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SUBJECT - "Puerperal Septicaemia due to Bacillus
Welchii. Considered as a Clinical
Entity: with the Results of a
Bacteriological Investigation of the
Frequency of Occurrence of this Organism
in the Genital Passages of Parturient
Women".

PART I Puerperal Septicaemia due to Bacillus
Welchii Considered as a Clinical Entity.

PART II Results of a Bacteriological Investigation
of the Frequency of Occurrence of Bacillus
Welchii in the Genital Passages of
Parturient Women.

RESULTS OF ANIMAL EXPERIMENTS

These experiments were carried out to prove biologically the identity of the infecting organisms - for experimental work pure cultures are essential but the amount of time and work necessary for purifying the cultures was not available owing to pressure of other work - the experiments therefore were discontinued. Strains of Bac. Welchii from these cultures have been kept and it is hoped that at some future date the experiments may be carried on. B. W. Williams Lancet, April 30th 1927, writes of the toxæmia in intestinal obstruction as being due to absorption of Bac. Welchii toxin and it is hoped that time may be found to investigate with the above cultures the method of absorption of bacterial toxin in general from the alimentary canal.

The standard culture used for animal inoculation was an eighteen hour pure culture grown on cooked meat medium at a temperature of 37°C. The fluid was lightly centrifuged for five minutes and probably contained bacilli and toxin. The injection was made after sterilisation of the skin into the muscle of the thigh near the groin. The antiserum used was that manufactured by Burroughs, Wellcome & Co. The animals used were guinea pigs of about 200 grammes weight.

Experiment 1. G.P.899. Given 1 c.c. Bac. Welchii Antiserum into left thigh muscles at 11.30 a.m. on 2/2/27. At 12 midday given 0.5 c.c. Bac. Welchii culture (No. 20 cervix) into muscles of left thigh.

Animal was found dead at 9 a.m. on 4/2/27. Post mortem examination showed blowing up of subcutaneous tissues over the thighs and abdomen with gas which escaped on incising the skin - the muscles of the thigh were necrosed and the planes separated by gas and blood-stained jelly-like oedematous fluid. No lesions were found macroscopically in the organs.

Experiment 2. G.P.890. Given 0.5 c.c. Bac.Welchii culture (No. 20 cervix) at 12 midday 2/2/27 into muscles of the thigh. The animal was found dead at 9 a.m. on 3/2/27. Post mortem showed the same findings as in G.P.899.

Experiment 3. 0.1 c.c. of Bac.Welchii Culture (No. 17 uterus) injected into the right thigh at 12.30 p.m. 10/2/27; at the same time 1 c.c. of antiserum was injected into the muscles of the left thigh. On 11/2/27 no swelling or discolouration were noted and the animal remained well until 21/2/27.

Experiment 4. G.P.916. 0.1 c.c. of Bac.Welchii Culture (No. 17 uterus) was injected into the right thigh at 12.30 p.m. on 10/2/27 - on 12/2/27 there was a solid swelling in the region of the injection but no discolouration and no gas formation - the animal was lively.

Experiment 5. G.P. 912. Given 0.1 c.c. Bac.Welchii culture (No. 18 uterus) in right thigh at 12.30 p.m. 10/2/27. At the same time 1 c.c. of antiserum was injected into the muscles of the left thigh. On 11/2/27 there was no swelling or discoloration of the thigh and the animal was lively. No change was notice in the animal up to 21/2/27.

Experiment 6. G.P.915. 0.1 c.c. of Bac. Welchii culture (No. 18 uterus) was injected into the right thigh at 12.30 p.m. on 10/2/27. On 11/2/27 there was marked discolouration of the skin and a crepitant swelling in the right groin. The animal died at 3 p.m. 12/2/27. Post mortem showed the skin separated off from the subcutaneous tissues over the whole of the abdomen and the thigh disintegrated, the muscle and subcutaneous tissue being filled with gelatinous blood-stained fluid. No lesions were found in the internal organs.

Experiment 7. G.P.917. 0.1 c.c. of Bac. Welchii Culture (No. 20 cervix) was injected into right thigh at 12.30 p.m. on 10/2/27. The animal was found dead at 7 a.m. 11/2/27. Post mortem findings - blown up with gas in the subcutaneous tissues of abdomen and thighs - escape of gas on puncturing skin - distension of stomach and colon with food; lungs hard, liver and spleen dark, gas bubbles and serous fluid in the groin among the muscle planes. No macroscopic lesions found in the internal organs.

