



Splenic abscess after splenic blunt injury angioembolization



Ann. Ital. Chir.

Published online (EP) 3 November 2014

pii: S2239253X1402297X

www.annitalchir.com

Dario Tartaglia, Christian Galatioto, Piero Vincenzo Lippolis, Matteo Modesti,
Desirée Gianardi, Andrea Bertolucci, Monica Cucinotta, Giuseppe Zocco, Massimo Seccia

Emergency Surgery Unit, Emergency-Acceptance Department, University of Pisa, Pisa, Italy

Spleen abscess after splenic blunt injury amgioembolization

INTRODUCTION: Splenic Angioembolization (SAE), during Nonoperative Management (NOM) of Blunt Splenic Injury (BSI), is an effective therapy for hemodynamically stable patients with grade III, IV, and V OIS splenic injuries. We report a case of a patient with a blunt abdominal trauma due to an accidental fall, who presented splenic abscess a week after SAE and a review of the literature.

CASE REPORT: A 38-year-old male arrived at Emergency after an accidental fall with contusion of the left upper quadrant of the abdomen. Abdominal CT scan revealed the fracture of the lower splenic pole with intraparenchymal pseudoaneurysms (OIS spleen injury scale IV). Considering the hemodynamic stability, NOM was undertaken and SAE was performed. After a week, the patient developed a splenic abscess confirmed by Abdominal CT; therefore, splenectomy was performed. There was no evidence of bacterial growing in the perisplenic hematoma cultures but the histological examination showed multiple abscess and hemorrhagic areas in the spleen.

DISCUSSION: Splenic abscess after SAE during NOM of BSI is a rare major complication. The most frequently cultured organisms include *Clostridium perfringens*, *Alpha-Hemolyticus Streptococcus*, gram-positive *Staphylococcus*, gram-negative *Salmonella*, *Candida*, and *Aspergillus*. This case represents our first reported splenic abscess after SAE.

CONCLUSION: SAE is a very useful tool for BSI managing; splenic abscess can occur in a short time, even if it is a rare major complication, so it may be useful to monitor patients undergoing SAE, focusing not only on the hemodynamic parameters but also on the inflammatory and infectious aspects.

KEY WORDS: Abscess, Angioembolization, Spleen, Trauma

Introduction

In the last two decades, NOM of BSI has become the "gold standard" in the treatment of hemodynamically stable trauma patients. At present, SAE, which was first

reported in traumatic splenic injuries in the early 1980s^{1,2}, is adopted as an effective procedure for hemodynamically stable patients with grade III, IV, and V splenic injuries (OIS), even in the absence of contrast blushes or pseudoaneurysms on the Abdominal CT scan. Recent studies demonstrated low rates of splenic abscess formation after SAE, respectively for distal and proximally SAE (0% to 1.9%)⁷. In this report, we present a case of a patient with a blunt abdominal trauma after an accidental fall, who developed a splenic abscess a week after SAE. A review of the indexed case-reports in literature was done searching on main databases (Pubmed-Medline). A study of the failure rates of SAE during NOM of BSI at our Unit from January 2007 to February 2014 was also carried out.

Pervenuto in Redazione Aprile 2014. Accettato per la pubblicazione Maggio 2014

Correspondence to: Tartaglia Dario, MD, Emergency Surgery Unit, Emergency-Acceptance Department Via Paradis 2, 56100 Pisa, Italy (E-mail: dario261184@gmail.com)

Abbreviations

SAE:	Splenic Angioembolization
NOM:	Nonoperative Management
BSI:	Blunt Splenic Injury
OIS:	Organ Injury Scale
US:	Ultrasound
CT:	Computed Tomography
AP:	Antero-posterior
LL:	Latero-lateral
CC:	Cranio-caudal

Presentation of the case

A 38-year-old male was observed at Emergency of our Hospital after an accidental fall at home with contusion of the left upper quadrant of the abdomen. The history showed no significant comorbidities, except for hypertension treated with calcium channel blockers, and a penicillin allergy. The laboratory exams revealed a mild leukocytosis with no significant modification of other parameters. A chest X-Ray showed a compound fracture of the back side of the VII, VIII, IX and X left ribs; Abdominal US demonstrated an effusion around the liver and in the pelvis.

An Abdominal CT scan showed a fracture of the lower splenic pole with evident areas probably related to the

post-traumatic intraparenchymal pseudoaneurysms in the arterial phase (OIS Grade IV) (Fig. 1).

