TRANSLATION NO. 389

DATE: 1 July 1968

DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland

U. S. Army Chemical Corps Research and Development Command
U. S. ARMY BIOLOGICAL WARFARE LABORATORIES
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Serotherapy of Anthrax

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Translated from: Vrachebnoe Delo (USSR), 22: 6: 447-450, 1940.

The morbidity of anthrax in prerevolutionary Russia was very high.

It is well known that the morbidity of anthrax is closely connected with the conduct of the veterinary and sanitation supervision.

During recent years, in our region, thanks to timely adopted measures, not a single outbreak of the intestinal form of anthrax has been noted.

The most wide spread and yet the mildest form of anthrax is the cutaneous form. From 1930 through 1936 we have not observed a single case of the intestinal or pulmonary forms of anthrax; the cutaneous form was encountered in single instances, and, therefore, it is one of the so-called mild infections with us.

In our present article we are presenting the material on 77 anthrax patients, the result of observations made over many years.

In the majority of cases anthrax afflicts the young. We had 49 persons in the 18-40 age group, 17 in the 40-60 age group, and 3 over 60. There were 8 children in ages from 3 to 12.

In a significant majority of the cases the process was localised on the exposed portions of the body: 34 cases on the face, one on the hairy portion of the head, one on the occiput, two on the cheek, two on the chest, one on the back, one on the neck, two on the shin, 13 on the forearm, 13 on the hands (7 on the right, 6 on the left), and 7 on the fingers.

In 62 patients the local process was in the form of a single pustule, in eight there were two pustules, and in seven cases numerous pustules were noted.

Our problem was to investigate the therapeutic effect of using specific serum with anthrax patients.

Regardless of the obscurity of the serum's mechanism of action the clinical manifestations attending its use have been well studied. Its action tells both on the local and overall manifestations.

The question of interest to us was: how does the use of serum affect the mortality. In which cases should it be used? How does the serum affect the loss of the scab? And, does serotherapy shorten a patient's stay in the hospital?

Since 1927 we have completely rejected the use of neosalvarsan in the treatment of anthrax and have been using only serum. Until 1933 we were using a minimum dose of 40 cm^3 and a maximum of 320 cm^3. After 1933 we increased the dose, the minimum to 80 cm^3 and the maximum to 900 cm^3.

Of our 77 patients 22 suffered a mild form of the disease, in 30 the course was of median gravity, in 15 it was grave, in 10 very grave, and in 4 of these it was accompanied by bacteriemia.

We determined the gravity both by the intensity of the general manifestations and by the magnitude of the edema. Two of the very grave cases terminated lethally on the day of arrival, two others on the day after. In one of the grave cases, where the pustule was localized on the chin, the edema was so great that it not only involved the cheek, but even descended onto the chest and threatened suffocation. The condition was critical, and the question as to the necessity of a tracheotomy was posed. Anthrax bacilli were found in the blood. The patient received three 900 cm^3 doses of serum and recovered without surgical intervention.

The mild cases were characterized by a low, sometimes normal temperature and insignificant edema. In this group were two atypical cases: with a normal temperature and an absence of edema, there were small pustules containing a clear fluid. The picture was so uncharacteristic for anthrax that only the epidemiological data caused us to resort to the laboratory investigation that proved the anthracic nature of the sickness.

We will present here a case history of one of these patients.

B - v, N., 19 years old, was admitted to the clinic as a suspected anthrax case. On the right hand near the base of the thumb is a small pustule the size of a 10-kopeck silver piece. The content of the pustule is clear. Neither infiltrate nor edema surrounds it. The patient feels well, and the temperature is normal; on the part of the internal organs there are no deviations from normal. From the anamnesis it was explained that our patient, together with three neighbors, killed an ailing cow, skinned it and cut the meat into portions. After an inspection by a veterinary it was learned that the cow had anthrax.

On the following day all received a prophylactic 90 cm^3 of antianthrax serum, except B-v. B-v did not agree to the serum injection until two days had passed, and on the next day after the injection of the serum he noted on his hand a small pruritic pimple that changed, after 3 days, into the pustule with which he came to us. B. anthracis was bacteriologically isolated from the contents of the pustule. No scab was formed, and after 9 days the patient was released with a healed ulcuscule. This case is of interest because two days after the admittance of B-v, his wife entered the clinic with a typical anthrax pustule on the left cheek. The disease was of median gravity. The temperature persisted for four days in the 38-39°C range. The edema was on the area of the cheek only. From the anamnesis it was established that the patient lives far

from the spot where the cow was skinned, and had no contact with any of the products from it. We had to assume that the infection occurred from her husband. Because the possibility of person-to-person infection has not been proved we began to investigate in detail just how the infection occurred. It was explained that B-v, having returned home, dried his hands on a towel that his wife later used to dry her face. In this manner an indirect transmittal of the infection occurred.

Of the 77 patients observed, 53 received serum, 22 were given conservative treatment; and tow patients died immediately upon admission.

Among the patients that were treated with serum were eight who were in very grave condition, seventeen in a grave condition, twenty in a median grave condition, and eight with the mild form.

