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SUPPRESSION OF URINE FOLLOWING LABOUR.*

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THE changes produced by pregnancy in the kidneys and in the urinary secretion have been, and promise for some time to be, the subject of much discussion. Serious disturbances in the renal function have long been recognised as among the most dangerous complications of gestation, but the physiological merges so insensibly into the pathological that it is far from easy, often impossible, to determine the exact point at which the normal is transgressed and danger begins. It is to the urine we must look for an indication. An early and constant sign of morbid changes in the kidney is to be found in a lessened secretion of urine with albuminuria and a lessened elimination of urea. In the most serious form, more especially in that which results in eclampsia, this diminution is very marked, as shown in the interesting series of cases reported by Herman.†

When these pathological changes are the result solely of the pregnant condition they usually disappear rapidly on its termination, though in eclamptic cases death may ensue before the functional activity of the kidneys has been restored.

Though a marked diminution in the quantity of the urine as the result of the nephritis of pregnancy is not uncommon, complete suppression is rare, and I know of no instance in which it has been noted during gestation apart from eclampsia or surgical interference.

* Read before the Obstetrical Society of London, March 5, 1902.

† *Obstet. Trans.*, vols. xxix., xxxii.

Bland Sutton* records a case in which anuria followed ovariectomy in the ninth month of gestation, necessitating the induction of labour. Although such an untoward result is by no means an infrequent experience of the surgeon in renal and other cases, as an obstetric complication it is extremely rare. So uncommon, indeed, is suppression of urine after labour, apart from eclampsia, that no text-book even mentions it, while, so far as I can gather, literature furnishes only three instances of its occurrence.

Recent experience, however, has led me to the conclusion that total or partial suppression of urine is not so uncommon a puerperal complication as these scanty records would suggest. At any rate, in the last three years three cases have come within my own knowledge, two of complete, one of partial suppression. Altogether we have a series of six cases, in five of which the suppression was complete. Notwithstanding the dangerous nature of the condition, it is a remarkable circumstance that in one only of the cases in which symptoms of serious disturbance existed before and during labour does the gravity of the complication seem to have been immediately recognised, with the result that valuable time was lost in initiating active measures of treatment. As will be seen, there was nothing during pregnancy or labour to arouse suspicion, and the medical man, unaware that an entire suspension of the renal function may follow an apparently normal and easy labour, was lulled into a false security by the absence of urgent symptoms, which is so characteristic a feature in many cases of suppression of urine. This important fact is of itself sufficient to justify the present paper.

The causation of suppression of urine after a physiological process, which is normally accompanied by an increased activity of the secretory organs, though in the meantime obscure, is a subject of great interest, and, owing to its dangerous character, of great practical importance. The question, however, is too complex to be settled by so small a number of cases, more especially as we have to rely on purely clinical evidence. Further, from the fact that few symptoms were present during pregnancy, the records are necessarily incomplete.

I shall first give the details of the three cases which came within my own knowledge, and thereafter, to complete the evidence, shall add an abstract of the three published cases.

CASE 1.—Suppression of urine following premature delivery of a still-born fœtus in the eighth month—No symptoms during pregnancy—Duration of suppression one week—Recovery.

Early in April, 1897, I was consulted by Mrs. S., who wished to engage me for her confinement. She was in the eighth month of her first

* *Lancet*, 1895, i. 461.

pregnancy. She was twenty-three years of age, high coloured, but of a delicate and strumous appearance, and markedly neurotic.

A week or two before coming to me she began to observe swelling of her ankles and puffiness of the face and hands. This increased, and when seen by me the œdema was quite obvious but not excessive in amount, and was limited to the situations mentioned above. Her urine was found to be scanty in amount and almost solid with albumen. She was ordered rest in bed, and put on an exclusively milk diet. This led to an improvement in the condition of the urine, which increased in quantity and contained less albumen; but, notwithstanding, in a few days labour pains set in, and she was delivered after an easy labour of a seventh-month fœtus, which had evidently been dead for over a week. She made a good though somewhat slow recovery. The albumen rapidly diminished in amount, but did not finally disappear till three weeks after labour.

