SUNTEXT REVIEWS

SunText Review of Case Reports & Images

ISSN: 2766-4589

Open Access

Case Report

Volume 3:3

A Novel Case of Delayed Splenic Rupture after Intervetional Arterial Embolization for Patients with Spleen-Kidney Blunt Injury

Zhang C, Lin J, Liu J, Guo D, Zhang D, Lv G*, Lin F and Xiao D

General Surgery Mindong Hospital Affiliated to Fujian Medical University, China

***Corresponding author:** Lv G, General Surgery Mindong Hospital Affiliated to Fujian Medical University, No. 89, Heshan Road, Fu'an, Fujian 355000, China; Tel: +86 593 8981013; E-mail: guifanglv2022@163.com

Received date: 21 September 2022; **Accepted date:** 28 September 2022; **Published date:** 04 October 2022

Citation: Zhang C, Lin J, Liu J, Guo D, Zhang D, Lv G, et al. (2022). A Novel Case of Delayed Splenic Rupture after Intervetional Arterial Embolization for Patients with Spleen-Kidney Blunt Injury. SunText Rev Case Rep Image 3(3): 153.

DOI: https://doi.org/10.51737/2766-4589.2022.053

Copyright: © 2022 Zhang C, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Introduction: Blunt abdominal injury with substantial organ rupture and haemorrhage is a common clinical critical emergency with high mortality. Non-surgical treatment and surgical treatment are the two most common clinical trials before. With the development of interventional medicine, selective arterial embolization has become one of the treatment methods for traumatic abdominal substantial organ rupture and haemorrhage. In this report, we presented a case of blunt abdominal injury with splenic renal rupture and haemorrhage, and spleen re-haemorrhage which occurred 1-week after interventional arterial embolization.

Case presentation: A 51-year-old male patient fell from a height of 2 meters, and was diagnosed as "blunt injury to the left abdomen with the rupture and haemorrhage of spleen and kidney". The patient was hemodynamic stability on admission, and non-surgical treatment, spleen and kidney artery selective embolization intervention, and retained the left ureter under cystoscope D-J tube were selected for treatment. But the non-surgical treatment is still delayed splenic rupture bleeding again after 1 week, laparotomy was finally chosen to remove the spleen.

Discussion: To date, with the development of imaging, especially the process of MDCT and vascular embolization in techniques and materials, the surgeons tend to choose non-surgical treatment for the patients with abdominal blunt injury, substantial organ rupture and haemorrhage, but hemodynamic stability. However, the risk of delayed rupture haemorrhage exists. Closely observed, vital sign monitoring, strict bed rest, dynamic detection and examination of haemoglobin and abdominal signs are recommended.

Conclusion: Interventional vascular embolization has shown superior in the non-surgical treatment of substantial organ injury, but delayed rupture and re-haemorrhage exist. Thus, a suggestion of closely observed, vital sign monitoring, strict bed rest, dynamic detection and examination of haemoglobin and abdominal signs is proposed. Nevertheless, surgery is necessary for patients who failed or recovered unstable after non-surgical treatment.

Keywords: Abdominal injuries; Blunt splenic injury; Blunt kidney injury; Delayed splenic rupture; interventional arterial embolization; Case report

Introduction

Closed abdominal injury is mainly caused by blunt violence, traffic accidents, falling from high places, fighting and sports injuries are the causes in general [1,2]. Among the abdominal parenchymal organ injuries, liver, spleen and kidney injuries are the most common. Due to the rapid development of the disease, if the patient is not treated in a timely and effective manner, it leads to death easily [3]. With the development of imaging, especially the process of MDCT and vascular embolization in techniques and materials, and aiming to protect the function of injured organs, and reducing the risk of surgery, more and more surgical treatments are switched into non-surgical treatments for treating the patients with abdominal blunt injury, substantial organ rupture and haemorrhage but hemodynamic stability. However, the risk of delayed rupture haemorrhage exists, closely observed, vital sign

monitoring, strict bed rest, dynamic detection and examination of haemoglobin and abdominal signs should be carried out. For patients with unstable vital signs or defeated non-surgical treatment, surgically remove of injured spleen or kidney is crucial [4-6].

Method

Updated consensus-based surgical case report (SCARE) was a guideline for this case [7].

