

Dr. Fred Klenner briefly reviews the physiology and environment of black widow spiders and discusses the diagnosis and treatment of their bites. There is wide variability in severity of bites. He recommends 350 mg of ascorbic acid per Kg of body weight administered intravenously along with a single dose of calcium gluconate by needle as the method of choice. He is critical of physicians “who would stand by and see their patients *die* rather than use ascorbic acid—because in their finite minds it exists only as a vitamin.”—*R.D.M.*

## The Black Widow Spider: Case History

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*Tri-State Medical Journal*, December 1957, Vol. 5, No. 10, pp. 15–18

The Black Widow spider has a wide distribution, extending from Canada to southernmost South America, the Hawaiian Islands, the Bahamas and West Indies. She produces, on the average, five egg sacs each season, yielding over one thousand spiderlings. Except for man, she has only one real enemy, the parasitic fly, *pseudogaurax signata* (Loew). This tiny fly lays its eggs on the spider's egg sac, where, after two to three days, they hatch. The larva then “worm” their way through the fabric of the egg sac and devour the eggs of the Black Widow. The maggots, after their *concentrated diet*, proceed to pupate in the Widow's nursery. In a few weeks the cocoons burst and the adult “Gaurax araneae” flies emerge, gnawing through the Black Widow's sac, only to seek out and destroy others. This female spider is extremely temperamental, not only in what “insects” she bites but also in her romance during her mating activities. Once a timid male finds her receptive to his advances she, very often, after satisfying her sexual impulse, will kill her insatiable little husband— hence the name Black Widow.

Spider lore, legend, facts. Books could be written covering these aspects. This paper will deal only with *facts*.

Some spider-bite victims escape without any ill effects, others suffer mildly, while still others experience excruciating pains, and, in some instances, death. The Black Widow, like other spiders, is equipped with a pair of fangs. The “Widow” differs from other spiders in that her fangs are fed by unusually large poison sacs. These sacs are not glandular, as we usually interpret its meaning, but function as absorptive organs which take up the poisonous constituents from the body fluid of the spider. The chemical and physical properties of the poison indicate it to be a neurotoxin, probably a toxalbumin, possibly a poisonous enzyme. The toxicity is destroyed by heating to 159 degrees F. for 45 minutes. It cannot be crystallized since desiccation destroys it. It has been preserved in glycerine for several months. The fangs project from the head of the spider, the points curving towards each other. On the convex sides, at their tip ends, there are tiny openings, and these apertures emit the poison when the sharp points

pierce the skin. The fangs are so positioned that it is impossible for them to be closed by the pressure created by the bite. The poison glands are situated in the head-part of the spider, and are enclosed in a very fine, membrane-like sac, which can be extracted with the fangs in a careful dissection. Each fang has its own individual poison pouch. These pouches (or sacs) are surrounded by a series of striated muscles, and compression of the sacs by these muscles causes the venom to be discharged. These muscles operate ONLY at the *volition* of the spider. The Black Widow may strike one person without injecting any poison into the wound, and in another instance, only a small amount; in still another case, the maximum contained in a single sac, and in yet another a portion approximating the full content of her venom sacs. It must also be remembered that should the spider contact a human subject shortly after she has expended her venom in subjugating an insect, the bite will be harmless, or certainly no more toxic than the bite of any one of a dozen less important spiders or insects. The age of the spider, her physical condition, whether or not she has recently fed, her temperament (for on being disturbed she might "play dead"), the area of the bite, for if the strike occurs where the skin is thick the fangs might not even break through, and the *all important* factor of the age and physical condition of her human victim will also determine the seriousness of the bite. The toxin of the Black Widow has a QUANTITATIVE effect; thus a given quantity would tend to be more serious in a child than to an adult. Certain individuals may be allergic to the poison, while others may have an uncommon type of resistance. One should always remember that the Black Widow spider could have, and this is a FACT proven, a venom supply at her command sufficient to cause intense suffering in any human subject and that it is always possible for a series of conditions to exist whereby DEATH to the victim will ensue.

