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Successful rush immunotherapy for anaphylaxis to imported fire ants

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Sections

Case Report

Methods

Results

Discussion

References

Publishing and Reprint Information

Articles with References to this Article

Abbreviations used

IFA Imported fire ant

RIT Rush immunotherapy

Imported fire ants (IFAs) infest most of the southern United States.<sup>1</sup> Life-threatening anaphylaxis occurs in 1% to 2% of patients treated by physicians for IFA stings.<sup>1</sup> In endemic areas the annual attack rate is high, ranging from 13% to 58%,<sup>2</sup> and IFAs may comprise the majority of insect hypersensitivity.<sup>3</sup> Immunotherapy with IFA whole body extract prevents recurrent anaphylaxis after subsequent IFA stings.<sup>4</sup> Although successful rush immunotherapy (RIT) has been reported for anaphylaxis caused by winged Hymenoptera,<sup>5</sup> no published reports of RIT for IFA anaphylaxis exist. We report the successful use of RIT with IFA extract.

Case report

During football practice, a 16-year-old high school student experienced a few insect stings on his leg. He noted the presence of ants at the time. Within minutes, he had generalized urticaria, which resolved after administration of oral diphenhydramine. One week later, he experienced two insect stings and immediately developed generalized pruritus and urticaria associated with angioedema of

his eyes and lips. He was taken by ambulance to an emergency room and received intravenous diphenhydramine en route. He subsequently noted a “lump” in his throat, cough, and chest tightness, which improved rapidly after administration of subcutaneous epinephrine. Pustular lesions were noted within 24 hours. Two weeks after this incident, skin testing was performed with a whole body fire ant (*Solenopsis invicta*/S. richteri) extract (“fire ant mix”; Bayer Pharmaceutical Division, Spokane, Wash.). Prick testing with a 1:100 dilution was negative, but intradermal testing was positive at a 1:10,000 dilution with a wheal of 12 mm diameter and a flare of 40 mm diameter.

## Methods

An RIT protocol was adapted from one currently undergoing study at the 59th Medical Wing, Wilford Hall Medical Center, San Antonio, Texas, and written informed consent was obtained. Premedication with prednisone (30 mg twice a day), fexofenadine (60 mg twice a day), and ranitidine (150 mg twice a day) was begun 3 days before the procedure and continued until completion of day 2. RIT was performed in the clinic according to the schedule outlined in Table I.

Table I. RIT schedule with whole body fire ant extract      Amount (ml)    Dilution (wt:vol)

Day 1 (8 injections)    0.1      1:10,000,000

0.3      1:10,000,000

0.1      1:1,000,000

0.3      1:1,000,000

0.1      1:100,000

0.3      1:100,000

0.1      1:10,000

0.3      1:10,000

Day 2 (8 injections)    0.1      1:1000

0.2      1:1000

0.3      1:1000

0.4      1:1000

0.5      1:1000

0.1      1:100

0.2      1:100

0.3      1:100

Day 8 (2 injections)    0.25      1:100

0.25      1:100

Day 150.5      1:100

Day 290.5      1:100

Day 500.5      1:100

Every 4 weeks 0.5      1:100

On days 1, 2, and 8 injections were administered at intervals of 45 to 60 minutes.

To achieve an arbitrary maintenance dose of 0.5 ml of a 1:100 (wt:vol) concentration, 16 injections of fire ant mix were administered subcutaneously at 45 to 60 minute intervals over 2 days, alternating the injections between both upper arms. Intravenous access was maintained, and standard emergency medications for treatment of anaphylaxis were available. Pulse, respiratory rate, blood pressure, and peak expiratory flow rate were measured before each injection.

## Results

Premedication was well tolerated. RIT was administered over 2 days without any modification of the schedule, reaching 0.3 ml of the 1:100 dilution. On day 8, two injections of 0.25 ml of the 1:100 dilution were given. Maintenance doses of 0.5 ml were administered on days 15, 29, 50, and every 4 weeks thereafter. No local or systemic reactions occurred. Pulse, respiratory rate, blood pressure, and peak expiratory flow rate remained stable throughout the RIT procedure. Unavoidable field stings, apparently by IFAs, occurred on days 10 and 14 after RIT. Reactions observed from these stings were limited to pustule formation.

## Discussion

In the southern United States, the extensive distribution of IFAs and the high attack rate can make avoidance difficult to achieve, particularly in persons engaged in outdoor athletic activities. Avoidance is also difficult to achieve for young children or adults with high-risk occupations (e.g., landscaping). Although a refractory period of 4 weeks can occur after fire ant stings, we performed skin testing 2 weeks after the anaphylactic episode to expedite RIT in the event of a positive test result. Negative skin test results would have necessitated repeat testing several weeks later. RIT was considered in this patient because of the timing of the anaphylactic episode (the middle of the football season with weekly games) and the patient's reluctance to abstain from playing because of his hopes for a college scholarship. Because IFAs are abundant in our community, we considered the patient to be extremely vulnerable to recurrent episodes of anaphylaxis without effective and rapid immunization. Previous reports have demonstrated the effectiveness of RIT for anaphylaxis caused by other Hymenoptera stings.<sup>5</sup> Before RIT, we pretreated our patient with prednisone, fexofenadine, and ranitidine in an effort to minimize potential systemic reactions to the RIT.<sup>6</sup> None occurred. Our experience represents an initial example of the use of RIT to prevent serious allergic reactions to IFAs. On the basis of our experience, we would propose that in areas endemic for IFAs, allergists may consider using RIT for the management of patients at high risk of unavoidable exposure (e.g., occupational exposure) or in other patients for whom avoidance of IFA stings may be difficult.

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