

## TREATMENT OF THE BITES OF COPPER-HEAD SNAKES

BY LOCAL FREEZING COMBINED WITH THE FREQUENT APPLICATION OF A POTASSIUM PERMANGANATE SOLUTION.

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For several years I have averaged about two cases of bites of copperhead snakes a year, and finally hit on a plan of treatment which gives me such good results that it may be worth while to communicate it to others.

My earliest experience with the use of caustics locally and whisky and ammonia internally was unsatisfactory in many respects, although I had no deaths. During the past year I treated for two months a fearful ulcer of the finger and hand which was caused by cauterization with caustic potash for snake bite. The final result was a contracted palm and stiff fingers.

Several years ago Dr. Thomas R. Brown<sup>1</sup> published an account of some experiments with potassium permanganate as an antidote to the venom of snakes of the viper class, e. g., rattlesnakes, copperheads and vipers. Previously I had used this drug in a measure, but afterward I used it almost entirely, at first hypodermically. Being refused this method of administration on one occasion, I used permanganate solution locally on compresses and apparently with good effect. Shortly after I hit on the plan I now pursue which gives me results incomparably better than anything I have known of heretofore. My plan is to freeze the area around the bite with ethyl chlorid spray, incise through the wound, usually making two parallel incisions of almost an inch in length through the two little wounds made by the fangs. Then I soak the part for a few minutes in strong permanganate solution and apply dressings wet with this solution. The edge of this dressing is raised up every half-hour or hour and fresh solution poured over the surface. The incisions, which are trifling, usually heal in a day. Certainly, so far as my experience goes, an incision in an area poisoned by snake bite appears to heal with extraordinary rapidity even in the absence of any effort at asepsis.

This method I have now used successfully in eight cases. I am inclined to attribute some virtue to the freezing by ethyl chlorid over and above the mere anesthetic effect. If the patient is seen within one hour after the bite, he is usually all right in two or three hours, with the exception of trifling swelling. The extension of the poison seems to be checked very shortly after this application. Internally I usually employ a few doses of strychnin, but occasionally use whisky and ammonia as well, perhaps out of respect to local prejudice.

The three cases cited herewith are, respectively, one illustrating the happiest result of treatment, another the most serious case, and the third the most peculiar case of all the instances of poison bites that I have met with.

### CASE HISTORIES.

**CASE 1.**—A boy, aged 8, visiting in the country, was bitten in the wrist by a huge copperhead. The snake was killed and was a typical specimen. It was during the month of August when snake bites are supposed to be most venomous.

I saw the boy within half an hour. Chloroform was employed to control the child, but ethyl chlorid was nevertheless used locally. The pain from the bite seemed to be intense. The arm was already much swollen and blue. The incisions

were made. There was some bleeding, which was encouraged by immersion in warm water. The permanganate solutions were applied as usual.

It was 10:30 a. m. when I left the house. On my return at 4 p. m. the boy was out in the mountains playing, and the swelling was scarcely apparent. I did not see him afterward as he was considered well.

**CASE 2.**—The second patient was a young woman school teacher who with a party of young people was doing some mountain climbing on an August day. She trod on a copperhead of medium size, which stuck its fangs into her foot just in front of the ankle.

It was perhaps two hours before she reached our village, but she had already been sufficiently dosed with whiskey to insure of the good effects of such treatment—if it has any. In my absence a neighboring doctor prescribed onion poultices and more whiskey. Shortly after this she became nauseated and vomited, and could take no more whiskey. It was nearly four hours after the time of the bite when I first saw her. The leg was much swollen, the whole body was of a jaundiced hue, and over the leg were splotches of deeper copper color. The general condition was one of extreme prostration. The pulse was almost indistinguishable, the respiration shallow, but the mind was clear. I gave some aromatic spirits of ammonia and had turned to look after the local wound when the patient became unconscious and respiration stopped. She was given a hypodermic of strychn. 1/30 and nitroglyc. 1/100, and artificial respirations were instituted. In a few minutes the injection was repeated. Respiration was re-established shortly afterward, the pulse returned with more force, and the patient revived.

