

Lice infestation causing severe anemia in a 4-year-old child

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Head lice infestation, or pediculosis capitis, is common in the pediatric population. In North America, pediculosis capitis affects up to 40% of children.¹ Management of this infection is often provided by primary care physicians and is well described in the literature,² although despite its high prevalence, the effects of this infection if left untreated are not well understood. Lice survive on blood meals taken from their hosts, either human or animal. Host blood loss to an individual louse during feeding has been reported to be 0.008 to 0.7 mL/d in a study in elementary school children, and an average child has 20 to 30 live lice when infected.³ Theoretically, this blood loss could lead to anemia, especially in the setting of severe or chronic *Pediculus humanus var capitis* infestation. In fact, animal studies have demonstrated severe anemia attributed to a lice infestation in cattle.^{4,5}

A search of MEDLINE and PubMed revealed only a handful of case reports describing the relationship between lice infestation and anemia. In humans, the literature is limited to 4 case reports totaling 5 patients with anemia associated with *P humanus var capitis* infestation.⁶⁻⁹ The first reported case was in a 61-year-old man with severe lice infestation and iron deficiency anemia, for which no other cause was found.⁷ In children, 3 cases have been reported, all with iron deficiency anemia and concurrent lice infestation.^{6,8} In all 3 cases, extensive investigations were done and no other cause of their iron deficiency anemia was found. Furthermore, following treatment of the lice infestation, all of the

children's serum hemoglobin levels were within normal range at the time of follow-up. Heart failure and other sequelae of severe ongoing anemia were not reported in any of these cases. Here we report a case of a 4-year-old child with a severe lice infestation and anemia with associated cardiac failure.

Case

A 4-year-old girl presented initially to a community hospital via a walk-in clinic with a 2-week history of fatigue and weakness accompanied by 3 days of nausea, vomiting, and refusal to bear weight. There was no history of injury or blood loss. Her past medical history was unremarkable. On social history, the patient was First Nations and living on reserve with her nuclear family including a 2-year-old sibling. At presentation, the patient appeared unwell, with marked pallor. Severe lice infestation was apparent in her hair, on her scalp, and on her neck, with numerous live lice visible on her face, neck, and arms as well as countless nits coating several inches of each hair strand. She had excoriation on her shoulders and back with postinflammatory hypopigmentation and hypopigmented scars (**Figures 1A and 1B**). Initial evaluation revealed a serum hemoglobin level of 21 g/L, a mean corpuscular volume of 54 fL, a lactate level of 5.8 mmol/L, a blood pressure of 88/48 mm Hg, and a heart rate of 130 beats/min. Signs of heart failure were present, including tachypnea, a grade 3 systolic murmur and gallop, and

Editor's key points

- ▶ This is the first case reported in the literature of anemia-related heart failure secondary to severe lice infestation in a child.
- ▶ When pediculosis capitis is identified, a full history including timeline of the active infection in addition to a detailed social and nutritional history should be done.
- ▶ In the setting of chronic lice infestation, workup for anemia-related sequelae should be considered, especially in those with evidence of severe infection or in those who are nutritionally depleted.

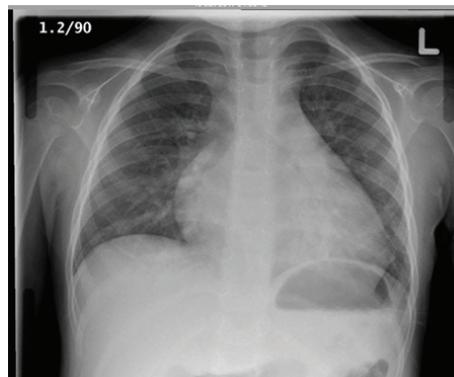
Points de repère du rédacteur

- ▶ Il s'agit du premier cas signalé dans la littérature médicale d'une insuffisance cardiaque liée à une anémie qui était secondaire à une infestation de poux chez une enfant.
- ▶ Lorsqu'une pédiculose du cuir chevelu est identifiée, il y a lieu de procéder à une anamnèse complète, y compris la chronologie de l'infection active, de même qu'à un bilan social et nutritionnel détaillé.
- ▶ Dans le cas d'une infestation de poux chronique, il faudrait envisager un bilan des séquelles liées à l'anémie, surtout chez les personnes dont la gravité de l'infection est évidente ou chez celles qui ont des carences nutritionnelles.

Figure 1. Patient's A) hair and B) neck and back before permethrin treatment



Figure 2. Patient's chest x-ray scan at presentation demonstrating cardiomegaly



hepatomegaly on examination, with cardiomegaly and small pleural effusions on radiographic imaging (**Figure 2**). She received a 10-mL/kg bolus of normal saline, and then 2, 5-mL/kg boluses of red blood cells (RBCs). She was then transferred to the tertiary care centre for further evaluation and stabilization.

