A case report of splenic artery embolization after delayed presentation following blunt abdominal trauma, complicated by multiple large splenic artery pseudoaneurysms

European Journal of Medical Case Reports
Volume 4(5):180–182

https://doi.org/10.24911/ejmcr/173-1588245815

Rohan Nandurkar[1], Ronny Kuang[1], Warren Clements[1,2*]

ABSTRACT

Background: Splenic laceration is the most common injury following blunt abdominal trauma. The injury is characterized by the presence of parenchymal laceration; however, vascular lesions may also be seen such as pseudoaneurysms. Multiple pseudoaneurysms are rare complication. Delayed treatment is traditionally with splenectomy, however, small case series of the use of embolization have been described.

Case Presentation: A 29-year-old female presented with left upper quadrant pain 22 days after a motor vehicle accident; she was hemodynamically stable. Computed tomography imaging with contrast enhancement demonstrated American Association Staging of Trauma grade IV splenic artery injury with multiple large splenic artery pseudoaneurysms. The patient proceeded to angiography and was treated with proximal coil embolization. Ultrasound demonstrated pseudoaneurysm thrombosis at 4 days and again at 6 weeks after treatment.

Conclusion: This case demonstrates the success of splenic artery embolization in achieving non-operative management of blunt splenic injury in a sub-acute setting, even with the presence of multiple large splenic artery pseudoaneurysms.

Keywords: Case report, splenic injury, pseudoaneurysm, embolization.

Received: 30 April 2020 **Accepted:** 18 May 2020

Type of Article: CASE REPORT **Specialty:** Radiology

Funding: None.

Declaration of conflicting interests: The authors declare that there is no conflict of interests regarding the publication of this case report.

Correspondence to: Warren Clements
*Department of Radiology, Alfred Health, Melbourne, Australia.
Email: w.clements@alfred.org.au
Full list of author information is available at the end of the article.

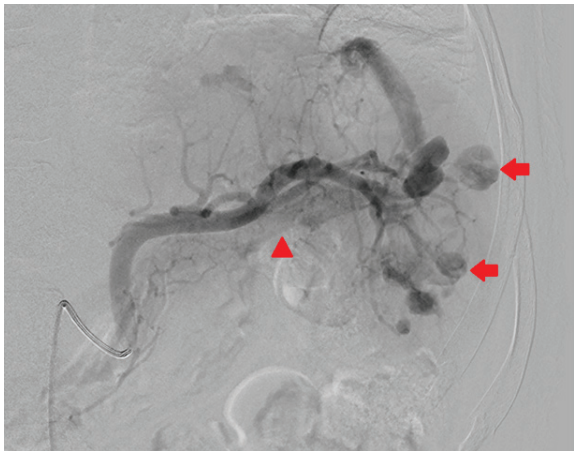
Background

The spleen is the most injured organ in blunt abdominal trauma. Splenic injury may be complicated by the presence of a vascular lesion, such as active bleeding, the development of pseudoaneurysms, or arteriovenous fistula. Historically, operative management has been the mainstay of splenic injury, however, over the last 10 years, there has been an emerging role for non-operative management (NOM) with adjuncts such as embolization in hemodynamically stable patients. This not only prevents the need for more invasive open surgery, but is associated with lower rates of complication and earlier discharge [1].This report presents a case of subacute treatment in a patient with American Association for the Surgery of Trauma (AAST) grade IV splenic injury with multiple large pseudoaneurysms, and successful non-operative course after the treatment.

