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Clinical Course and Outcomes Associated with Different Treatment Modalities for Pediatric Bark Scorpion Envenomation

Vasanth Coorg, MD; Rachel Levitan, MD; Jared Muenzer, MD; Richard Gerkin MD, Anne-Michelle Ruha, MD
Department of Medical Toxicology, Banner University Medical Center Phoenix; Department of Emergency Medicine, Phoenix Children's Hospital; Phoenix, AZ.

Background

- In the Southwestern United States, envenomation by *Centruroides sculpturatus* (Arizona bark scorpion) can lead to life-threatening illness in young children
- In 2011, Centruroides (Scorpion) Immune F(ab')$_2$ (Equine) Injection (Anascorp®) (AV), was FDA-approved for treatment of bark scorpion envenomation
- The recommended initial dose is three vials with additional one-vial doses if symptoms persist
- Antivenom cost led Phoenix Children's Hospital (PCH) to adopt guidelines for sequential single-vial dosing
- Alternatively, some physicians provide only supportive care, without antivenom

Research Question

- Does treatment approach influence emergency department (ED) length of stay (LOS), hospital admission rate, and complications in children with Grade III or IV scorpion envenomation?

Methods

- Retrospective chart review of all patients presenting to PCH ED between September 1, 2011 and March 31, 2014 with Grade III or IV scorpion envenomation
- Patients were grouped by treatment: G1 = no AV, G2 = FDA dosing, G3 = non-FDA dosing
- Descriptive statistics describe outcomes; Chi square and ANOVA were used for comparisons.

Results

	G1	G2	G3	P value
# Patients (total 156)	58	16	82	
Age (mean)	5.7 years	2.5 years	4.0 years	0.001; 0.024#
¶Grade IV	41%	87%	93%	<0.001*
Respiratory Distress (RD)	3%	56%	28%	<0.041#
# Vials (mean)	0	3.25	1.83	<0.001#
ED LOS (mean)	261 min	253 min	259 min	0.839
Hospitalization	3.4%	0	8.5%	0.167
Intubation	0	0	2.4%	0.607
Aspiration	0	0	2.4%	0.607

* For G1 vs. G2&3; # For G2 vs. G3; ¶ of 156 subjects, 73% were Grade IV

Discussion

- A Grade I – IV scale describes severity of bark scorpion envenomation in the US, with Grades III and IV describing systemic neurotoxicity beyond paresthesias[1]
- Children with Grade IV envenomation may have a wide spectrum of illness severity, with symptoms ranging from mild muscle tremors and nystagmus, to severe neuromuscular agitation, hyperadrenergic state and respiratory failure

Discussion

- While our results do not show a difference in outcomes between groups, they do strongly suggest that PCH physicians tailor their treatment based on severity of symptoms and/or perceived risk for deterioration.
- G1 subjects (no AV), were less ill on presentation, with majority Grade III, only 3% with respiratory distress (RD), and 3.4% admitted to the hospital. Mean LOS was 261 min in G1. A previous study of children presenting to PCH with scorpion envenomation when AV when unavailable reported a mean LOS of 28.7 hr.[2] This further highlights the relatively mild severity in G1.
- G2 subjects (initial 3 vial AV dose) were also different at baseline than G3 subjects (non-FDA dosing; mostly single sequential vials). G2 subjects were younger and more likely to have RD. Ultimately G2 patients received a larger mean dose of AV than G3 patients.
- The small number in G2 limits ability to detect statistical differences between groups, but no patients in G2 were hospitalized, intubated or reported to have aspirated, while nearly 10% of G3 patients were hospitalized.

Conclusion

- Group differences in age, Grade, and RD suggest that severity of illness influenced treatment. There were no significant differences in outcomes. Prospective studies may determine which patients will most benefit from which approach.

1. Curry et al . PMID 6381751. 2. O'Connor and Ruha. PMID 22562239