

Resolution of Debilitating Large Local Reaction from Imported Fire Ant Stings with Rush Immunotherapy: A Case Report

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ABSTRACT

Although treatment of systemic reactions with both flying Hymenoptera and imported fire ant (IFA) with immunotherapy is the standard of care, immunotherapy is currently not recommended for the perceived relatively minor hazard of large local reactions. However, some large local reactions can be debilitating, resulting in severe swelling, pain and discomfort as well as loss of function of an extremity. The objective of this study was to evaluate whether rush immunotherapy (RIT) with IFA whole-body extract can prevent debilitating large local reactions to the sting of the IFA. An 8-year-old boy with debilitating large local reactions to the sting of IFAs underwent a 2-day RIT protocol with IFA whole-body extract. Sting challenges were performed before, 30, and 90 days after RIT. The area of the wheal and flare were measured at 1-hour post-sting and the area of induration at 24 hours. There was a 96% increase in the 1-hour post-sting wheal at 1 month but a 60% decrease from baseline at 3 months post-RIT. The 1-hour flare was increased by 63% at 1 month but reduced by 16% from baseline at 3 months post-RIT. Induration at 24 hours was reduced by 26% at 1-month post-RIT and by 94% by 3 months. The patient tolerated RIT and the sting challenges without complications. We conclude that RIT may be effective in significantly attenuating the magnitude of debilitating, large local reactions from the sting of the IFA. (*Pediatr Asthma Allergy Immunol* 2000;14[4]333-338.)

INTRODUCTION

ALTHOUGH TREATMENT of systemic reactions with both flying Hymenoptera and imported fire ant (IFA) with immunotherapy is the standard of care, immunotherapy is currently not recommended for the perceived relatively minor hazard of large local reactions.⁽¹⁾ However, some large local reactions can be debilitating, resulting in severe swelling, pain, and discomfort as well as loss of function of an extremity. This can be accompanied by loss of schooldays and/or inability to participate fully in school activities. In addition, large local reactions can persist from days to more than a week. Furthermore, once established, these

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The views expressed in this article are those of the author and do not reflect the official policy of the Department of Defense or other Departments of the U.S. Government.

During the accomplishment of this article Dr. Hagan was a Colonel in the United States Air Force.

reactions are relatively resistant to conventional medical therapy. Consequently, prevention of these debilitating reactions is the only effective course of intervention. Mauriello et al.,⁽²⁾ in a series of 24 patients who experienced large local reactions to Hymenoptera and who were being treated with venom immunotherapy, reported that the incidence of large local reactions with subsequent stings was unchanged. However, there was no comment on the severity of the large local reactions prior to or after immunotherapy. In a study of children with flying Hymenoptera reactions confined only to the skin, those treated with venom immunotherapy were less likely to have large local reactions to future stings (31.1% vs. 9.5%).⁽³⁾ There are currently no other reports of the use of immunotherapy for large local reactions and none for the specific modification of debilitating local reactions.

A case of successful treatment of debilitating large local reactions to the sting of the IFA with rush immunotherapy (RIT) is presented.

METHODS

J.G. is an 8-year-old male with a 7-year history of large local reactions to the sting of IFAs. His reactions vary in diameter from 2 to 6 inches, depending on the anatomic location of the sting. These reactions may last from 3 days to a week or more. When these stings occur on the foot or the hand, he is unable to ambulate without crutches or perform his schoolwork. He has experienced no symptoms consistent with immediate systemic reactions. Treatment in the past with topical steroids and oral antihistamines was wholly ineffective.

Intradermal skin testing with whole-body IFA extract (Fire Ant Mix 1:10 wt/vol., Bayer Corporation, West Haven, CT) was positive (7×10 mm wheal and 22×36 mm flare) at a concentration of 1:1,000,000 wt/vol.

Because of the mother's extreme concern regarding reactions and their debilitating nature, the patient and his mother were counseled on the risks and potential benefits of RIT and they elected to proceed with immunotherapy with whole-body IFA extract. We chose RIT for this case in order to demonstrate efficacy of therapy in the shortest period of time possible, thus eliminating time as a confounding factor in interpretation of any changes. The 2-day immunotherapy schedule is described in Table 1. The patient took the following prophylactic medications for 3 days prior to and for the 2 days of the RIT: Atarax® (Pfizer, Labs Division, New York, NY), 10 mg three times a day; Zantac® (Glaxo-Wellcome, Research Triangle Park, NC), 150 mg twice a day; and prednisone, 30 mg twice a day.