Recovery was followed by a prolonged convalescence. There was marked anemia with a decided aortic murmur for some time. The mottling of the leg persisted for months.

I instance this case because of its gravity, the length of time from the bite until the extreme symptoms set in, and the evidence it afforded of the destruction of the red corpuscles of the blood.

About the time of the publication of the observations of Dr. Kelly and Dr. Brown another article appeared elsewhere in which were compared the relative effects of cobra viper venoms. The statement was made that both venoms contained two toxins, a poison destructive to red corpuscles and a nerve-destroying poison. It was also stated that the blood-destroying element was in excess of viper venom so that death occurred, if at all, some time after the bite, and with distinct evidences of destruction of red blood cells. Cobra bite, on the other hand, was said to be more rapidly fatal on account of the very large excess of the nerve-destroying poison in the cobra venom, the fatal result being accompanied by other evidences of implication of the nervous system.

From this article<sup>1</sup> also I received the impression that very young snakes—infant snakes—of the viper class were very poisonous and that this poison had a somewhat different action from the venom of the older snakes. By the way, it is the popular opinion among our mountain dwellers that large snakes are not more to be dreaded than smaller ones of the same species, and this certainly coincides with my observation. A very peculiar case came under my notice about six years ago, before I had used my present method of dealing with poisoned bites.

**CASE 3.**—A woman was walking barefoot in her garden on the mountain side. She was bitten on the side of the foot by something she did not see and could not find in the low vegetation that was there. She was a young woman of exceptionally fine physique and robust constitution.

Four or five hours later, when I first saw her, there were two very tiny spots at the side of her foot, and the leg was much swollen, but was white and edematous rather than blue or cop-

1. Johns Hopkins Hospital Bulletin, vol. x, 1899, p. 224.

per colored. She complained of a great deal of thirst, and the body was hot. The pulse was 120, and I was surprised to find a temperature of nearly 102 F. She declared that she had been perfectly well before. There was great pain in the foot and leg, which lasted for some days and required the use of opiates.

On the second day the temperature was 104 F. in the afternoon, and reached that point on several succeeding days. An evening temperature of at least 102 F. persisted for three, or perhaps four, weeks. The woman became as much debilitated as from an attack of typhoid. Indeed the general conditions made one suspect typhoid, and the blood was sent to the state health department on three or four occasions for a Widal test. One report was "suspicious," the others were uniformly "negative." The conditions in the leg persisted. It was pale and edematous. The dorsum of the foot gave a boggy sensation of fluctuation, and was incised deeply on three separate occasions. There was merely an exudation of watery fluid, and the incision did not cause any great pain. But the strangest thing to me was that the incisions healed in twenty-four hours.

Some very small snakes were seen in the garden the day after the woman was bitten. Could she have been bitten by a very small snake? This case has always been a matter of speculation to me, and I would like information on it. The woman has never quite recovered her former good health, and I understand that the affected leg is still different from the other.

Concerning the matter of the very poisonous nature of the bite of new-born snakes of the viper class, I remember a story from the Philadelphia Zoo. A rattlesnake and a boa-constrictor were separated by a fine-meshed wire screen. One night the rattlesnake hatched out young. The next morning some of her venomous brood were found about the dead body of the boa-constrictor.

#### REMARKS ON SAHLI'S DESMOID TEST OF THE STOMACH.

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In the beginning of 1905 Sahli<sup>1</sup> published a new method of testing the functions of the stomach. It consists of placing methylene blue or iodoform in a little rubber bag and tying it tightly with thin raw catgut.

This "desmoid bag" is swallowed by the patient after a large meal (dinner) and the urine or saliva is tested for the presence of methylene blue or iodine. Methylene blue colors the urine green or blue; the iodine or the iodoform may be demonstrated in the saliva by means of starch paper and fuming nitric acid (violet color). The reaction appears in healthy persons usually from six to eight hours after swallowing the desmoid bag. Its occurrence at this time points to a proper function of the stomach; if the reaction occurs later or not at all, it points to insufficiency of the stomach. This test is based on the fact that raw connective tissue, including catgut, is digested only by the gastric juice, according to Schmidt,<sup>2</sup> and not by the pancreas.