Due to hemodynamic stability, a NOM protocol was undertaken. The next day, the patient underwent a selective splenic artery angiography which confirmed the presence of multiple pseudoaneurysms of the splenic artery ramification in the equatorial-lower polar side of the spleen. A superselective embolization with spongostan gel and amagnetic metallic spirals was then performed (Fig. 2). Over the following days, the patient showed fever with laboratory findings of sepsis (WBC: 17.030 wbc/mm³; C-Reactive Protein: 15.05 mg/dl; Procalcitonin: 0.98 ng/ml), without a significant decrease in Hemoglobin values: therefore, an antibiotic-therapy with ciprofloxacin was undertaken. Abdominal US with contrast enhancement showed a small liquid effusion near the lower splenic pole, around the liver and in the mesogastric area. The spleen presented a dishomogeneous parenchyma especially in the equatorial area with normal vascularization of the lower and the upper poles. An abdominal CT scan showed a voluminous, dishomogeneous effusion inside the spleen (measures 11.5cm x 6.7cm x 16cm APxLLxCC) with hyperdense signal due to blood composition and air bubbles related to an ongoing septic-inflammatory process (Fig. 3). The effusion on the cranial side of the spleen reached the diaphragm with a satellite pleural effusion and a lower left lung lobe atelectasis.

The decision for a surgical approach was therefore taken. The exploration of the abdominal cavity showed perisplenic, left-parietocolic and pelvic blood spillage that



Fig. 1: Abdomen CT: fracture of the lower splenic pole with arterial-phase evident areas probably related to post-traumatic intraparenchymal pseudoaneurysms (OIS spleen IV).



Fig. 2: Splenic artery angiography: presence of multiple pseudoaneurysms of the splenic artery ramifications for the spleen equatorial-lower polar side.

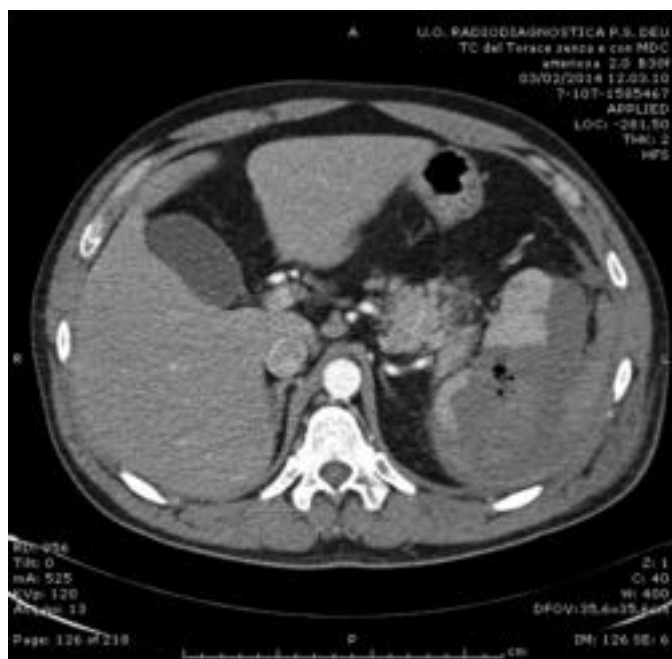


Fig. 3: Abdomen CT after SAE: voluminous unequal effusion inside the spleen (measures 11,5cm x 6,7cm x 16cm APxLLxCC) with hyperdense signal due to blood composition and air bubbles related to a septic-inflammatory process



Fig. 4: After splenectomy, the spleen seemed to have normal size, with extensive laceration of the lower pole and with a diffuse necrotic area of the upper pole of spleen.

was removed and partially sampled for bacterial cultures; a massive hematoma was noted into the splenic area, surrounded by a fibrous encasement. The spleen seemed to be of normal size, with extensive laceration of the lower pole and with a diffuse necrotic area of the upper splenic pole; therefore a splenectomy was performed (Fig. 4). Postoperatively, the patient was submitted to a large spectrum antibiotic therapy (Tigecycline and Teicoplanin) for a week. There was no evidence of bacterial growing in the perisplenic hematoma cultures. Due to the persistence of fever and the onset of hypoxia and hypocapnia, the patient was transferred to Intensive Care Unit, where he was treated with thoracentesis and Continuous Positive Airway Pressure (C-Pap). Due to the presence of thrombocytosis ($1266 \times 10^3/\text{ul}$), the patient was submitted to two platelet-apheresis sessions. In the following days, clinical conditions gradually improved: the ultrasound scan showed only a residual small effusion (3 cm) around the spleen. The patient was discharged on the sixteenth post-operative day.

The histological examination showed multiple abscess and hemorrhagic areas with occasional small vessels thrombosis and initial collateral granulating tissue.