The patient received 2 additional 10-mL/kg RBC transfusions, which she tolerated well, with her hemoglobin level rising to 65 g/L after transfusion. An extensive workup for possible hematologic, oncologic, metabolic, and rheumatologic causes for her anemia was completed. Nutritional markers included a normal serum ferritin level (40 pmol/L), a high vitamin B12 level (>1107 pmol/L), and a high RBC folate level (2300 nmol/L). Although these RBC building blocks were adequate, additional investigation results suggested other nutritional deficiencies including

hypocalcemia, hypophosphatemia, hypoalbuminemia, and osteopenia on imaging. Her vitamin C level was normal at 65 µmol/L. Results of fecal occult blood testing were negative.

Findings of a blood smear demonstrated hypochromic, microcytic anemia. Findings of a coagulation profile were normal. Results of a detailed metabolic workup, including urine organic acid levels and plasma amino acid levels, were normal.

Given the initial findings of cardiomegaly and tachypnea, an echocardiogram was completed, which showed a dilated left ventricle and a small pericardial effusion, consistent with chronic anemia. Findings of a 12-lead electrocardiogram were normal, and during 48 hours of telemetry monitoring, no arrhythmias were identified.

The duration of lice infestation was unknown but estimated to be 4 to 16 weeks. Previous treatment attempts with natural products were not successful. The patient's head was shaved and the lice were treated with 2 courses of permethrin shampoo, following which her energy improved dramatically. She was given oral supplements of iron (4 mg/kg/d), vitamin B12 (500 µg/d), and folate (200 µg/d) to promote RBC production. She also received daily oral calcium and vitamin D supplementation as per current Canadian Paediatric Society recommendations.¹⁰

The severity of the patient's lice infestation raised concerns for neglect, and child protection services were consulted during her hospital admission. No evidence of nonaccidental injury was found. The 2-year-old sibling and both parents were treated for lice infestation.

At the time of discharge, the patient's hemoglobin level was 95 g/L, her vital signs were normal, her energy was substantially improved, and she was walking normally.

The patient's family complied with social services, who conducted an extensive review including home

visits in conjunction with the local Aboriginal liaison team. At her community follow-up 3 weeks later, her skin had completely recovered and her energy and appetite had returned to baseline. Her hemoglobin level at follow-up was 95 g/L. Six months later, she continued to thrive and her family continued to be followed closely by a pediatrician in their community.

Discussion

To our knowledge, this is the first published case of anemia-related heart failure secondary to severe lice infestation in a child. Although no causal relationship between *P humanus* var *capitis* infestation and severe anemia has been established in large-scale studies, this case highlights the possibility of these complications in the setting of chronic and severe infestations. Although bone and protein nutritional deficiencies were identified at presentation, RBC building components including RBC folate, vitamin B12, and ferritin were all at normal levels in the serum and therefore their levels were unlikely to have contributed to the patient's anemia.

Our case confirms many of the findings of Burke and Mir, who published a series of 2 pediatric cases of severe lice infestation and related anemia.⁸ In both of those cases, the children were treated for lice and received oral iron supplementation. Unlike in these cases, our patient was medically unstable and required a prolonged hospital stay for the workup, monitoring, and treatment of cardiac failure and anemia. More consistent with the severity of our case, Hau and Muhi-Iddin published a case of an 11-year-old child with severe anemia related to lice infestation who required a 6-day hospital stay.⁶ Similar to our patient, that patient recovered dramatically in hospital and his symptoms of anemia resolved.

Conclusion

This case highlights that it is important to consider the consequences of blood loss related to pediculosis capitis, especially in the setting of chronic infestation. In addition, when these infestations are identified, a full history including timeline of the active infection in addition to a detailed social and nutritional history should be

done. Furthermore, in the setting of extensive or long-term infestation, a complete blood count and evaluation for anemia-related sequelae should be considered. Given the prevalence of pediculosis capitis, it is obviously not realistic or practical to investigate every patient biochemically and radiologically, but careful consideration is necessary in those who have chronic or severe infestations, are nutritionally depleted, or present with signs and symptoms of anemia.

Drs Ronstey and Ling were residents in the Department of Pediatrics at the University of British Columbia in Vancouver at the time of the case. **Dr Rehmus** is Clinical Associate Professor in the Department of Pediatrics and the Department of Dermatology and Skin Science at the University of British Columbia. **Dr Dmytryshyn** is Clinical Instructor in the Department of Pediatrics at the University of British Columbia.

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Competing interests

None declared

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