

previously reported onset of CCU at 24 to 48 hours after sting.^{5,6} Like other reports, the patient had a history of large local reactions to stings. Contrasting published cases that measured venom specific IgE, we elected intradermal testing to venom extracts since it is a more sensitive test and is used to guide venom desensitization, although our patient did not ultimately pursue it.⁷ However, the role of venom desensitization on the natural course of sting-induced CCU remains unknown. Anfonso-Capra et al⁸ published the case of a 49-year-old woman with sting allergy who developed CCU after 2 months of rush desensitization with yellow jacket. Her CCU symptoms resolved after the treatment was ceased.

Our case is unique since the patient's presentation of CCU quickly evolved into anaphylaxis compared to solitary cutaneous symptoms reported earlier. Moreover, her CST result remained positive at 12 months, although the result was of a smaller size, and she was able to tolerate colder water temperatures. These results contrast the findings of a negative CST result and lack of CCU symptoms at 12 months after sting noted in literature.^{5,6} Hogendijk and Hauser⁵ published a case of recurrent CCU symptoms occurring 3 months after each wasp sting. Similarly, our patient experienced worsened CCU symptoms after the second sting, although much earlier, at 2 weeks. This finding was confirmed by worsened CST wheal-and-flare response, which was not previously reported.

In conclusion, this case confirms the reported causal association between Hymenoptera stings and development of CCU. In addition, it demonstrates that the onset of CCU can be delayed by almost 2 weeks after the culprit sting and may worsen with further stings.

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Performance of the Acute Asthma Intensity Research Score (AAIRS) for acute asthma research protocols

Limited validated severity measures are available for acute asthma exacerbations that can be measured in all subjects regardless of age or ability to cooperate and that are sufficiently comprehensive and sensitive to be used as an outcome measure for research protocols. The 13-point (0–12) Pediatric Respiratory Assessment Measure (PRAM) was developed in young children with asthma exacerbations, using airway resistance as the reference measure, and discriminated baseline severity and responsiveness after treatment.¹ We have reported that the RAD score, a simple bedside severity score for pediatric patients with acute asthma exacerbations, performs as well as the PRAM score.²

The PRAM includes scalene retractions (Table 1), a sign that the PRAM developers noted in only 2% of their participants before treatment. Although the PRAM developers note that a training lecture and demonstration were used for score assessors, to our knowledge this teaching tool has not been reported.¹ In addition, it has long been recognized that scalene retractions may be consistently ascertained only by palpation or electromyography and that this assessment may be difficult.³ In a prospective research protocol of pediatric patients with acute asthma exacerbations, we experienced the same difficulty

in being able to visually discern scalene muscle retractions. Because of this, we studied the substitution of scalene muscle retractions with visual intercostal and subcostal retractions and expiratory phase prolongation.

This modification also allows generation of an acute asthma severity score with a greater number of relevant components that have been used in previous scores, are easy to observe, and might more fully capture the variability of exacerbation severity needed for research protocols.⁴ These modifications resulted in a 17-point (0–16) Acute Asthma Intensity Research Score (AAIRS) that excludes scalene and includes intercostal and subcostal retractions, as well as expiratory phase prolongation. Our objectives were to assess discrimination of baseline severity and responsiveness of the PRAM and AAIRS and the distributions of score values in children with exacerbations.^{5–7}

To assess score discrimination and responsiveness, we studied a prospective cohort aged 5 to 17 years presenting to a tertiary, academic pediatric emergency department with acute asthma exacerbations. AAIRS component values were specified a priori (as done by the PRAM developers) and corresponded to those of the PRAM to facilitate comparative assessment of performance.¹ Each score was calculated on presentation and after 2 hours of treatment. Predictor variables were baseline PRAM and AAIRS and change of each score after 2 hours of treatment (Δ PRAM, Δ AAIRS). Criterion standard outcome variables used to examine discrimination and responsiveness of each score were percent-predicted forced expiratory volume in 1 second (%FEV₁) and 2-hour proportionate change expressed as a percentage (Δ %FEV₁) in those who could perform this test at each time point. We performed linear regression of baseline %FEV₁ on baseline PRAM or AAIRS in 2 separate models. In 2 other models, Δ %FEV₁ was regressed on Δ PRAM or Δ AAIRS, baseline %FEV₁, and the

