

<https://doi.org/10.59854/dhrrh.2026.4.1.37>

– CASE REPORT –

Severe Subdural Hematoma after Minor Head Trauma in A Child With Hemophilia A and Inhibitors: Successful Conservative Management

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Abstract

Background: Intracranial hemorrhage represents one of the most severe and potentially fatal complications in children with Hemophilia A, particularly in the presence of inhibitors. Even minor head trauma may trigger life-threatening bleeding requiring urgent multidisciplinary management.

Case: We report the case of a pediatric patient with severe Hemophilia A complicated by inhibitors who developed a large subdural hematoma following minor cranial trauma caused by a football impact. Neurological symptoms appeared within 24 hours and included persistent headache, repeated vomiting, somnolence and progressive neurological impairment. Cranial computed tomography revealed a left fronto-temporo-parietal subdural hemorrhage with midline shift. The child required intensive care admission due to severe clinical deterioration, anemia and convulsive episodes. Multidisciplinary management included aggressive coagulation factor replacement therapy, transfusion support, anticonvulsant treatment and continuous neurological monitoring. Neurosurgical intervention was not indicated, and conservative management was pursued.

Outcome: Gradual clinical stabilization was achieved with regression of neurological symptoms and hemorrhagic manifestations. The patient was discharged in satisfactory condition with recommendations for continued hematologic follow-up.

Conclusion: This case highlights the high risk of severe intracranial bleeding after seemingly minor head trauma in children with Hemophilia A and inhibitors. Early recognition, rapid transfer to specialized centers and coordinated multidisciplinary conservative management may lead to favorable outcomes even in life-threatening situations.

Keywords: Hemophilia A, Subdural hematoma, Intracranial hemorrhage, Minor head trauma, Inhibitors, Pediatric intensive care

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Introduction

Hemophilia is a rare inherited bleeding disorder caused by deficiency or dysfunction of coagulation factor VIII (hemophilia A) or factor IX (hemophilia B), resulting in impaired thrombin generation and a lifelong tendency toward spontaneous or trauma-related hemorrhage. The condition follows an X-linked recessive inheritance pattern and predominantly affects males, with an estimated global prevalence of approximately 1 in 5,000 male births for hemophilia A and 1 in 30,000 for hemophilia B [1,2]. Disease severity is traditionally classified according to residual coagulation factor activity, with severe hemophilia defined by factor levels below 1%, moderate disease by levels between 1% and 5%, and mild disease by levels above 5% [3]. Although recurrent hemarthroses represent the hallmark clinical manifestation in children with severe hemophilia, life-threatening bleeding episodes may occur in other anatomical locations, including the central nervous system. Intracranial hemorrhage (ICH) is considered one of the most severe complications of hemophilia, being associated with significant morbidity, long-term neurological sequelae, and increased mortality rates [4,5]. Importantly, ICH in pediatric hemophilia may occur not only spontaneously but also following seemingly minor head trauma, emphasizing the vulnerability of these patients even in the context of low-energy injuries [6]. The development of inhibitors against replacement coagulation factors represents a major therapeutic challenge in hemophilia management. Inhibitors occur predominantly in patients with severe hemophilia A, with cumulative incidences reported between 20% and 30%, and are associated with reduced efficacy of standard replacement therapy, prolonged bleeding episodes, and increased need for intensive medical care [7,8]. The presence of inhibitors further complicates acute management of major hemorrhagic events, including traumatic intracranial bleeding, often requiring alternative hemostatic strategies and close multidisciplinary monitoring. Early recognition of neurological deterioration, prompt neuroimaging evaluation, and rapid initiation of hemostatic replacement therapy are essential for improving outcomes in children with hemophilia presenting with head trauma. However, the optimal balance between neurosurgical intervention and conservative treatment remains a complex clinical decision, particularly in patients with severe coagulopathy and inhibitor positivity [9].

We report the case of a child with severe Hemophilia A complicated by inhibitors who developed a large traumatic subdural hematoma following minor head trauma and was successfully managed through intensive conservative multidisciplinary treatment. This case highlights the importance of early diagnosis, coordinated care, and individualized therapeutic strategies in life-threatening hemorrhagic complications of pediatric hemophilia.

