Erythropoietin May Improve Anemia in Patients with Autoimmune Hemolytic Anemia Associated with Reticulocytopenia

Olga Arbach\textsuperscript{a} Robert Funck\textsuperscript{b} Frank Seibt\textsuperscript{c} Abdulgabar Salama\textsuperscript{a}

\textsuperscript{a} Institute for Transfusion Medicine, Universitätsmedizin Charité – Universitätsmedizin Berlin, \textsuperscript{b} St. Marien Amberg Clinic, Amberg, \textsuperscript{c} Private Internal Medicine Practice, Berlin, Germany

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Autoimmune hemolytic anaemia · AIHA · Reticulocytopenia · Anemia · Erythropoietin

Summary
Background: Management of patients with autoimmune hemolytic anaemia (AIHA) and reticulocytopenia remains challenging. \textbf{Case Reports:} Two patients with decompensated AIHA who were receiving immunosuppressive drugs were treated with erythropoietin (EPO). Administration of EPO increased reticulocyte counts and haemoglobin concentrations in both cases. One patient completely recovered following a short course of treatment. Hemolysis could be compensated in the second patient using only mild doses of immunosuppressive drugs in combination with EPO. \textbf{Conclusion:} The administration of EPO should be considered in patients with therapy-refractory AIHA, particularly in the presence of reticulocytopenia.

Introduction
In patients with active autoimmune hemolytic anemia (AIHA), reticulocytes are often increased. However, reticulocytopenia may occur in only a number of cases and may result in a life-threatening situation with a lack of compensatory mechanisms [1, 2].

Interestingly, the reticulocytopenia observed in affected patients may be associated with hyperplasia [3–7] or hypoplasia of bone marrow [8–12]. These findings might be explained by the presence of autoantibodies reacting with red blood cells (RBCs), reticulocytes and/or erythroid progenitor cells [8, 13–15]. In addition, parvovirus B19 infection has also been implicated as a cause of transient aplastic crisis in some cases [16, 17]. Furthermore, there is evidence which suggests that other mechanisms may be responsible for prolonged episodes of reticulocytopenia in AIHA [3]. Whatever the mechanisms may be, as long as these patients do not respond to treatment of the underlying disease, blood transfusions remain necessary [5, 18–20]. The question whether erythropoietin (EPO) may be effective in such cases has not yet been addressed. Here, we describe two patients with decompensated AIHA of warm type in whom administration of EPO evidently improved both anemia and outcome.

Schlüsselwörter
Autoimmunhämolytische Anämie · AIHA · Retikulozytopenie · Anämie · Erythropoetin

Zusammenfassung
Case Reports

Case I
A 23-year-old male with massive hemolysis was admitted to the hospital. Laboratory findings revealed the following abnormal values: decreased hemoglobin concentration (8.4 g/dl), increased lactate dehydrogenase (1,300 U/ml), slightly increased reticulocytes (8.6%), increased bilirubin (12 mg/dl), and positive direct and indirect antiglobulin tests, leading to the diagnosis of AIHA of warm type. Despite the administration of 100 mg prednisolone, hemoglobin levels dropped to 4.3 g/dl on the second day (fig. 1). A bone marrow biopsy revealed only reactive changes and normal erythropoiesis. Administration of dexamethasone (40 mg/day) followed by prednisolone and high-dose intravenous immunoglobulin (IvIg) did not halt hemolysis. Upon observation, anemia could not be corrected by blood transfusion, thus resulting in secondary intensive care. On days 23 and 31, EPO at a concentration of 40,000 IE was administered subcutaneously, and the patients’ condition rapidly improved.

Case II
The second case involved a 78-year-old female with chronic AIHA and accompanying renal failure who was on hemodialysis. Her longstanding AIHA could not be managed without intensive immunosuppressive therapy including azathioprine and cyclophosphamide. Prednisolone dosages were kept at a minimum of 5 mg. Immunosuppressive drugs resulted in depressed bone marrow production and leukopenia together with thrombocytopenia and decompensation of hemoglobin concentration.
which was observed to repeatedly occur. Continuous treatment with EPO was necessary as this patient also suffered from renal insufficiency. Despite this treatment, hemoglobin concentrations repeatedly deteriorated due to the dual impact of immunosuppression and continuous hemolysis (fig. 2). For over 12 months, the patient required continuous blood transfusions which resulted in an iron overload. As a rescue therapy for hemoglobin recompensation, the dose of EPO was increased from 60 µg twice weekly to 300 µg twice weekly. Hemoglobin levels were stabilized to normal levels, and the patients’ condition improved. During the last 18 months, the patient did not require any further transfusions.

**Discussion**

In this case report we described therapy-refractory AIHA associated with relative reticulocytopenia in two patients. The origin of reticulocytopenia in the first patient remained speculative, whereas treatment with cyclophosphamide could at least be partially responsible for the second patients’ reticulocytopenia. In both cases, hemolysis could not be halted using standard immunosuppressive drugs. Both patients were seriously compromised and required additional treatment. Due to the relative reticulocytopenia, the use of more aggressive immunosuppressive drugs did not appear to be adequate in both cases. In order to stimulate erythropoiesis, treatment with EPO was initiated in the first patient, and was intensified in the second. Beneficial effects of this treatment were evident in both cases. The first patient recovered from the aplastic crisis, whereas the second patient did not require any further blood transfusions, which was documented for an 18-month period following administration.

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**Disclosure Statement**

The authors declare no conflict of interest.

EPO has been proven to be an effective form of treatment for anemia related to renal failure, cancer or cancer-related disease, and in rare cases, for anemia related to other causes [21–23]. The mechanism by which EPO may improve the anemia observed in all these conditions is largely or even exclu-
sively reflected by the increased production of RBCs. In con-
trast, EPO may improve anemia in AIHA via two mecha-
nisms: Firstly, stimulation of RBC production and secondly,
decline in the total amount of autoantibodies present on each RBC, which is secondary to an optimal ratio of an in-
crease in the total number of RBCs to a total constant amount of antibody in the circulation. This is supported by the fact that the destruction of RBCs in AIHA is also related to the autoantibody concentration on RBCs.

Interestingly, the beneficial effect of EPO in AIHA may somewhat resemble that of the thrombopoietin-receptor ago-

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Erratum

In the article


figure 1 and figure 2 were interchanged. Figure 1 represents the data from case no. II and vice versa figure 2 represents the data from case no. I.