A Fatal Case of Puerperal Infection with the *Bacillus Aerogenes Capsulatus*.*

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THE patient, a married woman, aged 31, and in the eighth month of her pregnancy, was admitted to St. Mary's Hospital suffering from ante-partum hæmorrhage, and gave a history of two weeks' bleeding previous to admission. During this time she had been under the care of her family doctor, who had arrested the hæmorrhage by means of vaginal tampons.

The general condition of the patient was fairly good, although she looked somewhat pale and had evidently lost a considerable amount of blood. Her pulse and temperature were normal.

On examination, the vagina was found to be packed with several gamgee tampons which had evidently been there for some days, and were consequently extremely offensive. They were removed at once, and the vagina carefully swabbed out with an antiseptic. The cervix admitted the tip of the finger, but no placenta could be felt, and there was no bleeding during the examination; the vertex was presenting, but the patient was not yet in labour. The case was evidently one of accidental hæmorrhage, and as the bleeding had now ceased it was decided to keep the woman under observation until labour commenced.

Twenty-four hours after admission the vagina was again swabbed out; the general condition remained about the same; there had been no further loss and labour had not yet come on. A few hours later, however, the pains commenced and delivery was completed naturally within six hours.

The child was premature and stillborn, and presented a shrivelled appearance, being macerated and in addition having an extremely offensive smell. The placenta and membranes, also extremely offensive, were delivered naturally, but before they came away there was some hæmorrhage and the blood was noticed to contain a large number of gas bubbles. The uterus and vagina were carefully douched out with an antiseptic and the patient put back to bed. Within half an hour she was suddenly seized with a rigor, her temperature rose to 101°, and her pulse to 140. Strychnine was given, and she got much better and went to sleep.

Twelve hours after delivery the temperature was normal, the pulse 108, and the patient felt considerably better, although complaining of some pain in the hepatic region. Five hours later she had a second rigor; her temperature rose to 103°, her pulse to 136, and the pain became much more severe and localized over the

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liver and right kidney. The breathing became very rapid, the pulse got progressively weaker, and the woman became very collapsed and cyanosed. A catheter was passed and eight ounces of blood-stained urine drawn off. The general appearance at this stage was very striking, the skin having a marked icteric hue and a large patch of purplish discolouration being present on the right side of the chest.

The patient became rapidly worse, and died within half an hour of the commencement of this attack and eighteen hours after the termination of labour.

The pain was extremely severe up to the very end, and before death the discolouration of the skin was much increased. Death was evidently due to an extremely virulent type of septicæmia, but it was not until a post mortem examination had been made that the exact cause was determined.

The post mortem examination was performed seventeen hours later, and in cold weather. The body was swollen to twice its normal size owing to the general emphysema present, the skin surface being bright yellow in colour with areas of a deeper purplish tinge. On making an incision into the arm, bubbles of gas escaped from the subcutaneous tissues and also from the cut ends of the superficial veins. The abdomen was enormously distended, and on opening the peritoneal cavity there was a great rush of offensive smelling gas; the tissues of the abdominal wall were also saturated with gas bubbles and the peritoneal cavity contained a considerable quantity of blood-stained fluid. The whole of the internal organs of the body presented similar and characteristic appearances, gas-containing cavities being present in large numbers throughout their structure. The uterus was pale in colour and showed numerous gas bubbles under its peritoneal covering; a crepitating sound was heard on handling the organ, and on cutting into it numerous gas bubbles escaped from its muscular walls. Both kidneys were slightly enlarged, the capsules being quite free and in some places widely separated from the cortex by large blebs containing gas. Both cortex and medulla were deeply injected and riddled with small cavities. Gas was also present in the pelvis of each kidney and in the right ureter. The liver was enlarged, darker in colour than normal, and its cut surface had an appearance exactly similar to that of Gruyère cheese owing to the large number of gas-containing cavities throughout its structure.

Smears were obtained from the fresh-cut surface of the various organs, and on staining with methylene blue revealed the presence of enormous numbers of large bacilli having all the characteristics of the *bacillus aerogenes capsulatus*.

On examining stained sections from the different organs the same bacilli were found present in large numbers and lining the numerous ragged cavities produced by the evolution of gas.

Sections were also cut from the liver and lung of the fœtus, and

Microphotograph of section of Uterus.

Microphotograph of section of Fœtal Lung

these presented similar appearances to those found in the maternal organs, thus demonstrating the existence of the organisms in the tissues of the child.

The accompanying microphotographs show sections, stained by Gram's method, from the uterus of the mother and lung of the foetus respectively.

The sequence of events in the case appears to me to be as follows : Two weeks before admission to Hospital the patient commenced to bleed owing to separation of the placenta, and the vagina was therefore packed. This packing became infected with the bacillus *aerogenes capsulatus*, which is extensively present in the rectum and on the skin around the anus. The organisms made their way up to the maternal surface of the placenta along the channel formed by the escaping blood, their growth being favoured by the decomposing blood-clot present.

By this time the child was in all probability moribund owing to the amount of placental separation, and the organisms were therefore able to gain a firm footing here and to enter the foetal circulation before death took place. With the death of the child, the bacilli increased rapidly in numbers and virulence so that by the time the labour commenced the mother had a pure culture of exceedingly virulent organisms within her uterus. During or immediately after labour these gained an entrance into her circulation through the large sinuses in the uterine wall, with the result that a rapid septicaemia developed from which she succumbed.

It is interesting to speculate on the extent to which it is possible for an anaerobic organism such as the one under discussion to exist and grow in the oxygen containing blood of the maternal circulation, but I think there is no doubt that the bacilli were present and did multiply during life in the present case, as enormous numbers must have been thrown into the blood-stream at one moment and their virulence had been greatly enhanced by their passage through the tissues of the dead child.

The bacillus *aerogenes* was first described by Welch and Nuttall in 1891, and these authors made many careful inoculation experiments, with results which are important in the present connection. They found that the organism was not pathogenic for healthy animals under ordinary conditions, but only developed and produced the characteristic appearances after death. In only one case did death actually occur as the direct result of the inoculation, and here the animal, a rabbit, was found to be pregnant, there being six embryos in the uterus and definite evidence to show that two of these had been already dead at the time of the inoculation. The animal died in eighteen hours and appeared to be quite well half an hour before death. This experiment is therefore specially interesting as it provides an almost exact parallel to the present case.

The essential factors co-operating towards a fatal result appear to be as follows :—

1. The use of vaginal packing introduced with faulty antiseptic precautions and allowed to remain in the vagina for some days.

2. Hæmorrhage from the placental site providing a favourable channel along which the organisms may enter and gain a footing in the foetal circulation.

3. Weakly condition of the child, in this case due to placental separation, making it a more ready prey for the invading organisms which enter its circulation before death, and after this has occurred, increase enormously in numbers and virulence.

4. Inoculation of the mother with a pure culture of the virulent organisms, a favourable moment for this occurring at the end of labour when the large sinuses in the uterine wall have been opened up.

As a result, a rapid septicæmia develops and leads to a fatal termination within a very short period, extensive hæmolysis having occurred before death, and also some amount of gas formation, the latter accounting for the respiratory embarrassment and for the excruciating pain over the hepatic region. In fact, the sudden onset and short duration of the fatal seizure strongly suggest gas embolism as being the immediate cause of death, the formation of gas only occurring when the organisms have gained a certain concentration in the mother's tissues.

Whilst in St. Mary's Hospital the patient was under the care of Dr. Walls, and I wish to express my thanks to him for permission to publish the details of the case.