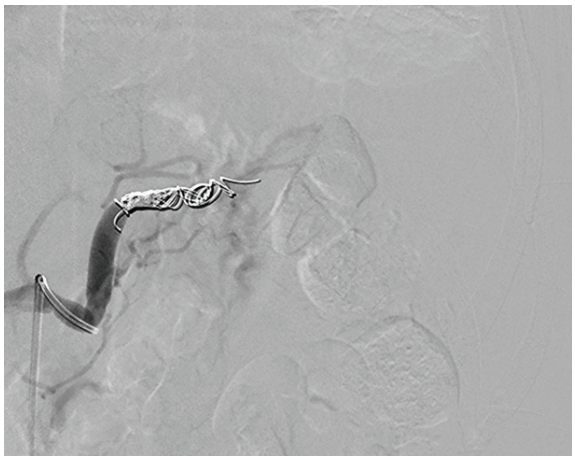
Case Presentation

A 29-year-old female was an unrestrained middle-seat back-row passenger in a motor vehicle accident. The incident occurred while on an international trip when the sports utility vehicle she was travelling in lost control and veered into an embankment at 50 miles per hour. She struck the roof and then front seat with her left chest and flank. After initial assessment at a local emergency department, she returned home. She was assessed locally 6 days after the injury where a minor orthopedic injury was treated conservatively. Twenty days after the incident, she experienced some left upper quadrant abdominal pain and was referred to our trauma clinic for assessment by her rehabilitation facility. Contrast-enhanced imaging of the abdomen on admission demonstrated AAST grade IV splenic laceration extending from the capsule to the hilum, with multiple intrasplenic pseudoaneurysms, the largest measuring 35 mm (Figure 1). The patient remained hemodynamically stable and serum hemoglobin 115 g/l. At a multidisciplinary meeting (including a trauma physician, surgeon, and interventional radiologist), it was decided to attempt NOM with splenic artery embolization. The femoral artery was accessed using a modified Seldinger technique, and 5-french sheath inserted. A catheter (5Fr C2, Cook Medical, Bloomington, IN) was advanced to the coeliac artery, followed by splenic artery selection. Subsequent angiography confirmed multiple large pseudoaneurysms and arteriovenous fistula (Figure 2a). These were treated with proximal coil embolization (Cook Nester 0.035″ coils 8 and 6 mm, Cook Medical, Bloomington, IN), placed distal to the dorsal pancreatic branch (Figure 2b). Abdominal

Figure 1. *Oblique coronal CT reformat showed AAST grade IV splenic laceration, with multiple large pseudoaneurysms (arrows).*



(a)



(b)

Figure 2. *(a) Splenic artery angiography demonstrating large pseudoaneurysms (arrows), as well as early filling of the splenic vein (arrowhead) indicating arteriovenous fistula. (b) Proximal coil embolization of the splenic artery distal to the dorsal pancreatic branches.*

ultrasound performed 4 days later demonstrated pseudoaneurysm thrombosis and serum hemoglobin remained stable. Blood film was negative for Howell-Jolly bodies indicating likelihood of preserved splenic function. Six-week follow-up ultrasound confirmed the maintenance of pseudoaneurysm thrombosis.

Discussion

The spleen is injured following blunt abdominal trauma in up to 45% of patients [2].Splenic injury is commonly graded according to the AAST classification system, which factors in presence of hematoma, degree of parenchymal laceration, and vascular injury, which may manifest as active bleeding, arteriovenous fistula, or pseudoaneurysm [3]. Vascular injury is believed to be secondary to rapid deceleration causing intimal and lamina tear [4]. The presence of multiple post-traumatic splenic artery pseudoaneurysms, as observed in our patient, is a rare complication. This large size of the pseudoaneurysms is likely contributed to by the delayed presentation and treatment which occurred 22 days after the injury. In many cases, spontaneous thrombosis of splenic artery pseudoaneurysms may occur [5]. However, persisting pseudoaneurysms have a high chance of rupture and confer a high risk of mortality if unrecognized and untreated [6,7].

Traditionally, splenectomy was the cornerstone of traumatic splenic injury management [8]. For delayed presentation or delayed rupture, it is still considered as the appropriate treatment by many, particularly with the presence of a vascular lesion. The evidence to support NOM for delayed presentations is limited to case series [9]. However, operative management results in longer hospital stay, longer wound healing, higher risk of infection, reduced splenic immune function, and heightened lifetime risk of encapsulated bacterial infection [10]. In the last 10 years, we have seen increasing acceptance of NOM in hemodynamically stable patients and is now the standard of care [8,11]. NOM focuses on close patient observation, coupled with embolization if necessary. A known complication of NOM is delayed pseudoaneurysm formation [12]. The reduction in operation numbers and improving detection rates (due to increase in access to high-quality CT imaging) may lead to increasing incidence of pseudoaneurysm detection [13].

The current body of literature to support NOM in this circumstance is largely limited to case reports and is bereft of any high-level evidence to guide protocols about optimal management of splenic artery pseudoaneurysms in the setting of subacute treatment [13].

Conclusion

This case highlights the success of proximal splenic artery embolization even in the circumstances of delayed treatment 22 days after injury and with multiple large pseudoaneurysms. This patient preserved their splenic immune function obviating the need for lifelong vaccinations and future prophylactic antibiotic use. NOM is the standard of care in the acute setting for hemodynamically stable patients; however, this case highlights that there may be

a role for embolization in the sub-acute patient cohort or patients with delayed rupture and requires further exploration.

What is new?

Historically, splenectomy has been the mainstay of splenic injury management. Recent years have seen increasing acceptance of NOM in hemodynamically stable patients. This case describes successful NOM (arterial embolization) in a patient with delayed presentation of multiple large splenic pseudoaneurysms, a severe and atypical injury.

