Chronic myeloid leukemia in a pediatric patient: A case report.

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Abstract

Introduction: Chronic myeloid leukemia (CML) is a rare pathology that occurs in childhood and represents 2-3% of leukemias diagnosed in children and adolescents; the incidence of CML ranges from 0.6 to 1.2/million children/year, and the incidence of CML increases with age.

Clinical case: The case of an 11-year-old boy who presented with abdominal pain secondary to acute appendicitis with persistent leukocytosis during his hospitalization is reported.

Evolution: He was evaluated by hematology. He was diagnosed with this disease and referred to a specialized entity. An RT–PCR was performed for BCR-ABL1, and the results were positive, confirming the findings of this study.

Conclusions: Chronic myeloid leukemia should be suspected in pediatric patients who present with hyperleukocytosis accompanied by thrombocytosis and splenomegaly without any cause, especially during adolescence, which is the most common age at which this pathology appears.

Keywords:

MeSH: leukemia, myeloid, chronic phase; appendicitis; case reports; child.

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Introduction

Myeloid leukemia, also known as chronic granulocytic leukemia, is a heterogeneous clonal disorder of pluripotent stem cells characterized by the presence of a cytogenetic abnormality that includes the reciprocal translocation of chromosomes 9 and 22 (the Philadelphia chromosome), creating a fusion gene (BCR-ABL).), which encodes a protein (p210) with an uncontrolled tyrosine kinase function. It is a rare disease in children and adolescents. The average age of presentation in developed countries is 60-65 years. In childhood, it represents 2% [1] of all leukemias in children under 15 years of age and 9% in adolescents, with an annual incidence of 1 to 2.2 cases per million in these two groups. Three classic forms of disease presentation are described: the chronic phase, the transformation phase, and the blast crisis. The definitive diagnosis is established by demonstrating the Philadelphia chromosome in the bone marrow; its diagnostic suspicion can be presented with laboratory data that reveal leukocytosis and thrombocytosis and findings from peripheral blood smears of immature cells (normoblasts, metamyelocytes, and myeloblasts), as well as abundant basophils and eosinophils. Children with CML exhibit more aggressive characteristics than adults with the same disease, which makes it necessary to optimize early diagnosis and subsequent treatment [2].

Case report

Clinical history

An 11-year-old male schoolboy presented with a clinical picture characterized by abdominal pain in the right iliac fossa, accompanied by vomiting, diarrhea, and an unquantified increase in temperature. The patient presented with significant paleness upon physical examination, and splenomegaly was palpable below the costal margin.

Diagnostic workshop

In the initial examinations, hyperleukocytosis (67,480 u/µl), anemia (with a hemoglobin level of 8 g/dl and hematocrit of 27%), thrombocytosis (5,070,000 u/ul), and a CRP concentration of 5.16 mg/l were observed.

Abdominal ultrasound revealed the presence of images suggestive of acute appendicitis, with 12 mm of evidence in the aperistaltic, blind cul-de-sac corresponding to the cecal appendix.

Resolution of acute abdomen

The patient was evaluated by pediatric surgery due to the presence of an acute abdomen. He underwent a laparoscopic appendectomy. The finding was a gangrenous appendix with a coprolite at the cutoff point, with little peri-appendicular inflammatory fluid. He received antibiotic treatment with a triple regimen of ceftriaxone, metronidazole, and amikacin (Figure 1).

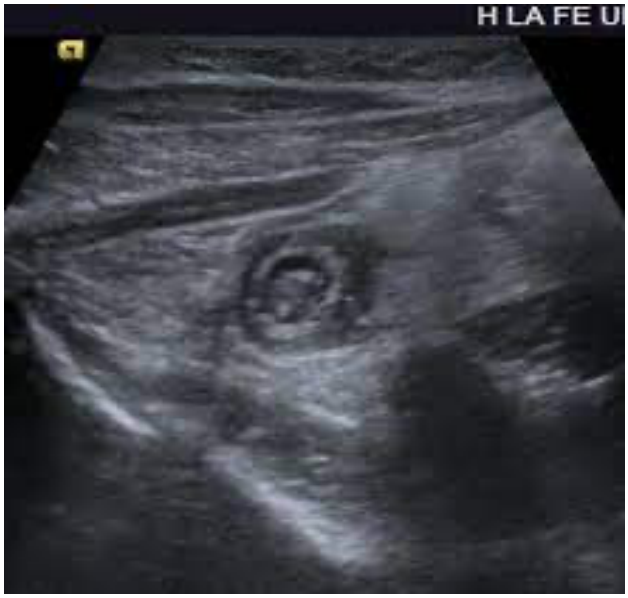


Figure 1. Ultrasound showed acute appendicitis.

Postoperative evolution

Despite clinical-surgical treatment, leukocytosis persisted (63,080 u/µl); therefore, he was consulted by the pediatric hematology service, who performed a peripheral blood smear with the following results: red series:

standard; white series: 50,000 u/ul leukocytes; neutrophils: 42%; arches: 30%; lymphocytes: 23%; eosinophils: 2%; monocytes: 3%; and platelets: 500,000 u/ul, with a diagnostic impression of reactive leukocytosis and the presence of arrows associated with the process of active infection. As an initial approach, complementary studies were requested to rule out the presence of an active contagious focus: the abdominal ultrasound reported hepatosplenomegaly, and the echocardiogram was normal. Polycultures were negative, with no microorganism growth.

Given the persistence of leukocytosis and no evidence of systemic response, a bone marrow puncture and aspiration were performed based on the myelogram results. The patient had good maturation and differentiation in both the erythroid and myeloid series, was reactive, had myeloid series hyperplasia, and had no infiltration. Given the improvement in his clinical condition, he was discharged from the surgery service and remained asymptomatic, with generalized paleness.

