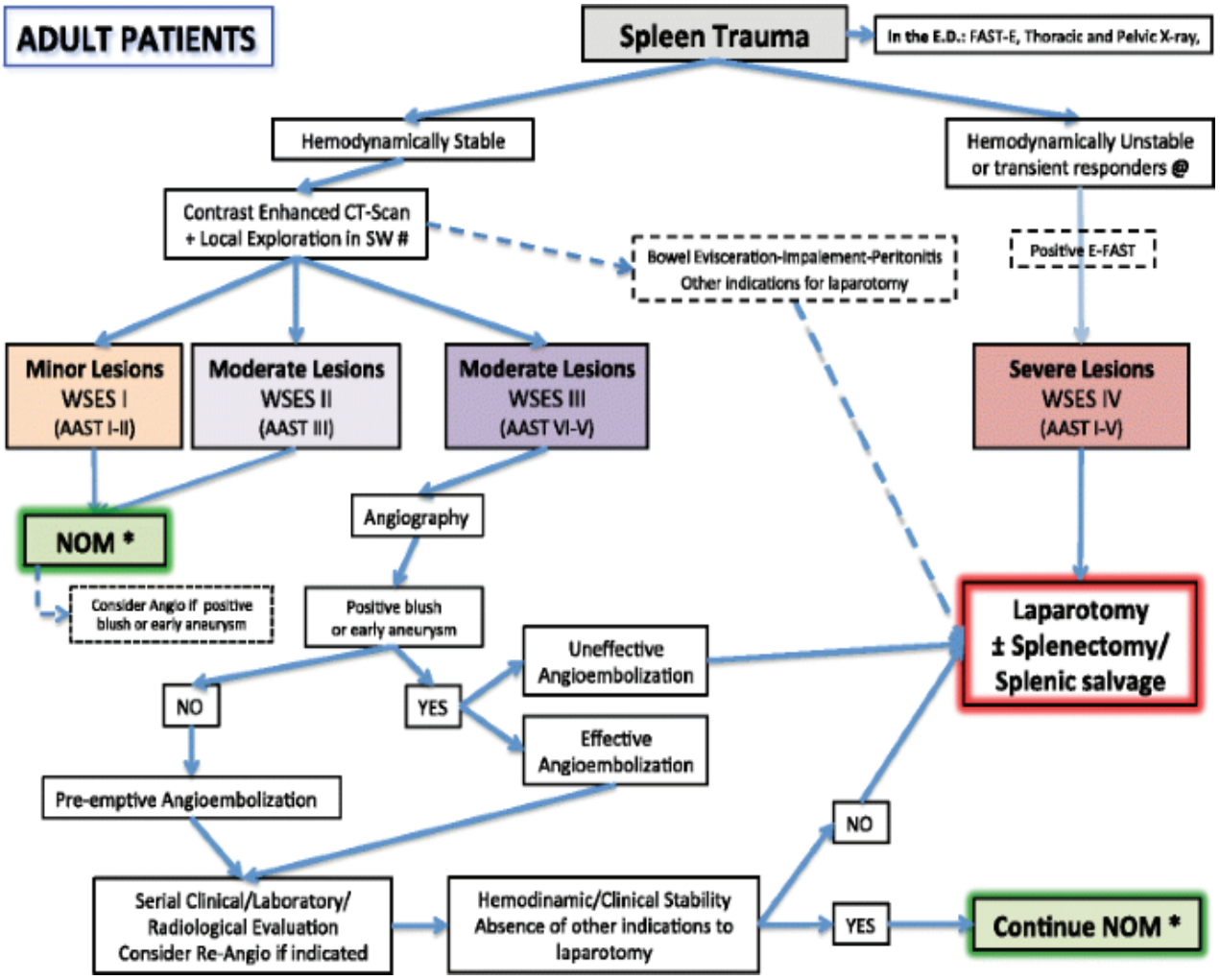
Meta-analyses and multicenter studies have confirmed the efficacy of SAE in reducing splenectomy rates, lowering transfusion requirements, and minimizing hospital stays. (6,7) Furthermore, SAE has been associated with comparable, if not superior, outcomes to operative management in carefully selected cases of high-grade injury (8).

