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Iron Chelation Therapy and Iron Overload Monitoring in Transfusion-Dependent Hemoglobinopathies: A Real-World Study from Albania

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Abstract:

Albania is one of the Mediterranean countries known for the prevalence of hemoglobinopathies, and iron chelation therapy is one of the main pillars of survival for patients who depend on transfusions. Despite international standards, iron chelation therapy and monitoring iron overload remain a challenge for us. However, like any growing child, we have adapted solutions that have led to progress and satisfactory outcomes in managing these patients.

This is a retrospective observational study that included 170 patients who regularly receive blood transfusions in Mother Theresa Univesity Hospital Centre, Tirana. Demographic characteristics, transfusion regimens, iron overload monitoring, individual iron chelation therapy choices, and prescribing patterns during 2025 were evaluated. A group of 18 patients who switched from Deferiprone to Deferasirox was analyzed to assess changes in serum ferritin levels over a 12-month period. An ANOVA test was performed to determine whether there is an association between age groups and the choice of iron chelator.

Measuring serum ferritin is the only indicator for assessing iron overload in Albania. The majority of patients received Deferasirox as the initial therapy; specially, 287 (68.5%) out of 419 prescriptions written in 2025, while Deferiprone accounted for 132 (31.5%). Deferasirox was associated with a faster decrease in serum ferritin levels compared to Deferiprone. With DFX, the ferritin level was below 1,000 ng/mL after one year of treatment; with DFP, it stayed between 1,700 and 2,100 ng/mL during the same period. The one-way ANOVA indicated that age was a significant predictor of response to therapy (p-0,032). In other words, DFX was more effective in young patients than in older ones. Moreover, DFP was connected with more instances of gastrointestinal tract disturbances, neutropenia, arthralgia, and liver enzyme abnormalities.

Iron chelation therapy does not always have to be a foreign language for developing countries. Incorporating MRI T2 assessment into routine clinical practice, together with individualized chelation strategies and multidisciplinary follow-up, may further optimize long-term outcomes for patients with transfusion-dependent hemoglobinopathies. Albania will always be welcoming to these advances.*

Keywords: Iron Chelation Therapy, Iron Overload Monitoring, Transfusion-Dependent Hemoglobinopathies, Albania

INTRODUCTION

The impressive increase in patient survival with transfusion-dependent hemoglobinopathies is undoubtedly one of the successes of modern Hematology. Repeated blood transfusions have improved the prognosis of Thalassemia major and Sickle cell anemia, turning deadly childhood diseases into manageable chronic conditions in adulthood. But because of iron overload, these patients risk impairment of their health equilibrium and quality of life. For this reason, it is essential that blood transfusion and iron chelation therapy be treated as integrated therapeutic concepts, with the latter playing a decisive role.

Since each blood transfusion contains about 200 to 250 mg of elemental iron in the form of hemoglobin and the human body does not have an active mechanism to eliminate excess iron, iron overload inevitably develops in all patients who receive regular transfusions. The introduction of iron chelating agents has undoubtedly improved the natural course of Thalassemia major, as demonstrated by other observational studies reporting a reduction in cardiac mortality and an overall survival benefit. According to standards, iron chelation therapy should be initiated after 10–20 blood transfusions or when serum ferritin concentration consistently exceeds 1000 ng/dL. The type and dose of chelator are determined individually based on age, number of blood transfusions, serum ferritin level, hepatic iron concentration, cardiac MRI T2 values, organ damage and patient compliance.

METHODS AND MATERIALS

This study presents a real-world experience of the National Hemoglobinopathy Center at the Mother Teresa University Hospital Center, Tirana, Albania, regarding iron chelation strategies and monitoring practices.

This retrospective observational study includes 170 patients who receive regular blood transfusions and are treated with iron chelators. Demographic characteristics, transfusion regimens, current practices for monitoring iron overload, and any current protocols followed for chelation therapy were evaluated. Prescriptions for Deferiprone and Deferasirox for 2015 were evaluated, and 18 patients who switched from DFP therapy to DFX therapy were selected to assess how ferritin changes with this switch. An ANOVA test was performed to find correlations between age and the effectiveness of a chelating therapy. The data were obtained from these patients' medical records with the approval of the Department Head. They were collected and processed using Microsoft Excel 2021. All data are confidential, and all ethical codes were respected in the creation of these results.

