TETANUS IN TWO BROTHERS: SUBDURAL AND SUBCUTANEOUS INJECTIONS OF SERUM: RECOVERY.

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As the value of the serum treatment of tetanus seems demonstrated by one, if not by both, of these cases, they may be worth publishing; that others may judge I give the notes in some detail.

In narrating the cases the days are numbered from the date of injury and unless otherwise stated the injections were made into the abdominal wall.

CASE I (X.).

Summary: Numerous dirty wounds; first symptoms of tetanus on tenth day. First injection of serum on eleventh, last on twenty-second; two subdural; total, 157 c.cm.

History.—The patient was a vanman, aged 29, whose horse ran away on June 14th; he held on to its head, was dragged many yards along the road, and received eight very dirty wounds on the head, hands, and lower limbs. The two worst were a large gash above the front of each knee, penetrating deeply into the muscles, and large enough to admit a fist. The left knee-joint just escaped.

Treatment.—As I was out of town he was attended by my assistant, who asked me to see him three days later. The wounds in the thighs were much inflamed, stinking and suppurating badly. Under chloroform they were cleaned out, several free counter-openings made at the back of each thigh, the wounds sluiced with hydrogen peroxide solution, followed by carbolic lotion and drains inserted. No pyrexia. From this time the wounds began to do well.

Progress.—Eleventh day (June 24th). The patient complained he could not open his mouth properly, and said he had noticed this and stiffness about back the previous day. Failing to get into the spinal theca with my longest antitoxin needle, I injected 10 c.cm. antitetanus serum into abdominal wall.

Twelfth day (Sunday). Having with difficulty procured a fine trocar and cannula, I managed to enter the spinal sheath, but only 2 c.cm. cerebro-spinal fluid could be got to flow, and it was thought best to inject only that amount of serum within the dura, and 15 c.cm. were injected into abdominal wall. Trismus, risus sardonius; spasm of trunk muscles well marked.

Thirteenth day. A proper needle having been made, 10 c.cm. of serum injected intraspinally under chloroform and 10 c.cm. subcutaneously.

Fourteenth day. Can move jaw with great exertion $\frac{1}{8}$ in.; cannot pass water; catheter; 20 c.cm. injected subcutaneously.

Fifteenth day. Pulse has fallen from 98 yesterday to 80 to-day; respirations from 28 to 20; sweating, which was profuse, has stopped. Patient feels better, takes food well. Catheter sets up spasm, opisthotonos, clonus of left leg. Jaw perhaps slightly freer; 20 c.cm. Patient's brother came to-day from Bathgate with well-marked trismus.

Sixteenth day. Slept well; can open jaw $\frac{1}{4}$ in.

Seventeenth day. Being better the patient got no serum; to-day he looks and is decidedly worse, feels exhausted. When turned, moves in one piece like a board, muscles much more rigid; pulse has risen from 70 yesterday to 85. I tried to give an intraspinal injection, but although it was evident from the "feel" and the position of the needle that it was in the canal, no fluid came. As the needle was found blocked with a peculiar soft slightly blood-stained clot, the puncture being at the site of the previous ones, I judged it safer to inject subcutaneously 20 c.cm. serum.

Nineteenth day. 20 c.cm. yesterday, 10 to-day. Pulse has fallen again from 86 to 68, and patient feels much better. Jaw is as rigid as ever, moves perhaps $\frac{3}{8}$ in.; but catheter does not set up clonus to nearly the same degree.

Twentieth day. 10 c.cm. Erythema all over abdomen. Nurse says patient is much more easily turned in bed, though the muscles of neck, trunk, and legs are still rigid.

Twenty-second day. No serum yesterday; teeth can be parted $\frac{1}{2}$ in. The gaps in the thighs have now granulated level with the skin; left knee-joint still swollen. 10 c.cm., the last injection.

Twenty-third day. Trunk muscles still very rigid; abdomen has been like a board throughout; lower limb muscles relaxed.

Twenty-fifth day. Passed urine without catheter; parts jaws $\frac{1}{2}$ in.; can turn himself in bed, but trunk muscles still rigid.

Twenty-ninth day. Opens mouth an inch; can chew a little.

Result.—Thirty-eighth day (July 21st). The patient feels very well, but there is still stiffness of jaw and trunk muscles, and

when he tried to get out of bed—for the first time—he could not do so owing to stiffness of back and pronounced clonus of left leg. The wounds at this time were becoming covered with epidermis.

Remarks.—In addition to the injections, syr. chloral in drachm doses was given every four hours for the first three days of the tetanus, but, as there was no obvious gain from it, it was stopped, except for an occasional dose at bedtime. Large quantities of fluid food were poured into the patient through interstices between the teeth, and he swallowed them well. Papain was given to aid digestion, helmitol as a prophylactic during catheterism. The wounds were washed daily with H_2O_2 lotion followed by carbolic solution.

CASE II (Y.).

Summary: Slight bruise of great toe; first symptom of tetanus by third day; muscles of jaw and spine chiefly involved. First injection of serum on seventh day (subdural), the last on the 14th—100 c.cm. Wound swabbed out with pure carbolic acid on seventh; required no more dressing.