To ascertain the efficacy of RIT, sting challenges were conducted prior to RIT, on day 30 and on day 90 post-RIT in the following manner: Imported fire ant mounds were identified on the day of the challenge

TABLE 1. IMPORTED FIRE ANT RUSH IMMUNOTHERAPY SCHEDULE

	<i>Amount</i> (mL)	<i>Dilution</i> (wt/vol)	<i>Time</i>
Day 1	0.1	1:1,000,000	0800
	0.3	1:1,000,000	0900
	0.1	1:100,000	1000
	0.3	1:100,000	1100
	0.1	1:10,000	1200
	0.3	1:10,000	1300
	0.1	1:1000	1400
	0.2	1:1000	1500
Day 2	0.3	1:1000	0800
	0.4	1:1000	0900
	0.5	1:1000	1000
	0.1	1:100	1100
	0.2	1:100	1200
	0.3	1:100	1300

and several fire ants were collected. Baseline vital signs and peak flow were performed. One ant was placed on the subject's anterior forearm and maintained in that location via an inverted transparent test tube until a sting occurred. The ant was subsequently removed. The patient was observed for a period of 2 hours post-sting for evidence of allergic or adverse symptoms. Repeat vital signs and peak flow were performed at 15, 30, 60, and 120 minutes post-sting. The wheal and flare was measured at 1 hour and the area of induration at 24 hours post-sting challenge. Tracings of these reaction sites were quantitated in centimeters squared by computer (Image Pro for Windows Version 1.2, Media Cybernetics, Del Mar, CA).

During the RIT schedule, the patient had a saline-lock intravenous catheter in place. Vital signs and peak flow were obtained prior to each immunotherapy injection.

RESULTS

There was a 96% increase in the 1-hour post-sting wheal at 1 month but a 60% decrease from baseline at 3 months post-RIT. The 1-hour flare was increased by 63% at 1 month but reduced by 16% from baseline at 3 months post RIT (Fig. 1). Induration at 24 hours was reduced by 26% at 1-month post-RIT and by a remarkable 94% by 3 months (Fig. 2). Photographs of 24-hour poststing challenges prior to and 3 months after RIT are reproduced in Figure 3. The presence of a characteristic pustule at 24 hours confirmed an imported fire ant sting. The patient tolerated RIT and the sting challenges without complications.

We recommended that the patient receive 3 to 5 years of IFA immunotherapy as in patients with systemic reactions to IFA stings.

DISCUSSION

Hypersensitivity to the sting of the IFA is a significant cause of morbidity and mortality in the United States. A 1989 report listed 32 deaths from the IFA in the southeastern United States.⁽⁴⁾ A survey of 901