Despite robust evidence supporting SAE, its adoption remains variable, often limited by resource availability, radiologic expertise, and institutional protocols. (9)

This variability is particularly pronounced in low- and middle-income countries, where trauma systems are still evolving and access to IR services is often inconsistent. (10,11)

In such contexts, reassessing the role of IR in splenic trauma is vital, not only from a clinical standpoint but also from the perspective of cost-effectiveness and healthcare resource optimization. (12,13)

By doing so, we aim to provide evidence that supports a broader and more systematic integration of IR techniques into trauma care pathways, particularly in emerging settings where such services are being established.



(*SW* stab wound, *GSW* gunshot wound. *NOM should only be attempted in centers capable of a precise diagnosis of the severity of spleen injuries and capable of intensive management (close clinical observation and hemodynamic monitoring in a high dependency/intensive care environment, including serial clinical examination and laboratory assay, with immediate access to diagnostics, interventional radiology, and surgery and immediately available access to blood and blood products or in the presence of a rapid centralization system in those patients amenable to be transferred; *@ Hemodynamic instability* is considered the condition in which the patient has an admission systolic blood

pressure <90 mmHg with evidence of skin vasoconstriction (cool, clammy, decreased capillary refill), altered level of consciousness and/or shortness of breath, or >90 mmHg but requiring bolus infusions/transfusions and/or vasopressor drugs and/or admission base excess (BE) >−5 mmol/l and/or shock index >1 and/or transfusion requirement of at least 4–6 units of packed red blood cells within the first 24 h; moreover, transient responder patients (those showing an initial response to adequate fluid resuscitation, and then signs of ongoing loss and perfusion deficits) and more in general those responding to therapy but not amenable of sufficient stabilization to be undergone to interventional radiology treatments. # Wound exploration near the inferior costal margin should be avoided if not strictly necessary because of the high risk of damaging the intercostal vessels.

Figure 1. Spleen Trauma Management Algorithm for Adult Patients.[14]

MATERIALS AND METHODS

We present a case of Grade III+ splenic injury successfully managed without surgery, with support from radiological embolization, illustrating the importance of early intervention and careful hemodynamic monitoring.

Table 1. AAST Splenic Injury Grading Scale [14]

Grade	Type of Injury	Injury description
I	Hematoma	Subcapsular, < 10% surface area
	Laceration	Capsular tear, < 1 cm parenchymal depth
II	Hematoma	Subcapsular, 10–50% surface area Intraparenchymal, < 5 cm diameter
	Laceration	1–3 cm parenchymal depth not involving a parenchymal vessel
III	Hematoma	Subcapsular, > 50% surface area or expanding
		Ruptured subcapsular or parenchymal hematoma
		Intraparenchymal hematoma > 5 cm
	Laceration	> 3 cm parenchymal depth or involving trabecular vessels
IV	Laceration	Laceration of segmental or hilar vessels producing major devascularization (> 25% of spleen)
V	Laceration	Completely shatters the spleen
	Vascular	Hilar vascular injury, which devascularized the spleen

Case Presentation

A 21-year-old male was brought by aeroambulance directly to the trauma red zone of the Emergency Department following a high-impact motorcycle accident sustained without protective gear. On arrival, his initial vital signs were as follows: BP: 80 mmHg; HR: 110 bpm; SpO_2: 98%; GCS: 15/15. Peripheral perfusion was poor, and the patient showed a partial response to the administration of 500 ml of Ringer's lactate, classifying him as a transient responder. Abdominal palpation revealed moderate tenderness without diffuse guarding.

The Focused Assessment with Sonography for Trauma (FAST) was positive in all quadrants. Contrast-enhanced CT (Figure 2) demonstrated a Grade III+ splenic contusion accompanied by a moderate-to-large hemoperitoneum, with no evidence of active contrast extravasation. Initial laboratory investigations showed a hemoglobin level of 12.1 g/dL, which decreased to 10.5 g/dL within 10 hours.

