

Treatment of Spider Bites by High Voltage Direct Current

Carl D. Osborn, MD

Between September 7, 1988, and January 15, 1991, 147 cases of confirmed (19) and suspected spider bites have been treated by high voltage direct current (HVDC) shocks. Venom damage to tissue was arrested at the time of treatment. Pain and systemic symptoms usually improved within 15 minutes. Lesion excision or grafts have not been necessary in any of the 127 cases with completed followup.

The first 21 cases were previously reported¹, and good results have been confirmed in an additional 126 cases. Return visits or report by phone or letter occurred in 127 cases (86%). Two cases developed cellulitis that responded to a change of antibiotic. One patient who did not take the prescribed antibiotics developed an abscess but responded to incision and drainage and subsequent antibiotics. All the other cases exhibited or reported improvement. No patient showed any progression of venom damage such as a new or larger bleb, or the enlargement or darkening of the area of tissue discoloration. All cases were observed a minimum of 15 minutes after treatment. Reduction of pain and systemic symptoms usually occurred within that time.

The diagnosis of spider bite envenomation in 87% of these cases was made on the clinical appearance of the lesion, since the vector was not seen and the specific time of injury was not known. In the typical case, in the first few hours there is erythema, usually with some itching or discomfort. Since the bites frequently occur during sleep or in the dark they may

initially be confused with mosquito or other insect bites. With magnification, two small punctures can sometimes be seen. In older lesions there is increasing tissue damage progressing to a bleb containing dark serum, and associated skin discoloration indicating beginning necrosis, usually within one to two days. Tissue destruction may continue over two to several weeks and may finally result in slough and tissue loss. Healing is very slow and local symptoms may persist for months. As long as there is any evidence of venom activity, such as pain, fever, or inflammation, HVDC therapy may be beneficial. Minor local discomfort is the only side effect observed in any case to date.

Case 79. 47Y WM — Bite (Recluse) occurred on the right flank 7/15/90. First medical attention given elsewhere included antibiotics. When seen 7/16/90 the area of reaction measured 16 cm × 20 cm. The patient reported using an "inhaler" all night "to help breathing." Ten minutes after multiple HVDC shocks the patient had less pain, and breathing improved enough to return to work. Four days later he was discharged with a 4 mm dry crust and no inflammation at the site of the bite.

Case 125. 38Y WM first noticed a bite at 2100H, and fifteen hours later the lesion on the right forearm, lateral side, measured 9 cm × 4 cm. The entire arm and shoulder hurt, and he had been nauseated for 1½ hours. Ten minutes after multiple HVDC shocks he was free of pain and nausea. Doxycycline 100 mg BID was prescribed, and five days later there had been no recurrence of pain or nausea. He was discharged with the lesion measuring 2 cm

Direct correspondence to Carl D. Osborn, MD, 1201-H East 5th Street, Ada, OK 74820.



Figure 1A. Case 41: Nine days after incident, patient presented with venomous bite on right cheek.

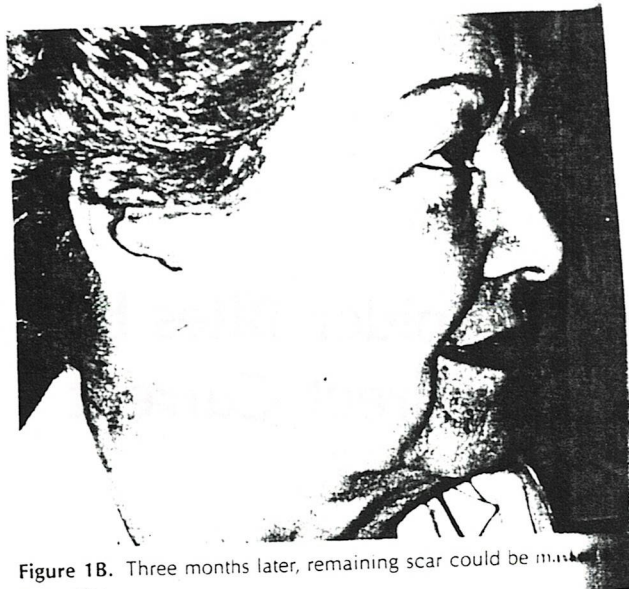


Figure 1B. Three months later, remaining scar could be masked with cosmetics.