RESULTS

Although at the National Center for the Treatment of Hemoglobinopathies, at the "Mother Teresa" University Hospital Center, Tirana, Albania, patients undergo regular blood transfusions according to standardized international protocols, yet managing iron balance remains a clinical challenge. Currently, there are approximately 170 patients being treated with blood transfusions at this Center, of whom 107 (63%) have ß-thalassemia major, 46 (27%) have thalaso-sickle cell disease, and 17 (10%) have sickle cell disease. By gender, the patients are distributed as follows: 90 are males and 80 are females. By age group, the patients are divided as follows: 33 patients are 0–10 years old;

46 patients are 11–20 years old; 47 patients are 21–30 years old; 28 patients are 31–40 years old; and 16 patients are 41–50 years old.

The average age at diagnosis for these patients is 15 months to 2 years, and the average hemoglobin level at diagnosis for patients with thalassemia was 5.5–6. 9 g/dL. Under these conditions, for 75% of these patients, transfusion therapy was initiated at the time of diagnosis and continued; 19% of them began it within the first year after diagnosis; while 6% started regular transfusion therapy after one year from diagnosis.

The practice at our Center regarding the indication for initiating transfusions is chronic anemia, with the goal of maintaining a stable hemoglobin level above 8.5 g/dL and limiting daily activities resulting from inadequate oxygenation of peripheral tissues. The factors that cause these patients to require ongoing transfusions (virtually lifelong) are growth impairment, endocrine complications, frequent vaso-occlusive crises, and aplastic crises resulting from viral and bacterial infections. As a result, these patients become subject to iron overload, and to assess it, before each transfusion session we measure serum ferritin and evaluate the complete blood count. Almost all patients who receive blood transfusions are on iron chelation therapy.

The above clinical issues sometimes require a more careful assessment in daily practice: Serum ferritin, although easy to test and the less expensive alternative, is not a reliable indicator of iron status because its levels can be elevated due to concurrent inflammation, as in the case of sickle cell disease. Therefore, current international guidelines recommend using serial ferritin measurements in combination with MRI T2 quantification of iron in the heart and liver to guide individualized therapies and minimize iron toxicity before organ damage manifests. Currently, this represents a gap in our system in Albania, because our practice is almost entirely focused on measuring serum ferritin to determine when transfusion should be initiated and how long it should continue. Not only that, but also to assess the success of the therapy initiated. We occasionally perform abdominal ultrasounds to evaluate the liver, but apart from its size, we do not obtain accurate information about iron overload.

In Albania, the preferred chelator is Deferasirox (DFX), and the preferred second choice is Deferiprone (DFP). Specifically, from the data collection for the year 2025, it was found that our Center has issued a total of 419 prescriptions, of which 287 are for DFX and 132 are for DFP. Our choice for this distribution is based on the fact that DFX is a medication that can be given only once every 24 hours and its prescribed dose is standard, specifically 20-40 mg/kg/day. Meanwhile, DFP is a medication that must be used 2–3 times a day and requires a higher dose, typically 70–100 mg/kg/day, to achieve the necessary concentration to clear accumulated iron from the organs. Today, these medications are fully reimbursed by the state, and patients have no difficulty obtaining them. But another challenge we face in Albania is that adolescents and young adults, in particular, because of the burden of treatment, unwanted side effects, and lack of perceived immediate clinical benefit, reduce or discontinue iron chelation therapy. Discontinuation without medical supervision exposes these patients to a significant risk of developing severe complications, such as hepatic fibrosis, endocrine dysfunction, and cardiomyopathy. To date, we have only had cases of impaired liver function and cases of diabetes that developed as a result of pancreatic damage, all of which were regularly monitored by the appropriate specialists. In addition to restarting iron chelation therapy to prevent the progression of the lesions, these patients are supported with appropriate hepatic enzymes and have been started on insulin therapy.

All of these outcomes have arisen as a result of the transition from childhood to adulthood, which is accompanied by numerous psychosocial challenges, such as reduced

parental involvement, increased autonomy, and a greater sense of responsibility for one's own health. Therefore, it is essential to provide patient education on multidisciplinary coordination to maintain a good quality of life, rather than relying solely on isolated laboratory tests to conclude that everything is going well.

