



Case Report

Leech bites: massive bleeding, coagulation profile disorders, and severe anemia

Abstract

Leeches have been in use for centuries, especially in plastic and reconstructive surgery wound and flap healing, in venous insufficiencies, and in the treatment of many disorders such as hemorrhoids and varicosity. With this study, we aimed to discuss coagulation disorder due to uncontrolled leech bites, consequent excessive skin hemorrhage, and anemia requiring blood transfusion.

A 65-year-old male patient was referred to the emergency department because of excessive intractable bleeding that had occurred after leech bites. On physical examination, a total of 130 bites were detected on various regions of the body. In the laboratory findings of the patient, hemoglobin and hematocrit levels were extremely low, and prothrombin time, international normalized ratio, and partial thromboplastin time were markedly increased. The patient received a total of 8 units of fresh frozen plasma and 6 units of erythrocyte suspension. Bleeding stopped by decreasing after the transfusion of fresh frozen plasma.

Although the complications due to leech injuries are rare, they may be an important cause of morbidity and mortality when an injury or prolonged bleeding in an internal region occurs. Prolonged skin hemorrhages rarely cause anemia, and deaths are caused by intractable hemorrhages. However, a coagulation disorder and consequent intractable hemorrhage have not been reported previously in the literature. In conclusion, it should be known that uncontrolled, blind, and excessive leech use causes severe hemorrhage and excessive blood loss, causing significant morbidity and mortality. Therefore, the awareness of either physicians or people using or recommending alternative medicine should be raised on this subject.

Leeches have been used in the field of health since the antique ages. Medicinal leeches (*Hirudo medicinalis*) are used as therapeutic agents by both physicians and auxiliary health staff in many countries throughout the world [1]. Leeches were previously and are still being used in public health to provide blood circulation and pain reduction. Physicians have used them for flap repair after reimplanta-

tion and to provide local circulation after thoracic wall reconstruction. Besides, leeches have been used for varicose veins and recovering venous congestion [1,2].

In the literature, the regions bitten by leeches (ie, nose, vagina, pharynx, larynx, esophagus, rectum, and urinary bladder) have been reported sporadically. In these conditions, leeches are considerable causes of morbidity and mortality [3,4]. Skin lesions due to leech bites in tropical climates are frequent, but serious skin complications and marked hemorrhage are rare. Prolonged and marked hemorrhage consequent to skin bites has rarely caused anemia and death [2]; however, coagulation disorders have not been reported.

To the best of our knowledge, there is no study with multiple bites on the whole body with severe bleeding disorder. On the other hand, life-threatening shock, intractable hemorrhage, and consequent severe anemia have not been reported before. Therefore, this study is the first one in emergency medicine literature, where the coagulation profile was disrupted (prothrombin time [PT], international normalized ratio [INR], and partial thromboplastin time [aPTT] are increased) and consequent intractable hemorrhages occurred.

A 65-year-old male patient was referred to the emergency department from another hospital with the diagnosis of intractable hemorrhage. According to the information acquired from the patient and his relatives, he had entered a leech pond about 6 to 8 hours previously and had remained in the pond for about an hour. After getting out of the pond, he realized that he had marked hemorrhage on his body, which did not stop, and hence presented to a hospital. After the first intervention, he was referred to our hospital's emergency unit because of continuing hemorrhage. The patient had received various treatment modalities for his varicosities, but when he observed that there were no benefits, he was referred to leech therapy by the recommendations of the people around him. He had received leech therapy at the same location for the same reason before, but he had not experienced hemorrhage in previous treatments. He had otherwise no disease and used no medications.

On the initial evaluation, his general condition was good; he was conscious, cooperative, and orientated, and his Glasgow Coma Scale was 15. Vital signs (blood pressure, 110/70 mm Hg; pulse, 88/min; body temperature, 36.8°C; and respiratory rate, 20/min) were normal.

On the physical examination, the whole body of the patient was covered with blood. On the detailed examination, there were traces of leech bites on various parts of the body, active hemorrhages, and surrounding ecchymoses. The regions of leech bites were as follows: 4 bites at the right toe; 3 bites at the right ankle; 28 bites on the medial side of the right leg; 4 bites on the right elbow; 3 bites on the left toe; 46 bites on the medial side of the left leg; 1 bite on the left wrist; 3 bites on the left elbow; 10 bites on the left axillary region; 3 bites on the periumbilical region; a total of 20 bites between the 2 scapulae, being less than 5 cm; and 5 bites on the scrotum—making up a total of 130 bites (Figs. 1 and 2). On the examination, venous ponding was only observed on the left lower extremity, evaluated as varices. Other system examinations were normal.