Case Presentation

The 51-year-old male patient was admitted to the emergency department of our hospital for 3 hours, with abdominal pain which was caused by accidentally falling from a height of 2 meters, and landing on the left abdomen. He had no medical history or surgical history. Enhanced abdominal CT results were as follows, injury of the left kidney and spleen, abdominal cavity and retroperitoneal hemoperitoneum, and no obvious injury of liver, pancreas and gastrointestinal. The patient's vital signs were stable, 36.3℃ (body temperature), 86 beats/min (pulse), 22 beats/min (respiration), and 109/72mmHg (blood pressure). After physical examination, flat abdomen, soft abdominal muscles, no obvious skin abrasion on the left abdomen, mild tenderness on the left abdomen, no obvious rebound pain, mild tenderness and tapping pain in the left kidney area, bowel sounds 3 times per minute, and no obvious abnormality were observed. Dark red bloody urine was extracted after the indwelling catheter. Laboratory tests results were performed that albumin, bilirubin, aminotransferase, electrolyte and amylase were basically normal, and ECG showed no abnormality. The more details were shown in (Table 1).

Table 1: *Laboratory parameters of patient.*

S.no	Laboratory test	Normal range	On admission	After interventional	Before laparotomy	Before discharge
1	WBC count ($\times 10^9$ cells/L)	3.5-9.5	22	17.7	13.8	11
2	Neutrophil (%)	40-75	90.1	86.2	74	70.8
3	Lymphocyte (%)	20-50	3.4	4.3	12.2	19.8
4	Hemoglobin (g/ L)	130-175	105	87	66	94
5	Platelet count ($\times 10^9$cells/L)	125-350	154	100	322	449
6	Hematocrit (%)	40-50	31.5	24.5	22.1	30.4
7	AST (U/L)	17-59	32	55	47	22
8	ALT (U/L)	21-72	32	48	45	21
9	Albumin (g/L)	35-50	33.9	29.7	28	38.1
10	Amylase (U/L)	0-130	50	58	56	62
11	Blood sodium level (mEq/L)	137-145	139	135	135	142
12	Blood potassium level (mEq/L)	3.5-5.1	4.3	4.3	4.39	4.14
13	Blood calcium	2.25-2.75	1.98	1.95	2.09	2.34

	level (mg/dL)					
14	Creatinine (mg/ dL)	58-110	110.3	112.4	111	86
15	GFR(ml/min)	≥80	66.39	68.95	65.88	89.69
16	PCT(ng/mL)	0-0.05	0.41	1.4	0.62	0.2

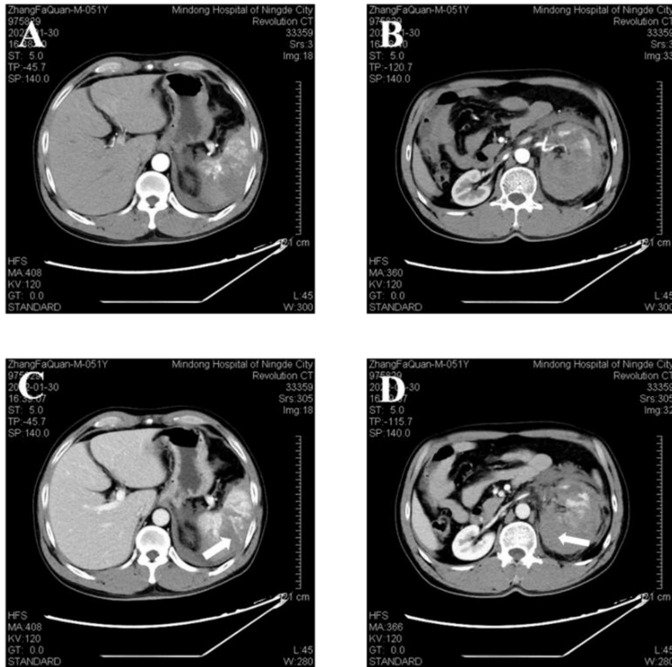

Figure 1: *(A, B): Splenorenal rupture at arterial stage through contrast-enhanced CT. (C, D): Splenorenal rupture at venous stage through contrast-enhanced CT. White arrow showed subcapsular hematoma with splenic renal parenchymal injury.*