The aim of this case report is to highlight the clinical course, diagnostic challenges, and therapeutic management of a severe traumatic subdural hematoma occurring after minor head trauma in a child with severe Hemophilia A complicated by inhibitors, emphasizing the role of multidisciplinary conservative treatment in achieving a favorable outcome.

Objective

- To describe the early clinical and neurological manifestations of traumatic intracranial hemorrhage in a pediatric patient with severe hemophilia.
- To analyze the therapeutic challenges associated with the presence of factor VIII inhibitors during acute hemorrhagic complications.
- To emphasize the importance of prompt neuroimaging evaluation and intensive neurological monitoring.
- To present the conservative treatment strategies used, including coagulation factor replacement therapy and supportive intensive care management.
- To underline the significance of multidisciplinary collaboration in reducing morbidity and improving clinical prognosis in life-threatening hemorrhagic events.

Methods

This study represents a descriptive case report of a pediatric patient with severe Hemophilia A complicated by inhibitors who developed a traumatic intracranial hemorrhage following minor head trauma. Clinical data were retrospectively collected from the patient's medical records, including history, physical examination findings, laboratory investigations, imaging studies, therapeutic interventions, and clinical outcomes.

Neurological status was evaluated through repeated clinical examinations and continuous monitoring in the

intensive care setting. Cranial computed tomography (CT) was performed to establish the diagnosis, assess hematoma localization and volume, and monitor disease progression. Hematological evaluation included complete blood count and coagulation profile, with particular focus on factor VIII deficiency and inhibitor status.

Therapeutic management consisted of multidisciplinary conservative treatment, including coagulation factor replacement therapy, transfusion support, anticonvulsant administration, hemodynamic stabilization, and close neurological surveillance. Decisions regarding neurosurgical intervention were made following multidisciplinary consultations involving hematologists, neurologists, neurosurgeons, and intensive care specialists.

The case was analyzed in accordance with ethical standards for clinical case reporting. Patient confidentiality was maintained, and informed consent for publication was obtained from the patient's legal guardian.

Results

A 12-year-old boy with severe hemophilia A (factor VIII activity <1%) complicated by high-titer inhibitors was transferred from a regional hospital to the surgical intensive care unit of a tertiary pediatric center due to progressive neurological deterioration following minor head trauma.

According to the medical history, the patient sustained a blunt cranial injury on 17 September 2025, being struck on the head by a football during routine play activity. The trauma was initially considered insignificant, with no immediate loss of consciousness. However, within the following 24 hours, the child developed generalized weakness, persistent headache, and repeated vomiting, which led to hospitalization in a regional medical facility. Due to worsening neurological status and suspected intracranial hemorrhage, he was subsequently transferred on 21 September 2025 in extremely severe clinical condition.

The patient had a known diagnosis of severe hemophilia A established during the first year of life, with documented inhibitor development since 2023. Recent laboratory assessment revealed very high inhibitor titers measured by the Bethesda assay (37.2 BU and 91.6 BU in two protocol-based measurements performed two weeks

apart). Since 2025, the child had been receiving prophylactic biological therapy with emicizumab.

The family history was remarkable for severe hereditary burden, with all male relatives on the maternal lineage reported to have died due to hemorrhagic complications of hemophilia, while female relatives were known carriers of the disease.

On admission to the intensive care unit, the child appeared pale and markedly ill, with multiple extensive ecchymoses and hemorrhagic skin lesions at different stages of evolution. Large soft-tissue hematomas were noted at previous peripheral venipuncture sites. Body temperature was 36.5°C. Respiratory examination revealed preserved nasal breathing and harsh vesicular breath sounds without adventitious findings. Cardiac auscultation demonstrated rhythmic heart sounds with a moderate systolic murmur at the apex. The abdomen was soft, with the liver palpable at the costal margin and no splenomegaly. Urinary output was adequate, while bowel movements were absent since admission.

Neurologically, the patient was somnolent, hypodynamic, and slow to respond to verbal stimuli, presenting persistent headache and recurrent vomiting episodes, particularly after oral intake. These findings, together with laboratory evidence of anemia and severe congenital coagulopathy, raised strong clinical suspicion of life-threatening intracranial hemorrhage.