× 6.6 cm with instructions to report any problems.

Case 41. 66Y WFe was first seen nine days after an injury on the right cheek, reporting: "I thought it was a mosquito bite that had gradually gotten worse" (Fig 1). There was a raised 2 cm × 2 cm hyperemic area with a central black crusted area 1 cm × 1.5 cm. Two shocks of 40-50 KV seconds each were administered through the bite with one contact inside the cheek. External shocks were then done across the bite X-fashion with two 40-50 KV second shocks each way. The referring physician had prescribed Cefadroxil 500 mg BID, and this was continued, and methyl-

prednisolone 4 mg in decreasing daily dosage was added. Tetanus toxoid 0.5 cc was given. On return after five days, the lesion measured 1 cm × 1 cm, and was dark and dry with no pain or swelling. An earache that was previously present but not reported, had stopped. Over the next four weeks healing occurred with superficial scarring. The final scar can be masked with cosmetics.

The patients' ages ranged from 15 months to 89 years, and many body areas were bitten. The interval between injury and therapy varied from less than 2 hours to 5 weeks (Table). Several cases had multiple

Spider Bites												
Patient Age Sex	<u>Under 10</u>		<u>11-30</u>		<u>31-50</u>		<u>51-65</u>		<u>66 & Over</u>		<u>Totals</u>	
	M	F	M	F	M	F	M	F	M	F	M	F
Duration of Lesion												
Under 48 H	3	6	11	16	13	19	3	6	4	5	34	52
49H-5D	1	1	10	10	6	9	2	3	1	1	20	24
6 to 14D	0	0	0	2	1	3	0	2	0	2	1	9
15D or more	1	0	0	2	1	0	1	2	0	0	3	4
Totals	5	7	21	30	21	31	6	13	5	8	58	89
Lesion Location												
Head & neck	1	1	2	0	2	5	0	2	1	1	6	9
Trunk	2	4	5	5	3	4	1	3	1	0	12	16
Upper ex.	1	1	7	4	6	7	0	5	0	2	14	19
Lower ex.	1	1	7	21	10	15	5	3	3	5	26	45
Completed Follow-up												
	4	7	16	30	16	26	5	12	5	6	46	81
Identified Vector												
	0	3	1	2	5	5	1	0	1	1	8	11



Figure 1. Wasp sting on bridge of nose, prior to HVDC treatment.

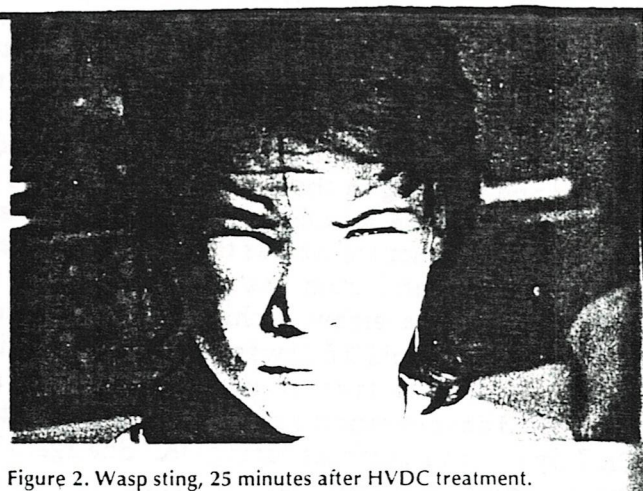


Figure 2. Wasp sting, 25 minutes after HVDC treatment.