According to organ injury scaling 2018 update, based on the situation of sustained hematuria, assessment of splenic IV and renal IV injury via enhanced CT classification (Figure 1), "selective left kidney and splenic artery embolization" was arranged in the interventional catheter room (Jan 30), after discussion by the multidisciplinary team of the emergency Department and obtaining the consent of the patient's family [8]. Absolute bed rest was performed after surgery, infection prevention and fluid rehydration support were provided (Figure 1). On the second postoperative day (Feb 1), the patient was in poor mental state, and had a fever to a maximum body temperature of 39℃. The presented data were haemoglobin: 87 g/L, erythrocyte specific volume: 24.5%, white blood cell: 17.7×10^9 cells/L, neutrophil percentage: 86.2%, PCT: 1.4 ng/mL. Blood clots were observed in urine, white blood cell (+) and red blood cells (31985.90 /ul) were detected. Urologists performed "cystoscopic indwelling of left ureteral D-J tube" in consideration of the infection or urine extravasation of left kidney injury (Feb 5). The patient's haemoglobin was 73 g/L, RBC was 21.3%, white blood cell was 13.1×10^9 cells/L, and 2 units of B-type RhD positive dewhitening red blood cells were applied for infusion; after transfusion, haemoglobin was 83 g/L, erythrocyte specific volume was 24.5%. The symptom of abdominal distension was complained by patient, decreased blood pressure and oxygen saturation were observed. Vital signs were as follows: 105 times/min(pulse), 25 times/min(respiration), 85/56mmHg(blood pressure), 93%(SPO2). Anti-shock, oxygen and other treatments were given, and whole-abdominal enhanced CT showed that splenic rupture and abdominal hemoperitoneum increased significantly (Figure 2).

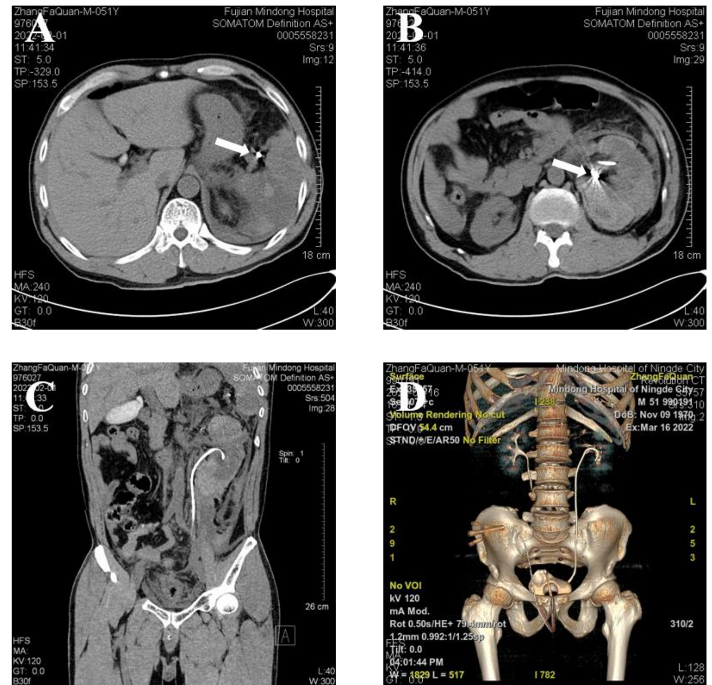

Figure 2: *(A, B)Splenorenal satery embolism (of Plain CT scan).White arrow showed the embolized spring coil. (C, D)Coronal CT image of left ureteral D-J tube placement.*

"Exploratory laparotomy splenectomy" was operated immediately. During the operation, there were multiple splenic lacerations, the largest of which was about 6.5×3×1.8cm, and there was active bleeding, all of them were induced by shock. The total amount of blood and fluid in the abdominal cavity was about 1500ml. During the operation, 3 units of whole blood were transfused. After the resection, the spleen was confirmed as Grade

V injury (Figure 3). The adhesion around the spleen, and the swelling around the ruptured left kidney were obvious, the retroperitoneum which affected the exposure of splenectomy was lifted significant, due to the difficult operation and long-term postoperation. The patient was transferred to intensive care unit after surgery, recovered well and discharged on March 1. Up to the present day, the D-J tube of the left ureter has been removed and the patient has returned to normal (Figure 4).

