INTRODUCTION

Bee stings can cause local, large local reactions and anaphylaxis. Rarely, other reactions occur after bee envenomation, including deep venous thrombosis (DVT), acute kidney injury, stroke, and acute coronary syndrome. The reactions usually occur shortly after the sting and the severity of the reaction depends on the level of envenomation that is the number of stings. However, there may be a delayed onset of reaction to bee stings and the level of reaction may not match the level of envenomation. This case report describes a rare case of delayed onset of DVT in a middle-aged woman after a single wild bee sting.

CASE PRESENTATION

A forty-year-old female presented at Siaya County Referral Hospital with a history of progressive left lower limb swelling and severe pain for three days. Two weeks before her presentation at the facility, she had suffered a wild bee sting on the same leg. After the sting, she developed swelling, pain, and pruritus at the sting site and was treated in a peripheral health facility shortly after the sting. She was diagnosed with deep vein thrombosis (DVT). The development of DVT was attributed to thrombogenic properties of bee venom and endothelial injury caused by released inflammatory cytokines. The patient’s mainstay treatment was with anticoagulants.

Abstract: Deep vein thrombosis is one of the rare reactions that can occur after bee envenomation. A 40-year-old female presented at our facility for evaluation and management of a left lower limb swelling two weeks after suffering a bee sting. She was diagnosed with deep vein thrombosis (DVT). The development of DVT was attributed to thrombogenic properties of bee venom and endothelial injury caused by released inflammatory cytokines. The patient’s mainstay treatment was with anticoagulants.

Keywords: Deep vein thrombosis, bee venom allergy, bee sting.
additional heart examination was unremarkable, with normal fullness, no masses, organomegaly or tenderness.

Patient investigations included a Doppler ultrasound of the left lower limb, international normalized ratio, erythrocyte sedimentation rate, full hemogram, and urea, creatinine and electrolytes:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
<th>Ref. range</th>
</tr>
</thead>
<tbody>
<tr>
<td>White blood cell count</td>
<td>5.62</td>
<td>10^9/μL</td>
<td>4.00-9.00</td>
</tr>
<tr>
<td>Platelets</td>
<td>154.1</td>
<td>10^9/μL</td>
<td>150.0-350.0</td>
</tr>
<tr>
<td>Red blood cell count</td>
<td>4.79</td>
<td>10^9/μL</td>
<td>3.76-5.70</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>14.23</td>
<td>g/dL</td>
<td>12.00-18.00</td>
</tr>
<tr>
<td>Mean corpuscular volume</td>
<td>89.6</td>
<td>fL</td>
<td>80.0-100.0</td>
</tr>
<tr>
<td>Mean corpuscular hemoglobin</td>
<td>29.7</td>
<td>pg</td>
<td>28.0-32.0</td>
</tr>
<tr>
<td>Mean corpuscular hemoglobin conc.</td>
<td>33.2</td>
<td>g/dL</td>
<td>31.0-35.0</td>
</tr>
</tbody>
</table>

4. Urea, creatinine and electrolytes

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
<th>Reference range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td>3.92</td>
<td>mmol/L</td>
<td>2.82-8.2</td>
</tr>
<tr>
<td>Creatinine</td>
<td>95.51</td>
<td>mmol/L</td>
<td>53-106</td>
</tr>
<tr>
<td>Potassium</td>
<td>4.36</td>
<td>mmol/L</td>
<td>3.50-5.50</td>
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<tr>
<td>Sodium</td>
<td>138.79</td>
<td>mmol/L</td>
<td>135.00-155.00</td>
</tr>
<tr>
<td>Chloride</td>
<td>112.57</td>
<td>mmol/L</td>
<td>96.00-109.00</td>
</tr>
</tbody>
</table>

5. The ESR was 13mm/hour

The patient was admitted to the ward and managed with Ibuprofen 400mg three times a day, unfractionated heparin 15,000 IU twice a day for the first 5 days, and warfarin 5mg once daily. The management also involved daily measurements of the lower limb swelling and limb elevation. On the seventh day, the patient’s symptoms had noticeably reduced. The swelling of the left leg was now 32 cm at 10cm below the tibial tuberosity. She also had a significant reduction of pain on the left lower limb. The patient was then discharged on warfarin 5mg once a day for three months and ibuprofen 400mg three times daily for three days.