The initial laboratory findings were as follows: white blood cells, $12\,000/\mu\text{L}$ (reference range [RR], $4.3\text{--}10.3 \times 10^3/\mu\text{L}$); hemoglobin (Hb), 9.2 g/dL (RR, 13.6–17.2 g/dL); hematocrit (Htc), 0.29% (RR, 39.5%–50.3%); and platelet, $230\,000/\mu\text{L}$ (RR, $156\,000\text{--}373\,000/\mu\text{L}$). Other complete blood cell count parameters (mean corpuscular volume, mean corpuscular hemoglobin, and mean corpuscular hemoglobin) and biochemical values were normal. Fluid replacement and Tetavax vaccine were administered. All the bleeding sites were cleansed with Betadine, and dressings were used as tight bandage (Fig. 3). The patient had active hemorrhage and received 2 units of erythrocyte suspension because of the low Hb levels. However, his bleeding did not cease in the 12 to 15 hours of follow-up. His general health status deteriorated, and sweating, dyspnea, tachypnea, hypotension, and tachycardia developed. Although bandages were changed and cryotherapy was applied to bleeding points by silver nitrate, active hemorrhage continued. He was reevaluated. On the second day of his hospitalization, the coagulation profile and complete blood cell count were repeated. Despite 2 units of erythrocyte replacement, the



Fig. 2 Leech bite sites in our patient.

results were as follows: Hb, 7.3 g/dL; Htc, 23.2%; platelet, $420\,000/\mu\text{L}$; PT, 105 seconds (RR, 11–14.2 seconds); INR, 12.46 (RR, 0.85–1.2); aPTT, 64.9 seconds (RR, 26–37.2 seconds).

Because the PT, the INR, and the aPTT levels of the patient were extremely high and he had continuing active bleeding, he was diagnosed as having a hemorrhagic diathesis due to excessive leech use and was followed up in the emergency service for 5 days. He became hypotensive and received fluid replacement with 4 units of erythrocyte suspension. Because of the high coagulation profiles, 2×2 units/d of fresh frozen plasma (FFP) were administered for 2 days (a total of 8 units of FFP). Be it due to the high number of bites on his body, be it due to the leukocytosis, he



Fig. 1 Leech bite sites in our patient.



Fig. 3 All the bleeding sites did not stop despite compression and wrapping with tight bandages.

was administered sulbactam ampicillin (Ampisid) 4×1 g/d intravenous (IV) and ciprofloxacin (Cipro) $200 \text{ mg} \times 1$ g/d for 3 days with prophylactic aims. His bleeding stopped on the third day of hospitalization after FFP replacement. Control complete blood cell count analysis were as follows: Hb, 10.4 g/dL; and Htc, 32.3%; coagulation parameters (PT, 14.8 seconds; INR, 1.24; and aPTT, 24.6 seconds) were performed. On the follow-up, the patient, who had no more bleeding and having stable vital signs, was discharged from the hospital with the recommendation to return for control. Whereas no problem was observed in the patient's control examinations, there was no additional pathology.

Leeches are invertebrates classified in the Annelida group and Hirudinea class, measuring approximately 12.5 to 15.25 mm in length [5]. They have 2 suckers, 1 in the anterior part and 1 in posterior. The anterior sucker has a mouth and 3 jaws, with teeth that are designed to bite. The leech sucks the blood as a result of the contractions of its muscular pharynx and stores the blood until digestion. The leech has a blood-sucking ability 10 fold of its weight. Clinicians experienced in the use of leech have reported that a leech can suck 5 to 15 mL of blood [3,6].

Some studies have reported that medical leeches suck venous blood and help in ulcer healing. Therefore, they are effective adjuncts in the treatment of complicated varicose veins and venous congestion [7,8]. This patient used leeches to decrease the pain and treat varicose veins.

Leech bite-related morbidity is observed basically because of 2 factors—mechanical obstruction of a vital organ and/or severe hemorrhage, as observed in this case. The most frequent problem in leech-related admissions is blood leakage, as in our patient. In a few studies, bleeding and, rarely, anemia have been reported, despite the presence of no hematological disorder. Besides, leech treatment did not cause any changes in the systemic coagulation profiles [2-4,9]. Ikizceli et al [2] reported a case of skin hemorrhage caused by leech, where the hemorrhage was localized (only the knee), and the Hb, Htc, PT, INR, and aPTT were normal. Again, in their study, hemorrhage lasted for 18 hours and was ceased by sterile gauze bandages. In another study, rectal hemorrhage secondary to leech bites was reported. There was anemia due to rectal hemorrhage, and 4 units of blood were transfused [4]. In addition, 2 cases because of leech bites in the vaginal region have been reported. Only 1 case had anemia in these cases with vaginal bleeding, and 1 unit of blood was transfused [3]. However, in these studies, the coagulation profile (PT, INR, and aPTT) was normal [3,4]. Similarly, in a study of Kumar et al [9], they reported a case with coronary artery disease, who was on aspirin, that developed gastrointestinal hemorrhage and severe anemia after leech treatment for knee pain. However, in their study, despite the fact that aspirin was the main point of their study, the coagulation parameters were normal. As seen in these studies, the leech bite was localized and only 1 in number. In addition, severe intractable hemorrhages and anemia generally originate from internal tissues. However, no case with