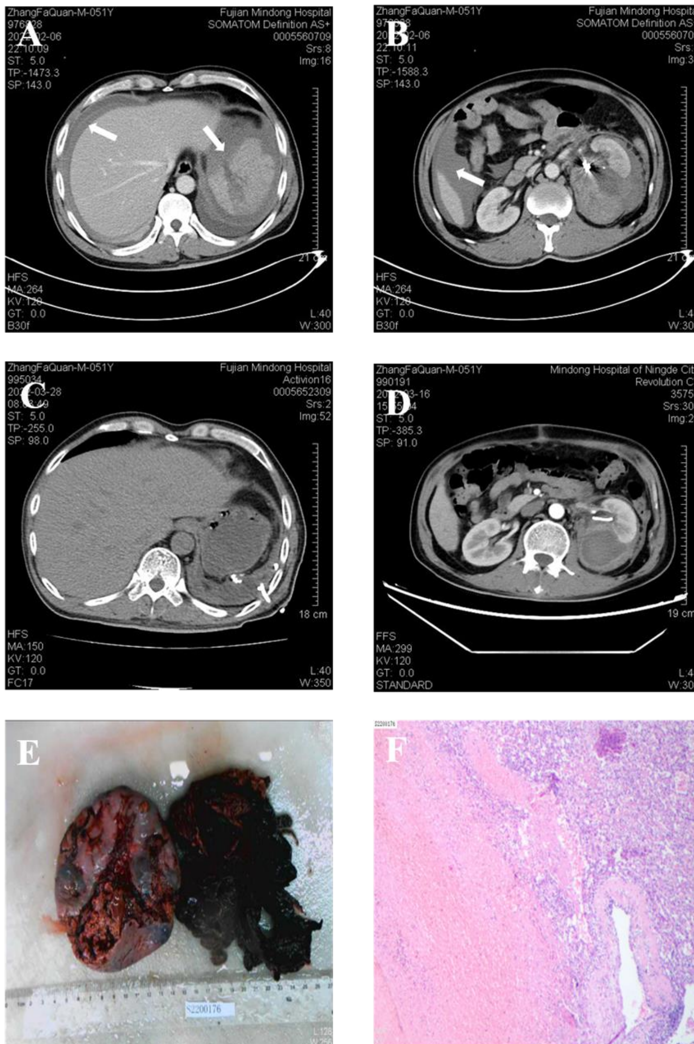

Figure 3: *(A, B) CT image of peritoneal hematocele with delayed splenic hemorrhage (white arrow). (C, D) CT image after splenectomy. (E, F) Gross examination of spleen after resection and HE tissue staining.*