Due to this Hb drop and CT-confirmed parenchymal injury, the patient was referred to a private tertiary center for interventional radiology.

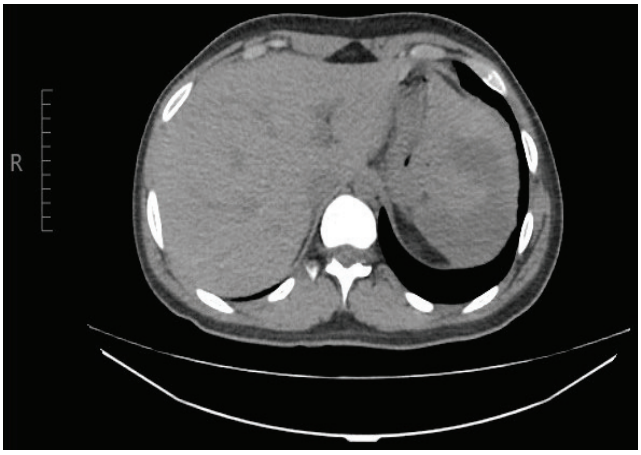


Figure 2. Axial contrast-enhanced CT scan of the upper abdomen showing a Grade III+ splenic contusion with surrounding moderate-to-large hemoperitoneum.

Intervention and Follow-up

Selective embolization of the splenic artery was performed using microcoils and PVA particles. Angiographic findings revealed a minor contrast blush in the upper splenic segment, and hemostasis was successfully achieved without complications. Post-procedure, the patient was monitored in the ICU for 48 hours, during which no fever or post-embolization syndrome occurred. Hemoglobin levels remained stable throughout the observation period. The patient was mobilized after 72 hours and discharged on Day 7. Follow-up echography at 72 hours demonstrated resolving perisplenic fluid, and a 4-week outpatient evaluation confirmed complete recovery.

DISCUSSION

Nonoperative management of splenic injuries has become the gold standard in stable patients (15). Selective arterial embolization enhances the safety and success of NOM in transient responders or in cases with high-grade injuries

Table 2. WSES Spleen Trauma Classification for adult and pediatric patients

	WSES class	Mechanism of injury	AAST	Hemodynamic status [a, b]	CT scan	First-line treatment in adults	First-line treatment in pediatric
Minor	**WSES I**	Blunt/penetrating SW/GSW	**I-II**	Stable	Yes + local exploration in SW[d]	NOM[c]+ serial clinical/laboratory/ radiological evaluation	NOM[c] + serial clinical/laboratory/r adiological evaluation
Moderate	**WSES II**	Blunt/penetrating SW/GSW	**III**	Stable	Yes + local exploration in SW[d]	Consider angiography/ angioembolization	Consider angiography/ angioembolization
	WSES III	Blunt/penetrating SW/GSW	**IV-V**	Stable		NOM[c] All angiography/angioe mbolization + serial clinical/laboratory/ radiological evaluation	
Severe	**WSES IV**	Blunt/penetrating SW/GSW	**I-V**	Unstable	No	OM	OM

SW stab wound, GSW gunshot wound

a -Hemodynamic instability in adults is considered the condition in which the patient has an admission systolic blood pressure < 90 mmHg with evidence of skin vasoconstriction (cool, clammy, decreased capillary refill),altered level of consciousness and/or shortness of breath, or > 90 mmHg but requiring bolus infusions/transfusions and/or vasopressor drugs and/or admission base excess (BE) > − 5 mmol/l and/or shock index > 1 and/or transfusion requirement of at least 4–6 units of packed red blood cells within the first 24 h; moreover, transient responder patients (those showing an initial response to adequate fluid resuscitation, and then signs of ongoing loss and perfusion deficits) and more in general those responding to therapy but not amenable of sufficient stabilization to be undergone to interventional radiology treatments