In the beginning of September, 1898, she again became pregnant. In the interval the urine was examined on two or three occasions, and found free from albumen. In the early months of pregnancy she was remarkably well. There was no sickness nor was there any œdema. The urine was tested at intervals of about a month, but showed no albumen.

On the forenoon of April 17 I received a message to call on her. At 3 a.m. she had been seized with a sudden pain in the lower part of the abdomen, which in about an hour abated, but was followed at 5 a.m. by intense sickness and vomiting. This continued intermittently till I saw her at noon. She was not in bed. She still complained of sickness, and of pain in the back and abdomen, not severe, but continuous. There was a slight appearance of hæmorrhage from the vagina. She was sent to bed, and for the sickness an effervescent saline medicine was ordered, along with a mustard poultice to the epigastrium. The urine, which owing to an oversight had not been sent to me for six weeks, was to be kept for examination. Soon after I left the vaginal hæmorrhage increased, and I was again summoned at 2.30 p.m. On my arrival it was evident that there had been considerable bleeding. Pain in the back, and to a less extent in the abdomen, was still complained of. On examination, it was found that the os uteri admitted a finger readily, but the cervix was not drawn up; the head presented; the placenta could not be felt in the lower uterine segment. The hæmorrhage had stopped, and there were no labour pains. Absolute rest in bed, with the application of a tight abdominal bandage, was all the treatment employed. I visited her again at 6 p.m. In the interval there had been no further bleeding, but the sickness and pain in the back were as before.

Having to leave town for a few hours, I gave instructions that Professor Stephenson, who had kindly consented to take charge of her in my absence, should be sent for in the event of further bleeding or of labour pains beginning. About 8 o'clock an urgent message was sent to him, but before his arrival a seven and a half months' fœtus, dead, but quite fresh, had been expelled, almost without warning, after two or three strong pains. There was no great hæmorrhage. The placenta was found to be covered almost in its whole extent with adherent black clots. About an hour after labour she was left in an apparently satisfactory condition.

She passed a fair night, save that she was much troubled with sickness; any attempt to take fluid, either water or milk and soda, caused vomiting. No urine had been voided. There was no evidence of bladder distension, but at 1 o'clock the nurse passed the catheter. Only $\frac{1}{2}$ ounce of urine was drawn off. When this was examined it was found to contain one quarter albumen, while the deposit showed blood corpuscles, triple phosphates, and epithelial casts; urea, .25 per cent.

I saw her again late in the afternoon and introduced the catheter, but no urine was obtained. The sickness still continued, but otherwise she

made no complaint of pain or discomfort. The temperature was normal; the pulse but little accelerated, and of no great tension; tongue clean and moist; skin dry and harsh. A hot fomentation was applied to the renal region.

19th.—Apart from occasional sickness she had passed a fair night. Vomiting occurred only on attempting to take fluids. The lochial discharge was small in amount and well under the average. No urine had been passed, but as there was no evidence of bladder distension the catheter was not used. Poultices were continued to the lumbar region, and a diuretic mixture was ordered. The mixture caused vomiting, however, as did everything save ice and iced water. Occasionally iced milk and soda in very small quantity was retained.

20th.—The symptoms and general condition were as before, save that she now complained of slight headache and some aching pain in the loins. No urine had been passed. Poultices were applied, and a hot pack ordered. A compound jalap powder was given, but as it was at once rejected an enema was administered.

21st.—No urine had been voided; pulse and temperature subnormal; pupils normal; the sickness somewhat moderated, but apt to be induced by taking any fluid. A pint of warm normal saline solution was injected into the rectum, and a hot pack given. The saline solution in part returned, but a few minutes later she passed $8\frac{1}{2}$ ounces of urine, after which she expressed herself as much relieved. Analysis: urine slightly acid; specific gravity, 1010; urea, .01 per cent., or 4 grains in all; a trace of albumen; pus and blood corpuscles in the deposit.

At 7 o'clock the same evening another injection of saline solution was given, followed two and a half hours after by a hot pack, after which she expressed a wish for hot fluids, and was allowed hot water, hot water and milk, a little tea, all of which she retained.

