

# Splenic Infarction Due to Epstein-Barr Virus: A Case Report and Literature Review

Review began 03/21/2024  
Review ended 04/11/2024  
Published 04/16/2024

© Copyright 2024

Singhal et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Adit Singhal<sup>1</sup>, Kelly I. Suchman<sup>2</sup>, Aaron Rhee<sup>1,3</sup>, Himanshu Patel<sup>1,5</sup>, Awais Paracha<sup>1</sup>, Vedika Agrawal<sup>4</sup>, Jessica Cohen<sup>1</sup>

1. Internal Medicine, Northwell Health, New Hyde Park, USA 2. Gastroenterology, Northwell Health, New Hyde Park, USA 3. Internal Medicine, Zucker School of Medicine at Hofstra/Northwell, Hempstead, USA 4. Pediatrics, Ohio State University, Nationwide Children's Hospital, Columbus, USA

**Corresponding author:** Himanshu Patel, hpatel39@northwell.edu

---

---

## Abstract

Splenic infarction is a rare and likely underdiagnosed complication of Epstein-Barr virus (EBV)-associated infectious mononucleosis (IM). Here, we describe an 18-year-old Guyanese male with persistent severe left-sided abdominal pain found to be EBV positive and have a large splenic infarct, along with a transient decrease in protein C, protein S, and antithrombin III activity levels. He was treated with supportive care and anticoagulated with heparin and apixaban. We review prior reports and perspectives on underlying pathophysiology, diagnosis, and the management of these cases, which likely do not require anticoagulation but may be considered on a per-case basis.

---

**Categories:** Genetics, Infectious Disease, Hematology

**Keywords:** ebv, case report, epstein-barr virus, splenic infarction, infectious mononucleosis

## Introduction

Infectious mononucleosis (IM), caused by Epstein-Barr virus (EBV), is characterized by fever, sore throat, lymphadenopathy, and fatigue. While most cases of IM are self-limiting and resolve without complication, rare complications such as splenic rupture or infarction have been described in 0.1–0.5% of cases [1,2]. EBV-associated splenic infarction has been reported in 29 cases per our literature review, yet the mechanism by which it occurs remains unclear. Although management typically involves supportive care, infarction should be considered in patients presenting with IM and abdominal pain to prevent potential complications such as rupture, abscess, and sepsis [3,4]. Here, we present an EBV-positive young adult male with abdominal pain, found to have a splenic infarct along with a transient decrease in protein C, S, and antithrombin III (ATIII) activity levels.

This article was previously posted to the Authorea preprint server on March 25, 2023.

## Case Presentation

An 18-year-old male with no past medical history presented in the emergency department (ED) with persistent left-sided abdominal pain for eight days with associated subjective fevers, nausea, and non-bilious, non-bloody emesis. His pain was described as burning and stabbing diffusely and localized more to the left upper quadrant (LUQ). He denied any recent illness, diarrhea, cough, recent travel, or other symptoms. His pain was well controlled with oral acetaminophen. The patient was in college, learning remotely, and denied recent sick contacts. He took no medications, had no family history of autoimmune disorders, and denied alcohol, tobacco, or drug use.

On presentation, he was afebrile (37.8°C) and tachycardic to 118 beats per minute. The exam was notable for LUQ and right lower quadrant abdominal tenderness. No lymphadenopathy, tonsillar edema/exudates, petechial hemorrhages, splenomegaly, or hepatomegaly were noted. Computed tomography (CT) revealed a mildly enlarged spleen measuring 13.8 cm with a large wedge-shaped region within the superior aspect of the spleen, compatible with infarct (Figures 1A, 1B).

