


From Splenectomy to Partial Splenic Embolization, Which is Better for Hereditary Spherocytosis?

Mengyuan Si¹, Shanghong Yang², Zijian Chen², Aixia Dou¹ 

¹Department of Hematology, The Second Qilu Hospital of Shandong University, Cheeloo College of Medicine, Shandong University, Jinan, Shandong, People's Republic of China; ²The Second Clinical Medical School of Shandong University, Cheeloo College of Medicine, Shandong University, Jinan, Shandong, People's Republic of China

Correspondence: Aixia Dou, Department of Hematology, The Second Qilu Hospital of Shandong University, 247 Beiyuan Street, Jinan, Shandong, 250033, People's Republic of China, Tel +86-17660080381, Email douax0110@163.com

Abstract: Hereditary Spherocytosis (HS), with characteristic red blood cells (RBCs), is a group of genetic hemolytic disorders that occur in an autosomal-dominant manner. It is clinically characterized by anemia, splenomegaly, jaundice, and mutations in key genes. Splenectomy is the standard treatment for HS. Alternatively, partial splenic embolization (PSE) balances efficacy and safety, making it a promising solution. To determine how to choose surgery and ensure correct management, we reviewed the indications, techniques, efficacies, complications, and progress of alternative solutions to reach a comprehensive conclusion. Core clinical dimensions between Splenectomy and PSE in the treatment of HS, including surgical indications, operative techniques, hemoglobin improvement, infection risk, immune function preservation, long-term complications and recurrence rate. PSE is better than Splenectomy. Furthermore, forefront-targeted drugs, precise embolization ranges, and multidisciplinary team (MDT) discussions were reviewed. Collaboration requires multiple departments and family members. Through this narrative review, we hope to provide practical advice for long-term follow-up and emergency management.

Keywords: hereditary spherocytosis, partial splenic embolization, splenectomy

Introduction

Hereditary Spherocytosis (HS), with characteristic red blood cells (RBCs), is a group of genetically hemolytic disorders that occur in an autosomal dominant manner.¹ HS is clinically characterized by anemia, splenomegaly, jaundice, and reticulocytosis. Mutations in key genes such as *ANK1*, *SPTB*, *SPTAI1*, *SLC4A1*, and *EPB42* are common in HS. Erythrocyte osmotic fragility test is a simple and practical diagnostic tool for HS. When the clinical manifestations are combined with the mean reticulocyte volume (MRV), mean spherical cell volume (MSCV), mean corpuscular volume (MCV), family pedigree, and genetic expression, the diagnosis of HS can be confirmed. Early and accurate molecular diagnosis facilitates clinical treatment and family counseling.^{2,3}

Defects in the cytoskeletal proteins in RBC membranes lead to decreased membrane stability, cell spheroidization, and extravascular hemolysis in the spleen. Approximately 50% of the patients develop gallstones due to hyperbilirubinemia. The spleen has become the core of treatment as it is the main site of RBC destruction. Splenectomy is the standard treatment for HS. Partial splenic embolization (PSE) can balance efficacy and safety through precise intervention techniques, making it a promising alternative solution.⁴ In this article, we review HS and various treatment management methods, including indications for surgery, the selection of different surgical methods, efficacy, complications, advances in alternative solutions, and the possibility of gene-targeted therapy. Our article was based on classic studies, the latest clinical evidence and mainstream guidelines in the field of HS treatment, from the main databases (eg, PubMed, Web of Science) and the time range of core clinical studies in the past 30 years and the latest progress in the past. Through this narrative review, we hope to provide practical advice for future clinical practice.