Emergency cranial computed tomography performed on 21 September 2025 confirmed the presence of a large acute left fronto-parietal subdural hematoma associated with mass effect and cortical sulcal effacement, establishing the diagnosis of severe traumatic intracranial bleeding in the context of inhibitor-complicated hemophilia (Figure 1).

Given the extremely high inhibitor titers and the significant perioperative hemorrhagic risk, a multidisciplinary decision was made to initiate intensive conservative hemostatic management under continuous neurosurgical, hematological, and intensive care monitoring.

Radiological findings were consistent with acute traumatic subdural hematoma without immediate neurosurgical indication, supporting the decision for conservative multidisciplinary management.

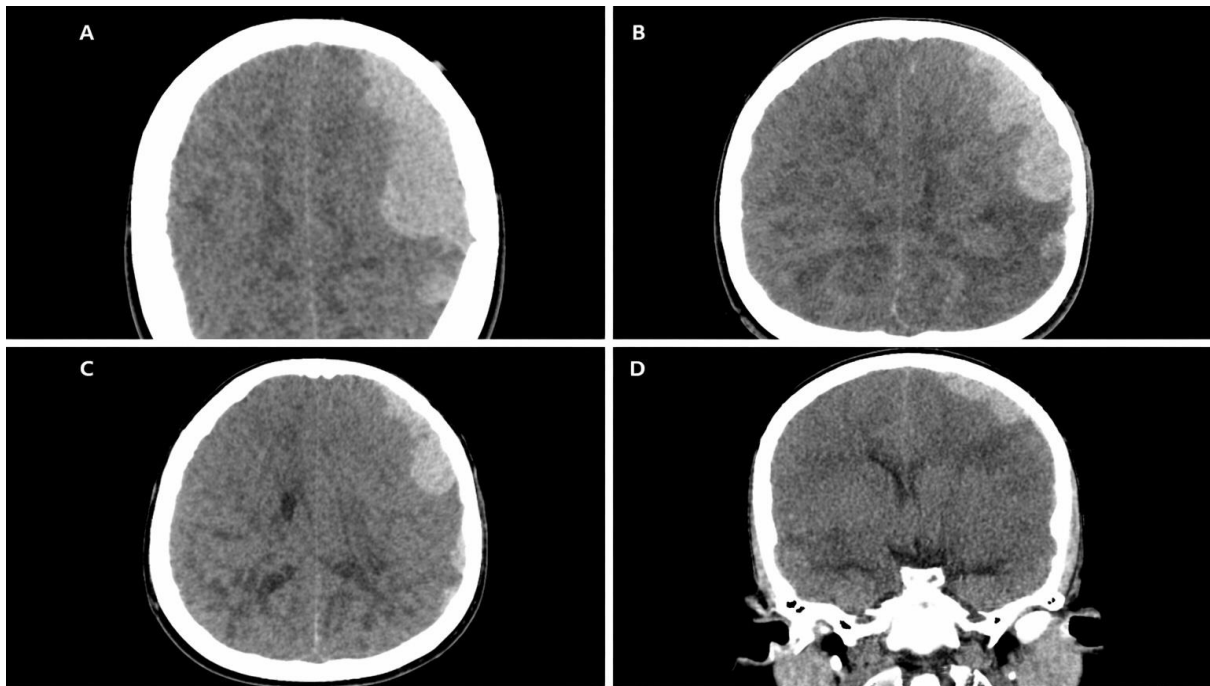


Figure 1. Initial cranial computed tomography performed on 21 September showing a left fronto-temporo-parietal acute subdural hematoma with mild mass effect and sulcal effacement. Multiplanar evaluation (axial and coronal views) confirmed the extra-axial crescentic hyperdensity consistent with traumatic hemorrhage.

Continuous monitoring of vital parameters was performed throughout the intensive care stay. The patient remained afebrile during the entire hospitalization period, with body temperature ranging between 36.1°C and 36.8°C, suggesting absence of infectious complications.

Respiratory status remained stable, with respiratory rates varying between 18 and 28 breaths per minute and peripheral oxygen saturation consistently maintained between 95% and 99% on room air, indicating preserved pulmonary function and adequate oxygenation.