List of Abbreviations

AAST American association staging of trauma
NOM Non-operative management

Consent for publication

Written informed consent was obtained from the patient

Ethical approval

Ethical approval is not required at our institution for publishing an anonymous case report.

Author details

Rohan Nandurkar[1], Ronny Kuang[1], Warren Clements[1,2]
1. Department of Radiology, Alfred Hospital, Melbourne, Australia
2. Department of Surgery, Monash University, Clayton, Australia

References

1. Patil MS, Goodin SZ, Findeiss LK. Update: splenic artery embolization in blunt abdominal trauma. Semin Intervent Radiol. 2020;37(1):97–102. https://doi.org/10.1055/s-0039-3401845
2. Brady RR, Bandari M, Kerssens JJ, Paterson-Brown S, Parks RW. Splenic trauma in Scotland: demographics and outcomes. World J Surg. 2007;31(11):2111–6. https://doi.org/10.1007/s00268-007-9218-9
3. Kozar RA, Crandall M, Shanmuganathan K, Zarzaur BL, Coburn M, Cribari C, et al. Organ injury scaling 2018 update: spleen, liver, and kidney. J Trauma Acute Care Surg. 2018;85(6):1119–22. https://doi.org/10.1097/TA.0000000000002058
4. Norotsky MC, Rogers FB, Shackford SR. Delayed presentation of splenic artery pseudoaneurysms following blunt abdominal trauma: case reports. J Trauma. 1995;38(3):444–7. https://doi.org/10.1097/00005373-199503000-00029
5. Muroya T, Ogura H, Shimizu K, Tasaki O, Kuwagata Y, Fuse T, et al. Delayed formation of splenic pseudoaneurysm following nonoperative management in blunt splenic injury: multi-institutional study in Osaka, Japan. J Trauma Acute Care Surg. 2013;75(3):417–20. https://doi.org/10.1097/TA.0b013e31829fda77
6. Huang IH, Zuckerman DA, Matthews JB. Occlusion of a giant splenic artery pseudoaneurysm with percutaneous thrombin-collagen injection. J Vasc Surg. 2004;40(3):574–7. https://doi.org/10.1016/j.jvs.2004.06.020
7. Woods MS, Traverso LW, Kozarek RA, Brandabur J, Hauptmann E. Successful treatment of bleeding pseudoaneurysms of chronic pancreatitis. Pancreas. 1995;10(1):22–30. https://doi.org/10.1097/00006676-199501000-00003
8. Roy P, Mukherjee R, Parik M. Splenic trauma in the twenty-first century: changing trends in management. Ann R Coll Surg Engl. 2018;100(8):1–7. https://doi.org/10.1308/rcsann.2018.0139
9. Liu PP, Liu HT, Hsieh TM, Huang CY, Ko SF. Nonsurgical management of delayed splenic rupture after blunt trauma. J Trauma Acute Care Surg. 2012;72(4):1019–23. https://doi.org/10.1097/TA.0b013e3182464c9e
10. Aiolfi A, Inaba K, Strumwasser A, Matsushima K, Grabo D, Benjamin E, et al. Splenic artery embolization versus splenectomy: analysis for early in-hospital infectious complications and outcomes. J Trauma Acute Care Surg. 2017;83(3):356–60. https://doi.org/10.1097/TA.0000000000001550
11. Davis KA, Fabian TC, Croce MA, Gavant ML, Flick PA, Minard G, et al. Improved success in nonoperative management of blunt splenic injuries: embolization of splenic artery pseudoaneurysms. J Trauma. 1998;44(6):1008–13; discussion 13-5. https://doi.org/10.1097/00005373-199806000-00013
12. Morrison CA, Gross BW, Kauffman M, Rittenhouse KJ, Rogers FB. Overview of nonoperative blunt splenic injury management with associated splenic artery pseudoaneurysm. Am Surg. 2017;83(6):554–8.
13. Tessier DJ, Stone WM, Fowl RJ, Abbas MA, Andrews JC, Bower TC, et al. Clinical features and management of splenic artery pseudoaneurysm: case series and cumulative review of literature. J Vasc Surg. 2003;38(5):969–74. https://doi.org/10.1016/S0741-5214(03)00710-9

Summary of the case

1	**Patient (gender, age)**	Female, 29
2	**Final diagnosis**	Splenic artery pseudoaneurysm
3	**Symptoms**	Left upper quadrant pain
4	**Medications**	N/A
5	**Clinical procedure**	Angiogram, embolization
6	**Specialty**	Interventional radiology, general surgery