### How to cite this article

Singhal A, Suchman K I, Rhee A, et al. (April 16, 2024) Splenic Infarction Due to Epstein-Barr Virus: A Case Report and Literature Review . Cureus 16(4): e58414. DOI 10.7759/cureus.58414



	Year	Age/Sex	Abdominal Pain	Splenomegaly	Splenic Rupture	Splenectomy	Anticoagulation	Survival
Chevat et al. [6]	1961	N/A	LUQ	Yes	Yes	Yes	N/A	Yes
Guibaud et al. [7]	1983	34/M	LUQ	N/A	N/A	Yes	N/A	Yes
Boivin and Bernard [8]	1990	19/F	LUQ	Yes	No	Yes	N/A	Yes
Garten et al. [9]	1992	57/F	No	Yes	No	Yes	N/A	Yes
Trevenzoli et al. [10]	2001	17/M	LUQ	Yes	No	No	No	Yes
Symeonidis et al. [11]	2001	17/M	LUQ	Yes	No	No	No	Yes
Kim and Kopelman [12]	2005	40/M	LUQ	No	No	No	No	Yes
van Hal et al. [13]	2005	35/F	LUQ	No	No	No	No	Yes
Benz et al. [14]	2007	19/F	LUQ	Yes	No	No	No	Yes
Hunt et al. [4]	2010	29/F	LUQ	Yes	No	No	No	Yes
Breuer et al. [15]	2010	13/M	LUQ	Yes	No	No	No	Yes
Cull and Stein [16]	2012	18/F	LUQ	Yes	Yes	No	No	Yes
Gang et al. [17]	2013	7/F	RUQ	Yes	No	No	No	Yes
Gavriilaki et al. [18]	2013	17/M	LUQ	Yes	No	No	No	Yes
Kobe et al. [19]	2013	22/M	RUQ	Yes	No	No	No	Yes
Mackenzie and Liebmann [20]	2013	18/M	LUQ	Yes	No	No	No	Yes
Li et al. [21]	2014	19/F	Upper	Yes	No	No	No	Yes
Bhattarai et al. [22]	2014	16/M	Epigastric	Yes	No	No	No	Yes
Machado et al. [23]	2015	24/M	LUQ	Yes	No	No	No	Yes
Heo et al. [24]	2016	20/F	LUQ	No	No	No	No	Yes
Naviglio et al. [25]	2016	14/M	LUQ	Yes	No	No	No	Yes
Noor et al. [26]	2017	25/F	LUQ	Yes	No	No	No	Yes
Li et al. [27]	2018	24/F	LUQ	No	No	No	No	Yes
		20/M	LUQ	No	No	No	No	Yes
		25/F	LUQ	Yes	No	No	No	Yes
Pervez et al. [28]	2020	20/M	LUQ	No	No	No	No	Yes
Turrian [29]	2021	24/M	LUQ	N/A	No	No	7 Days	Yes
Nishioka et al. [30]	2022	19/M	LUQ	No	No	No	No	Yes
Sowka and Mali [31]	2022	60/M	Left Side	N/A	No	No	Lovenox to ASA	Yes

**TABLE 1: Literature review of splenic infarction in EBV infectious mononucleosis**

M, male; F, female; LUQ, left upper quadrant; RUQ, right upper quadrant; N/A, not applicable; ASA, aspirin; EBV, Epstein-Barr virus

The mechanism behind splenic infarction with EBV infection remains unclear. Splenic histopathology results are limited but have noted splenic lymphoid hyperplasia, partial fibrosis, and sinus congestion without thrombus formation. This hypercellularity has been thought to disrupt splenic sinus infrastructure, causing shifts in blood flow that are unable to meet the increased oxygen demand of an enlarged spleen and thereby increase the risk of ischemia [6,9,32,33]. Earlier case reports and studies have also suggested that transient coagulopathic states may be involved, with instances of decreased activity of proteins C and S, positive lupus anticoagulant and anticardiolipin antibodies, positive antiphospholipid antibodies, and increased factor VIII [4,15-17,23,27]. However, thrombophilia studies in most reports were unremarkable. An

underlying predisposition in conjunction with the above may predispose certain patients to be more coagulopathic including hereditary spherocytosis, sickle cell trait, pyruvate kinase deficiency, or co-infection with other viruses [8,21,32,33]. However, most reports showed unremarkable thrombophilia studies and no signs of thrombus formation in other organ systems. Furthermore, almost all cases exhibited splenomegaly. Thus, we suspect architectural changes with lymphoproliferation within splenic sinuses likely contribute to infarction more than a transient thrombogenic state.

