INTRODUCTION

Anemia is a global public health problem that affects up to 49% of the population worldwide. About 29% of all women of reproductive age have anemia globally. Approximately 50% of cases of anemia are considered to be due to iron deficiency, but the proportion probably varies among population groups and in different areas. The anemia cutoffs vary based on age, sex, and pregnancy-specific (Table 1). Severe anemia is defined by WHO as Hb < 70 g/L in pregnant women and children under 5 years of age and Hb < 80 g/L in all other age groups.

In chronic anemia usually, the body accumulates, and patients might be asymptomatic or have mild symptoms; on the other hand, acute anemia typically presents with more apparent symptoms. The quality of life can be affected by IDA as previously reported to affect the metabolism of glucose, thyroid function, and spermatogenesis.

Iron deficiency anemia is reported to affect other blood parameters, for example, neutropenia and lymphocytopenia. The association between IDA and platelet is complex; iron deficiency is usually associated with either normal platelet counts or thrombocytosis; however, in rare cases, IDA can be associated with thrombocytopenia; even though, thrombocytopenia that occurs with IDA responds to iron therapy. Iron therapy rarely causes transient thrombocytopenia per se. We are reporting an African female patient who is found to have thrombocytopenia secondary to iron deficiency anemia (IDA), and she responded to iron replacement therapy initially with a transient drop in platelets, followed by a rapid rise in platelets till platelets reached the normal level.

KEYWORDS
anemia, iron, iron deficiency anemia, thrombocytopenia
cases such as paroxysmal nocturnal hemoglobinuria, Evan’s syndrome, and aplastic anemia, so it is always challenging to narrow the differential diagnosis early upon patient presentation as early intervention in some of this diseases has mortality benefit like in the case of thrombotic microangiopathy and leukemia. Blood peripheral smear is always the first step that usually can guide the management plan.

Heavy menstrual bleeding (HMB) is a common gynecologic problem that affects around 27% of women. Chronic heavy or prolonged uterine bleeding is a common cause of severe anemia in women.11

| Population                      | Hemoglobin (g/L) | Anemia | |
|--------------------------------|------------------|--------|------------------|
| Nonanemic                      |                  |        |                  |
| Children 6-59 mo of age        | ≥110             | 100-109| 70-99            |
| Children 5-11 y of age         | ≥115             | 110-114| 80-109           |
| Children 12-14 y of age        | ≥120             | 110-119| 80-109           |
| Nonpregnant women (15 y of age and above) | ≥120 | 110-119| 80-109           |
| Pregnant women                 | ≥110             | 100-109| 70-99            |
| Men (15 y of age and above)    | ≥130             | 110-129| 80-109           |

We are describing a young adult African woman who was found to have severe iron deficiency anemia and thrombocytopenia. Iron deficiency anemia in this patient was mostly attributed to her heavy menstrual bleeding as well as possible nutritional deficiency which can be from her economic status as she works as a maid. The patient presentation and symptoms was related to the anemia, and her anemia symptoms were moderate despite having low hemoglobin "grade 4 anemia," all of this is pointing toward that this anemia is chronic.9

Iron deficiency anemia is usually associated with either normal platelets or thrombocytosis. The association between IDA and thrombocytopenia is rare. And it is best diagnosed retrograde after correcting the anemia; the platelets will rise.

The exact mechanism of IDA and thrombocytopenia is not well understood; Apar Kishor Ganti et al suggested that it may be related to the alteration in the activity of iron-dependent enzymes in thrombo- and leukopoiesis.13 Another suggested mechanism by T P McDonald and R E Clift Cottrell might be an early response to direct stimulation of the EPO receptor on megakaryocytes or shunting into the erythroid precursor pathway, leading to decreased platelet formation.14

The peripheral smear of the patient revealed a dimorphic blood picture with the majority of cells markedly hypocromic and microcytic. Iron profile confirmed the IDA picture with low iron, ferritin levels, and elevated TIBC level.