22nd.—A slight improvement was visible; temperature still subnormal; sickness now only occasional, most of the fluids she took being retained, as also a small quantity of thin cornflour. The same treatment was continued, but in the twenty-four hours only 4 ounces of urine were passed, which gave the following analysis: reaction, slightly alkaline; specific gravity, 1016; urea, .6 per cent., or 12 grains in the twenty-four hours; albumen, .15 per cent. by Esbach; deposit, blood and pus cells and triple phosphates.

23rd.—Little change in the general or renal condition, only a small quantity of urine— $5\frac{1}{2}$ ounces—being passed in the preceding twenty-four hours. In this there were $24\frac{3}{4}$ grains of urea and .06 per cent. of albumen, while there were still some blood corpuscles in the deposit.

24th.—Considerable improvement; pulse and temperature normal, while the skin was much less harsh and inclined to perspire. During the twenty-four hours up to 4 a.m. on the 25th, 12 ounces of urine were passed, an analysis of which gave the following result: reaction; specific gravity, 1010; urea, .9 per cent.; blood corpuscles; albumen, a trace. The patient looked very well, and expressed herself as very much better; indeed, notwithstanding the fact that up to this time—the seventh day—only 90 grains of urea had been secreted, she never looked really ill.

25th.—In the twenty-four hours ending 4 a.m. on the 26th, the quantity of urine passed was 49 ounces. Examined, it gave the following result: reaction, acid; urea, 1.15 per cent., or 232 grains in the twenty-four hours; albumen, .01 per cent.; a few pus and blood cells. The patient seemed quite well. There was little tendency to sickness, almost all the nourishment she took being retained.

For the next few days there was marked polyuria, 64 ounces being passed on the 26th, while on the following day there were 72 ounces, which, on examination, showed an acid reaction, a specific gravity of 1010, with

·9 per cent. of urea and ·05 per cent. of albumen; there were no blood corpuscles or casts. On the next two days 96 ounces and 120 ounces were obtained, the analysis of which was similar to the above.

The urine was tested at intervals for some months, and contained a trace of albumen for about six weeks after labour.

This case has a peculiar interest in being the sole recorded instance—to which, at least, I have had access—of prolonged anuria after labour which ended in recovery.

*CASE 2.—Complete suppression of urine preceding and following premature labour at the beginning of the seventh month—Death—Child still-born.**

Mrs. S., aged forty-two, a spare woman of slender build and of a markedly neurotic temperament, was delivered of her first child, which is still alive, ten and a half years ago. Throughout the greater part of pregnancy she suffered from excessive nausea, sickness, and prostration. The urine continued free from albumen throughout. After labour, which was at term, and attended with an unusual degree of suffering, she made a good recovery. She has since had two miscarriages, the last six years ago. In both the pregnancies she was similarly affected with sickness and prostration, which in the first was so great as to cause considerable anxiety to the medical attendant, who on one or two occasions was on the point of inducing premature labour. Both, however, spontaneously terminated at the sixth month in the birth of dead children.

In the early months of the present pregnancy she suffered from a recurrence of vomiting and nausea, which, however, were not so severe, and passed off towards the end of the fourth month, after which she was in very good health. The urine was not tested on this occasion, the symptoms being so similar to those in previous pregnancies when the urine was found not to contain albumen.

Early in the morning of October 20, 1901, she was suddenly seized, in the beginning of the seventh month of pregnancy, with severe pain in the hypogastrium, followed soon by a slight discharge of blood from the vagina. She was seen at 8 a.m. by Dr. Gordon, who was struck by her waxy appearance, and her expression of great suffering. She was much troubled with sickness and retching, and had intense, continuous pain over the uterus, which was tender on pressure. There was no œdema. As examination showed no signs of commencing labour, a mixture containing ergot and morphia was given. Later in the forenoon the condition was much the same. For the abdominal pain, which was still very severe, a morphia pill was ordered every four hours.