Cardiovascular parameters demonstrated moderate variability in heart rate, ranging from 62 to 115 beats per minute, likely reflecting clinical stress, anemia, and neurological condition during the acute phase. Blood pressure values remained within acceptable limits for age, without episodes of sustained hypotension or hypertensive crisis. Overall, the evolution of vital signs indicated hemodynamic and respiratory stability under intensive multidisciplinary conservative management, supporting the decision to avoid neurosurgical intervention. (Table 1)

Date	21.09.25	22.09.25	23.09.25	24.09.25	25.09.25	26.09.25	27.09.25	28.09.25	29.09.25	30.09.25	01.10.25	03.10.25	06.10.25	08.10.25	10.10.25	13.10.25
T (°C)	36.3	36.8	36.8	36.5	36.3	36.2	36.4	36.6	36.1	36.6	36.5	36.4	36.5	36.5	36.5	36.5
Rr (breaths/min)	20	28	22	23	18	19	19	18	21	20	23	23	20	18	20	20
Heart reat (beats/min)	87	115	78	112	105	62	73	74	69	88	112	114	95	93	96	96
Blood pressure (mmHg)	114/85	115/58	106/65	95/60	114/85	123/81	105/65	110/54	103/69	95/65	95/60	95/65	100/65	105/65	100/65	100/65
SPO2 (%)	98	95	96	97	96	95	99	98	98	99	99	99	99	99	97	98

Table 1. Evolution of vital parameters during hospitalization and intensive care monitoring

* Parameters monitored in the Intensive Care Unit

* Parameters monitored in the Benign Hematology Department

The clinical course during hospitalization demonstrated initial extremely severe general condition, followed by gradual stabilization and progressive improvement under intensive multidisciplinary conservative management. At admission, the patient presented with life-threatening hemorrhagic syndrome, characterized by a large left-sided subdural hematoma and extensive soft-tissue hematomas at peripheral venipuncture sites, associated with multiple ecchymoses at different stages of evolution. Recurrent vomiting episodes were also noted, suggesting increased intracranial pressure and neurological involvement. During the following days, the patient remained in severe

but clinically stable condition, with persistent hemorrhagic manifestations and repeated vomiting. Neuroimaging confirmed the presence of a left fronto-temporo-parietal subdural hemorrhage with mild midline shift (up to 4 mm). Subsequently, progressive clinical improvement was observed, reflected by reduction in hemorrhagic skin lesions, stabilization of neurological symptoms, and gradual disappearance of vomiting episodes. The general condition improved from severe to moderate severity, and eventually to satisfactory clinical status toward the end of hospitalization (Figure 2).

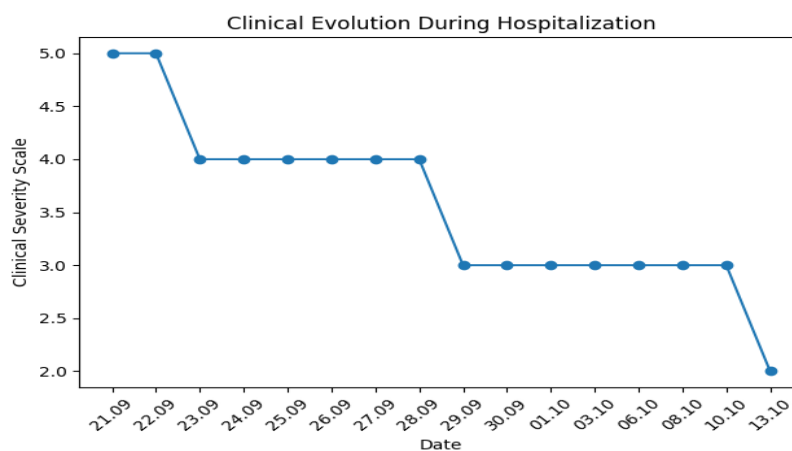


Figure 2. Progressive clinical improvement from extremely severe presentation to stable condition under conservative multidisciplinary management.

