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Case Report

Multiple complications of treatment for acute lymphoblastic leukemia in a child: Hypertriglyceridemia and acute pancreatitis

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Abstract

Introduction: Acute lymphoblastic leukemia (ALL) is the most common haematological malignancy in children. While chemotherapy remains the standard treatment, its toxicity can limit use. In such cases, biological therapies offer an effective alternative. We present a case of a 5-year-old with pre-B ALL who achieved remission and underwent haploidentical transplantation thanks to biological therapy, highlighting its role in pediatric leukemia treatment.

Aim: The aim of the study is to present a case of a pediatric patient with ALL pre-B, where biological therapy was necessary due to high chemotherapy toxicity. We describe the treatment course, its effectiveness, and the importance of modern therapies when standard approaches are insufficient or carry a high risk of complications.

Case study: We describe a 5-year-old girl diagnosed with pre-B acute lymphoblastic leukemia (ALL) after presenting with persistent non-specific symptoms. Chemotherapy according to the ALLIC 2009 protocol was initiated, but led to severe complications, including acute pancreatitis and marked hypertriglyceridemia, requiring discontinuation of treatment and urgent plasmapheresis. A year later, following relapse, biological therapy with blinatumomab was introduced, leading to remission and enabling haploidentical transplantation.

Results and discussion: Due to the high toxicity of chemotherapy, an alternative therapy was used. Blinatumomab proved effective, leading to remission and enabling transplantation. This case highlights the role of biologic therapy in treating children with ALL, especially when standard methods are too toxic or ineffective.

Conclusions: Leukemias are severe childhood cancers. Chemotherapy is the conventional route, but biologic therapy, such as blinatumomab, provides an alternative for patients with high or ineffective treatment.

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1. INTRODUCTION

Acute lymphoblastic leukemia (ALL) is a disease caused by abnormal proliferation of lymphoid cells, mainly pre-B cells, which can infiltrate the bone marrow, lymphatic system, the central nervous system and testicles. It is most common in children aged 1–4 years.[1,2] The clinical picture of ALL is highly variable. One of the indispensable drugs used in the first-line treatment of ALL in children is L-asparaginase (L-ASP), but it has numerous side effects, such as nausea, vomiting, allergic reactions, hypertriglyceridemia and pancreatitis.[3] In this article, we present an interesting case of a 5-year-old female patient who developed a number of complications during chemotherapy that required, for example, plasmapheresis to normalize the unusually high concentration of triglycerides occurring as one of the many side effects after the use of L-ASP. The girl was one of the first paediatric patients in Poland to receive a new anti-CD-19 biological drug in the form of blinatumomab, which is an alternative to traditional chemotherapy.

2. AIM

The aim of the study is to present a case of a pediatric patient with ALL pre-B, where biological therapy was necessary due to high chemotherapy toxicity. We describe the treatment course, its effectiveness, and the importance of modern targeted therapies when standard approaches are insufficient or carry a high risk of complications.