Splenectomy

The pathophysiological core of HS includes RBC membrane defects, splenic sequestration, and destruction of spherical RBCs with impaired deformability. The spleen is the main site and driving factor of HS hemolysis. Splenectomy remains a curative method that effectively improves hemoglobin (Hb) levels and reduces hemolysis. Individualized decision-making is crucial for balancing the surgical benefits and complications. HS with moderate-to-severe anemia or severe complications is the primary indication for surgery. Splenectomies can be divided into total and partial resection.⁵

Patients with Hb consistently less than 80 g/L or transfusion dependency, reduced exercise tolerance, delayed growth (in children), and heart failure require surgery to cure them. For patients with Hb levels between 80 and 100 g/L, surgery should be performed if their quality of life (QoL) is significantly affected or if chronic ulcers occur in the lower limbs. For pediatric patients, completing all planned immunizations before 5 years of age, delaying the operation until the age of 6 years (when the immune system is more mature), and multidisciplinary team (MDT) discussions to reach a comprehensive conclusion are needed.

The efficacy of splenectomy is evident, particularly its excellent effect on hematology. The vast majority of patients showed a significant improvement in Hb levels after surgery, and anemia was corrected. Hemolysis stopped or was significantly reduced. Although spherical RBCs still exist, their clinical significance has disappeared. Symptoms such as fatigue, jaundice, and palpitations disappeared, and the risk of new gallstones significantly decreased. Children with delayed growth exhibit catch-up growth.

The risks and complications of splenectomy can be divided into perioperative and lifelong. Bleeding, infection, anesthesia risk, adjacent organ damage, deep vein thrombosis, pulmonary embolism, and subphrenic effusion/abscess are referred to as perioperative risks, emphasizing the importance of perioperative anticoagulation prevention.⁶ The lifelong risks, such as overwhelming infection, thromboembolic diseases, controversial tumor risk, and the risk of recurrence and lifelong immunodeficiency, require individualized assessment and long-term management. Long-term antibiotic prevention, vaccination, standardized anticoagulation, and other forms of management must be individualized. Future research should focus on optimizing surgical strategies, reducing the risk of long-term complications, and exploring effective targeted therapies.^{7,8}

Partial Splenic Embolization

Since the 1970s, PSE has become an important alternative to splenectomy. Clinically, PSE may benefit patients with HS. With an interventional radiology technique, PSE reduces blood supply to the splenic parenchyma, thereby reducing splenomegaly and related complications. Since its first clinical application in the 1970s, PSE has become an alternative to splenectomy because it is minimally invasive, safe, and effective.⁴ The femoral artery is used for selective catheterization of the splenic artery, and certain materials can be used to embolize the designated blood vessels. After PSE, the patients showed improvements in blood and platelet counts early in the postoperative period. Because of the segmental distribution of arterial branches in the spleen and the small number of communication branches between each segment, occlusion of an artery affects only the corresponding area; thus, the immune function of the spleen may be preserved. Several months after embolization, Immunoglobulin A (IgA) and complement 3(C₃) levels increase significantly.^{4,8}

Research has shown that the efficacy of PSE is similar to that of splenectomy. No significant difference was observed in the postoperative increase in white blood cell (WBCs) or Hb levels between the PSE and SP groups.⁹ Moreover, patients who underwent PSE recovered faster than those who underwent splenectomy. PSE has additional advantages, such as less trauma and fewer complications. Furthermore, PSE treatment may also induce host immune activation and increase immunity.¹⁰ The spleen volume decreases by 50% to 80% after PSE and usually reaches maximum atrophy at 2–6 months after surgery.¹¹ The lower risk of adverse outcomes and significant effectiveness promote the clinical application of PSE.

