

## BLACK FIRE ANT (*SOLENOPSIS RICHTERI*) STING PRODUCING ANAPHYLAXIS: A REPORT OF 10 CASES FROM NAJRAN

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Ants (superfamily *Formicoidea*) are present in almost all countries and in all places. There are two main groups in the *Formicoidea*, the Myrmecoid complex and the Poneroid complex. The latter includes the subfamily *Myrmecinae* that contains species of *Solenopsis*, the fire ant.<sup>1</sup> It is the black fire ant *S. richteri* which is present in Najran in abundance and is of medical importance. The sting of these ants is very painful, and on rare occasions, anaphylaxis may occur.

It is estimated that between 0.5% and 5% of individuals having *Hymenoptera* (bees, wasps and ants) stings in the United States develop systemic reactions.<sup>2</sup> Systemic reactions with fire ant stings occur in about four out of 100,000 exposed individuals.<sup>3</sup> We could not find any report on fire ant stings from Saudi Arabia. We retrospectively analyzed 10 cases which had anaphylaxis following black fire ant sting and their outcome in Najran General Hospital.

### Patients and Methods

We conducted a retrospective study on 10 patients admitted in the last two years at Najran General Hospital, Najran, with black fire ant sting causing anaphylactic reactions. All the cases were managed in the Intensive Care Unit. We screened the patients' files to study the various clinical features as well as the mode of therapy and outcome. The cases included those with and without previous episodes of a similar nature. All patients were asked to provide detailed personal and family history of atopic diseases. Patients were followed weekly for one month after their discharge and asked specifically for any residual problem or complication. The results were tabulated and analyzed.

### Results

Apart from the 10 cases of black fire ant sting with

anaphylaxis admitted to the Intensive Care Unit in the last two years, many more cases presented to the emergency department with pain, itching at the local site and other minor symptoms. Of these, 76 patients (13 Saudis and 63 non-Saudis) needed admission, mostly for large local reactions. However, we analyzed only those cases who presented with severe allergic manifestations (anaphylaxis).

All 10 patients were non-Saudi expatriates, comprising seven females and three males. Their ages ranged from 35 to 60 years. The patients were from India (four), Egypt (three), Jordan (two) and Pakistan (one). We have not encountered anaphylaxis in Saudi nationals so far.

Generalized urticarial rash involving the trunk and limbs was seen in nine patients (90%), although the most common symptom was severe anxiety, which was felt by all patients (100%). The other important symptom was breathlessness in eight patients. Seven of the 10 patients had hypotension (BP  $\leq$ 90/60). The various clinical features are shown in Table 1. Three of the patients had multiple (three or more) stings, the others had only one.

Most of the patients were bitten at home (7 out of 10). Each of the other three was bitten in a bathroom, a mosque and a public park, respectively. Three of the 10 had a history of a previous ant sting with similar problems. For the others, it was their first experience.

An intravenous line was established in all patients and Ringer Lactate or Dextrose saline was infused. Care of the airway was taken and oxygen given. Eight patients were given subcutaneous epinephrine 1:1000 0.5 mL and

TABLE 1. Clinical features of black fire ant (*Solenopsis richteri*) sting causing anaphylaxis.

Clinical features	Number of cases (%)
Severe anxiety	10 (100)
Urticarial skin rash	9 (90)
Breathlessness	8 (80)
Vomiting	2 (20)
Tachycardia ( $\geq$ 100/min)	10 (100)
Hypotension ( $\leq$ 90/60)	7 (70)
Multiple sting marks ( $\geq$ 3)	3 (30)
Angioedema	2 (20)

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repeated every 30 minutes with 2-3 doses. All patients received hydrocortisone 100 mg 6 hourly for 24 hours. Within 12 hours, 80% of the patients became asymptomatic and the rest were well within 24 hours. The patients were discharged with the advice to avoid ant stings by keeping their homes free of black fire ants. They were also advised to avoid walking bare-footed.

A kit containing epinephrine, 1 mL syringes, and antihistamine tablets was provided to the three patients who had presented with anaphylaxis before. They were taught how to use these. As venom immunotherapy was indicated in these patients, they were advised about its use. None of the patients had any residual problem or delayed reaction one month after their discharge.