b - Hemodynamic stability in pediatric patients is considered systolic blood pressure of 90 mmHg plus twice the child's age in years (the lower limit is inferior to 70 mmHg plus twice the child's age in years, or inferior to50 mmHg in some studies). Stabilized or acceptable hemodynamic status is considered in children with a positive response to fluid resuscitation: 3 boluses of 20 mL/kg of crystalloid replacement should be administered before blood replacement; positive response can be indicated by the heart rate reduction, the sensorium clearing, the return of peripheral pulses and normal skin color, an increase in blood pressure and urinary output, and an increase in warmth of extremity. Clinical judgment is fundamental in evaluating children

c - NOM should only be attempted in centers capable of a precise diagnosis of the severity of spleen injuries and capable of intensive management (close clinical observation and hemodynamic monitoring in a high dependency/intensive care environment, including serial clinical examination and laboratory assay, with immediate access to diagnostics, interventional radiology, and surgery and immediately available access to blood and blood products or alternatively in the presence of a rapid centralization system in those patients amenable to be transferred

d - Wound exploration near the inferior costal margin should be avoided if not strictly necessary because of the high risk to damage the intercostal vessels

and hemoperitoneum but no active bleeding (15). Studies report splenic preservation in >85% of patients with embolization, reducing infectious risks associated with splenectomy (16).

Careful selection, CT findings, and access to interventional radiology are key determinants of success. The present case further illustrates the viability and success of this approach, even in a patient who was a transient responder and had a high-grade injury. The key to the successful outcome was the timely use of selective arterial embolization (SAE) as an adjunct to NOM (17).

The case report highlights several critical points.

First, while a CT scan may not show active contrast extravasation, a progressive drop in hemoglobin is a strong indicator of ongoing bleeding and should prompt further investigation. This finding was the main trigger for the patient's transfer and subsequent embolization, preventing the need for a splenectomy (18,19).

Second, the case reaffirms that SAE can be an effective and safe procedure in managing high-grade splenic injuries, even in patients who do not achieve full hemodynamic stability with initial fluid resuscitation (20).

The patient's complete recovery underscores the benefits of splenic salvage, preserving the organ's vital immune function and avoiding the long-term risks associated with splenectomy, such as an increased susceptibility to infection. (20,21)

This case also brings to light the challenges that may be faced in developing trauma systems. Despite clear evidence supporting SAE, its implementation is often limited by the availability of resources and specialized radiological expertise. (22)

Our patient required transfer to a private institution to receive this specialized care, emphasizing the need for a more widespread and systematic integration of interventional radiology services within public trauma systems (23).

By integrating these services, healthcare providers can offer patients advanced, organ-preserving treatment options, which not only improve patient outcomes but also contribute to the optimization of healthcare resources. (20-23)

CONCLUSION

This case demonstrates that even high-grade splenic trauma in transient responders can be managed without surgery when supported by radiologic embolization. Access to interventional radiology should be considered a crucial component of modern trauma systems.

Editorial Statements

Ethics Approval and Consent to Participate
This study involved the analysis of data from human participants. The research protocol was reviewed and approved by the Institutional Ethics Committee and was conducted in accordance with institutional regulations, the principles of the Declaration of Helsinki, and internationally accepted standards for biomedical research ethics.

Data Availability Statement
The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Author Contributions (CRediT): Conceptualization & Methodology: AD, EB; Data Curation, Investigation and Writing – Original Draft: EB, BR, DG: Formal Analysis: EB, KD: Writing – Review & Editing: BB, BDh, AB: Supervision: AD. All authors have read and approved the final version of the manuscript.

Artificial Intelligence (AI) Statement
The authors used a generative artificial intelligence tool solely for language editing and grammar improvement. All scientific content, data analysis, interpretation, and conclusions were independently developed, verified, and approved by the authors.

Funding: This research received no specific grant from any funding agency in the public, commercial, or notfor-profit sectors.

Conflict of Interest: The authors declare that they have no competing interests or conflicts of interest related to this study.