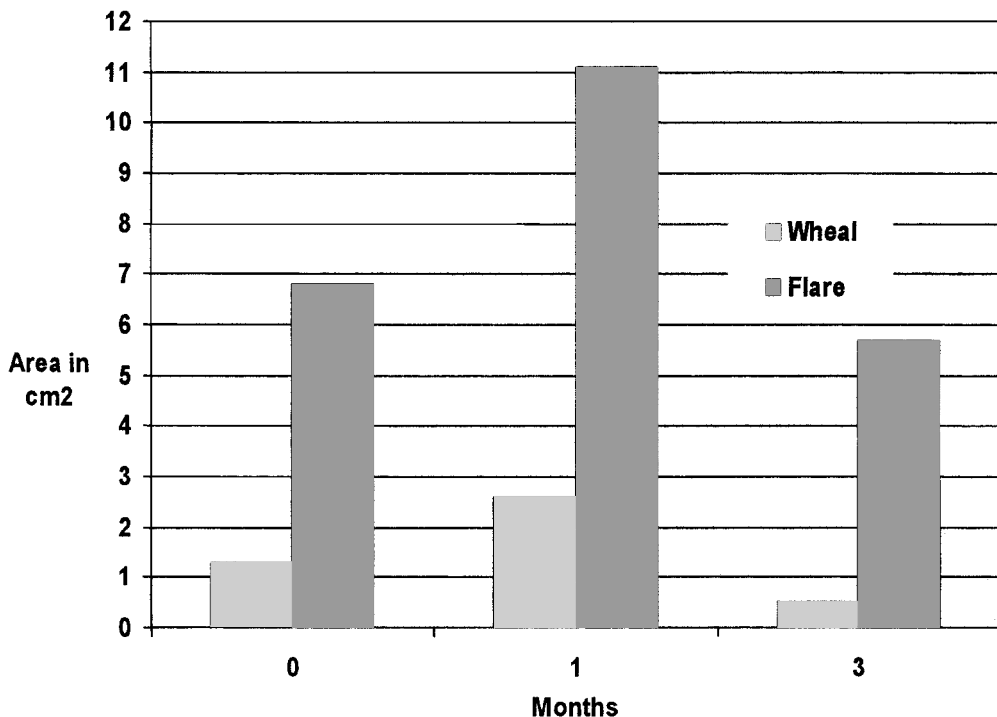


FIG. 1. Wheal and flare measurements in centimeters squared at 1 hour poststing challenge prior to rush immunotherapy (RIT) and 1 and 3 months post-RIT.

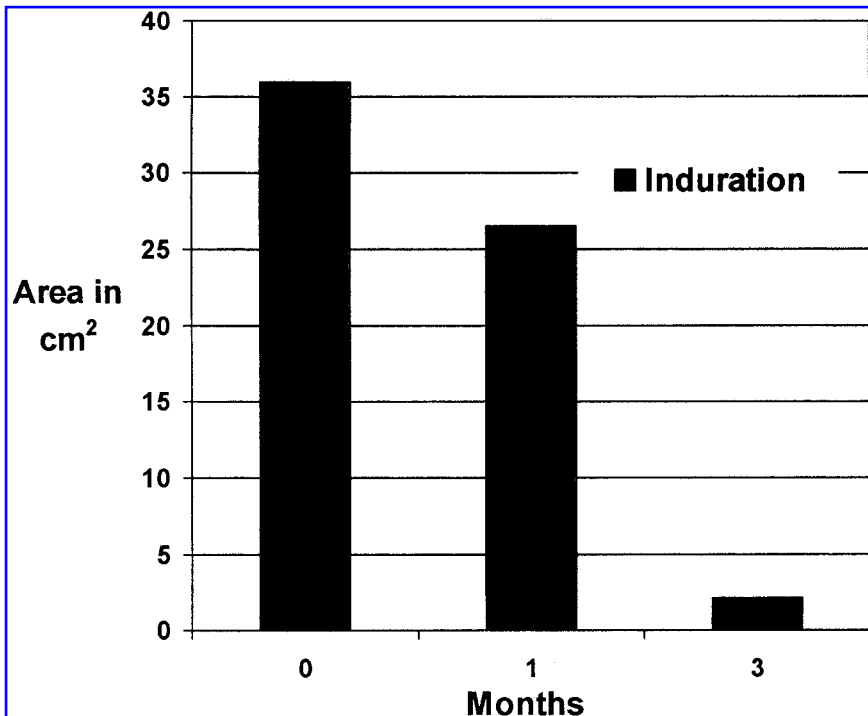


FIG. 2. Induration measurements in centimeters squared at 24 hours poststing challenge prior to rush immunotherapy (RIT) and 1 and 3 months post-RIT.

physicians from IFA endemic areas conducted in 1971 showed high morbidity from stings including 54% of patients with secondary infections, 8 requiring skin grafts and 5 limb amputations.⁽⁵⁾ The IFA is ubiquitous in the southeast and Gulf Coast areas including large areas of Texas. The IFA is aggressive and multiple stings are the norm. IFA hypersensitivity has been reported to approach or exceed the combined incidence of hypersensitivity to all other Hymenoptera species in Florida.⁽⁶⁾