This favorable clinical evolution correlated with radiological regression of the subdural hematoma and

effective hemostatic control under conservative treatment strategy. (Figure 3 and 4)

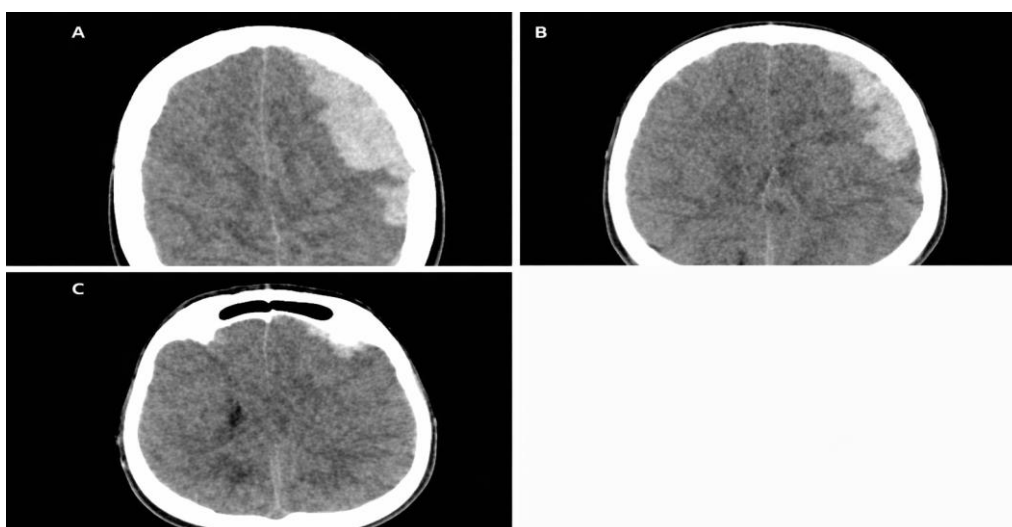


Figure 3. Follow-up cranial computed tomography performed on 24 September demonstrating a persistent left fronto-parietal hyperdense crescent-shaped extra-axial collection consistent with subdural hematoma. Compared with the initial examination, imaging suggests slight reduction in hematoma thickness and mass effect, with partial re-expansion of adjacent cortical sulci and no evidence of new hemorrhagic lesions or significant midline shift progression.

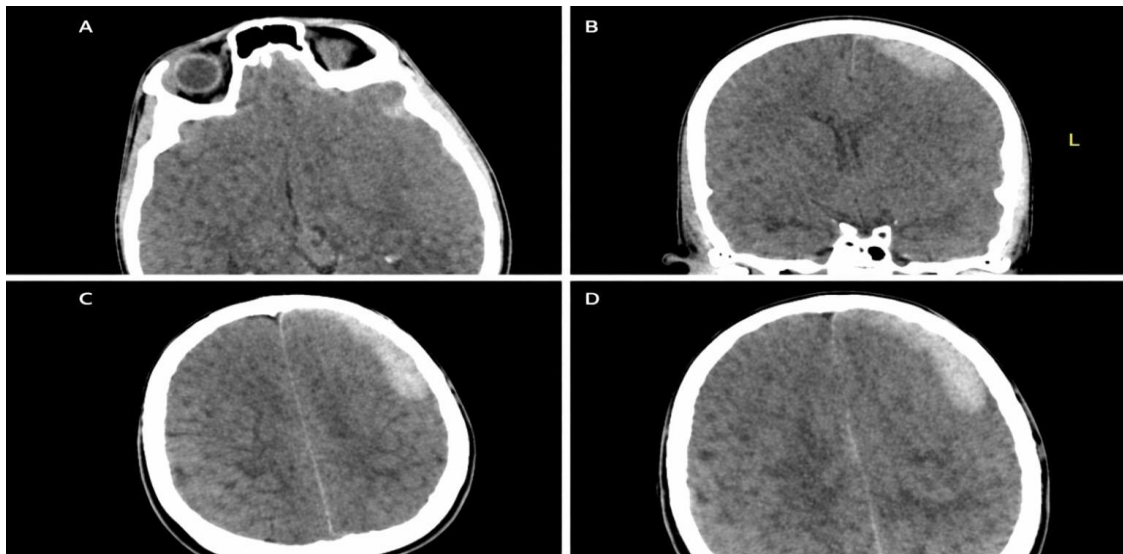


Figure 4. Follow-up cranial computed tomography performed on 30 September demonstrating marked regression of the previously described left fronto-parietal subdural hematoma. Axial and coronal sections show further decrease in hematoma thickness and density, progressive re-expansion of cortical sulci, and restoration of normal brain parenchymal configuration. No new intracranial hemorrhagic foci, hydrocephalus, or significant midline shift are identified, supporting favorable radiological evolution under conservative multidisciplinary management.