After confirming the results, the patient received intravenous 750 mg of ferrous carboxy maltose based on her iron profile, and in the second day, after ruling out TTP by blood peripheral smear findings, one unit of packed red blood cells transfused to the patient after that patient symptoms improved. Her platelet count followed on days 3 and 4 which showed improvement to 65, 91 × 10⁹/L, respectively. Another platelet count followed after 50 days from discharge which was 240 × 10⁹/L. No further workup was done as the patient symptoms and condition improved rapidly.

2 | CASE REPORT

A 32-Year-old Kenyan female patient not known to have any chronic illness admitted to our institute in August 2019 with the chief complaints of colicky abdominal pain for 2 days; she reported tiredness, fatigue, and shortness of breath that worsen with exertion. There was no associated nausea, vomiting, change in bowel habit, weight loss, or fever.

She gave a history of heavy menstrual bleeding for the past 2 years, and she has no family history of chronic diseases or anemia. Social history was unremarkable for smoking, alcohol drinking, and she was not sexually active. She works as a maid.

Clinical examination was remarkable for pallor only, with unremarkable abdominal as well as other general examination.

Initial laboratory workup for her revealed anemia with hemoglobin 6.5 g/dL (13-17 g/dL), platelet count 54 000 × 10⁹/L (150 000-450 000 × 10⁹/L). Peripheral blood smear revealed a dimorphic blood picture with the majority of cells markedly hypochromic and microcytic. Iron profile confirmed the IDA picture with low iron, ferritin levels, and elevated TIBC level.

Based on the history, clinical examination, Hb, iron study, and peripheral smear picture, the patient was started on treatment for iron deficiency anemia by IV iron and transfusion
of one unit of packed RBCs. After the patient received the IV iron, her platelets counts dropped transiently for 2 days and then started to pick up rapidly after 3-4 days. A follow-up clinic with laboratory result after 50 days from discharge showed platelet count within normal range 240 × 10^9/L, and the patient was completely asymptomatic Table 2.

4 CONCLUSION

Iron deficiency anemia can be associated with thrombocytopenia. It should be thought of after ruling out serious differential diagnosis like TTP; thrombocytopenia caused by IDA responds to iron replacement therapy, which can cause a transient drop in platelets initially.

ACKNOWLEDGMENTS

Qatar National Library funded the publication of this article. Published with written consent of the patient.

CONFLICT OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

MSE and MAA-T: took the lead in writing the manuscript, literature review, and created the legends. MAA-T and MAY: revised manuscript critically for important intellectual content. All took care of the patient, contributed to and approved the final version of the manuscript.

TABLE 2 Complete blood count and iron profile before and after iron transfusion

|                      | Normal range | admission | 4 days after admission | 5 days after admission | after 2 months |
|----------------------|--------------|-----------|------------------------|------------------------|---------------|
| Hemoglobin (g/dL)    | 13-17        | 6.5       | 9.1                    | 8.5                    | 12            |
| Hematocrit (%)       | 36-46        | 23.8      | 32                     | 29                     | 41.5          |
| MCV (fL)             | 83-101       | 55        | 61                     | 61.3                   | 70.1          |
| RDW (%)              | 11.6%-14.5%  | 29.4      | 37                     | 37                     | 22            |
| WBC                  | 4-10 × 10^9/μL | 9.2      | 9.8                    | 11.7                   | 7             |
| Platelets            | 150-450 × 10^9/L | 54      | 65                     | 91                     | 240           |
| Reticulocytes (%)    | 0.5-2.5      | 0.6       | 1.9                    | 0.8                    |               |
| Iron (μg/dL)         | 6-35         | 6         |                        |                        | 9             |
| TIBC (μg/dL)         | 45-80        | 95        |                        |                        | 68            |
| Transferrin (gm/L)   | 2.0-3.6      | 3.8       |                        |                        | 2.7           |
| Ferritin (ng/mL)     | 6.0-44.0     | 5.2       |                        |                        | 16.7          |
| Folate (ng/mL)       | 2-20         | 17.8      |                        |                        | 16.9          |
| LDH (U/L)            | 125-220      | 225       |                        |                        |               |
| Vitamin B12 (pg/mL)  | 160-950      | 322       |                        |                        |               |

ETHICAL APPROVAL

Ethical approval for this study was obtained from The Medical Research Center At Hamad Medical Corporation (ABHATH) ID: MRC-04-20-445.