A Meta-analysis evaluated the efficacy of Splenectomy versus PSE, such as recovery in peripheral platelet count, the difference became non-significant by 1 month postoperatively. And the Natural killer (NK) cell count: The PSE group had a significantly higher number of NK cells than the Splenectomy group postoperatively, and the immunological advantage persisted at 1 year postoperatively (95% CI: 1.25 to 5.96, P = 0.003).¹²

Technological Optimization of PSE

PSE was improved by precisely controlling the embolization range. Using ultrasensitive intubation technology combined with intraoperative image monitoring, the target embolization volume is controlled within 30–70% to avoid excessive embolization. Imaging monitoring and revolution Computed Tomography (CT) prior to PSE can provide effective methods for surgeons to manage embolization areas, clinically relieve hypersplenism, enhance liver function, and reduce the risk of complications.¹³ The novel concept of the splenic infarction volume, rather than the splenic infarction ratio, helps us identify appropriate treatments.⁴

Embolic materials for PSE have been gradually modified, from traditional gelatin sponges⁸ to controllable release microspheres, such as Embosphere[®], drug-loaded microspheres, and biodegradable materials. This optimization can improve the embolization accuracy and reduce the risk of ectopic embolization.¹⁴ Gelatin sponges are common temporary embolic materials. It is primarily used when the embolism area exceeds 50%. Absolute alcohol and lipiodol are inexpensive temporary materials. Permanent materials are suitable for embolizing the main trunk of the splenic artery. Metal materials such as polyvinyl alcohol (PVA) materials,¹⁵ and super absorbent polymer microspheres (SAP-MS)¹⁶ are permanent materials. Currently, some materials in the experimental stage, such as the CELPHERE, are safe solid embolic materials for permanent vascular occlusion in animal models.¹⁷

The combination of PSE with other surgical or interventional radiology techniques has improved the success rates. In combination with temporary balloon occlusion of the splenic artery trunk, the dosage of embolic agents is reduced.¹⁸ Fluorescent navigation embolization¹⁹ improves intraoperative visibility, which may reduce some of the complications associated with PSE.

Complications of PSE

PSE has fewer complications, milder symptoms, and is easier to manage.^{20,21} Postoperative embolism syndrome, including fever, abdominal pain, nausea and vomiting, bloating, and loss of appetite, is commonly reported. Corticosteroids and analgesic pumps can alleviate thrombotic syndromes. In addition, the new embolic material reduced the rate of severe complications by <5%. The incidence of splenic abscess is 3%–5%, and strict aseptic operation and antibiotic prevention should be considered. The incidence of splenic rupture is less than 1%.²² The safety of PSE is better than that of splenectomy.

Sequential Splenectomy

PSE is considered a safe and effective adjuvant procedure performed prior to elective laparoscopic splenectomy in children. The mean estimated blood loss during surgery was 9 mL, successfully reducing the amount of intraoperative blood loss. Sequential splenectomy is superior to traditional splenectomy, and a nomogram-based prediction model can predict the occurrence of intraoperative bleeding.²³

Other Treatments in HS

Cholecystectomy

In patients with HS, bilirubin production increases significantly due to increased hemolysis. Excessive bilirubin deposits and crystallizes in the gallbladder, leading to the formation of gallstones, biliary colic, cholecystitis, and even more serious complications such as cholangitis.⁹ Concurrently performing PSE and cholecystectomy was safe and effective, reducing the degree of trauma associated with a second surgery. When PSE and cholecystectomy are performed in patients with liver cirrhosis and hypersplenism, improved liver function provides a better foundation for cholecystectomy.²¹ However, large-scale, high-quality studies with research limitations are lacking. Whether prophylactic cholecystectomy should be performed for patients with HS without or with asymptomatic gallstones remains controversial. In summary, gallbladder removal in patients with HS requires comprehensive consideration of various aspects.

Drug Therapy

Folic Acids

Folic acid supplementation is recommended for patients with HS because it increases RBC production. As a key enzyme involved in the processes of deoxyribonucleic acid (DNA) synthesis and cell division, folic acid requirements are

significantly high.²⁴ Folic acid supplementation can effectively prevent megaloblastic anemia, thereby relieving anemia symptoms and reducing transfusion dependence.