At admission on 21 September 2025, the patient presented with severe neurological impairment, characterized by intense headache, somnolence, hypodynamia, delayed responsiveness to verbal stimuli, and convulsive status. Despite the altered level of consciousness, neurological examination demonstrated symmetrical palpebral fissures, round and reactive pupils, preserved convergence, absence of nystagmus, symmetrical facial expression, intact phonation and swallowing, midline tongue position, preserved sensory function, and full active movements in all limbs with maintained muscle tone and strength.

On 22 and 23 September, the neurological condition remained impaired but relatively stable. The patient was conscious but continued to experience headache and vertigo, consistent with cerebral contusion and ongoing intracranial involvement.

On 24 September, persistent headache and frontal negativism were noted. Although the patient remained conscious and neurological examination findings were largely preserved, convulsive episodes occurred, indicating fluctuating neurological deterioration.

On 25 and 26 September, neurological status showed partial improvement, with the patient becoming conscious and oriented, though still hypodynamic. Pupillary symmetry and preserved photoreaction were maintained.

Between 27 and 28 September, transient neurological worsening was observed. The patient responded to questions with delay, showed reduced contact, and experienced episodic rigidity associated with gaze deviation to the left, accompanied by recurrent seizure activity.

By 29 September, neurological stabilization became evident. The patient was conscious and oriented, with persistent hypodynamia and occasional dizziness, but without further major neurological deficits.

On 30 September, a temporary neurological setback occurred, characterized by severe headache, fixed gaze, delayed consciousness, and increased risk of convulsive status.

From 1 October onward, progressive neurological recovery was documented. The patient presented preserved cranial nerve function, symmetrical pupils with brisk photoreaction, intact motor and sensory function, and restoration of independent gait. Deep tendon reflexes were lively and symmetrical.

During the following days (3–13 October), neurological examination remained stable, with only mild residual headache and no recurrence of seizures or focal neurological deficits, indicating favorable neurological outcome and clinical stabilization. (Figure 5)

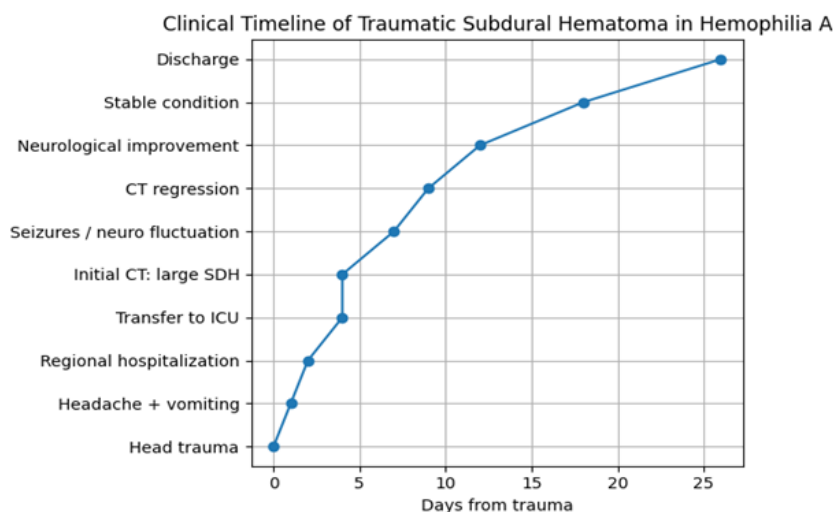


Figure 5. Integrated clinical timeline of traumatic subdural hematoma evolution in a child with severe hemophilia A and inhibitors.