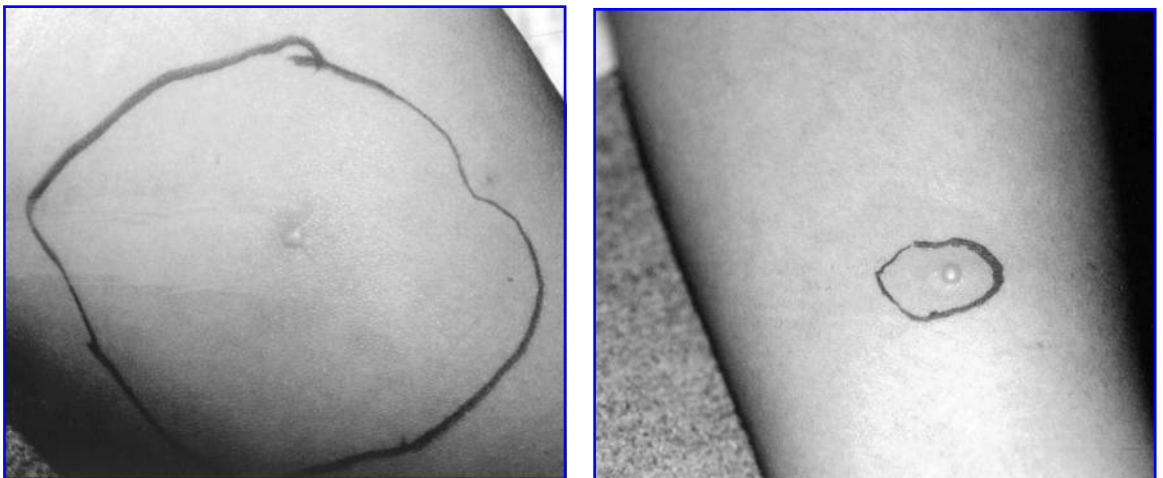


FIG. 3. The area of induration in the pre- and 3 months post-rush immunotherapy sting challenge is outlined with a surgical skin marker. Note the central pustule characteristic of the sting of the imported fire ant.

Both conventional immunotherapy and RIT have been shown to be effective in treating flying Hymenoptera hypersensitivity associated with systemic reactions.^(7,8) Conventional immunotherapy with IFA whole-body extract has also been shown to be effective.⁽⁹⁾ Efficacy of RIT with whole-body IFA extract has not been published, although an ongoing study in this department is apparently both safe and efficacious (unpublished data).

Compared to conventional protocols, however, RIT may be associated with an increased incidence of systemic reactions. Conventional immunotherapy has been reported to be associated with a systemic reaction rate of 2.9%⁽¹⁰⁾ to 16%.⁽¹¹⁾ On the other hand, RIT with flying Hymenoptera venom has variously been reported to have a systemic reaction rate of 0%⁽¹²⁾ to 55%.⁽¹³⁾ These studies are in patients with a history of systemic reactions to Hymenoptera stings and our patient would, by definition, have only large local reactions and the risk of systemic reactions with RIT can be assumed to be significantly less.

Although not commonly used in conventional immunotherapy, prophylactic treatment with a combination of H1 and H2 antihistamines and systemic steroids has been shown to significantly reduce the systemic reaction rate in other RIT protocols.^(14,15)

Large local reactions to Hymenoptera stings are felt to be immunoglobulin E (IgE)-mediated because 90% of adults and 84% of children are skin test positive to the venom.^(16,17) Furthermore, injection of allergen reveals mast cell degranulation on histologic examination.⁽¹⁸⁾

Unlike patients with flying Hymenoptera hypersensitivity who may avoid subsequent stings for many years or even decades, patients with IFA hypersensitivity are at daily risk of repeated stings. Tracey et al.⁽¹⁹⁾ reported a 51% attack rate in 107 patients followed for 3 weeks with the subsequent development of specific IgE antibodies in 16%.

Yunginger⁽¹⁾ states immunotherapy is indicated only for systemic reactions to Hymenoptera stings as local reactions do not warrant such aggressive therapy. Significantly, 30% to 50% of IFA stings result in allergic local reactions.^(18,20) There is a subgroup of these patients who suffer recurrent and significant morbidity from debilitating large local reactions and would benefit from IFA immunotherapy if it were determined to be effective. Our patient is the first reported case of severe large local reactions to the sting of the imported fire ant improved by RIT.

It was interesting to observe an initial increase in the wheal and flare at 1-month post-RIT and this may reflect the well-known phenomenon of an initial increase in IgE levels with immunotherapy. However, the amount of induration at 24 hours progressively decreased and after 3 months of immunotherapy was reduced to a size consistent with maintaining a routine lifestyle.

In conclusion, RIT may be effective in significantly attenuating the magnitude of debilitating, large local reactions from the sting of the IFA.

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1. 2001. Literature Watch Literature Watch. *Pediatric Asthma, Allergy Immunology* **15**:1, 63-68. [[Citation](#)] [[PDF](#)] [[PDF Plus](#)]