Erythropoietin Receptor Agonists

Erythropoietin receptor agonists (such as Luspatercept) promote erythroid progenitor cells by activating erythropoietin receptors, significantly increasing effective RBC production, and reducing transfusion requirements. Studies have shown that luspatercept has clinical efficacy in the treatment of transfusion-dependent anemia associated with myelodysplastic syndrome (MDS) or β -thalassemia,^{25,26} which can effectively increase the Hb level of patients, reduce RBC transfusion dependence, and significantly relieve anemia-related symptoms.

PSE for Other Diseases

In HS, a hereditary RBC membrane defect disease, PSE has shown unique clinical advantages in its treatment, providing valuable ideas for other types of hemolytic anemia (HA) and idiopathic thrombocytopenic purpura (ITP).

Autoimmune Hemolytic Anemia (AIHA)

The pathogenesis of autoimmune hemolytic anemia (AIHA) involves autoantibodies that attack RBCs, leading to hemolytic anemia. Excessive destruction of RBCs by the spleen and antibodies secreted by B cells are the causes of refractory AIHA. Therefore, PSE can be considered a treatment option.²⁷ Although PSE cannot fundamentally correct immune system disorders, it can provide clinical benefits, and some patients experience improvement after the operation.²⁸ The PSE could be used as an effective alternative treatment method in emergency clinical situations.

Thalassemia

Thalassemia is a special type of HA caused by defects in globin gene synthesis. Severely ill patients with thalassemia present with splenomegaly and hypersplenism, which further aggravates the symptoms of anemia. Research has indicated that PSE can significantly reduce hemolytic anemia and increase platelet and WBC counts accordingly. PSE is a promising and effective alternative to splenectomy. This operation not only significantly improves blood cells but also has high safety and can retain part of the immune function of the spleen.²⁹

Idiopathic Thrombocytopenic Purpura (ITP)

In the pathogenesis of ITP, the spleen is the main site of platelet destruction and is an important site for the production of platelet antibodies. PSE in patients with ITP can effectively reduce the destructive effects on the spleen and increase platelet counts. Miyazaki et al showed that PSE has good application prospects for the treatment of chronic ITP, especially in patients insensitive to glucocorticoids. More than 70% of patients achieve complete or partial remission.²⁰

Overall, the successful use of PSE in the treatment of HS provides new ideas for the treatment of other types of HA and ITP.²⁷ However, owing to the differences in the pathogenesis of various diseases and individual patient variations, before PSE, a comprehensive assessment is needed, personalized plans should be developed, and the treatment effects and complications should be closely monitored.

Discussion

Although splenectomy can effectively control HS, a series of complications can occur after surgery, including increased infection, thrombosis, and splenic regeneration. Conversely, PSE retains some immune functions and ameliorates hemolysis by reducing the destruction of spherical RBCs. Compared with those of splenectomy, the side effects of PSE are significantly reduced.²¹ Furthermore, the sequential mode of PES-splenectomy has significant advantages in reducing bleeding during surgery. Oral drugs such as folic acid and erythropoietin receptor agonists provide nonsurgical options for treating HS,²⁵ and PSE can be combined with drugs or surgical treatments for HS to improve the response rate and reduce the degree of effect. The application of PSE therapy in HSs provides a new therapeutic approach for other immune-related diseases such as AIHA and ITP. When combined with drugs or concurrently treated with PSE and laparoscopic cholecystectomy, PSE plays a synergistic role in controlling hemolysis and provides greater flexibility in the selection of clinical treatment plans.

Table 1 Comparison of Core Clinical Indicators Between Splenectomy and PSE in the Treatment of HS