3. CASE STUDY

A 5-year-old obese girl reported to the hospital for diagnosis with the following symptoms: fever, an episode of fainting and pain in the lower limbs; which had been present for several days. Due to the suspicion of proliferative disease, the patient was admitted to the Department of Paediatric Hematology, Oncology and Transplantology in Lublin. A peripheral blood smear revealed the presence of 42% of atypical cells. During hospitalization, a bone marrow aspiration biopsy was performed, where pre-B common acute lymphoblastic leukemia (ALL) was diagnosed. The number of blasts in the myelogram was 95.6% with positive PAS (periodic acid-Schiff) reaction being obtained in 21% of the studied cells. The patient started chemotherapy according to the ALLIC 2009 Program (Protocol I) in force at that time with initially good response to steroids. On the 12th day, during the L-asparaginase infusion, allergic symptoms occurred. From the 22nd day of chemotherapy, a gradual increase in triglyceride levels was observed, which reached the maximum level: 9320 mg/dl. In the following days, an increase in the concentration of pancreatic enzymes was found: amylase – 1002 U/l and lipase – 1455 U/l. Computer tomography (CT) of the abdominal cavity revealed enlargement of the pancreas with blurring of its borders and numerous, disseminated hypodense lesions, which were not strengthened after administration of i.v. contrast, corresponding to areas of necrosis, as well as a hypodense extensive fluid area descending to the pelvis (Figure 1). After numerous consultations, it was decided to perform plasmapheresis as a matter of urgency, resulting in a decrease in triglyceride concentration to 2140 mg/dl. In the following days, the child's general condition deteriorated. The patient developed cardiorespiratory failure secondary to peripheral hypoperfusion with tachycardia, tachypnea accompanied by a decrease in oxygen saturation and blood pressure, an episode of generalized convulsions and impaired consciousness. The girl was transferred to the ICU, where sepsis of the etiology of Pseudomonas aeruginosa was diagnosed, AP with the presence of Cullen's and Grey Turner's symptoms and visible progression of pancreatic necrotic lesions on CT examination. Due to numerous massive complications caused by oncological treatment and the inability to continue chemotherapy, it was decided to discontinue the treatment on day 33 of the First Protocol and to carefully observe and subject the girl to regular check-ups, including a bone marrow biopsy with minimal residual disease. One year later, a recurrence of ALL pre-B was diagnosed with a percentage of blasts at 85.6%. Chemotherapy was initiated according to the ALL REZ BFM 2010 Program. During treatment, the child experienced toxicities manifested as increased levels of pancreatic enzymes and abdominal pain, as a result of which cholecystectomy was performed. Numerous complications of conventional chemotherapy prevented its further use, so the girl was one of the first in Poland to be given Blincyto (blinatumomab) in order to achieve remission. After confirmation of remission and consolidation, the patient was qualified for hematopoietic cell transplantation, obtaining, after 3 weeks, haematological renewal. On the 12th day after the transplant, Graft-versus-host disease (GvHD) was diagnosed and treatment with Solu Medrol was initiated with good results. Currently, the girl is in haematological remission, the results of laboratory tests, including the concentration of pancreatic enzymes, are normal.

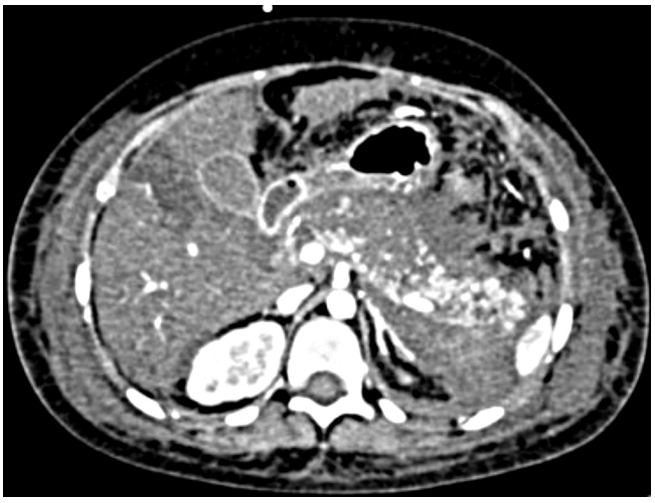

Figure 1. CT scan of the abdomen showing necrotic pancreatic lesions.