Intensive conservative management included combined hemostatic, supportive, and symptomatic therapy. Broad-spectrum antibiotic treatment with intravenous ceftriaxone was administered throughout hospitalization. Hemostatic support consisted of repeated administration of factor VIII concentrate (Octafactor), fresh frozen plasma, cryoprecipitate, and calcium supplementation. Due to the presence of severe anemia secondary to hemorrhagic syndrome, packed red blood cell transfusions were performed during the early intensive care period. Adjunctive hemostatic therapy included etamsylate administration. Neurological stabilization and seizure control were achieved using rectal diazepam during the acute phase, while antihistaminic therapy with diphenhydramine was also provided. Blood pressure monitoring and control were supported by low-dose captopril administration. The multidisciplinary conservative treatment strategy resulted in progressive clinical stabilization, radiological regression of intracranial hemorrhage, and favorable neurological recovery without the need for neurosurgical intervention. Treatment includes:

- Sol. Ceftriaxone 1 g twice daily
- Factor VIII concentrate (Octafactor) 1000 IU twice daily
- Captopril 6.25 mg

- Diazepam 10 mg rectal tube (for seizure control)
- Diphenhydramine solution 1 ml
- Etamsylate 1 ml three times daily
- Calcium supplementation
- Red blood cell transfusion
- Fresh frozen plasma 10 ml/kg
- Cryoprecipitate (3 units)

The relationship between clinical severity, neurological evolution, and therapeutic intensity is summarized in the integrated clinical course timeline (Figure 6). The integrated timeline illustrates the dynamic relationship between overall clinical severity, neurological impairment, and intensity of therapeutic interventions throughout hospitalization. The early phase was characterized by extremely severe clinical presentation, marked neurological deterioration including seizure activity, and the need for intensive multimodal hemostatic and supportive treatment. Progressive stabilization was observed after the first week, accompanied by reduction in treatment intensity and gradual neurological recovery. Toward the end of hospitalization, both clinical and neurological parameters reached stable levels, reflecting favorable outcome under conservative multidisciplinary management.

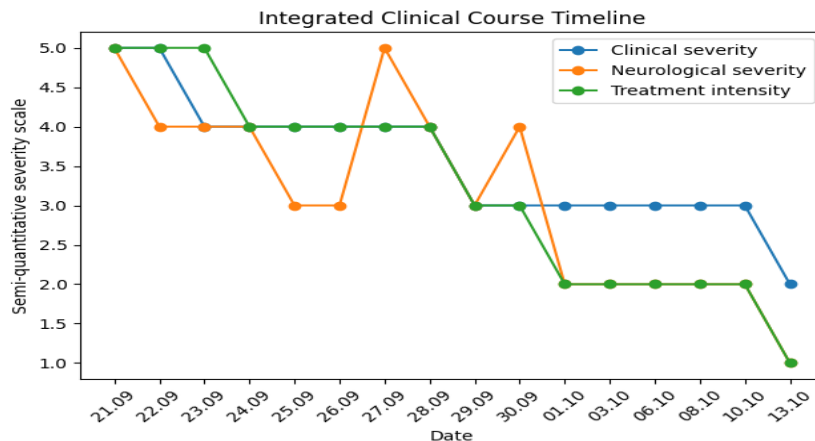


Figure 6. Integrated timeline of clinical severity, neurological status, and treatment intensity during hospitalization.

Discussions

Intracranial hemorrhage remains one of the most severe and life-threatening complications in patients with severe hemophilia, particularly in the pediatric population. Even minor head trauma may precipitate significant bleeding due to impaired thrombin generation and ineffective clot stabilization. The present case highlights the potential for delayed neurological deterioration following low-impact trauma, emphasizing the need for early clinical suspicion and prompt neuroimaging evaluation in children with severe congenital coagulopathies.

A distinctive feature of this case is the presence of very high inhibitor titers, which substantially complicate hemostatic management. Inhibitors neutralize replacement factor VIII activity and are associated with increased bleeding severity, prolonged hospitalization, and higher treatment costs. Reported cumulative incidence of inhibitor development in severe hemophilia A ranges between 20% and 30%, with high-titer inhibitors representing a major therapeutic challenge.