#### DIAGNOSIS

Arriving at a correct diagnosis in Black Widow spider bite is of cardinal importance. The severe bite "mimics" many other serious pathological conditions; namely acute pancreatitis, biliary or renal colic, food poisoning, lock-jaw, angina pectoris, volvulus, coronary thrombosis, diffuse peritonitis, intussusception, lobar pneumonia, perforated gastric or duodenal ulcer and strangulated umbilical hernia. In our case the parents interpreted the child's illness, initially, as *food poisoning* and later as *intestinal obstruction*. In a typical case of a person who is bitten, say, upon the palm of the hand, the pain will progress upward to the elbow, from thence to the shoulder area, and then down the trunk of the body toward the region of the kidneys, following which the abdomen becomes rigid. Other various symptoms are: cold perspiration, an increase in the blood pressure (thus a bite in a patient with existing hypertension might prove fatal by the indirect route of cerebral hemorrhage), a rise in body temperature (the higher the fever curve the greater the danger for a fatal termination to the bite), nausea and anorexia, vomiting, slight twitching or spasms of the muscles of the extremities, malaise, urinary retention, constipation, speech defect, local oedema, difficult breathing, restlessness, cynosis, vertigo, chills, paralysis, a macular skin eruption, convulsion, prostration and delirium.

The aforesaid symptoms represent three significant phases: (1) The rapidity with which the poison is distributed throughout the body. Thus the initial effect presents

itself early, the interval between the bite and the first symptom, which is pain, being sometimes a matter of only a few minutes. (2) The degree of pain experienced in various parts of the body. Usually there are cramps and spasms in all of the larger muscles of the body. The pain can be so excruciating that numerous accounts record that the spider-bite victims roll and toss and moan in agony upon their beds of pain. (3) The many GENUINE cases of Black Widow spider bite have been wrongly diagnosed. Fortunately a GOOD HISTORY *plus* a few simple laboratory tests will allow a proper evaluation. A knowledge of the fang marks can, alone, make the diagnosis. The advice of Ginsburg is worth reviewing: "In the case of ruptured ulcer versus Black Widow bite a history of a BITE will be elicited, no history of ulcer symptoms, course of spread from bitten area to abdomen, mild or no collapse, temperature normal or slightly elevated, pulse slightly faster, cramp of extremities, X-ray negative for gas bubble, and the patient can sit up or move about. A ruptured ulcer gives no history of a bite, history of ulcer symptoms, knife-like pain at the point of rupture, collapse, temperature subnormal, no cramps of extremities, X-ray evidence of gas bubble in majority of cases, and the patient remains very quiet—does not want to be moved."

#### TREATMENT

Bogen, Thorp and Woodson state that more than NINETY different remedies have been employed in the treatment of the bite of the Black Widow. Since the introduction by Stewart and Gilbert of the intravenous use of calcium chloride or calcium gluconate, all other therapeutic measures are of "academic" importance only. In 1925 Bogen did use human convalescent serum, and at that time reported "that although theoretically sound and of unquestioned value, nevertheless the results were NOT so striking as to 'make it the most valuable treatment.'" Later he, Bogen, stated that calcium gluconate proved so effective that the use of serum was seldom indicated. Still later, however, a new serum, traded named "Lyovac" antivenom was introduced. This serum is dehydrated by a special process of rapid freezing and dehydration under high vacuum, called lyophilization. Since there is an element of risk with the use of this serum it must NEVER be used until a negative intradermal skin test and eye test have been obtained. It cannot be denied that serious sickness and even death can result from its use. The usual dose is 2.5 c.c. given by the intramuscular route, preferably the deltoid muscle. Our purpose in this paper is to introduce a NEW treatment to cure the bite of the Black Widow. Ascorbic acid in the amount of 350 mg. per Kg. body weight given intravenously in conjunction with a single dose of Calcium gluconate is suggested as the treatment of choice.