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Table 1

PRAM and AAIRS acute asthma severity score components, values assigned by severity of each component, and ranges of component values constituting each score

Component	Component values				Component range	
	0	1	2	3	PRAM	AAIRS
Retractions ^a						
Scalene	No		Yes		0 or 2	
SCM	No		Yes		0 or 2	0 or 2
Intercostal	No		Yes			0 or 2
Subcostal	No		Yes			0 or 2
Air entry	Normal	Decreased at bases	Widespread decrease	Absent or minimal	0–3	0–3
Wheezing	Absent	Expiratory	Inspiratory and expiratory	Audible without stethoscope or silent chest	0–3	0–3
SpO ₂	> 95%	92–94%	< 92%		0–2	0–2
Expiratory phase	Normal	Prolonged	Severely prolonged			0–2
Possible total score range					0–12	0–16

Abbreviations: PRAM, pediatric respiratory assessment measure; AAIRS, Acute asthma intensity research score; SCM, sternocleidomastoid; SpO₂, oxygen saturation by pulse oximetry.

^aAny visible use of accessory muscle group (Yes/No).

baseline value of the corresponding score. Linear spline functions were used in both sets of models to allow for nonlinear relationships between each predictor and the respective outcome. Ninety-five percent confidence intervals (95% CI) were calculated using bootstrap resampling techniques with 1,000 replications. Analyses were performed using R-software version 2.14.1.⁸ The study protocol was approved by our institutional review board.

Of 661 unique subjects, median (IQR) age was 8.8 (6.9, 11.3), 60% were male, and 59% were African-American. Accessory muscle use was visually observed in: Scalene, 2 (0.3%); sternocleidomastoid, 362 (55%); intercostal, 110 (17%); and subcostal, 113 (17%). Prolonged expiratory phase was noted in 329 (50%) and severely prolonged expiratory phase in 45 (7%). Baseline scores were: PRAM 4 [1, 5], range 0–9 (SD 2.32); AAIRS 5 [1, 8], range 0–14 (SD 3.53). Baseline %FEV₁ was 51 [36, 72; $n = 430$] and $\Delta\%$ FEV₁ 27 [9.6, 62; $n = 282$]. Both scores discriminated baseline severity assessed using %FEV₁ ($n = 430$): PRAM, R^2 0.44 (95% CI, 0.37–0.51); AAIRS, R^2 0.47 (95% CI, 0.41–0.51). In addition, the adjusted models that included change of each score demonstrated responsiveness in predicting $\Delta\%$ FEV₁ ($n = 282$): Δ PRAM, R^2 0.28 (95% CI, 0.17–0.37); Δ AAIRS, R^2 0.28 (95% CI, 0.18–0.34).

The AAIRS demonstrates discrimination and responsiveness comparable to the PRAM. Scalene retractions were observed rarely, whereas intercostal and subcostal retractions and expiratory phase prolongation were observed frequently, accounting for the greater range and variability (SD 3.53 vs 2.32) of AAIRS. The greater range of values of the AAIRS, which substitutes relevant signs that are easier to identify, might provide more comprehensive assessment of acute asthma exacerbation severity for research protocols.

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Type I variant of Kounis syndrome secondary to wasp sting

Allergic episodes have been shown to be associated with acute coronary syndromes.¹ Human heart mast cells with their mediators are believed to be the most important cell involved in anaphylaxis,² acting on the coronary vasculature in susceptible individuals, such as patients with Hymenoptera venom allergy.

Kounis syndrome (KS) is described as “the coincidental occurrence of chest pain and allergic reactions accompanied by clinical and laboratory findings of classic angina pectoris caused by inflammatory mediators released during the allergic insult.”³ Three types of syndrome are recog-

nized⁴: type 1 appears in patients with normal coronary arteries, type 2 occurs in patients with a preexisting atheromatous disease, and type 3 (drug-eluting stent thrombosis) occurs in patients with stent thrombosis.

A 53-year-old, previously healthy man was admitted to the emergency department of the University of Parma because of erythematous rash followed by chest discomfort 30 minutes after being stung on the neck by a wasp. His blood pressure was 110/80 mm Hg, pulse was 93/min, and oxygen saturation was 95%. Cardiac and pulmonary auscultations were normal. The symptoms rapidly evolved into a loss of consciousness with hypotension. The electrocardiogram showed ST-segment elevation in the II, III, and aVF