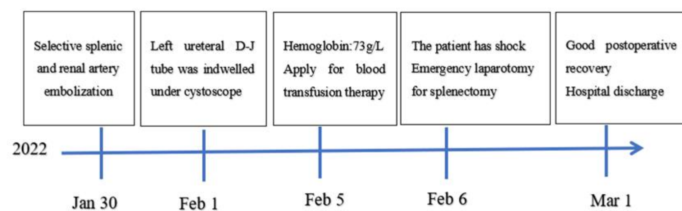

Figure 4: *Timeline overview of events and interventions.*

Discussion

The spleen is the most common injured parenchymal organ in blunt abdominal injury [9]. However, spleen injury is accompanied by left kidney injury in patients. Splenectomy used to be the main treatment for splenic rupture and haemorrhage, but postoperative patients have risks such as explosive infection and rapid increase of platelet [10]. Non-surgical treatment has been established as one of the main treatment methods for blunt abdominal parenchymal organ injury in patients with hemodynamic stability, especially as the standard treatment method in paediatric abdominal parenchymal organ injury, and the success rate of non-surgical treatment has reached to 90-100% as reports [11-13]. In adult patients, non-surgical treatment is becoming a preference for surgeons. With the development of vascular embolization technical and materials, interventional vascular embolization has become an important adjunctive method for the non-surgical treatment of parenchymal organ injury, effectively improving the success rate of the non-surgical treatment. However, delayed complications of non-surgical treatment have been reported from time to time, including pseudocyst, abscess, pseudocyaneurysm, delayed rupture haemorrhage, etc. Among these complications, delayed rupture haemorrhage is the most serious and deserves more attention from clinical surgeons. I declared delayed rupture of the spleen as the rupture of the spleen that occurred after 48-hours of post operation firstly, and defined it as the Latent period of Baudet, which was diagnosed as the case of delayed rupture of the spleen. Rupture usually occurs 48 to 72 hours after injury [14,15]. However, presented four cases of delayed splenic rupture that occurred in 4 to 20 days after injury [16]. Davis et al. reviewed cases of delayed splenic haemorrhage and found that they occurred 2 to 28 days after injury [17]. In our report, a case of delayed splenic rupture occurred on the 7th day after injury interventional embolization, and the patient presented abdominal pain, abdominal distension, shock, and other manifestations. The re-examination of enhanced CT found that the abdominal hematocele was increased, so that emergency splenectomy was selected. Delayed splenic rupture has been reported, but re-haemorrhage after splenic interventional embolization is rarely reported, and the patients also have left kidney injury, which brought greater challenges to clinical treatment and observation of the condition. Kidney injury accounts for 8-10% of abdominal trauma and 1-5% of all trauma [18,19]. With the management of kidney injury has been established. Non-surgical treatment (NOM) has even been mainly used for severe renal injury [20]. There has been controversy over the management of hemodynamically stable patients with grade IV-V blunt injury and penetrating injury, but the conservative treatment is supported by majority currently [21]. In this case, the patient suffered both

spleen and kidney injury. After discussion by a multidisciplinary team, we first chose non-surgical treatment mainly involving vascular embolization to preserve the function of organs to the best of our ability, unfortunately the patient still suffered from delayed splenic rupture and haemorrhage. Interventional vascular embolization has shown good advantages in the non-surgical treatment of substantial organ injury. In 2017, compared the early postoperative infection rate and prognosis of patients with spleen injury treated by splenic artery embolization (N =461) and splenectomy (n =3 602) The results illustrated that the early postoperative infection rate (11.7%) and mortality rate (5.4%) in the splenic artery embolization group were significantly lower than those in the splenectomy group (23.1%, 12.7%, P < 0. 001). The historical incidence of delayed splenic rupture has been reported to range from 0.3% to 24% [22]. A systematic review by Olthof et al showed that the prognostic factors for non-surgical treatment failure were age (40 and above), injury severity score (ISS) (25 years and above), spleen injury grade (3 and above), and red blood cell infusion (1 or more units) [23]. It also suggests that surgeons should closely observed, vital sign monitoring, strict bed rest, dynamic detection and examination of haemoglobin and abdominal signs during non-surgical treatment.

Conclusion

With the development of imaging, especially the process of MDCT and vascular embolization in technique and materials, interventional vascular embolization in substantive organ damage non-surgical therapy showed superior advantages, for patients with abdominal blunt injury, substantial organ rupture and haemorrhage but hemodynamic stability, the surgeons prefer to non-surgical treatment. However, there is delayed rupture haemorrhage existence probably, closely observed, vital sign monitoring, strict bed rest, dynamic detection and examination of haemoglobin and abdominal signs are as a standard during recovery time after non-surgical treatment.

Acknowledgements

We thank the Hospital multidisciplinary team for providing useful advice and cooperation.

Authors Contributions

Chun Zhang, Jian-yuan Lin, Dai-chang Zhang and Deng-fang Guo underwent emergency splenectomy. Chun Zhang, Gui-fang Lv and Jia-bin Liu, De-xian Xiao were responsible for the writing of the manuscript and critically revised the important knowledge content of the article. Feng Lin finally approved the article. All authors read and approved the final draft.

Funding

No funding has been received for this project.

Availability of Data and Materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Consent for publication

This report obtained the written consent of patient to be published, and a copy of document could be consulted by the editor upon request.

Ethics approval and consent to participate

This case report was approved by the Medical Ethical Committee of Xi’an Daxing Hospital and the Medical Ethical Committee of Mindong Hospital Affiliated to Fujian Medical University. Written informed consent was obtained from this patient.

Competing Interests

All authors jointly declare that they have no conflict of interest.

