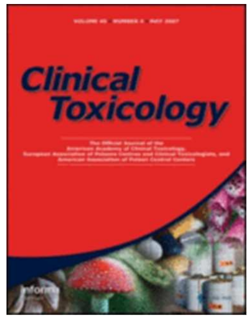

Pressure Immobilization after North American Crotalinae Snake Envenomation

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POSITION STATEMENT

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American College of Medical Toxicology, American Academy of Clinical Toxicology, American Association of Poison Control Centers, European Association of Poison Control Centres, International Society of Toxinology

Background

The vast majority of venomous snake bites treated at health care facilities in the United States each year involve non-neurotoxic Crotalinae species. (1) Large case series reveal the major clinical effect associated with these envenomations to be local tissue injury. Extremity swelling and dermonecrosis are common, with compartment syndrome an infrequent but potentially limb-threatening effect of envenomation. (2,3,4,5) Life-threatening systemic toxicity and death are rare.

Historically, many first-aid measures have been employed in the treatment of snake bites, but none have been shown to improve patient outcome. Pressure immobilization is a technique routinely employed in the pre-hospital management of neurotoxic snake species in Australia. First described by Sutherland and colleagues in the 1970s, pressure immobilization involves wrapping the entire extremity with a bandage and then immobilizing the extremity with a splint. (6) The bandage should generate a pressure between 40-70 mmHg in the upper extremity and 55-70 mmHg in the lower extremity in order to effectively delay systemic absorption of venom. (7)

Several animal studies have demonstrated delayed systemic absorption of venom with pressure immobilization. (6,7,8) However, studies have also revealed that pressure immobilization bandages are commonly applied incorrectly, even in a simulated setting following provider instructions and training. (9,10,11,12) Although the more common error is to apply the bandage too loosely, when applied too tightly the bandage may function as a tourniquet, causing limb ischemia, and may also increase systemic absorption of venom. (7)

Animal models of North American Crotalinae envenomation demonstrate delayed systemic absorption of venom and delayed mortality following application of pressure immobilization bandages. (13,14,15) However, the local effects of sequestering cytotoxic venom in the extremity are less clear. In a swine model of pressure immobilization following C atrox lower extremity envenomation, intracompartmental pressure increased significantly compared to controls, from a non-surgical range to levels that would prompt fasciotomy. (13)

Position

Given that the primary toxic effect of envenomation is local tissue injury, mortality is not an ideal outcome measure to extrapolate to human crotaline envenomation. Available evidence fails to establish the efficacy of pressure immobilization in humans, but does indicate the possibility of serious adverse events arising from its use. The use of pressure immobilization for the pre-hospital treatment of North American Crotalinae envenomation is not recommended.

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