Discussion

Currently up to 80% of hemodynamically stable trauma patients are successfully treated adopting NOM proto-

cols^{3,5,16}. The benefits of this approach include preservation of splenic immune function and reduction of rates of overwhelming postsplenectomy infection (OPSI)^{1,15,16}. NOM has been accepted as the standard treatment for OIS grades I, II and III BSI but there is still no consensus in the management of the most severe splenic injuries. Banerjee et al. proposed incorporating the selective use of NOM and, if necessary, SAE, in hemodynamically stable patients with grade IV and V BSI in level I trauma centers, to reduce the rate of laparotomy recourse⁶. According to the Eastern Association for the Surgery of Trauma practice management guideline, NOM of BSI is the first treatment of choice in hemodynamically stable patients, irrespective of the grade of injury, patient age, or the presence of associated injuries¹¹. SAE is performed during NOM of BSI from 1.4% to 10 % respectively in low and high embolization center⁶.

To date, several retrospective studies have demonstrated that the use of angioembolization is a safe and effective adjunct to NOM of BSI, associated with a low incidence of complications and acceptable failure rate^{4,5}.

According to a recent meta-analysis of Schnüriger et al., the overall failure rate after SAE during NOM is 10.2%, ranging from 0% to 33.3%⁷. Major complications requiring splenectomy range between 8.7% for proximal SAE and 10.8% for distal SAE: re-bleeding (4.7% - 6.3%), infarction (0%-1.6%) and infection (1.9% - 0%)⁴⁻⁷. An age of over 65 years represents a risk factor for a

higher rate of major complications¹³. In a recent study of Ekeh et al., splenic abscess after SAE occurs in 6.8% of NOM for splenic trauma: 2 (33%) patients were treated with splenectomy, other 2 (33%) with laparoscopic drainage, 1 (17%) with CT-guided drainage and in 1 (17%), the abscess regressed with an antibiotic therapy. Splenic abscesses were more frequent in distal than in proximal splenic embolization, in contradiction with Schnüriger's meta-analysis¹⁰. Infections mainly regarded the spleen; to our knowledge, there is only one case of a perisplenic abscess¹². The most commonly cultured organisms include *Clostridium perfringens*, *Alpha-Hemolyticus Streptococcus*¹⁴, gram-positive *Staphylococcus*, gram-negative *Salmonella*, *Candida* and *Aspergillus*¹². Our patient showed signs of infection approximately one week after SAE. Surgical perisplenic effusion cultures resulted negative despite clinical, laboratory and radiological signs indicating a splenic abscess; this last feature was subsequently confirmed by histological examination. Considering the period between January 2007 and February 2014, this case represents our first reported splenic abscess after SAE during NOM of BSI. During that period, we admitted 203 BSI, of which 38 were treated with NOM (18.7%). 12 SAE (31.5%) were performed and 3 procedures failed (25%): two because of pseudoaneurysm splenic artery formations and one due to the splenic abscess in the case which we reported.

Conclusion

SAE is a very useful tool in the treatment of BSI; splenic abscess can occur in a relatively short time, even if it is a rare major complication, so it may be useful to monitor patients undergoing SAE, focusing not only on the patient's hemodynamic parameters but also on the inflammatory and infectious aspects.

Riassunto

L'angioembolizzazione splenica è una efficace procedura nel corso del trattamento non operativo dei pazienti emodinamicamente stabili con traumi splenici di grado OIS III, IV, V. L'ascesso splenico rappresenta una rara complicanza maggiore di questa procedura. Di seguito riportiamo il caso di un paziente di 38 anni, giunto in Pronto Soccorso dopo una caduta accidentale domestica, con contusione del quadrante superiore sinistro dell'addome. La TC addome documentava una frattura del polo inferiore della milza, con pseudoaneurismi intraparenchimali (grado IV OIS). Vista la stabilità emodinamica, il paziente veniva sottoposto a trattamento non operativo. Successivamente si eseguiva un'angioembolizzazione della parte distale dell'arteria splenica con spongostan gel e spirali metalliche. Per la comparsa di febbre e per l'evidenza di sepsi agli esami ematochimici, si effettuava

un'ulteriore TC addome che evidenziava la presenza di una voluminosa raccolta di circa 11 cm all'interno della milza con multiple bolle aree nel suo contesto, con segni di emoperitoneo diffuso nei recessi addominali. Per tale motivo, ad una settimana dalla procedura, il paziente veniva sottoposto ad intervento chirurgico di splenectomia con evacuazione del versamento ematico. Gli esami colturali eseguiti sull'ematoma perisplenic risultavano negativi, ma l'esame istologico della milza documentava multiple aree ascessualizzate ed emorragiche. Dopo un ciclo di terapia antibiotica a largo spettro con Tigeciclina e Teicoplanina, il paziente veniva dimesso in sedicesima giornata post-operatoria.