Discussion

Venomous snake bites are seen infrequently (if at all) by most physicians. Anti-venin is considered the "gold standard" of treatment, with the dose dependent on the severity of the bite, type of snake (if known), and the size of the victim. Unfortunately, there is an appreciable risk of anaphylaxis and serum sickness associated with its use. A procedure that may reduce or eliminate the need for anti-venin could reduce that risk. According to the theories of Kroegel C. Meyer zum Buschenfelde KH,⁴ referring to a report of R. Guderian et al,⁵ HVDC alters the structure of venom with resulting alteration of action. The experience of the author with 5 snake bites, added to results observed with spider bites and stings, lends weight to that theory.

Case Reports, Snake Bite

Case 1. A 44-year-old white female was admitted to the emergency room at 10:12 PM on July 2, 1990, with a bite on the dorsum of the left foot that reportedly occurred at 9:50 PM. The snake was thought to be a copperhead (*Agkistrodon contortrix*) but it escaped. There were punctures 1 cm apart on the dorsum of the foot in a 7 cm x 7 cm area of erythema and edema. Demerol 50 mg - Phenergan 50 mg was given IM and Decadron 8 mg was administered IV slowly. Shocks of 40-50 kV seconds each were administered through each puncture to the plantar surface, followed by 5 more in radial fashion with one contact centered in the bite and the other at points around the circumference of the area of reaction at 10:25 PM. The patient was admitted to an attending surgeon and transferred to her room at 11:30 PM with an emergency room note stating "patient seemed to be improving." Cefuroxime 250 mg BID was started. Anti-venin was not given (surgeon's decision). Electrolytes, PTT, and hematology values were normal. The patient had been treated for spider bite July 12, 1989, and had a

tetanus booster at that time. On July 3, 1990, there was minimum swelling and discoloration of the left foot. It was painful to pressure but comfortable when the patient was still at rest. Vital signs were normal. On July 4, 1990, Valium 10 mg was given IV and the foot was shocked through each puncture and cross-shocked (40-50 kV seconds each, total 4). Four hours later the attending surgeon discharged the patient to return July 13 for out-patient physical therapy on a triweekly basis. The patient did not keep her fourth appointment, but did return to work July 24, 1990. There was no loss of tissue or function.

Case 2. A 29-year-old white male was bitten on the medial aspect of the left heel at about 10 PM on July 2, 1990. 2 cc Celestone plus 2 cc lidocaine was injected at the bite site (prior to arrival at the local hospital). The patient was then transferred to the local emergency room, arriving at 12:15 AM, July 3. The left foot and ankle was noted to be twice the size of the right, with pitting edema to the knee. Shocks (2) of 40-50 kV seconds each were administered through the bite on the heel, dorsum of the toes to the heel (2), and from the plantar surface of the heel to the knee at 3 locations. Ancef 1 gm q8h IV was started and the patient was admitted to an attending surgeon (who elected to not give anti-venin). Vital signs were stable. Laboratory values were normal throughout the hospital stay. On July 5, Valium 10 mg IV was given at 9:20 AM. Shocks (2) of 40-50 kV seconds each were done from the plantar base of the toes to the dorsum of the arch, dorsal base of the toes to the heel (2), and the plantar surface of the heel to locations around the knee (4). At 1:20 PM the patient was discharged by the attending surgeon with a note stating "less swelling, denies any pain." A later verbal report from the surgeon was "no problems."

Case 3. A 32-year-old white female came to the emergency room at 6:13 PM with a history of a possible snake bite which occurred 32 hours before while she

was clearing brush. At that time she had picked up "something thorny," but on questioning remembered wiping dark material from her arm. There were two punctures 1 cm apart 7 cm above the wrist on the antero-medial aspect of the right forearm in an area of hyperemia 4 cm x 5 cm. The patient complained of itching and burning in the area. Shocks of 40-50 kV seconds each were administered through the arm through each puncture, across the arm at the level of the punctures, and from the distal margin of the hyperemia to the elbow. Itching stopped immediately. Tetanus toxoid 0.5 cc was given IM. The patient was instructed to take Duricef 500 mg BID and return in 3 days or report any problems immediately. On July 6 the patient was "doing OK." She again had some itching and minimal erythema. Two shocks from the distal edge of the erythema to the elbow relieved symptoms. The patient was released with instructions to finish her medications and report any problems.