Point-of-care ultrasound is becoming more utilized as a first-line imaging modality in the acute setting for abdominal pain [7], but given that a 2009 retrospective study showed ultrasound sensitivity to be only 18% [2], contrast-enhanced CT should be the test of choice. MRI may be considered for pediatric populations in particular if ionizing radiation is a concern. Few prior studies reported follow-up imaging like ours, but results vary from improvement to no significant changes. Repeat CT or MRI is likely an unnecessary and costly test with little benefit in guiding further management. Patients should avoid contact sports to reduce the risk of splenic rupture for a minimum of three weeks after onset of clinical symptoms [34], although splenomegaly has been reported in cases to persist for longer (>8 weeks in our case). Clinicians may use ultrasound to help gauge improvement in splenomegaly if a patient plans to return to contact sports.

## Conclusions

Although rare, splenic infarctions associated with IM should be considered in patients presenting with abdominal pain. There are currently no guidelines for diagnosis and management of these patients. Despite some cases having a self-limiting transient thrombogenic phase which doesn't require anticoagulation, clinicians should be aware of potential complications including abscess and rupture.

## Additional Information

### Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

**Concept and design:** Himanshu Patel, Awais Paracha, Adit Singhal, Vedika Agrawal, Jessica Cohen

**Critical review of the manuscript for important intellectual content:** Himanshu Patel, Awais Paracha, Adit Singhal, Kelly I. Suchman, Aaron Rhee, Vedika Agrawal, Jessica Cohen

**Acquisition, analysis, or interpretation of data:** Adit Singhal, Kelly I. Suchman, Aaron Rhee

**Drafting of the manuscript:** Adit Singhal, Aaron Rhee

**Supervision:** Jessica Cohen

### Disclosures

**Human subjects:** Consent was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

## References

1. Luzuriaga K, Sullivan JL: Infectious mononucleosis. *N Engl J Med.* 2010, 362:1993-2000. [10.1056/NEJMcp1001116](https://doi.org/10.1056/NEJMcp1001116)
2. Antopolsky M, Hiller N, Salameh S, Goldshtein B, Stalnikowicz R: Splenic infarction: 10 years of experience. *Am J Emerg Med.* 2009, 27:262-5. [10.1016/j.ajem.2008.02.014](https://doi.org/10.1016/j.ajem.2008.02.014)
3. Jaroch MT, Broughan TA, Hermann RE: The natural history of splenic infarction. *Surgery.* 1986, 100:743-50.
4. Hunt DP, Thabet A, Rosenberg ES: Case records of the Massachusetts General Hospital. Case 29-2010. A 29-year-old woman with fever and abdominal pain. *N Engl J Med.* 2010, 365:1266-74. [10.1056/NEJMcp1007084](https://doi.org/10.1056/NEJMcp1007084)
5. Nores M, Phillips EH, Morgenstern L, Hiatt JR: The clinical spectrum of splenic infarction. *Am Surg.* 1998, 64:182-8.
6. Chevat H, Aulong C, Demaille A, Adenis L, Bertrand M: Splenic infarct and infectious mononucleosis [Article in French]. *Lille Med.* 1961, 6:314-7.
7. Guibaud S, Plumet-Leger A, Frobert Y: Transient neutrophil aggregation in a patient with infectious mononucleosis. *Am J Clin Pathol.* 1983, 80:883-4. [10.1093/ajcp/80.6.883](https://doi.org/10.1093/ajcp/80.6.883)
8. Boivin P, Bernard JF: Pyruvate kinase deficiency, infectious mononucleosis, hemolytic anemia with cold autoantibodies and massive splenic infarction [Article in Turkish]. *Presse Med.* 1990, 28:818-9.
9. Garten AJ, Mendelson DS, Halton KP: CT manifestations of infectious mononucleosis. *Clin Imaging.* 1992,