This patient was a brother of the preceding, a farrier, aged 31. He was a powerfully-built man, who came from Bathgate on June 28th; he walked from the station to my house with great difficulty, and was much exhausted in consequence.

State on Examination.—He complained of pain and stiffness in jaws, shoulders, loins. Trismus was distinct, and he bit tongue when asked to show it. Seven days before, when he was shoeing a fresh colt, it stamped on his foot, sending its hoof through his boot, and slightly bruising his right great toe. He took little notice of the injury, and did not think the skin was broken. Two days later he felt his jaw stiff; on the fourth day he could not eat, and felt pain and stiffness in his back. He saw a doctor on this and following days. On seventh day, when he came to Hamilton, he could just cross his legs with great difficulty; knee-jerks very exaggerated.

Treatment.—Chloroform was given; 10 c.cm. cerebro-spinal fluid withdrawn by lumbar puncture; 10 c.cm. serum injected into the canal. On dorsum of great toe was a small, slightly-discoloured spot the size of a split pea, with unbroken cuticle. This was scraped off and found to cover a flat, punched-out, clean-looking sore, not more than $\frac{1}{2}$ in. deep. This was scraped and swabbed out with pure carbolic acid.

Eighth day. The patient feels pretty well; stiffness much the same. To-night I tried to inject more serum by lumbar puncture, but could not hit the cavity, perhaps because the patient refused chloroform. He bore the procedure badly, and had two violent spasms; 30 c.cm. into abdominal wall.

Ninth day. Pulse has fallen from 84 yesterday morning to 60, respiration from 24 to 20, temperature from 100° on 7th to 97.5° . Was sleeping with mouth open. The moment he woke his jaws snapped together and severely bit tongue. He can part teeth; 10 c.cm. serum.

Twelfth day. 10 c.cm. to-day, 10 yesterday, 20 the day previous. Patient says he was getting worse every day till he came under treatment; has been feeling better every day since. Wants to get up, but is still afraid to show his tongue.

Fourteenth day. Can open his mouth a little wider. Had no injection yesterday; demands one to-day. Had 10 c.cm.

Result.—Twenty-second day. Able to open mouth an inch for last four days, and to chew. Gait still spastic, jaws still stiff. Patient allowed home to Bathgate to-day, and warned to rest a fortnight. Two weeks later he reported himself well.

REMARKS.

These two cases present a curious contrast. The first, the younger brother, of slighter build, had a number of severe and dirty wounds, presented no tetanic symptoms till the tenth day, and had a severe attack. The second had a trivial injury, yet although he developed tetanic symptoms within seventy, if not sixty, hours, he had a much less severe illness than his brother—that is, the severity of the illness was related to the severity of the injury, and therefore probably rather to the quantity of the poison than to its virulence. According to accepted notions, the earlier development indicates the more virulent poison. As to the value of serum treatment, the improvement which Y. ascribed to the serum may have been due to rest, good feeding, to the opening of the closed wound and the consequent weakening of the bacillus by its exposure to oxygen, as well as by the pure carbolic acid. But that this is not all is proved by X. This was the more inveterate case, yet the improvement in pulse, respiration, and aspect while the injections were given; the reversal of this and the horrible dying aspect the day after the injection.

tions were missed; the renewed improvement with their resumption, left the same kind of impression on one's mind as is left by the improvement of the throat after diphtheria antitoxin. The evidence is clinical; it seems in accord with the accumulating statistical evidence. Of course it is unsafe to draw conclusions—one can only have "impressions"—from two cases. They are the only cases I have had. Neither of them had convulsions. The occurrence of tetanus in the two brothers was probably merely a coincidence from both happening to have accidents in connexion with horses. Possibly the long dry weather of June may have favoured the inoculation and virulence of the tetanus bacillus. At any rate I considered it wise to give a prophylactic injection of antitetanic serum to a third patient, another vanman, who fell from his van on July 1st and received a compound comminuted fracture of left clavicle, and dirty wound of ear and scalp. The wounds were dressed, the scalp wound being swabbed with pure carbolic acid. The patient recovered, but on the nineteenth day he had a febrile attack, with temperature of 102° , pains in muscles and joints. These were probably rheumatic, and lasted two days. They yielded to 60-gr. doses of sodium salicylate together with 120 gr. of sodium bicarbonate night and morning.

As the tetanus bacillus is an anaërobie, H_2O_2 seems an ideal solution to use for such wounds as occurred in these cases. The inoculations kindly made by my friend, Dr. R. M. Buchanan, Bacteriologist to the City of Glasgow, from pus taken about the fourteenth day were negative. Obviously in tetanus lumbar puncture should be done under chloroform.

IMPROVED METHODS FOR¹ RECOGNITION OF BLOOD AND SEMINAL STAINS,

ESPECIALLY IN TROPICAL CLIMATES.

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[From the Agra Government Laboratory.]

THE high temperature of tropical climates has a twofold action on blood and seminal stains. If the stains are kept damp they are liable to putrefy rapidly. If they are kept dry they become so insoluble as to be acted on with difficulty by the ordinary reagents. Either of these changes may render recognition of the stains difficult or impossible.