### Discussion

Ant stings are common and the presentation has a wide spectrum. Two notable groups of ants are the fire ants (*Solenopsis* spp.) and the harvester ants (*Pogonomyrmex* spp). The most common ant in Najran is the black fire ant (*Solenopsis richteri*). The sting of this ant causes a severe type of allergy.

The fire ant is known to grip the skin with its mandibles and then insert its sting. It may pivot and sting many times in a circular pattern.<sup>4</sup> The usual reaction to a sting in nonsensitive individuals is a fiery, sharp pain followed by a wheal and flare response. Within hours, a clear vesicle appears that becomes pustular after about 24 hours. The sterile pustule may persist for 3-10 days and become dry as a crust, leaving a macule, scar or fibrous nodule.<sup>5</sup> In those with anaphylactic reactions to red and black fire ant stings, it may produce generalized urticaria, angioedema, wheezing and hypotension.<sup>4,6</sup> No scar or residue is seen. In fact, only two, minute, hemorrhagic puncta may be seen, indicating the site of attachment of the mandibles. Some patients develop large local reactions, which are slow in onset and may progress up to 24-48 hours. Some patients may have associated systemic reaction. These are large areas of induration, which may immobilize an entire limb. Resolution may take several days.

The composition of fire ant venom is complex and includes water insoluble piperidine alkaloids responsible for the local reaction at the sting site,<sup>7</sup> and several allergenic proteins.<sup>4</sup> Despite their small bodies, the fire ants may be as dangerous as bees and wasps, since their venom has similar antigenic properties.<sup>8</sup>

Children are known to have more cutaneous symptoms than adults.<sup>9</sup> We had no children with anaphylaxis, probably for the same reason.

In contrast to bee and wasp stings, where occasionally late onset reactions occur in the form of serum sickness-like illness,<sup>10</sup> patients with black fire ant sting have generalized anaphylactic reaction occurring within a few minutes of the sting. All the cases of black fire ant sting producing anaphylaxis were non-Saudis. It is possible that

exposure to fire ant venom since childhood has provided the local community with some sort of immunity. Non-Saudis working in the Kingdom arrive here during adulthood and since they have generally not been exposed previously, remain prone to allergic reactions. No personal or family history of atopy was present in our patients. This is consistent with observations of a large study confirming that the frequency of sting reactions is similar in atopic and normal populations.<sup>11</sup>

Fire ants easily move into dwellings, causing problems for the inhabitants.<sup>12</sup> Seventy percent of our cases had stings at home. One of the patients who suffered ant sting in a public park had multiple sting marks. She collapsed but was saved, as the hospital was nearby. Sleeping on fire ant mounds may be extremely dangerous.<sup>13</sup>

Delayed reactions to *Hymenoptera* stings are uncommon. They include local skin necrosis, serum sickness, thrombocytopenic purpura, acute tubular necrosis, hepatic failure and neurologic changes.<sup>14</sup> We did not encounter any such complications. Death has also been documented due to fire ant sting.<sup>15</sup> So far, all our patients have been discharged in a healthy condition.

The diagnosis of *Hymenoptera* allergy is imperfect. The only sure way is to assess the reaction after a sting. Venom-specific IgE titers are elevated in the majority of patients with a history of allergic reactions to stings,<sup>16</sup> however, the most sensitive and specific test is the venom skin test.<sup>17</sup>

In addition to primary prevention, such as using insecticides at home and avoiding insect bite, venom immunotherapy is useful. It is thought to exert its beneficial effect by stimulating the development of IgG (blocking) antibodies against the venom allergens. Immunotherapy should be carried out in patients who have history of life-threatening reactions and in cutaneous reactors who are old, have cardiovascular disease or live far away from a medical facility. After immunization, fewer than 3% of patients have any systemic symptoms after a challenge sting. Also, cutaneous manifestations are uniformly less severe than previous reactions.<sup>18,19</sup> Presently, this mode of therapy is not available in Najran.

Individuals should be advised to avoid walking barefoot, especially when lawn-mowing or gardening. It would be advisable for patients at risk of anaphylactic response to stings to wear an identifying tag, such as those provided by "Medi-Alert" in the UK, in case they are discovered unconscious following a sting.<sup>20</sup> Systemic reactions to insect stings cause few fatalities, but the morbidity, fear and change in lifestyle caused by these reactions is significant.

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