Acknowledgements: The authors thank all the healthcare professionals at our institution whose work contributed to the development of evidence-based data, regarding our study

REFERENCES

1. Stassen, N. A., Bhullar, I., Cheng, J. D., & Eastern Association for the Surgery of Trauma (2012). Nonoperative management of blunt hepatic injury: an Eastern Association for the Surgery of Trauma practice management guideline. *The Journal of Trauma and Acute Care Surgery*, *73*(5 Suppl 4), S288–S293. https://doi.org/10.1097/TA.0b013e318270160d
2. Dogjani, A., Haxhirexha, K., Lenjani, B., Subashi, K., Ademi, A., Blloshmi, A., Doci, K., & Bregaj, E. (2025). Liver Trauma Management: Three-Year Experience in a Tertiary Trauma Center. *Albanian Journal of Trauma and Emergency Surgery*, *9*(2), 1737 - 1758. https://doi.org/10.32391/ajtes.v9i2.485
3. Olthof, D. C., van der Vlies, C. H., & Goslings, J. C. (2017). Evidence-Based Management and Controversies in Blunt Splenic Trauma. *Current trauma reports*, *3*(1), 32–37. https://doi.org/10.1007/s40719-017-0074-2
4. Cirocchi, R., Boselli, C., Corsi, A., Farinella, E., Listorti, C., Trastulli, S., Renzi, C., Desiderio, J., Santoro, A., Cagini, L., Parisi, A., Redler, A., Noya, G., & Fingerhut, A. (2013). Is nonoperative management safe and effective for all splenic blunt trauma? A systematic review. *Critical care (London, England)*, *17*(5), R185. https://doi.org/10.1186/cc12868
5. Haan, J. M., Bochicchio, G. V., Kramer, N., & Scalea, T. M. (2005). Nonoperative management of blunt splenic injury: a 5-year experience. *The Journal of Trauma*, *58*(3), 492–498. https://doi.org/10.1097/01.ta.0000154575.49388.74
6. Dogjani, A., Gjata, A., Haxhirexha, K., & Cobani, D. (2021). Current Concepts about Managing Trauma Patients. Albanian Journal of Trauma and Emergency Surgery, 5(2.5), 24-25. https://doi.org/10.32391/ajtes.v5i2.5.259
7. Agron Dogjani. (2013). Traumat e mbyllura të abdomenit, menaxhimi dhe trajtimi. In Traumat e mbyllura të abdomenit, menaxhimi dhe trajtimi (p. 282). "Botimet Barleti". https://doi.org/10.5281/zenodo.5510592
8. Schnüriger, B., Inaba, K., Konstantinidis, A., & Demetriades, D. (2011). Outcomes of proximal versus distal splenic artery embolization after trauma: a systematic review and meta-analysis. *The Journal of Trauma*, *70*(1), 252–260. https://doi.org/10.1097/TA.0b013e3181f2a92e
9. Requarth, J. A., D'Agostino, R. B., Jr, & Miller, P. R. (2011). Nonoperative management of adult blunt splenic injury with and without splenic artery embolotherapy: a meta-analysis. *The Journal of Trauma*, *71*(4), 898–903. https://doi.org/10.1097/TA.0b013e318227ea50
10. Banerjee, A., Duane, T. M., Wilson, S. P., Haney, S., O'Neill, P. J., Evans, H. L., Como, J. J., & Claridge, J. A. (2013). Trauma center variation in splenic artery embolization and spleen salvage: a multicenter analysis. *The Journal of Trauma and Acute Care Surgery*, *75*(1), 69–75. https://doi.org/10.1097/TA.0b013e3182988b3b