Experiment 8. G.P. 914. Given 0.1 c.c. Bac. Welchii Culture (No. 20 cervix) into right thigh at 12.30 p.m. 10/2/27; at the same time 1 c.c. of antiserum was injected into the muscles of the left thigh. On 11/2/27 there was marked discolouration of skin over the region of the right thigh with great swelling of the same region and crepitus. 1 c.c. of antiserum was injected intramuscularly at 12 a.m. The animal was found dead at 7 a.m. on 12/2/27. Post mortem showed the abdomen denuded of fur, infiltration of subcutaneous tissue of both legs and abdomen with gas

and blood-stained fluid, necrosis of muscles of the left thigh, the lungs, spleen, kidneys and liver showed no gross lesions.

These experiments are too few to be conclusive. Certain of the animals died after injection of the culture and at the post mortem examination characteristic lesions (necrosis and gas formation) were the only ones found. It is reasonable to assume therefore that the lesions caused the death of the animals, and that the lesions were produced by the culture injected.

Experiments 1, 2, and 7 were carried out with the one strain (No. 20) and prove its potency. The immunised animal G.P.899 lived for twenty-four hours longer than the unimmunised G.P.890. Probably by suitably adjusting the dose of culture employed and the amount of antiserum used it would be possible to find out the minimum lethal dose of this strain and the amount of antiserum necessary to protect against it.

Experiments 3 and 4 do not prove anything - apparently the strain used here (No. 17) is of low virulence.

Experiments 5 and 6 show that the immunised animal lived, whereas the non-immunised guinea pig died with the production of the characteristic lesions in 50 hours.

Experiment 7 demonstrates the difference in virulence between strains No. 18 and No. 20. After the same dosage the victim of No. 18 lived for 50 hours while that of No. 20 was dead in 18 hours. Apparently No. 20 is a highly virulent strain.

Further experiments were carried out to endeavour to produce by injection of Strains Nos. 17 and 18 an immunity to Strain No. 20.

Experiment 8. At 12 midday 21/2/27 0.5 c.c. of culture from No. 18 strain were injected into G.P. 912 which had had an injection of 0.1 c.c. of the same culture on 10/2/27. No result was apparent except some fluid swelling locally at the site of the injection. The animal remained healthy. On 7/3/27 at 4.30 p.m. 0.5 c.c. of 18 hour culture of No. 20 was injected - the animal was found dead at 8 a.m. next day. Post mortem examination showed the characteristic muscle necrosis and local oedema and gas formation.

Experiment 9. At 12 midday on 21/2/27 0.5 c.c. of culture from Strain No. 17 were injected into G.P. 913 without any noticeable result other than that of producing local swelling of fluid type; at 4.30 p.m. on 7/3/27 0.1 c.c. of 18 hour culture of Strain No. 20 was injected into the thigh muscle. The guinea pig was found dead at 8 a.m. on 8/3/27. Post mortem examination showed the characteristic lesions.

Experiment 10. At 4.30 p.m. on 7/3/27 0.2 c.c. of culture of No. 20 Strain was injected into G.P. 934. Death occurred before 8 a.m. on 8/3/27. Post mortem examination revealed the same lesions.

Experiments 8 and 9 appear to prove that the immunity established to Strains No. 17 and 18 was not sufficient to withstand the action of Strain 20.

Experiment 10 merely proves the potency of the culture of No. 20 used.

SUMMARY OF RESULTS

<u>Strain used</u>	<u>No. of animal</u>	<u>Amount of culture</u>	<u>Amount of antiserum</u>	<u>Result</u>
No.20	G.P.899	0.5cc	1 cc.	Found dead in 45 hours
No.20	G. F.890	0.5cc.	none	" " 21 hours
No.20	G.P.917	0.1cc.	none	" " 18 hours
No.17	G.P.913	0.1cc.	1 cc.	No lesion, animal lived
No.17	G.P.916	0.1cc.	none	Solid swelling, animal lived.
No.28	G.P.912	0.1cc.	1 cc.	No lesion animal lived
No.18	G.P.915	0.1cc.	none	Death 50 hours later
No.18	G.P.912	0.5cc.	none	No lesions; animal live
No.17	G.P.913	0.5cc.	none	No lesion animal lived
No.20	G.P.912	0.1cc.	none	Death inside 16 hours
No.20	G.P.913	0.5cc.	none	Death inside 16 hours