4. RESULTS AND DISCUSSION

According to the NCCN guidelines presented in the publication by Patrick Brown, acute lymphoblastic leukemia is diagnosed when the number of lymphoblasts exceeds 20% of the examined cells in the haematological examination of the bone marrow aspiration and biopsy materials.[2] Chemotherapy is one of the basic elements of ALL therapy.[4] One of the many chemotherapeutic agents used is L-asparaginase, which is part of a multidrug treatment algorithm for patients with ALL, which our patient also received. The mechanism of action of L-ASP is to reduce the plasma concentration of asparagine by decoupling asparagine to aspartic acid and ammonia. In the case of adequate enzyme activity, asparaginase therapy leads to complete depletion of serum asparagine, which deprives leukemia blasts of this amino acid. This results in a decrease in protein synthesis and ultimately leads to the death of leukemia cells.[5,6] In her article, Anna Płotka points to the importance of using L-ASP in the treatment of acute lymphoblastic leukemia since the 1960s. Emphasizing its impact during therapy on improving the effectiveness of ALL treatment in children.[7] Various complications have been observed in patients treated with L-asparaginase in the form of allergic reactions, hepatotoxicity, thrombosis, pancreatitis, and disorders of lipid metabolism.[8] The described girl developed allergic symptoms, but the developing inflammation of the pancreas and constantly increasing triglyceride levels, which required plasmapheresis, were a major problem. Risk factors for acute pancreatitis (AP) include the presence of gallstones, alcohol abuse, and age; but there are also genetic factors, including a mutation in the PRSS1 gene.[9,10] Pancreatitis associated with the use of L-asparaginase occurs in 2–18% of children with acute lymphoblastic leukemia.[11] It is most often manifested by abdominal pain, vomiting, nausea, abnormalities in imaging tests, increased levels of amylase and lipase, as well as weight loss.[12] The information contained in the publication by Maria Tosta Pérez indicates a significant frequency of the above clinical picture in patients over 4 years of age, on average 12 days after L-asparaginase administration. In the case of the described patient, pancreatic parameters began to increase as early as on the 22nd day, and other symptoms typical of AP were also observed. Pancreatitis in children with acute lymphoblastic leukemia treated with L-asparaginase may also be associated with immunosuppression, coagulation disorders, translocation of microorganisms from the intestines and hyperlipidemia.[13] Patients with ALL have a statistically increased risk of kidney damage due to various factors, including: renal infiltration by abnormal cells, use of nephrotoxic drugs, tumor lysis syndrome, hypertension and sepsis.[14] According to Reeti Kumar, 10–30% of people who suffered from acute lymphoblastic leukemia in childhood had a reduced glomerular filtration rate (GFR).[15] Numerous clinical manifestations and the dynamics of the disease process have made it necessary to implement newer and newer methods of ALL treatment. Breakthrough therapeutic strategies, including a.o cellular or humoral immunotherapy, have been developed over the past decade.[16] In case of failure of the standard chemotherapy regimen for ALL, it is possible to use bispecific immunotherapy involving T lymphocytes – blinatumomab.[17] It consists of two different single-chain Fv fragments. One binding the CD3 antigen, which activates the cytotoxicity of T lymphocytes, and the other binding to the CD19 B lymphocyte antigen, which is expressed on most B-ALL cells.[18] The TOWER study shows that the body shows an increased response to blinatumomab in cases where the proportion of blasts in the bone marrow was <50%. According to this study, this drug can reduce the risk of death by 29% compared to standard chemotherapy.[19] Blinatumomab is usually given intravenously by continuous intravenous infusion over a period of 4 weeks. Due to the need to monitor the patient for possible adverse effects, such as cytokine release syndrome, the patient should be hospitalized for the first few days of the cycle.[20] In order to avoid this side effect, intravenous premedication with dexamethasone is used.[21] Despite many cases and studies described in scientific publications, it was not decided to re-administer L-ASP in the presented patient, but she was introduced with another new biological treatment with blimatumomab, which was innovative at that time. This procedure contributed to a significant improvement in the girl's health, enabling her to achieve ALL remission, necessary to perform the transplant, which resulted in haematological restoration.