The serum was given on the second day of the disease to 5 of the people, on the third day to 14 people, on the fourth day to 13, on the fifth day to 9, on the sixth day to 7, on the seventh day to 1, on the eighth day to 1, on the ninth day to 2, and on the tenth day to 1.

The action of the serum was shown first by a drop in the temperature, which usually fell to normal within two, or sometimes three days.

In some cases the temperature fell to normal on the very next day, giving slight evening rises for the next 3-4 days.

Sometimes, regardless of the decrease in temperature and the improvement of the general condition, the local manifestations continued to increase, and this was an indication for a repeat injection of serum.

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B-n, Yu., 36 years old, was admitted to the clinic 5 Aug 1933 on the fourth day of the disease. On his chin is a small anthrax pustule. The edema is considerable, occupying the entire cheek and touching the chest in two places. The pulse is 140 per minute and weak filling.

After the injection of 100 cm^3 of serum the temperature fell 2°; the sense of well being improved; the edema has spread down to the center of the chest. A repeat injection of serum was given two times, 100 cm^3 each; the temperature dropped to normal and the edema began to decrease.

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In other cases, after a serum injection, the general condition would improve and the edema would recede, but the temperature, though lowering slightly, would remain high for a long time. These cases were usually accompanied by suppuration; in one the temperature did not return to normal until the 39th day. In those receiving serum the temperature dropped to normal on the fourth day of the disease in 4 cases, on the fifth day in 10, on the sixth day in 10, on the seventh day in 13, on the eighth day in 5, on the ninth day in 1, on the tenth day in 1, and after the tenth day in 1 case.

In six patients the temperature was normal upon admission, two died on the second and third day after an injection of serum.

In those that were not treated with serum the temperature fell to normal on the sixth day of the disease in 2 cases, on the seventh day in 2, on the eighth day in 1, on the ninth day in 1, and after 10 days in two cases.

In 14 patients who were not treated with serum the temperature was normal upon admittance.

If it is taken into consideration that among those treated with serum were most of the gravely ill patients one should note that the serum injection has hastened the decrease in the temperature.

Four patients died (5.2 %). If we should exclude two of the cases, one of whom died upon admittance, and the other within 4 hours after arrival, then our mortality percentage is 2.6.

According to the literary data the percentage of mortality will range from 3 to 30 (Ivashentsov - 15-25 %, Rozenberg - 3-30 %). The sharp fluctuation of the mortality percentage is explained by the difference in the methods of treatment.

There is no doubt that in the grave cases of cutaneous anthrax serotherapy lowers the percentage of mortality.

The question arises: is it necessary to use serum in the mild and median forms of anthrax that usually terminate in recovery with conservative treatment. Because sepsis, which is usually the cause of death in anthrax, can develop not only during the acute period of the sickness, but also after the temperature fall and the formation of the necrotic scab, we consider it necessary to inject serum in some of the mild and median cases. This is required in those cases where a patient, regardless of his illness, continues to work and transfers to a bed regime late.

In our observations we also attempted to explain the effect of serotherapy on the separation of the scab. Skrotskiy thinks that the serum stops the local process during the first two days only; later the normalization occurs in the usual way, because the serum can hardly act on a well advanced necrotic process. Later, the normalization of the local process proceeds exactly as in the cases where the serum treatment was not used. Stanishevskaya also noted no acceleration effected by the serum in the normalization of the local process.

According to our observations the scab came off in those cases treated with serum as follows: on the 7th-8th day of the disease in 3 cases, on the 11th-12th day in 2, on the 13th-14th day in 5, on the 15th-16th day in 7, on the 17th-18th day in 12, on the 19th day in 1, and after the 20th day of the disease in 21; in those not treated with serum it occurred on the 11th day of the disease in 2 cases, on the 13th day in 2, on the 15th-16th day in 3, on the 17th-18th day in 7, on the 19th day in 2, and after the 20th day in 4.

In the majority of cases with the cutaneous form of anthrax the scab is lost on the 17th-18th day.

From our material it is seen that in the patients who had received serum the scab was lost prior to the 19th day in 56.8 %, in those who had not received it - in 70 %. Thus, we see that the serum shows no noticeable effect on the time required for the scab separation.

Complications in the cutaneous form of anthrax are generally infrequently encountered, and their development is unaffected by the treatment with serum. We had one case of suppurated lymphadenitis with the pustule localized on the cheek, and three cases of phlegmon with the pustule localized on the hands. All of these noted complications were observed in patients that had received serum.

The release of the patient usually depends on the separation of the scab, and only suppuration can lengthen the patient's stay in the hospital; consequently, anthrax serum does not affect the number of bed-days. According to our data the average bed period for an anthrax patient treated with serum equals 15.8 days, and for those not receiving serum - 15.4 days.

Conclusions

1. The use of serum for anthrax has more justification than the use of neosalvarsan. The anthrax serum should be used in all serious cases.

2. In view of the possibility of sepsis in the median and mild forms of anthrax, it is sometimes necessary to utilize serum in these cases, while individualizing each one.

3. The treatment with serum lowers the mortality.

4. Serotherapy will show no effect on the development of complications.

5. Serum does not affect the normalization process and, therefore, its use is not reflected on the scab's separation time.

6. Serotherapy shows no effect on the patient's hospitalization period.