Clinical Indicator	Splenectomy	Partial Splenic Embolization (PSE)
Surgical Indications	Primary treatment for moderate-to-severe anemia or severe complications	Hypersplenism, mild-to-moderate anemia, patients requiring immune function preservation
Operative Techniques	Complete or partial removal of the spleen; requires post-operative management for infection prevention	Invasive, selective embolization of the splenic vessel, preserving some immune function
Hemoglobin Improvement	Significant improvement	Slower and more gradual
Platelet Counts	Significant increase	Moderate increase
White Blood Cell Counts	No significant change	Significant increase
Spleen Volume Reduction	Complete removal of spleen	Significant reduction (spleen volume decreased by 75–90%)
Infection Risk	Higher lifetime risk of infections, including OPSI	Lower infection risk
Immune Function Preservation	Permanent loss of immune function	Retains some immune function
Long-Term Complications	Thrombosis, post-splenectomy syndrome, recurrence of hypersplenism, potential malignancies	Fewer long-term complications
Recurrence Rate	Very low recurrence rate	Possible recurrence

Patient communication and education are important, as are providing full informed consent, clearly communicating complex risks, and understanding long-term follow-up and emergency management after surgery.

By comparing the advantages and disadvantages of splenectomy and PSE (Table 1), we find the optimized choice for HSs. The disadvantages and postoperative complications in splenectomy, leading the increasingly rare application. More and more clinical doctors are recognizing the advantages of PSE. And supplementary thinking on individualized treatment combined with clinical scenarios (pediatric/adult patients, patients with combined immune diseases) were gradually recognized.

Prospects

According to existing research, PSE has unique advantages in the treatment of HS; however, further investigation is needed to determine the optimal timing and extent of embolization. Although PSE effectively benefits patients with HS, the remaining functional splenic tissue may lead to the recurrence of hemolysis and related symptoms. This is accompanied by complications such as splenic abscesses and splenic ruptures. PSE requires optimization of the embolization protocol, including the rational selection of embolization materials, precise control of the degree of embolization, and scientific determination of the timing of repeat embolization. Furthermore, MDTs, including those in the Hematology, Pediatric, Surgery, Anesthesiology, Infection, and Immunology vaccination departments, should participate jointly.

Since patients with HS have a unique genetic background, gene-editing therapy based on CRISPR/Cas9 technology,³⁰ which can repair pathogenic gene mutations in HS (such as those in the ANK1 and SLC4A1 genes), can fundamentally rehabilitate RBC membrane defects. These preclinical studies have provided new insights into HS healing. Technical and ethical challenges must be overcome, and off-target effects and long-term safety issues require special attention. Similarly, long-term follow-ups and evaluations of the scientific efficacy of PSE are indispensable. Through an in-depth analysis of the relevant factors affecting individual differences, clinicians can develop more accurate and effective treatment plans, thereby improving patients' quality of life and long-term prognosis.

In conclusion, HS treatment is constantly being optimized and improved. Both splenectomy and PSE have their advantages and disadvantages. Currently, PSE is gradually becoming a promising minimally invasive treatment that is expected to replace splenectomy. We compared 7 core clinical dimensions between Splenectomy and PSE in the treatment of HS, including surgical indications, operative techniques, hemoglobin improvement, infection risk, immune function preservation, long-term complications and recurrence rate. PSE is better than Splenectomy. Furthermore, exploring more effective, safe, and personalized treatment methods is the key to improving the prognosis of patients with HS.

Funding

Jinan Clinical Medical Science and Technology Innovation Plan (No. 202019141).

Disclosure

The authors report no conflicts of interest in this work.