11. Valcarcel, C.R., Bieler, D., Bass, G.A. et al. ESTES recommendations for the treatment of polytrauma—a European consensus based on the German S3 guidelines for the treatment of patients with severe/multiple injuries. Eur J Trauma Emerg Surg 51, 171 (2025). https://doi.org/10.1007/s00068-025-02852-4
12. Deunk, J., Brink, M., Dekker, H. M., Kool, D. R., Blickman, J. G., van Vugt, A. B., & Edwards, M. J. (2010). Predictors for the selection of patients for abdominal CT after blunt trauma: a proposal for a diagnostic algorithm. Annals of Surgery, 251(3), 512–520. https://doi.org/10.1097/SLA.0b013e3181cfd342
13. Chandran, P., Chakiath, A., Meera Sainaba, S., Girijavallabhan Nair, P., Siby, J., Madhusudanan Pillai, G., Khan, A. A., Jose, A., Pradeep Kumar, D., & George Viju, J. (2023). A Comparative Study of Operative Versus Nonoperative Management of High-Grade Splenic Injuries in a Tertiary Care Center in India. *Cureus*, *15*(12), e50010. https://doi.org/10.7759/cureus.50010
14. Huber-Wagner, S., Lefering, R., Qvick, L. M., Körner, M., Kay, M. V., Pfeifer, K. J., Reiser, M., Mutschler, W., Kanz, K. G., & Working Group on Polytrauma of the German Trauma Society (2009). Effect of whole-body CT during trauma resuscitation on survival: a retrospective, multicentre study. Lancet (London, England), 373(9673), 1455–1461. https://doi.org/10.1016/S0140-6736(09)60232-4
15. Cocanour, C. S., Moore, F. A., Ware, D. N., Marvin, R. G., & Duke, J. H. (2000). Age should not be a consideration for nonoperative management of blunt splenic injury. *The Journal of trauma*, *48*(4), 606–612. https://doi.org/10.1097/00005373-200004000-00005
16. Xu, X., Lv, M., Wang, C. *et al.* Clinical analysis on comparison of outcomes between partial splenic artery embolization and splenectomy for management of grade II–III splenic injury in blunt trauma. *Eur J Med Res* **30**, 707 (2025). https://doi.org/10.1186/s40001-025-02968-8
17. Skattum, J., Naess, P. A., & Gaarder, C. (2012). Non-operative management and immune function after splenic injury. *The British journal of surgery*, *99 Suppl 1*, 59–65. https://doi.org/10.1002/bjs.7764
18. Meyer, H. J., Riegelbauer, S., Mehdorn, M., Tautenhahn, H. M., Scheuermann, U., Zimmermann, S., Ebel, S., Denecke, T., & Struck, M. F. (2026). Prognostic relevance of contrast extravasation in patients undergoing endovascular embolization of acute bleeding. *European radiology*, *36*(3), 2147–2156. https://doi.org/10.1007/s00330-025-11986-3
19. Hatim, A. H., Kabrah, D. K., Hassan, M. E., & Qabha, H. M. (2025). Contrast Extravasation on Computed Tomography Angiography as a Predictor of Hematoma Expansion and Outcomes in Spontaneous Intracerebral Hemorrhage: A Retrospective Study. *Cureus*, *17*(10), e95853. https://doi.org/10.7759/cureus.95853
20. Breeding, T., Nasef, H., Patel, H., Bundschu, N., Chin, B., Hersperger, S. G., Havron, W. S., & Elkbuli, A. (2024). Clinical Outcomes of Splenic Artery Embolization Versus Splenectomy in the Management of Hemodynamically Stable High-Grade Blunt Splenic Injuries: A National Analysis. *The Journal of surgical research*, *300*, 221–230. https://doi.org/10.1016/j.jss.2024.05.012
21. Assaf, M., Abdullah Omar, A. A., Kaur, K., Mosa Basha, B., Shetty, S., Al-Kassar, A., & Khan, J. (2026). Role and Techniques of Splenic Angioembolization in the Management of High-Grade (AAST III-V) Blunt Splenic Trauma: A Systematic Review. *Cureus*, *18*(3), e105221. https://doi.org/10.7759/cureus.105221
22. Indian Radiological and Imaging Association (2025). Summary of the Proceedings of Asian Oceanian Radiology Forum 2025: Key Challenges in Radiology Clinical Practice across the Asia-Oceania Region. *The Indian journal of radiology & imaging*, *35*(2), 213–217. https://doi.org/10.1055/s-0045-1807250
23. Luckhurst, C. M., & Mendoza, A. E. (2021). The Current Role of Interventional Radiology in the Management of Acute Trauma Patient. *Seminars in interventional radiology*, *38*(1), 34–39. https://doi.org/10.1055/s-0041-1725113