In letteratura, è stato riportato che gli ascessi splenici dopo la procedura di angioembolizzazione splenica nel corso di un trattamento non operativo dei traumi splenici, si verificano nel range dello 0-1,9%. In circa un terzo dei casi richiedono un trattamento chirurgico. Nel caso riportato l'ascesso splenico si è sviluppato nel giro di una settimana dalla procedura. In conclusione, dal momento che questa rara complicanza maggiore, si può verificare in un tempo relativamente breve da una spleno-embolizzazione, sarebbe opportuno monitorizzare i pazienti sottoposti a questa procedura, non solo da un punto di vista emodinamico ma anche infettivo e infiammatorio.

References

1. Cogbill TH, Moore EE, Jurvovich GJ, Morris JA, Mucha P, Shackford SR: *Nonoperative management of blunt splenic trauma: A multicenter experience*. J Trauma, 1989; 29:1312-317.
2. Sclafani SJ: *The role of angiographic hemostasis in salvage of the injured spleen*. Radiology, 1981; 141:645-50.
3. 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: *Is non-operative management safe and effective for all splenic blunt trauma? A systematic review*. Journal Crit Care, 2013; 17(5):R185.
4. Wei B, Hemmila MR, Arbabi S, Taheri PA, Wahl WL: *Angioembolization reduces operative intervention for blunt splenic injury*. J Trauma, 2008; 64(6):1472-477.
5. Hurtuk M., Reed RL II, Esposito TJ, Davis KA, Luchette FA: *Trauma surgeons practice what they preach: the NTDB story on solid organ injury management*. J Trauma, 2006; 61:243-54.
6. Banerjee A, Duane TM, Wilson SP, Haney S, O'Neill PJ, Evans HL, Como JJ, Claridge JAJ: *Trauma center variation in splenic artery embolization and spleen salvage: A multicenter analysis*. Trauma Acute Care Surg, 2013; 75(1):69-74.
7. Schnüriger B, Inaba K, Agathoklis K, Lustenberger T, Chan L S, Demetriades D: *Outcomes of proximal versus distal splenic artery embolization after trauma: A systematic review and meta-analysis*. Journal of Trauma-Injury Infection & Critical Care, 2011; 70 (1): 252-26.
8. Ekeh AP, McCarthy MC, Woods RJ, Haley E: *Complications*

- arising from splenic embolization after blunt splenic trauma. *Am J Surg*, 2005; 189:335-39.
9. Sclafani SJ, Shaftan GW, Scalea TM, Patterson LA, Kohl L, Kantor A, Herskowitz MM, Hoffer EK, Henry S, Dresner LS: *Nonoperative salvage of computed tomographydiagnosed splenic injuries: Utilization of angiography for triage and embolization for hemostasis*. *J Trauma*, 1995; 39:818-25.
10. Ekeh AP1, Khalaf S, Ilyas S, Kauffman S, Walusimbi M, McCarthy MC: *Complications arising from splenic artery embolization: A review of an 11-year experience*. *Am J Surg*, 2013; 205(3):250-54.
11. Stassen NA, Bhullar I, Cheng JD, Crandall ML, Friesen RS, Guillaumondegui OD, Jawa RS, Maung AA, Rohs TJ Jr, Sangosanya A, Schuster KM, Seamon MJ, Tchorz KM, Zarzuar BL, Kerwin AJ: *Eastern Association for the Surgery of Trauma: Selective nonoperative management of blunt splenic injury: an Eastern Association for the Surgery of Trauma practice management guideline*. *J Trauma Acute Care Surg*, 2012; 73.
12. Johnson N, Cevasco M, Askari R: *Delayed presentation of perisplenic abscess following arterial embolization*. *Int J Surg Case Rep*, 2013; 4(1):108-11.
13. Wu SC, Fu CY, Chen RJ, Chen YF, Wang YC, Chung PK, Yu SF, Tung CC, Lee KH: *Higher incidence of major complications after splenic embolization for blunt splenic injuries in elderly patients*. *Am J Emerg Med*, 2011; 29(2):135-40.
14. Haan JM, Biffl W, Knudson MM, Davis KA, Oka T, Majercik S, Dicker R, Marder S, Scalea TM: *Splenic embolization revisited: A multicenter review*. *Western Trauma Association Multi-Institutional Trials Committee*. *J Trauma*, 2004; 56(3):542-74.
15. Rosito M, Lattarulo S, Pezzolla A, Fabiano G, Palasciano N: *Il trattamento conservativo nel trauma splenico*. *Ann Ital Chir*, 2009; 80:231-36.
16. Miniello S, Nacchiero M, Balzanelli MG, Cristallo G, Cavallo M, Lissidini G: *Trattamenti conservativi dei traumi splenici*. *Ann Ital Chir*, 2005; 76(6):553-58.