References

- Panarach C, Netsawang C, Nuchprayoon I, Leecharoenkiat K. Identification and functional analysis of novel SPTB and ANK1 mutations in hereditary spherocytosis patients. *Sci Rep.* 2024;14:27362. doi:10.1038/s41598-024-78622-w
- Wang R-J, Xiao L, Xu X-M, Zhang -M-M, Xiong Q. Super-selective partial splenic embolization for hereditary spherocytosis in children: a single-center retrospective study. *Front Surg.* 2022;9:835430. doi:10.3389/fsurg.2022.835430
- Wu Y, Liao L, Lin F. The diagnostic protocol for hereditary spherocytosis-2021 update. *J Clin Lab Anal.* 2021;35:e24034. doi:10.1002/jcla.24034
- Beppu T, Masuda T, Imai K, Hayashi H. Clinical benefits of partial splenic embolization for cancer patients. *Hepatol Res.* 2025;55:4–11. doi:10.1111/hepr.14142
- Nasiri A, Haroon A, Alzahrani H. Clinical and demographic characteristics of pyruvate kinase deficiency patients: a comprehensive case series analysis. *Cureus.* 2024;16:e60035. doi:10.7759/cureus.60035
- Yagasaki H, Umeda Y, Suzuki T, Watanabe R, Noda T. Transcatheter edge-to-edge repair for post-surgical recurrent mitral regurgitation in hereditary spherocytosis: a case report. *Eur Heart J Case Rep.* 2025;9:ytaf211. doi:10.1093/ehjcr/ytaf211
- Al Toub FA, Asseri AHO, Baig MR, Almalki NAR, Anwar F. Crosstalk: biochemical signatures and clinical implications in rare hereditary hemolytic anemias (hereditary spherocytosis). *Curr Pharm Des.* 2025;31:1551–1561. doi:10.2174/0113816128326588241211063917
- Zaitoun MMA, Basha MAA, Elsayed SB, et al. Comparison of three embolic materials at partial splenic artery embolization for hypersplenism: clinical, laboratory, and radiological outcomes. *Insights Imaging.* 2021;12:85. doi:10.1186/s13244-021-01030-5
- Liu Y, Jin S, Li Y, et al. Treatment of asymptomatic gallstones in children with hereditary spherocytosis requiring splenectomy. *J Pediatr Surg.* 2023;58:756–761. doi:10.1016/j.jpedsurg.2022.11.012
- Ishikawa T, Terai N, Sato R, et al. Partial splenic embolization for portal hypertension exacerbation during Atezolizumab/Bevacizumab combination therapy in unresectable hepatocellular carcinoma. *In Vivo.* 2025;39:936–941. doi:10.21873/invivo.13898
- Lu H, Zheng C, Xiong B, Xia X. Efficacy and safety of heparin plus dexamethasone after partial splenic embolization for liver cirrhosis with massive splenomegaly. *BMC Gastroenterol.* 2022;22:470. doi:10.1186/s12876-022-02580-8
- Liu M, Wei N, Song Y. Splenectomy versus non-splenectomy for gastrointestinal bleeding from left-sided portal hypertension: a systematic review and meta-analysis. *Ther Adv Gastroenterol.* 2024;17:17562848241234501. doi:10.1177/17562848241234501
- Hu Y-B, Duan L, Liu G-Y, Wang X-M. Clinical application of preoperative volumetric measurement for interventional precise embolization in the treatment of hypersplenism caused by liver cirrhosis. *BMC Surg.* 2025;25:270. doi:10.1186/s12893-025-03028-y
- Satai M, Vaidya A, Rathod K, et al. Partial splenic artery embolization for the management of symptomatic hypersplenism in portal hypertension: clinical insights from a case series. *J Clin Exp Hepatol.* 2024;14:101435. doi:10.1016/j.jceh.2024.101435
- Abbas Q, Jamil MT, Haque A, Sayani R. Use of interventional radiology in critically injured children admitted in a pediatric Intensive Care Unit of a developing country. *Cureus.* 2019;11:e3922. doi:10.7759/cureus.3922
- Iwase K, Higaki J, Yoon H-E, et al. Splenic artery embolization using contour emboli before laparoscopic or laparoscopically assisted splenectomy. *Surg Laparosc Endosc Percutan Tech.* 2002;12:331–336. doi:10.1097/00129689-200210000-00005