#### CASE HISTORY

White female 3½ years of age, suddenly became ill while at play on a pile of old bricks. She refused supper, complaining of severe griping pain in her abdomen. A series of trips to the "bathroom" were non-compensating. Nausea was present most of time and this was followed by vomiting some six hours after onset. The vomiting continued, off and on, throughout the night. The illness was interpreted as a food intoxication by the child's parents. The following morning, roughly 12 hours from onset of illness, she

had 1½ degrees of fever, and was very moody. As the fever continued to rise, the mother observed a redness about the child's umbilicus associated with considerable swelling and rigidity. The slightest pressure elicited severe pain. Over the next several hours the child's condition progressively became worse. The speech became incoherent and shortly thereafter the child became increasingly stuporous. At this point the mother of the child called my office and reported that because of the pathology described in the area around the umbilicus, she felt that a condition of obstruction existed. There had been no bowel movement since the preceding day. She was instructed to bring the child for examination. At 10 a.m., approximately 18 hours after onset, the situation was this: A young female lying prostrated on the examining table. The child made no response, verbal or physical, to questions asked. The fever was recorded at 103.5 F. Axillary 5 minutes (corrected). The area around the umbilicus, about the size of a man's palm of his hand, was indurated, dark red in color, warm to touch and in the very center the protrusion resembled a hernia under pressure. On close inspection, however, two tiny spots, about ⅛ inch apart, were observed within this edematous circle. With the aid of a magnifying glass it became obvious that these were the fang marks of the Black Widow. The breathing was now labored; the abdomen was boardlike. I suggested to the mother that this was a case of a Black Widow bite, but she was not impressed, since there was no history of a bite. I was so positive of the diagnosis that I informed the mother that I would treat the child for that particular pathology. Ten c.c. of calcium gluconate was immediately given intravenously. This was followed within 15 minutes with four grams of ascorbic acid, also given intravenously. Although the child was critically ill, I was so confident of the success of the treatment that when the Father requested to take the child home rather than to the hospital, I agreed. Seen six hours later, she was responsive to manipulations, especially pressure on the abdomen. The fever curve was down to 101 F. Axillary 5 minutes (corrected). Nothing by mouth had been attempted. Four grams of ascorbic acid was given intravenously and the child again allowed to go home. Instructions were given to try water by mouth and if and when successful to switch to strained orange juice and coca cola. The child was again seen in six hours, that time at her home. She was listless but awake and taking fluids in small amounts without difficulty. The fever curve was now at 100 F. (A) Corrected. Instructions were given for the night, which was uneventful, and the little patient was again seen around 10 a.m., the following morning, in the office. Now she was awake, relatively active, not so tender and about 50 per cent of the swelling and discoloration about the umbilicus gone. She was given four grams ascorbic acid intravenously and three grams intramuscularly and allowed to return home. The next three days showed continuing improvement, ascorbic acid 1000 mg. by mouth every 3 to 4 hours was the only medication; her diet remained liquid to semi-soft. On the fourth day it was made known that the child had had no bowel movement since the day of the bite. The mother was instructed to give an oil retention enema and if this failed, to follow in two hours with a fleets enema. A large TAR-LIKE stool was passed following the "fleets." This finding was previously reported by Herms and others "AT AUTOPSY"; to wit: "Post mortem examinations showed the stomach wall ruptured and the small intestine filled with a bloody fluid." Following the bowel movement the child's appetite immediately improved and her return to normal

was rapid and uneventful. Following her recovery the child told of “knocking a big black bug off her stomach” the day of the bite.