Despite the large size of the subdural hematoma and the presence of neurological impairment, a conservative multidisciplinary treatment strategy was successfully implemented. The decision to avoid immediate neurosurgical intervention was influenced by the extremely high hemorrhagic risk related to inhibitor status and the patient's hemodynamic stability. This approach required intensive hemostatic support, close neurological monitoring, and repeated imaging evaluation.

The clinical course demonstrated fluctuating neurological severity during the acute phase, including seizure episodes and transient deterioration in consciousness. However, progressive radiological regression of the hematoma was observed, which correlated with gradual

neurological recovery and stabilization of vital parameters. This favorable evolution supports the concept that, in selected patients with hemophilia and intracranial hemorrhage, carefully supervised conservative management may represent a viable therapeutic alternative to surgical evacuation.

Another important aspect of this case is the role of prophylactic biological therapy with emicizumab, which has been shown to significantly reduce bleeding frequency in patients with inhibitor-complicated hemophilia. Although the traumatic hemorrhage occurred despite ongoing prophylaxis, the subsequent stabilization and absence of recurrent major bleeding episodes may reflect the beneficial hemostatic background provided by this therapy.

Furthermore, the strong hereditary burden observed in this patient underscores the importance of early diagnosis, genetic counseling, and structured long-term follow-up in families affected by severe hemophilia. In resource-limited settings, delayed access to specialized care and comprehensive monitoring may contribute to increased morbidity associated with traumatic bleeding events.

Overall, this case contributes to the limited literature on traumatic intracranial hemorrhage in children with severe hemophilia and high-titer inhibitors, demonstrating that favorable outcomes may be achieved through timely diagnosis, intensive conservative hemostatic management, and coordinated multidisciplinary care.

Conclusions

- This case highlights that minor cranial trauma may lead to severe and delayed intracranial hemorrhage in children with severe hemophilia A complicated by high-titer inhibitors, even

under ongoing prophylactic therapy. Early recognition of neurological symptoms and prompt neuroimaging evaluation are essential to prevent life-threatening complications.

- Carefully selected patients may benefit from a conservative multidisciplinary treatment approach, particularly when the hemorrhagic risk associated with surgical intervention is significantly increased due to inhibitor presence. Intensive hemostatic support, continuous neurological monitoring, and serial imaging assessment are critical components of successful management.
- The favorable clinical and radiological outcome observed in this case underscores the importance of individualized therapeutic decision-making and coordinated care involving hematology, neurosurgery, and intensive care specialists. Furthermore, the case emphasizes the need for structured long-term follow-up and preventive strategies in pediatric patients with severe hemophilia.

Ethics Statement and Conflict of Interest Disclosures Financial support and sponsorship

All authors have declared that no financial support was received from any organization for the submitted work.

Ethics Consideration

The authors declare that all the procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008(5), as well as the national laws.

Written informed consent was provided by the patient participant in this study.

Conflict of interest

No known conflict of interest correlated with this publication. Availability of data and materials: The data used and/ or analyzed throughout this study are available from the corresponding authors upon reasonable request.

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Competing interests

The authors declared that they have no competing interests.

The use of generative AI and AI-assisted technologies: The authors did not use in this article generative AI and AI-assisted technologies.

Author Contributions

Dorina Agachi, as a PhD candidate, together with Vladimir Iacomi, clinical doctor in the Department of Benign Hematologic Disorders, were responsible for primary data collection, clinical documentation review, and preparation of the initial case report draft.

Galina Esanu, hematologist in the Department of Benign Hematologic Disorders, supervised all stages of data analysis, clinical interpretation, and manuscript development.

Professor Valentin Turea contributed to the conceptual framing of the case presentation, refinement of the study objectives, and critical revision of the conclusions and overall scientific content of the manuscript.

All authors reviewed and approved the final version of the manuscript.

Biography

Dorina Agachi is a pediatrician and PhD candidate in Medical Sciences at the State University of Medicine and Pharmacy "Nicolae Testemițanu", Republic of Moldova. Her doctoral research focuses on the clinical, biochemical, and genetic aspects of pediatric hemophilia, with emphasis on diagnostic optimization and treatment strategies. She is actively involved in clinical practice and academic research, contributing to national registries and pediatric hematology studies. She has authored and co-authored multiple scientific abstracts and articles published in national and international journals and actively participates in medical conferences and scientific forums.

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