- Kai Y, Hamada J, Morioka M, Todaka T, Hasegawa S, Ushio Y. The utility of the microcrystalline cellulose sphere as a particulate embolic agent: an experimental study. *AJNR Am J Neuroradiol.* 2000;21(6):1160–1163.
- Wu J, Kim J, Yamoah K, Aderie L, Nezami N, Fang A. Celiac trunk angiography with balloon occlusion of splenic artery for diagnosis and treatment of splenic steal syndrome. *Radiol Case Rep.* 2025;20:1354–1358. doi:10.1016/j.radcr.2024.11.052
- Sulthana S, Shrestha D, Aryal S. Maximizing liposome tumor delivery by hybridizing with tumor-derived extracellular vesicles. *Nanoscale.* 2024;16:16652–16663. doi:10.1039/d4nr02191f
- Egbaria A, Touma E, Cohen-Abadi M, Bisharat N. The use of splenic embolization in immune thrombocytopenia: a systematic review and meta-analysis. *Br J Haematol.* 2024;204:1966–1976. doi:10.1111/bjh.19418
- Huang Y, Ren D, Gao F, et al. An updated meta-analysis of partial splenic embolization versus splenectomy in the treatment of hypersplenism due to cirrhosis. *Minim Invasive Ther Allied Technol.* 2022;31:664–675. doi:10.1080/13645706.2021.1933535
- Salem MM, Kuybu O, Nguyen Hoang AN, et al. Middle meningeal artery embolization for chronic subdural hematoma: predictors of clinical and radiographic failure from 636 embolizations. *Radiology.* 2023;307:e222045. doi:10.1148/radiol.222045
- Huang L, Li Q-L, Yu Q-S, et al. Will partial splenic embolization followed by splenectomy increase intraoperative bleeding? *World J Gastrointest Surg.* 2024;16:318–330. doi:10.4240/wjgs.v16.i2.318
- Paniz C, Lucena MR, Bertinato JF, et al. Daily supplementation with 5 mg of folic acid in Brazilian patients with hereditary spherocytosis. *J Invest Med.* 2019;67:1110–1117. doi:10.1136/jim-2019-001025
- Molica M, Rossi M. Luspatercept in low-risk myelodysplastic syndromes: a paradigm shift in treatment strategies. *Expert Opin Biol Ther.* 2024;24:233–241. doi:10.1080/14712598.2024.2336086
- Zamora EA, Schaefer CA. Hereditary spherocytosis. In: *StatPearls*. Treasure Island, FL: StatPearls Publishing; 2025.
- Molica M, Massaro F, Annechini G, et al. Life-threatening autoimmune hemolytic anemia and Idiopathic thrombocytopenic purpura. Successful selective splenic artery embolization. *Mediterr J Hematol Infect Dis.* 2016;8:e2016020. doi:10.4084/MJHID.2016.020
- Campbell R, Marik PE. Severe autoimmune hemolytic anemia treated by paralysis, induced hypothermia, and splenic embolization. *Chest.* 2005;127:678–681. doi:10.1378/chest.127.2.678
- Bazeboso JA, Mbuyi Mukendi D, Mbongo C-L, et al. Partial splenic embolization in paediatric sickle cell disease patients with hypersplenism. *Cardiovasc Intervent Radiol.* 2024;47:652–660. doi:10.1007/s00270-024-03701-4
- Canciani G, Palumbo G, Brewin J, Rossi F, Ceglie G. Editorial: recent advances in pediatric red blood cells disorders. *Front Pediatr.* 2024;12:1403651. doi:10.3389/fped.2024.1403651

Journal of Blood Medicine

Publish your work in this journal

The Journal of Blood Medicine is an international, peer-reviewed, open access, online journal publishing laboratory, experimental and clinical aspects of all aspect pertaining to blood based medicine including but not limited to: Transfusion Medicine; Blood collection, Donor issues, Transmittable diseases, and Blood banking logistics; Immunohematology; Artificial and alternative blood based therapeutics; Hematology; Biotechnology/nanotechnology of blood related medicine; Legal aspects of blood medicine; Historical perspectives. The manuscript management system is completely online and includes a very quick and fair peer-review system. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <http://www.dovepress.com/journal-of-blood-medicine-journal>

Dovepress
Taylor & Francis Group