### CONCLUSION

The Black Widow (*Lactrodectus mactans*) inhabits your back yard, or if not yours, then certainly that of your neighbor. There exists, then, a potential danger to all of us. A rock, a brick, or an old board should not be raised without taking every precaution, unless thick canvas or leather gloves are worn. Such activities must never be practiced after dark. One should always lift an object from the ground with the expectation of finding a Black Widow. Your eyes might first see a bright, shiny, black ball. If this “ball” is touched, gently, with a small twig, the full spider will reveal herself. Outdoor privies are common “hang-out” places; so are the openings in cinder blocks. I have killed three mature “Widows” in the back corner of the brick alcove entrance to our home. A pair of shoes allowed to remain on the porch is a likely spot, for she likes dark recesses. The bite of the Black Widow can “mimic” many serious pathological conditions; always consider this possibility in your differential diagnosis. The attack of KIDNEY COLIC which started in the garden, might well be, in reality, the BITE of the Black Widow. The usual symptoms following the bite of the “Widow” are rather well marked, yet to the practitioner not familiar with them they are as if none exist. This is one of the reasons for writing this paper. I have treated eight proven cases of Black Widow bite during my tenure as a physician; I have actually seen no more “bonified” cases of RENAL COLIC. The treatment of the bite is very important. It is criminal to give these patients an opiate to relieve their pain, for in so doing you might add to their distress and actually precipitate a fatality. This is not a prophesy; honest physicians have reported case histories on such “accidents.” It is never necessary to subjugate these patients to a variety of therapeutic measures, such as tepid baths, for such must be recognized as not intended for the benefit of the “victim” but only for his family, friends and relatives. If your choice of treatment rests with ANTIVENOM, then you might be forced also to employ other “foolish” practices. Calcium gluconate, alone, has CURED many, many cases of the Black Widow bite. In my hands it has done just this, and done it well, although in three instances two and in a third case three injections were required. In the case we have presented here, I doubt, if even the skeptic would question the serious nature of the bite. Yet only one dose of calcium gluconate was given. Since ascorbic acid behaves much like calcium in the body, and also acts synergistically with it, we elected to observe its action. The fact that the child recovered, even without supportive therapy, will argue the cause for us. This child, according to the rules, should have died. She lives, in our opinion, because we elected to use this powerful therapeutic agent. But, then, there are some physicians who would stand by and see their patient *die* rather than use ascorbic acid—because in their finite minds it exists only as a vitamin.

### REFERENCES

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"Consider the black widow spider. It's a timid little beastie, useful and, for my taste, the prettiest of the arachnids, with its shiny, patent-leather finish and its red hourglass trademark. But the poor thing has the fatal misfortune of possessing enormously too much power for its size.Â Prey. The Black Widow Spider can often be found hanging upside down within the center of their nest as they await their prey. The spider's web (or silk), which possesses a sticky-like residue and fibrous quality allows the Black Widow to rest at a safe distance from unsuspecting insects and bugs who cross into their vicinity. As insects enter the spider's nest, they quickly become entangled in the Black Widow's web. Black widow spiders are typically black with two reddish triangular markings usually joined to form a reddish hourglass shape on the underside of their abdomen " their most recognized feature. Females are occasionally brownish black. Most black widow spiders are 3 to 10 mm long, with females being larger than males. Black widow spiders have eight legs and eight simple eyes, including two lateral pairs that almost touch. Young black widow spiders are primarily orange and white but acquire more black color as they mature. They have markings that are very similar to male adults " with one or two Black widow, any of several species of black spiders distinguished by an hourglass-shaped marking on the abdomen. Black widows are found throughout much of the world. Their venomous bite often produces muscle pain, nausea, and mild paralysis of the diaphragm. Learn more about the behavior of black widow spiders.Â The female may lay several masses of eggs during one summer. The egg case is suspended in the web and contains 250"750 eggs. It is white or tan in colour and has a papery texture, and it measures up to 12 mm (0.5 inch) in diameter. The young spiders, which are orange and white, emerge in 14 to 30 days. Females may live more than 1 1/2 years.