If a blood stain is so altered in this way that it refuses to respond to the ordinary tests, I have found that it may give the absorption bands of haemochromogen, even although the blood-colouring matter is in an apparently undissolved and insoluble condition. The method of carrying out the test based on this fact is as follows:

If on clothing, etc., the suspected stain is cut out and plunged into boiling water for a few moments. It is then placed on a glass slide and wetted with ammonium sulphide. It is examined under the microscope, and the specimen is moved until the whole field of view is occupied by a portion of the coloured material. If this cannot be achieved with a low power, the use of an oil immersion may be necessary. The eyepiece is then taken out and replaced by a microspectroscope. If the stain is of blood the two absorption bands of haemochromogen will be seen. Should the bands not be visible—as may occur apparently owing to the effects of commencing putrefaction—a drop of a 10 per cent. solution of potassium cyanide should be allowed to fall on the stain. Two bands will at once develop resembling those of haemochromogen, but situated a little nearer to the red end of the spectrum.

The object of boiling the blood-stained cloth is to prevent the colouring matter from going into solution. If this was to occur, as might happen with a fresh stain, the colour might be so diluted that the absorption bands could not be observed. If the stain is on a weapon or a piece of jewellery, it should first be wetted with ammonium sulphide. A small portion may then be scraped off with a knife and treated as above.

Extended experience during the last four years has given me confidence in the value of this method. It has also been employed with success by Captain Windsor, I.M.S., Chemical Examiner to the Government of Burma.

In dealing with difficultly soluble seminal stains, I attempted to take advantage of the known solvent action of potassium cyanide on proteid matter. I found that spermatozoa were rapidly disintegrated under the action of this reagent, unless they were first hardened by immersion in boiling water. The suspected seminal stain is first placed for a minute in boiling water. It is allowed to cool. It is then placed for two minutes in a 2 per cent. solution of potassium cyanide. It is then rapidly washed in distilled water, placed on a glass slide, teased up and scraped, and larger pieces of the cloth are removed. The film on the slide is dried at air temperature; it is then fixed by heating, stained with gentian violet, and examined. This treatment gave distinctly better results than methods previously at my disposal, but was not quite satisfactory in that the tails of the spermatozoa were not always adequately stained. Better results may be obtained as follows:

1. The suspected stain is boiled for two minutes in a watery solution containing tannin $\frac{1}{2}$ per cent., and sulphuric acid 1 per 1,000.

2. The stain is washed for two minutes in a solution made by adding one part of saturated ammonia solution to 400 of water.

3. It is then transferred for two minutes to a 2 per cent. solution of potassium cyanide.

4. It is then rapidly washed in distilled water, scraped, and teased up on a glass slide, dried, fixed by heat, and stained.

It is stated in textbooks that seminal stains must be gently treated, and not roughly teased up, to avoid breaking off the flagella from the heads of the spermatozoa. My experience indicates that breaking off of the tails is mostly due to treatment with inappropriate solvents, but partly to changes that may occur spontaneously, especially in a thick layer of the stain.

By the above method I have been able to detect spermatozoa in a stain in which they were covered with masses of bacteria, and were only visible with the help of an oil immersion lens; in another stain which had been covered with a mixture of red ink and starch paste, and also in a stain that I had heated to 140° C. in a hot air sterilizer.

ITALIAN TUBERCULOSIS CONGRESS.—The Italian Congress on Tuberculosis was held at Milan in the last week of September. In the opening address Dr. F. Gatti, President of the Organizing Committee, contrasted the vigorous action taken for the abatement of the tuberculosis scourge in Great Britain and in Germany with the little that was being done in Italy. Resolutions were passed urging the organization of an efficient public service of disinfection, the sanitary control of the milk supply and the provision of hospital accommodation for the subjects of tuberculosis. In regard to the latter question the feeling of the meeting was that such persons should be treated in separate hospitals with distinct departments for curable and incurable cases respectively. Professor Di Veste dwelt on the importance of the teaching of the principles of hygiene, with special application to tuberculosis, in all schools. Professor Foà advocated the establishment of prophylactic dispensaries; curative dispensaries, he thought, did more harm than good, as it was impossible to treat the tuberculous successfully as out-patients. He proposed that the prophylactic dispensaries should be under the direction of the municipal authorities, and a resolution in that sense was adopted by the Congress. A committee, consisting of Professors Gatti, Bordoni-Uffreduzzi and Zenoni, was appointed to submit the resolutions to the Mayor of Milan and to urge upon him the expediency of establishing a prophylactic dispensary in that city without delay.

NEW GERMAN MEDICAL SOCIETIES.—As an outcome of the recent meeting of the German Association of Scientists and Medical Practitioners, it has been decided by the Section of Neurology that a German Society of Specialists in Nervous Diseases should be formed. A provisional committee, under the presidency of Professor Oppenheim of Berlin, has been appointed to draw up a scheme of organization. A German Society of Urology has been formed with Professor Oberlander as its president. Congresses are to be held every two years in Berlin and Vienna alternately.