References

1. Tozzi P, Pralong E, Gronchi F, Siniscalchi G. A new combined technique reducing the risk of paraplegia during thoracoabdominal aorta replacement. Thorac Cardiovasc Surg. 2017; 65: 126-129.
2. Soto JA, Anderson SW. Multidetector CT of blunt abdominal trauma. Radiology. 2012; 265: 678-693.
3. Miele V, Piccolo CL, Trinci M, Galluzzo M, Ianniello S, Brunese L. Diagnostic imaging of blunt abdominal trauma in pediatric patients. Radiol Med. 2016; 121: 409-430.
4. Morey AF, Brandes S, Dugi DD, Armstrong JH, Breyer BN, Broghammer JA, et al. Urotrauma: AUA guideline. J Urol. 2014; 192: 327-335.
5. Lynch TH, Martinez-Pineiro L, Plas E, Serafetinides E, Turkeri L, Santucci RA, et al. EAU guidelines on urological trauma. Eur Urol. 2005; 47: 1-15.
6. Coccolini F, Moore EE, Kluger Y, Biffl W, Leppaniemi A, Matsumura Y, et al. Kidney and uro-trauma: WSES-AAST guidelines. World J Emerg Surg. 2019; 14: 54.
7. Agha RA, Franchi T, Sohrabi C, Mathew G, Kerwan A. The scare 2020 guideline: updating consensus surgical case report (scare) guidelines. Int J Surg. 2020; 84: 226-230.
8. 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: 1119-1122.
9. Lynn KN, Werder GM, Callaghan RM, Sullivan AN, Jafri ZH, Bloom DA. Pediatric blunt splenic trauma: a comprehensive review. Pediatr Radiol. 2009; 39: 904-916.
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: 356-60.

11. Daodu O, Brindle M, Alvarez-Allende CR, Lockyer L, Weber B, Lopushinsky SR. Outcomes of an accelerated care pathway for pediatric blunt solid organ injuries in a public healthcare system. J Pediatr Surg. 2017; 52: 826-831.
12. Martin K, Vanhouwelingen L, Butter A. The significance of pseudoaneurysms in the nonoperative management of pediatric blunt splenic trauma. J Pediatr Surg. 2011; 46: 933-937.
13. Notrica DM, Sayrs LW, Bhatia A, Letton RW, Alder A, St Peter S, et al. The incidence of delayed splenic bleeding in pediatric blunt trauma. J Pediatr Surg. 2018; 53: 339-343.
14. El Rifi K. The latent period of baudet. Br J Surg. 1967; 54: 238-239.
15. Resteghini N, Nielsen J, Hoimes ML, Karam AR. Delayed splenic rupture presenting 70 days following blunt abdominal trauma. Clin Imaging. 2014; 38: 73-74.
16. Jen HC, Tillou A, Cryer HG, Shew SB. Disparity in management and long-term outcomes of pediatric splenic injury in California. Ann Surg. 2010; 251: 1162-1166.
17. Davies DA, Fecteau A, Himidan S, Mikrogianakis A, Wales PW. What's the incidence of delayed splenic bleeding in children after blunt trauma? An institutional experience and review of the literature. J Trauma. 2009; 67: 573-577.
18. Parth P, Dipesh D, Samir K. Management of renal injuries in blunt abdominal trauma. J Res Med Den Sci. 2014; 2: 38-42.
19. Gormley EA, Lightner DJ, Burgio KL, Chai TC, Clemens JQ, Culkin DJ, et al. Diagnosis and treatment of overactive bladder (non-neurogenic) in adults: AUA/SUFU guideline. J Urol. 2012; 188: 2455-2463.
20. Brewer ME Jr, Strnad BT, Daley BJ, Currier RP, Klein FA, Mobley JD, Kim ED. Percutaneous embolization for the management of grade 5 renal trauma in hemodynamically unstable patients: initial experience. J Urol. 2009; 181: 1737-1741.
21. Urogenital trauma guidelines. 2022.
22. Hamidian Jahromi A, Migliaro M, Romano M, Sangster G. Delayed splenic rupture; normal appearing spleen on the initial multidetector computed tomography (mdct) can sometimes be misleading. Trauma Mon. 2016.
23. Olthof DC, Joosse P, van der Vlies CH, de Haan RJ, Goslings JC. Prognostic factors for failure of nonoperative management in adults with blunt splenic injury: a systematic review. J Trauma Acute Care Surg. 2013; 74: 546-557.