Case 4. A 9-year-old white male was admitted to the emergency room at 12:20 AM on July 10, 1990, with a history of copperhead bite on the dorsum of the right foot at 11:30 pm July 9 (snake killed, common name ID by family). Multiple HVDC shocks were administered by the emergency room physician. A skin test for anti-venin was negative but anti-venin was not given (decision of attending pediatrician). Rocephin 1 gm IV q12h was started and the patient was admitted for care. There was some discoloration of the foot with edema to the ankle. At 6:15 PM, because of persistent pain to pressure, 20 mg Demerol was given IV and the foot was reshocked (8 shocks of 40-50 kV seconds each). The patient was ambulatory and pain free the next morning and was discharged at 6:05 PM on July 11 by the attending pediatrician with a prescription for Ceclor 250 mg TID #15. Laboratory values were normal and vital signs were stable during the patient's 2-day hospital stay.

Case 5. A 35-year-old white female was clearing the edge of her yard, wearing shorts, when she noticed "something" hanging on her right leg. On inspection it was found to be a hollow tooth filled with dark material except at the tip (described by the patient, lost before inspection by a physician). When seen 20 minutes after discovery of the injury, she was found to have a small spot of blood 1/4 inch from the fang mark with erythema around the bite. The injury was diagnosed as snake bite with minimum envenomation, lateral aspect, right calf. HVDC shocks of 40-50 kV seconds were administered with one contact on the bite and the other at 8 positions around

the bite past the margin of erythema. Duricef 500 mg BID was started and Medrol Dospak was prescribed. The patient was contacted by phone 5 hours later and reported that all redness had disappeared. She had no sequelae.

Discussion

The specific cause of a venomous bite or sting is not usually identified. Treatment is based on clinical diagnosis in 80% to 90% of cases, and should be started as soon as possible to avoid anaphylaxis, limit tissue damage, and reduce pain. The safety of the victim is paramount and immediate transport to a medical facility for appropriate management is mandatory. Multiple shock HVDC does not interfere with any indicated medication or procedure and has reduced the need for some that have been used routinely. Specific identification of the vector has not been necessary since beneficial effect has been observed with every type of venom encountered to date in this area. Other than momentary discomfort, NO complication has occurred with the HVDC shock technique as outlined. The immediate response and absence of later reaction supports the theory of venom modification.⁴

Summary

Multiple HVDC shocks of 40-50 kV seconds each have been effective in 351 cases of venomous bites and stings with no complications from the shocks. Tissue damage from venom has consistently been arrested with the first series of shocks. The simple procedure can be done in 1 to 2 minutes on site or in transit. Any other indicated treatment may be used in conjunction with the HVDC shocks. Potential infection should be covered with broad spectrum antibiotic therapy. Tetanus protection should be current. Age and/or medical conditions are NOT contraindications to HVDC. Its use for first aid and as a therapeutic measure is recommended. **ALTERNATING (HOUSE) CURRENT IS ABSOLUTELY CONTRAINDICATED.**

References

1. J&K Industries, Claremore, Okla. Cliff Mackey, President.
2. Muehler LA. Shocking cure for snake bite. *Outdoor Life* June 1986, Part I, July 1986, Part 2.
3. Osborn CD. Treatment of spider bites by high voltage direct current. *J Okla State Med Assoc* June 1991, pp 257-260.
4. Kregel C, Meyer zum Buschenfelde KH. Biological basis for high voltage shock treatment for snake bite. *Lancet* December 6, 1986, p 1335.
5. Gudenan R et al. High voltage shock treatment for snakebite. *Lancet* July 25, 1986, p 229.

The Author

Carl D. Osborn, MD, is a gynecologist in Ada, Oklahoma.