- 16:114-6. [10.1016/0899-7071\(92\)90123-q](https://doi.org/10.1016/0899-7071(92)90123-q)
10. Trevenzoli M, Sattin A, Sgarabotto D, Francavilla E, Cattelan AM: Splenic infarct during infectious mononucleosis. *Scand J Infect Dis.* 2001, 33:550-1. [10.1080/00365540110026629](https://doi.org/10.1080/00365540110026629)
  11. Symeonidis A, Papakonstantinou C, Seimeni U, et al.: Non hypoxia-related splenic infarct in a patient with sickle cell trait and infectious mononucleosis. *Acta Haematol.* 2001, 105:53-6. [10.1159/000046534](https://doi.org/10.1159/000046534)
  12. Kim KM, Kopelman RI: Medical mystery: abdominal pain--the answer. *N Engl J Med.* 2005, 353:1421-2. [10.1056/NEJMc055352](https://doi.org/10.1056/NEJMc055352)
  13. van Hal S, Senanayake S, Hardiman R: Splenic infarction due to transient antiphospholipid antibodies induced by acute Epstein-Barr virus infection. *J Clin Virol.* 2005, 32:245-7. [10.1016/j.jcv.2004.07.013](https://doi.org/10.1016/j.jcv.2004.07.013)
  14. Benz R, Seiler K, Vogt M: A surprising cause of chest pain. *J Assoc Physicians India.* 2007, 55:725-6.
  15. Breuer C, Janssen G, Laws HJ, Schaper J, Mayatepek E, Schroten H, Tenenbaum T: Splenic infarction in a patient hereditary spherocytosis, protein C deficiency and acute infectious mononucleosis. *Eur J Pediatr.* 2008, 167:1449-52. [10.1007/s00431-008-0781-3](https://doi.org/10.1007/s00431-008-0781-3)
  16. Cull E, Stein BL: Splenic infarction, warm autoimmune hemolytic anemia and antiphospholipid antibodies in a patient with infectious mononucleosis. *Int J Hematol.* 2012, 95:573-6. [10.1007/s12185-012-1047-4](https://doi.org/10.1007/s12185-012-1047-4)
  17. Gang MH, Kim JY: Splenic infarction in a child with primary Epstein-Barr virus infection. *Pediatr Int.* 2013, 55:e126-8. [10.1111/ped.12143](https://doi.org/10.1111/ped.12143)
  18. Gavrilaki E, Sabanis N, Paschou E, Grigoriadis S, Mainou M, Gaitanaki A, Skargani-Koraka M: Splenic infarction as a rare complication of infectious mononucleosis due to Epstein-Barr virus infection in a patient with no significant comorbidity: case report and review of the literature. *Scand J Infect Dis.* 2013, 45:888-90. [10.3109/00365548.2013.821627](https://doi.org/10.3109/00365548.2013.821627)
  19. Kobe D, Nakatani T, Fujinaga Y, et al.: A case of infectious mononucleosis with splenic infarction [Article in Japanese]. *Nihon Shokakibyō Gakkai Zasshi.* 2013, 110:1461-7.
  20. Mackenzie DC, Liebmann O: Identification of splenic infarction by emergency department ultrasound. *J Emerg Med.* 2013, 44:450-2. [10.1016/j.jemermed.2012.03.005](https://doi.org/10.1016/j.jemermed.2012.03.005)
  21. Li Y, Pattan V, Syed B, Islam M, Yousif A: Splenic infarction caused by a rare coinfection of Epstein-Barr virus, cytomegalovirus, and Mycoplasma pneumoniae. *Pediatr Emerg Care.* 2014, 30:636-7. [10.1097/PEC.0000000000000211](https://doi.org/10.1097/PEC.0000000000000211)