excessive hemorrhage and anemia has been reported in skin hemorrhages. On the contrary of these studies, the coagulation profile in our case was disrupted (PT, INR, and aPTT extremely increased), and the whole body skin and scrotum had multiple lacerations (a total of 130 bites). The blood quantity leeches suck depends on the number of leeches and the quantity of blood they suck [10], and in our case, this had caused intractable skin hemorrhages and anemia, resulting in shock. Blind use of the leeches in this case is the point in question. The patient entered the leech pond with all his body, not only by his legs. In a report, the mean bleeding time from a leech wound was determined as 10 hours [11]. Some authors have stated that bleeding after leech bite may last for 24 hours after extraction [1]. Bleeding lasted for 2 to 3 days in this patient.

Prolonged hemorrhage after the leech bite occurs by the effects of factors such as histaminelike vasodilators in the leech saliva, hirudin (a potent antithrombin), hyaluronidase, and calin (a platelet aggregation inhibitor). Hirudin, a thrombin inhibitor, is an important enzyme, converting fibrinogen to fibrin in the coagulation cascade. It is secreted onto the wound and inhibits the coagulation of the sucked blood [8,10]. Munro et al [11] reported that hirudin has a temporary antithrombin effect ending in about 15 minutes. The prolonged bleeding time was caused by proteases or other enzymes secreted by leeches during nutrition, resulting in collagen-platelet interaction modifying the vascular wall [11]. Calin inhibits the platelet aggregation induced by collagen. In addition, calin has been shown to inhibit platelet adhesion [3,8]. Other pharmacologically active compounds secreted by leeches are composed of proteolytic enzymes, fibrinase, collagenase, and apyrase; among these, apyrase suppresses platelet aggregation by inhibiting the adenosine triphosphate secretion. Some studies have shown the existence of local anesthetics secreted by the leech. Therefore, leech bites are painless and recover slowly [1,10].

Related with the treatment, when a leech remains on the body, salt, saline solution, vinegar, or lignocaine solutions are helpful in the removal procedure. The leech should not be removed forcefully because its teeth may remain in the wound and cause infection. To remove residual hirudin, hyaluronidase, and other secretions that probably exist, the wound should be irrigated and cleaned thoroughly [1]. When the bleeding is severe, local pressure should be exerted; sterile gauze soaked with thrombin solution may be applied. Bleeding due to leech bites may be severe, cause shock, and hence require blood transfusion [1,10]. In this patient, leeches were extracted when he was at the emergency service, and there was no thrombin solution to use with the bandages. All the bleeding points were cleaned with Betadine, and tight bandage was applied with dressings. Because there was active bleeding and low Hb levels, 2 units of erythrocyte suspension were transfused. However, hemorrhage did not cease in the next 12 to 15 hours of follow-up. The general health status deteriorated, and

sweating, dyspnea, tachypnea, hypotension, and tachycardia ensued. Although the bandages were renewed and cryotherapy was applied by silver nitrate onto the bleeding points, active hemorrhage continued. Despite 2 units of erythrocyte suspension replacement, Hb was 7.3 g/dL, and PT, INR, and aPTT were extremely high; there was a hemorrhagic diathesis (coagulation disorder) due to excessive leech use, and intractable hemorrhage had developed. The patient received a total of 6 units of erythrocyte suspension and 8 units of FFP. After FFP was given, the hemorrhage ceased gradually.

Contamination with pathogenic microorganisms may result in erysipelas and submucosal abscess. An *Aeromonas hydrophila* infection had been reported a long time ago. This is found in the flora of the leech intestine and has been grown from *H medicinalis* [12]. Effective antibiotic treatment against *Aeromonas* is composed of third-generation cephalosporins, aminoglycosides, trimethoprim-sulfamethoxazole, and ciprofloxacin; however, there is resistance to first-generation cephalosporins and penicillin because of β -lactamase production [6,12]. Because of the presence of multiple bites and leukocytosis in our patient, for prophylactic purposes, sulbactam-ampicillin (Ampisid) 4×1 g/d IV and ciprofloxacin (Cipro) 200 mg 2×1 g/d IV were administered for 3 days.

In conclusion, it should be known that uncontrolled, blind, and excessive leech use cause severe hemorrhage and excessive blood loss, causing significant morbidity and mortality. In hemorrhages due to leech bites, there may be coagulation disorders, and due precautions should be taken. Therefore, the awareness of either physicians or people using or recommending alternative medicine should be raised on this subject.

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