To explain why in our practice we more often choose DFX than DFP, we selected 18 patients who had started therapy with DFP and then switched exclusively to DFX, monitoring their serum ferritin levels—two measurements each month—for one year of use of each preparation. From the data analysis, it emerged that DFP required on average nearly four months for a significant drop in serum ferritin levels to begin, and its stabilization did not fall below 1700–2100 ng/dL. In contrast, upon starting DFX, It was observed that ferritin levels began to fall as early as the second month, and by the end of the year they had dropped below 1000 ng/dL of serum ferritin. This result is a key point for our practice, prompting us to direct the initiation of chelation therapy more toward DFX than DFP. The comparison is clear, as shown in the chart below.

Another assessment we make when initiating iron chelation therapy is the patients' age. Knowing that as patients age they become more aware of the disease and its progression, we find it easier to select DFP for these patients and adjust its dosage based on serial ferritin monitoring. For younger patients, who find it more difficult to understand the significance of the disease and its management, and given that their rebellion may lead us to discontinue treatment, we choose the simplest therapy to administer that yields the quickest benefit. In this case, DFX is the preferred choice. Based on our data, the under-30 age group constitutes the largest number of patients, representing childhood, adolescence, and the period of personal and intellectual development. Since it is an age group with high variability, treating iron overload with DFX has been easier for us, because monitoring both its uptake and its effects is simpler.

However, to see whether there really is any statistical link between age and the selection of the appropriate chelator, We selected patients from each age group who had used both DFX and DFP, compared the level of ferritin variability over time during use of each preparation, and applied the ANOVA test. Through this test we will be able to answer two questions:

1. Do different age groups have ferritin levels (at baseline or after treatment) that differ significantly?

2. Does the effectiveness of DFX compared to DFP depend on the patient's age group? (e.g., does DFX work better in children, while DFP works better in adults?).

From data processing, after applying the ANOVA test, the p-value was 0.032452, which is less than 0.05, indicating a significant relationship between age and the choice of iron

chelator. 05, indicating that there is a significant relationship between age and the choice of iron chelator, determining that for younger ages DFX yields the desired effect better than DFP. This is reflected in the table below.

Source of Variation	SS	df	MS	F	P-value
ANOVA test	286053.3	4	71513.33	3.266443	0.032452

We emphasize that this is a result based solely on our findings in Albania, without relying on the practices of other Hemoglobinopathies Treatment Centers worldwide. And not only that, but the goal is simply to showcase our experience based on the population we work with, and not to promote models to others.

Another point we want to mention as part of our practice for selecting the appropriate iron chelator is the complications they bring to the patient's health. For this, we have observed the complications of DFX and DFP over time and made a simple comparison between them, which is presented in the table below:

	DFX (no. of patients)	DFP (no. of patients)
Gastrointestinal disturbances	2	14
Joint pain	0	8
Skin rashes	5	3
Increases in liver enzymes	4	10
Increases in serum creatinine	3	1
Neutropenia	1	11

From these findings, it is observed that the use of DFP has a more negative impact on these patients' health because it is associated with more cases of gastrointestinal disorders, joint pain, elevated liver enzymes, and neutropenia. For this reason, we also prefer DFX. In analogy with what we said above regarding age groups, since adult patients can be monitored more easily, we choose DFP for these age groups because they are more aware of routine check-ups and of adhering precisely to therapy.

CONCLUSION

Based on all these findings, we have established a stable model for the treatment and monitoring of these patients with respect to iron overload. In this way, we can confidently say that Albania has made significant progress in improving the quality of care for patients with hemoglobinopathies; however, some areas still require improvement to ensure long-term health outcomes for these patients. Our experience underscores the need to also involve social determinants of health in the follow-up, treatment, and monitoring of these patients who receive blood transfusions and are treated with iron chelators to reduce iron overload. Furthermore, we believe that future local research conducted at the Mother Teresa University Hospital Center should go beyond the simple assessment of serum ferritin as an outcome or predictor of response to iron chelation therapy. Including MRI T2 as an examination will provide us with more information regarding cardiac, hepatic, and endocrine complications, further guiding us toward individualized rather than group therapy.

Finally, we want to emphasize that the survival rate of patients with hemoglobinopathies should not be considered the sole indicator of our clinical interventions. It is equally important to focus on improving their quality of life, helping

them become as free as possible from the burden of the disease and its complications. By ensuring that these patients grow up, pursue their careers, and lead healthy, happy lives, we will truly achieve the desired outcomes of transfusion and iron chelation therapy.

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