**DISCUSSION**

Bees are in the Apidae family, under the order of Hymenoptera, which also includes wasps and ants [1]. Insects in this order have venom constituting similar allergens, including low-molecular-weight proteins, proteolytic enzymes (phospholipase, hyaluronidase, acid phosphatases, and proteases), carbohydrates, lipids, and high-molecular-weight proteins [1]. There is a paucity of data on the epidemiology of reactions to bee stings in Africa. However, in Europe and the United States, up to 5% of the population has allergic responses to bee and wasp stings with varying severity [2].

Reactions following insect stings can be grouped into uncomplicated local reactions, large local reactions, and systemic reactions (anaphylaxis) [1]. Local reactions are characterized by swelling, erythema, pain, and itching. These reactions are due to the low molecular weight proteins contained in the venom and are classified as type 1 immune reactions [1, 3]. Large local reactions present as uncomplicated local reactions but with a greater area of involvement (more than 10cm) and last for longer. Conversely, anaphylaxis is caused by high-molecular-weight proteins in the venom and is due to IgE-mediated release of antihistamines [1, 4]. It presents with generalized urticaria and angioedema, wheezing and respiratory distress, nausea and vomiting, abdominal pain, and flushing [4].

This case presents a rare reaction following a bee sting: a wild bee sting causing deep venous thrombosis in a forty-year-old female with no underlying disease or predisposing events that would otherwise explain the pathology. A few other cases of vascular thrombosis after a bee sting have been reported in the literature. A 15-year-old is reported to have developed peripheral DVT in the lower limb one week following a single bee sting in the affected limb [5]. Similarly, a 65-year-old hypertensive male with dyslipidemia developed acute femoral thrombus after envenomation by a swarm of bees [6]. Akgul et al. also report a case of brachial artery thrombosis in a 47-year-old male presenting one hour after a single bee sting on the leg [3].

The development of a thrombus following bee stings is attributed to the Virchow triad, namely, vascular endothelial injury, venous stasis, and...
hypercoagulability [5, 7]. Bee venom has thrombogenic constituents that induce a pro-coagulant state. They include phospholipase A2 and B, hyaluronidase, histamine, dopamine, and adrenaline [6, 2]. Increases in phospholipase A2 concentration affect coagulation parameters, including prothrombin time and activated partial thromboplastin time [8]. It also plays a role in forming thromboxane A2, the latter of which speeds up platelet aggregation and thus causes coagulation [8]. Bee venom also induces the release of inflammatory cytokines which lead to endothelial injury [5].

The onset and severity of thrombosis secondary to bee stings are determined by the level of envenomation [9]. However, severe presentation after a seemingly minor/single sting as in this presentation and as described by both Akgul et al. and Cil et al. can occur [3, 5]. Thrombus formation after a single sting may be attributed to reduced clearance due to the ensuing local edema and direct inoculation of bacteria either from the victim’s body or the insect [9]. Due to itching at the sting site, the victim may also scratch the affected site, causing additional epidermal injury and implantation of pathogenic bacteria, increasing the likelihood of clot formation [9]. The development of DVT in this patient days after the bee sting was likely a delayed response to bee antigens. Bee antigen has been thought to persist in the body for up to two weeks [10].

Other rare reactions to bee stings have been described in the literature. The pathophysiology of these rare reactions to bee stings has also been partly attributed to thrombogenic chemicals in bee venom [9, 11, 12, 13, 15]. For instance, Otieno et al. and Silva et al. describe the development of acute kidney injury after multiple bee stings [9, 11]. Otieno et al. further outline complications of cavernous sinus thrombosis with convulsions [9]. Cases of hemorrhagic stroke in a 13-year-old male and a 41-year-old female have also been reported [12, 13]. Dimos et al. and Pirasath et al. similarly describe the development of Kounis syndrome following bee stings [14, 15].

CONCLUSION

This case presentation highlights that deep vein thrombosis can result from bee envenomation, although rarely. Healthcare providers should be able to identify these cases to ensure prompt treatment and prevent DVT-associated complications and mortality.

REFERENCES


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