DATA AVAILABILITY STATEMENT

Individual data for this patient will not be publicly available due to ethical restrictions by HMC medical research center that does not generally allow sharing of data to individuals or entities outside Hamad Medical Corporation.

ORCID

Mustafa A. Al-Tikrity © https://orcid.org/0000-0003-4069-9242
Mohamed A. Yassin © https://orcid.org/0000-0002-1144-8076

REFERENCES

1. McLean E, Cogswell M, Egli I, Wojdyla D, De Benoist B. Worldwide prevalence of anaemia, WHO vitamin and mineral nutrition information system, 1993–2005. *Public Health Nutr*. 2009;12(4):444-454.
2. Babikir M, Ahmad R, Soliman A, et al. Iron-induced thrombocytopenia: a mini-review of the literature and suggested mechanisms. *Cureus*. 2020;12(9):e10201. https://doi.org/10.7759/cureus.10201
3. Vmnis, "Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity.”
4. Janz TG, Johnson RL, Rubenstein SD. Anemia in the emergency department: evaluation and treatment. *Emerg Med Pract*. 2013;15:11.
5. Soliman AT, De Sanctis V, Yassin M, Soliman N. Iron deficiency anemia and glucose metabolism. *Acta Biomedica*. 2017;88:112-118.

6. Soliman AT, De Sanctis V, Yassin M, Wagdy M, Soliman N. Chronic anemia and thyroid function. *Acta Biomed*. 2017;88(1):119-127.

7. Soliman A, Yassin M, De Sanctis V. Intravenous iron replacement therapy in eugonadal males with iron-deficiency anemia: effects on pituitary gonadal axis and sperm parameters; a pilot study. *Indian J Endocrinol Metab*. 2014;18(3):310-316.

8. Abdelmahmuod E, Yassin MA, Ahmed M. Iron deficiency anemia-induced neutropenia in adult female. *Cureus*. 2020;12(6):e8899.

9. Cunha V, Ferreira M, Barosa R, Fonseca AG, Delerue F, Carvalho C. Iron-induced thrombocytopenia in severe iron-deficiency anemia. *Expert Rev Hematol*. 2015;8(2):247-251.

10. Kloub MN, Yassin MA. Oral iron therapy-induced neutropenia in patient with iron deficiency anemia. *Case Rep Oncol*. 2020;13(2):721-724.

11. American College of Obstetricians and Gynecologists. Alternatives to hysterectomy in the management of leiomyomas. *Obstet Gynecol*. 2008;112:387-400.

12. Lanzkowsky P. Chapter 3 - Classification and Diagnosis of Anemia in Children. *Lanzkowsky’s Manual of Pediatric Hematology and Oncology (Sixth Edition)*. 2016:32-41. https://doi.org/10.1016/B978-0-12-801368-7.00003-X

13. Ganti AK, Shonka NA, Haire WD. Pancytopenia due to iron deficiency worsened by iron infusion: a case report. *J Med Case Rep*. 2007;1:175.

14. McDonald TP, Clift RE, Cottrell MB. Large, chronic doses of erythropoietin cause thrombocytopenia in mice. *Blood*. 1992;80(2):352-358. PMID: 1627797

**How to cite this article:** Eisa MS, Al-Tikrity MA, Babikir MM, Yassin MA. Thrombocytopenia secondary to iron deficiency anemia responding to iron therapy. *Clin Case Rep*. 2021;00:1–4. https://doi.org/10.1002/ccr3.3983