What distinguishes this case from previously reported pediatric ALL cases is an extremely high and rarely documented in the literature level of triglycerides-9320 mg/dl as well as rapid onset of pancreatitis that followed the very first dose of L-ASP. Despite intensive interventions, including plasmapheresis, the patient developed extensive pancreatic necrosis, a condition mostly associated with high mortality; remarkably, she survived. The massive, life-threatening toxicities precluded further chemotherapy, leaving blinatumomab as the only viable option. The patient was among the first pediatric cases in Poland to receive blinatomumab, at a time when its effectiveness in achieving remission was still uncertain. This approach enabled successful haploidentical transplantation. Currently at 14,5 years of age, the girl remains in long-term remission, with normal laboratory test results, which makes this case unique both due to the extremely severe course of complications and by demonstrating the sustained efficacy of this therapeutic strategy.

5. CONCLUSIONS

(1) Leukemias are the most common group of cancers in children. The heterogeneity of forms, etiology and clinical course makes the selection of the appropriate therapy, dedicated to the case of a specific patient, extremely difficult.

(2) Treatment is a chronic, multi-stage process, of which chemotherapy is an inseparable element often associated with a generalized effect on the patient's body, resulting in various and numerous side effects.

(3) The implementation of biological treatment tends to be a beneficial solution, enabling the targeting of therapy, minimizing its generalized impact.
(4) It is extremely important to maintain appropriate diagnostic vigilance throughout the treatment and, in the event of complications, prompt therapeutic intervention.

Informed consent
Informed/verbal consent obtained from the carer/parent.