Sahli prefers his method to the usual examination of the stomach contents. He says: "I believe that the des-

moid reaction informs us not only how quickly the gastric juice is able to dissolve the connective tissue, but indirectly it shows how well the meal with which the bag has been given has been digested."

It is natural that such a method, if practicable, might be of considerable use. Investigations on the value of Sahli's method were made by Eichler,<sup>3</sup> Kühn<sup>4</sup> and Kaliski.<sup>5</sup> They were all favorable and Sahli's assertions were entirely confirmed. Kaliski even says that the various degrees of acidity can be determined from the strength and the time of occurrence of the reaction. He says in his conclusions:

"1. A deep blue color of urine after from four to seven hours speaks for hyperacidity. If the acidity is normal the reaction occurs after from seven to twelve hours; the first urine is light blue.

"2. In subacidity or motor insufficiency the reaction occurs only on the following day."

As already mentioned, the reaction is based on the solubility of raw connective tissue (catgut) in the gastric juice and not in the pancreatic secretion. Ogata and Schmidt have made these assertions regarding connective tissue. While I<sup>6</sup> was working on my method of testing the functions of the digestive apparatus by means of glass beads loaded with different food stuffs—I looked for a substance that would be soluble in the stomach and not in the bowel. Naturally I turned to catgut because it can be so easily handled. At first I was satisfied with the results obtained. Soon, however, it became evident that catgut was also soluble in the digestive apparatus of patients with marked achylia gastrica. This proves that catgut may be digested in the bowel. In order to establish this fact I made the following experiment: A catgut bead was placed in melted mutton fat and, after solidification of the fat which thus coated the bead entirely, it was given to healthy persons. These beads were then recovered in the stool and found without the catgut. The latter must have been digested in the bowel, as the stomach could not attack the fat.

Although these experiments seemed to show that catgut was hardly suitable as an indicator for gastric digestion, yet I decided to try the desmoid test on some patients. I selected several cases of achylia gastrica, simple and complicated, and tried the desmoid test on these patients. As there was no gastric juice present in these patients, the desmoid test, if it were to be really useful, ought to be negative, otherwise it could not be used for ascertaining the condition of stomach digestion.

#### REVIEW OF THE CASES.

CASE 1.—A. S., male, was suffering from achylia gastrica, took a desmoid bag filled with methylene blue. Five and one-half hours later the patient noticed that the urine was blue.

CASE 2.—G. N. W., male, suffering from achylia gastrica and subacute enteritis, was examined Feb. 13, 1906, one hour after a test breakfast, with the following result: HCl=O; rennet=O; T. A.=8. He then received Sahli's desmoid bag with methylene blue. Seven hours later the urine was blue.

February 17: The stomach contents were again examined after a test breakfast: HCl=O; rennet=O; reaction, neutral. Shortly after this examination (at about 10 a. m.) the patient received a desmoid bag with methylene blue. At 12:30 he took his dinner consisting of a plate of soup, veg-

1. Sahli: "Über die Prüfung des Magenchemismus unter natürlichen Verhältnissen und ohne Anwendung der Schlundsonde. Desmoidreaction, eine neue Untersuchungsmethode." Correspondenzblatt f. Schweizerärzte, 1905, Nos. 8 and 9.

2. Schmidt, Ad.: Deutsch. med. Wochft., 1899, No. 49.

3. Eichler: Berlin. Klin. Wochft., 1905, No. 50.

4. Kühn: Münch. med. Wochft., 1905, No. 50.

5. F. Kaliski: Deutsche med. Wochft., 1906, No. 5.

6. Einhorn, M.: "A New Method of Testing the Functions of the Digestive Apparatus," Med. Rec., Feb. 10, 1906.