  22. Bhattarai P, Pierr L, Adeyinka A, Sadanandan S: Splenic infarct: a rare presentation in a pediatric patient. *JNMA J Nepal Med Assoc.* 2014, 52:1017-9.
  23. Machado C, Melo Salgado J, Monjardino L: The unexpected finding of a splenic infarction in a patient with infectious mononucleosis due to Epstein-Barr virus. *BMJ Case Rep.* 2015, 2015: [10.1136/bcr-2015-212428](https://doi.org/10.1136/bcr-2015-212428)
  24. Heo DH, Baek DY, Oh SM, Hwang JH, Lee CS, Hwang JH: Splenic infarction associated with acute infectious mononucleosis due to Epstein-Barr virus infection. *J Med Virol.* 2017, 89:332-6. [10.1002/jmv.24618](https://doi.org/10.1002/jmv.24618)
  25. Naviglio S, Abate MV, Chinello M, Ventura A: Splenic infarction in acute infectious mononucleosis. *J Emerg Med.* 2016, 50:e11-3. [10.1016/j.jemermed.2015.09.019](https://doi.org/10.1016/j.jemermed.2015.09.019)
  26. Noor M, Sadough M, Chan S, Singh G: Splenic infarct in a patient with infectious mononucleosis: a rare presentation. *J Community Hosp Intern Med Perspect.* 2017, 7:248-50. [10.1080/20009666.2017.1361291](https://doi.org/10.1080/20009666.2017.1361291)
  27. Li Y, George A, Arnaout S, Wang JP, Abraham GM: Splenic infarction: an under-recognized complication of infectious mononucleosis?. *Open Forum Infect Dis.* 2018, 5:ofy041. [10.1093/ofid/ofy041](https://doi.org/10.1093/ofid/ofy041)
  28. Pervez H, Tameez Ud Din A, Khan A: A mysterious case of an infarcted spleen due to kissing disease: a rare entity. *Cureus.* 2020, 12:e6700. [10.7759/cureus.6700](https://doi.org/10.7759/cureus.6700)
  29. Turrian U: Splenic infarction after Epstein-Barr virus infection: case report. *Ann Clin Case Rep.* 2021, 6:2045. [10.25107/2474-1655](https://doi.org/10.25107/2474-1655)
  30. Nishioka H, Hayashi K, Shimizu H: Case report: splenic infarction in infectious mononucleosis due to Epstein-Barr virus infection. *Am J Trop Med Hyg.* 2021, 106:623-5. [10.4269/ajtmh.21-0943](https://doi.org/10.4269/ajtmh.21-0943)
  31. Sowka B, Mali P: S3215 Transient splenic infarct in a patient with Epstein Barr virus (EBV) infection: a rare presentation. *Am J Gastroenterol.* 2022, 117:e2054. [10.14309/01.ajg.0000869492.89693.97](https://doi.org/10.14309/01.ajg.0000869492.89693.97)
  32. Suzuki Y, Shichishima T, Mukae M, et al.: Splenic infarction after Epstein-Barr virus infection in a patient with hereditary spherocytosis. *Int J Hematol.* 2007, 85:380-3. [10.1532/IJH97.07208](https://doi.org/10.1532/IJH97.07208)
  33. Ma Z, Wang Z, Zhang X, Yu H: Splenic infarction after Epstein-Barr virus infection in a patient with hereditary spherocytosis: a case report and literature review. *BMC Surg.* 2022, 22:136. [10.1186/s12893-022-01580-5](https://doi.org/10.1186/s12893-022-01580-5)
  34. Maki DG, Reich RM: Infectious mononucleosis in the athlete. Diagnosis, complications, and management. *Am J Sports Med.* 1982, 10:162-73. [10.1177/036354658201000308](https://doi.org/10.1177/036354658201000308)