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Study design: KK, NMO, KM, MM-L
Data collection: KK, NMO, KM, MM-L
Statistical analysis: KK, NMO, KM, MM-L
Data interpretation: KK, NMO, KM, MM-L
Manuscript preparation: KK, NMO, KM
Literature search: KK, NMO, KM
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References
1 Malard F, Mohty M. Acute lymphoblastic leukaemia. *Lancet*. 2020;395(10230):1146–1162. https://doi.org/10.1016/S0140-6736(19)33018-1.
2 Brown P, Inaba H, Annesley C, et al. Pediatric Acute Lymphoblastic Leukemia, Version 2.2020, NCCN Clinical Practice Guidelines in Oncology. *J Natl Compr Canc Netw*. 2020;18(1):81–112. https://doi.org/10.6004/jnccn.2020.0001.
3 Lau KM, Saunders IM, Goodman A. Pegaspargase-induced hypertriglyceridemia in a patient with acute lymphoblastic leukemia. *J Oncol Pharm Pract*. 2020;26(1):193–199. https://doi.org/10.1177/1078155219833438.
4 Śliwa-Tytko P, Kaczmarska A, Lejman M, Zawitkowska J. Neurotoxicity Associated with Treatment of Acute Lymphoblastic Leukemia Chemotherapy and Immunotherapy. *Int J Mol Sci*. 2022;23(10):5515. https://doi.org/10.3390/ijms23105515.
5 Elouali A, M'harzi S, Lahrache K, et al. Corrigendum to Acute pancreatitis following L-asparaginase in acute lymphoblastic leukemia. *Leuk Res Rep*. 2023;20:100375. https://doi.org/10.1016/j.lrr.2023.100375.
6 Burke MJ, Zalewska-Szewczyk B. Hypersensitivity reactions to asparaginase therapy in acute lymphoblastic leukemia: Immunology and clinical consequences. *Future Oncol*. 2022;18(10):1285–1299. https://doi.org/10.2217/fon-2021-1288.
7 Płotka A, Wziątek A, Wachowiak J, Derwich K. Successful Management of a Child With Drug-induced Necrotizing Pancreatitis During Acute Lymphoblastic Leukemia Therapy: A Case Report. *J Pediatr Hematol Oncol*. 2019;41(2):125–128. https://doi.org/10.1097/MPH.0000000000001181.
8 Talluri VP, Mutaliyeva B, Sharipova A, et al. L-Asparaginase delivery systems targeted to minimize its side-effects. *Adv Colloid Interface Sci*. 2023;316:102915. https://doi.org/10.1016/j.cis.2023.102915.
9 Rocka A, Woźniak M, Lejman M, Zawitkowska J. Severe complications in the induction phase of therapy in a pediatric patient with T-cell acute lymphoblastic leukemia: A case report. *Medicine (Baltimore)*. 2023;102(36):34965. https://doi.org/10.1097/MD.0000000000034965.
10 Lankisch PG, Apte M, Banks PA. Acute pancreatitis [published correction appears in Lancet. 2015 Nov 21;386(10008):2058]. *Lancet*. 2015;386(9988):85–96. https://doi.org/10.1016/S0140-6736(14)60649-8.
11 Chen CB, Chang HH, Chou SW, et al. Acute pancreatitis in children with acute lymphoblastic leukemia correlates with L-asparaginase dose intensity. *Pediatr Res*. 2022;92(2):459–465. https://doi.org/10.1038/s41390-021-01796-w.
12 M'harzi S, Elouali A, Lahrache K, et al. Acute pancreatitis following L-asparaginase in acute lymphoblastic leukemia. *Leuk Res Rep*. 2022;18:100357. https://doi.org/10.1016/j.lrr.2022.100357.
13 Tosta Pérez M, Herrera Belén L, Letelier P, Calle Y, Pessoa A, Farías JG. L-Asparaginase as the gold standard in the treatment of acute lymphoblastic leukemia: A comprehensive review. *Med Oncol*. 2023;40(5):150. https://doi.org/10.1007/s12032-023-02014-9.
14 Sherief LM, Azab SF, Zakaria MM, et al. Renal Presentation in Pediatric Acute Leukemia: Report of 2 Cases [published correction appears in Medicine (Baltimore). 2015 Oct;94(40):1]. *Medicine (Baltimore)*. 2015;94(37):1461. https://doi.org/10.1097/MD.0000000000001461.
15 Kumar R, Reed S, Stanek JR, Mahan JD. Defining kidney outcomes in children with acute lymphoblastic leukemia in the modern era. *Pediatr Nephrol*. 2022;37(9):2119–2126. https://doi.org/10.1007/s00467-021-05402-3.
16 Inaba H, Mullighan CG. Pediatric acute lymphoblastic leukemia. *Haematologica*. 2020;105(11):2524–2539. https://doi.org/10.3324/haematol.2020.247031.
17 Ojemolon PE, Kalidindi S, Ahlborn TA, Aihie OP, Awoyomi MI. Cytokine Release Syndrome Following Blinatumomab Therapy. *Cureus*. 2022;14(1):21583. https://doi.org/10.7759/cureus.21583.
18 Beneduce G, De Matteo A, Stellato P, et al. Blinatumomab in Children and Adolescents with Relapsed/Refractory B Cell Precursor Acute Lymphoblastic Leukemia: A Real-Life Multicenter Retrospective Study in Seven AIEOP (Associazione Italiana di Ematologia e Oncologia Pediatrica) Centers. *Cancers (Basel)*. 2022;14(2):426. https://doi.org/10.3390/cancers14020426.

[19] Mocquot P, Mossazadeh Y, Lapierre L, Pineau F, Despas F. The pharmacology of blinatumomab: State of the art on pharmacodynamics, pharmacokinetics, adverse drug reactions and evaluation in clinical trials. *J Clin Pharm Ther*. 2022;47(9):1337–1351. https://doi.org/10.1111/jcpt.13741.

[20] Shimazu Y, Kitawaki T, Kondo T, Takaori-Kondo A. Pretreatment blast-to-lymphocyte ratio as a prognostic marker for CD19/CD3-bispecific T cell-engaging antibodies (blinatumomab) treatment against relapsed or refractory B-precursor acute lymphoblastic leukemia. *Cancer Immunol Immunother*. 2023;72(11):3861–3865. https://doi.org/10.1007/s00262-023-03514-3.

[21] Lantz J, Pham N, Jones C, Reed D, El Chaer F, Keng M. Blinatumomab in Practice. *Curr Hematol Malig Rep*. 2024;19(1):1–8. https://doi.org/10.1007/s11899-023-00714-7.