Second entry

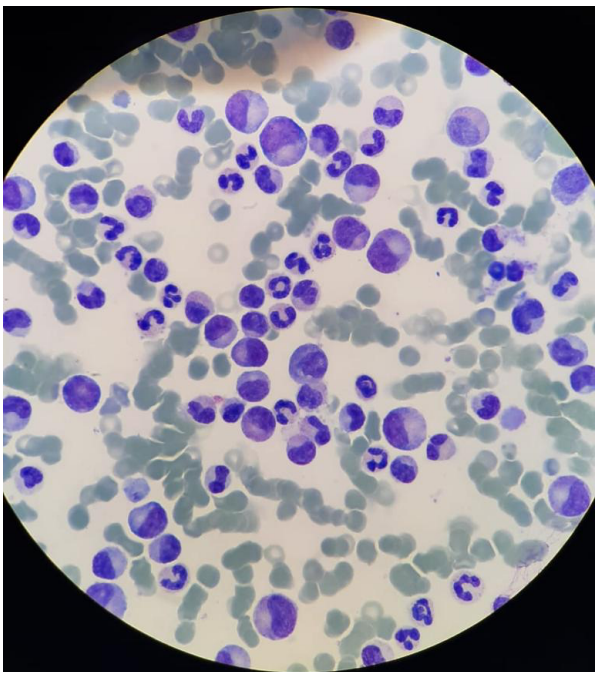
The patient attended outpatient follow-up by hematology and was re-evaluated via laboratory studies, which revealed hyperleukocytosis (104,070 u/ul), moderate anemia (hemoglobin 9.9 g/dl, hematocrit 28.6%), and thrombocytosis with platelets of 510,000 u/ul. A report on peripheral blood smears revealed the following: leukocytes >120,000 u/µl; myelocytes 22%; metamyelocytes 5%; bands 16%; neutrophils 41%; lymphocytes 15%; eosinophils 3%; and platelets 700,000 u/µl in the majority added. Thus, a new hospitalization was performed to perform specialty studies, including molecular biology (BCL-ABL-1/Philadelphia chromosome), cytogenetics, and immunophenotyping. On physical examination, the hepatosplenomegaly was striking. Chest tomography was performed, during which the presence of a right peribronchial and right paravertebral retrocardiac mass was observed, with several lymph node conglomerates.

Diagnosis, Management, and Treatment

Biochemical and electrolyte studies were negative for tumor lysis, and hyperhydration therapy, bone marrow puncture, and aspiration were initiated. A myelogram revealed hypercellular, heterogeneous marrow with juvenile platelet-producing megakaryocytes. The erythroid series included 11% normoblasts, 20% myeloid series myoblasts, 16% promyelocytes, 12% myelocytes, 51% meningenocytes, 47% segments, 15% lymphocytes, and 15% eosinophils. These cells were counted as 200 cells, with a diagnostic impression of myeloid series hyperplasia compatible with chronic myeloid leukemia. Patients were referred to the oncology service for corresponding treatment, with suspicion of being in the chronic phase of the disease (Figure 2).

The molecular biology report described the presence of the QUANTITATIVE TRANSLOCATION (9:22), which was generated by detecting the BCR-ABL1 fusion gene. Specific treatment was initiated with Imatinib and Hydroxyurea at therapeutic doses, and the patient's general condition improved, with a last control report of FISH 9 22 (q34; q11.2) BCR/ABL in 5%.

Figure 2. Bone marrow aspirate.



Discussion

CML has a low incidence in pediatrics; the average age at diagnosis in international registries is approximately 11 years [3], in addition to the initial symptoms, which include abdominal pain and asthenia, coinciding with our clinical case. Similarly, splenomegaly, high white blood cell counts, anemia, and thrombocytosis are some of the most characteristic signs of this disease [4]. As in adults, the diagnosis must detect the translocation of t (9;22) (q34; q11), which gives rise to the BCR-ABL fusion gene. This gene encodes a 210 kd protein, the main rearrangements being b3a2 in 51% of pediatric patients and b2a2 in 40% of patients [5]. Ninety-two percent of children are diagnosed in the chronic phase, 6% are diagnosed in the accelerated phase, and the remaining 2% are in blast crisis [6]. In the present case, the patient was diagnosed in the chronic phase for subsequent therapy with a tyrosine kinase protein inhibitor and hydroxycarbamide. During the last seven years (2013-2020), only 2 cases have been reported; one was reported at the Roberto Gilbert Hospital in Guayaquil and was still in treatment during outpatient follow-up.

Conclusions

In the present case, chronic myeloid leukemia was suspected in the pediatric patient due to the presence of hyperleukocytosis accompanied by thrombocytosis and splenomegaly without any cause, especially in adolescence, which is the most frequent age at which this pathology appeared for early diagnosis and timely initiation of therapy.

Abbreviations

CML: Chronic myeloid leukemia.

Supplementary information

No supplementary materials are declared.

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Not declared.

Author contributions

Oscar Navarrete Espinoza: conceptualization, data curation, formal analysis, acquisition of funds, research, methodology.

María Auxiliadora Pulla Armijos: Data curation, formal analysis, acquisition of funds, research.

Robinson Ramírez: project administration, formal analysis, Resources, Software, Supervision, writing – review and editing.

Karla Calderon Salvalarria: Validation, writing – original draft.

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

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Availability of data and materials

The data were collected from medical archives and are not publicly available due to patient confidentiality but are available through the corresponding author upon reasonable academic request.

Statements

Ethics committee approval and consent to participate

Approval from an ethics committee is not required for clinical cases. The authors obtained the permission of the tutors to publish this case.

Publication consent

The authors obtained written permission to publish images, X-rays, and specific studies from the patient's guardians.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Author information

Not declared.

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