At 6 p.m. she was still very sick; temperature subnormal; pulse regular and good; respiration at times laboured. Since early morning she had passed no water; the catheter showed the bladder to be empty. She was suffering so intensely that a hypodermic injection of morphia— $\frac{1}{4}$ grain—was given. At 9 p.m. she was seen along with Professor Stephenson. No urine had been passed, while her general condition was as before. Labour had not begun; another injection of morphia— $\frac{1}{4}$ grain—was given. She passed a fairly good night, but was very weak, and unable to retain anything save a few sips of tea. She had occasional attacks of precordial pain. There was little change in her condition next morning. With the catheter a teaspoonful of urine was drawn off, but it was mixed with the vaginal discharge, and useless for examination. It was observed that the hands and legs had become somewhat swollen.

True labour pains seem to have begun at noon, and at 4 p.m. she was

* For the report of this case I am indebted to Dr. John Gordon, of Aberdeen.

delivered of a fœtus which had evidently been dead for some time. So rapid was the latter part of the expulsion, and so severe the abdominal pain, that the woman was unconscious of its birth. The placenta could not be expelled, and was removed under chloroform about an hour after. The pain was little, if at all, relieved by the emptying of the uterus. At the beginning of and during labour the temperature was 97°.

In the evening she was found much easier. She passed a good night, but any attempt to eat brought on vomiting and pain.

22nd.—The patient was very weak, and unable to take nourishment; temperature, 99°; pulse, tolerably good. The catheter was twice passed during the day, but without result. Poultices were applied to the loins; pilocarpine was injected subcutaneously, and later digitaline and strychnine. In the evening she seemed fairly well and comfortable, though still troubled with sickness.

23rd.—She passed a quiet night, and slept a little. No urine was obtained during the day. At 10 p.m. she had what the nurse described as a rigor—probably a convulsion. Her temperature was found to be 97°, and in half an hour had fallen to 95°. When visited soon after by Dr. Gordon, her breathing was laboured, her pupils contracted, and her appearance so alarming that he asked Dr. Stephenson to see her. Injections of saline solution into the rectum were added to the treatment previously employed.

24th.—During the night she was very restless, with severe precordial pain. She asked for, and got, a few sips of tea, which she retained. At 6 a.m. she gave vent to a loud shriek, and cried that she was choking, while her face became contorted. She was seen soon after, when the temperature was found to be 95°, the pulse regular, and of moderate tension. No urine was obtained by the catheter.

At 11 a.m. inhalations of oxygen were tried, but she gradually became weaker, and died at 3.45 p.m., suffering great precordial pain, and conscious to the last. No post-mortem examination was allowed.

CASE 3.—*Partial suppression of urine in a primipara lasting for three days after labour two weeks before term, followed by polyuria and recovery—Child alive.*

Mrs. N., aged nineteen, was admitted to the Maternity Hospital on October 26. She was advanced to within two weeks of the end of her first pregnancy. Previous to gestation, she had always enjoyed good health. In the early months she suffered merely from the usual subjective symptoms, but at the beginning of the ninth month she was suddenly seized with sickness and vomiting, attended with severe headache and pain in the back. As during the next ten days she had frequent recurrence of these symptoms, she sent for her medical attendant, who advised her to go to the hospital.

On admission she was seen to be of average build and well nourished. Though neurotic in temperament, she was not markedly so. There was no œdema. The catheter was passed, but only $\frac{1}{2}$ ounce of urine was withdrawn, which became almost solid on boiling. Her temperature was 100°, her pulse 122. There was considerable tenderness in the left loin and over the left side of the uterus.

A few hours after admission labour spontaneously commenced, and dilatation proceeded rapidly, the first stage being completed in five hours. About an hour after, with the head lying on the pelvic floor, Dr. Stephenson applied the forceps under anæsthesia, on account of the condition of the woman and the urine, and completed delivery without trouble at 10.30 p.m. The child, a male, was alive, well nourished, and weighed 6½ pounds.

Soon after labour the woman began to suffer from sickness, with persistent retching and vomiting. The pulse and temperature were subnormal, the pulse falling at midnight on the 27th to 48. No urine was voided

within the first twenty-four hours. On passing the catheter only 4 ounces were obtained, which on boiling deposited one-third albumen. The lochial discharge was normal in quantity. Poultices were applied to the lumbar regions every three hours, rectal injections of saline solution were ordered every four hours, and she was given by the mouth sips of very hot water and milk and potass, of which she took 3 pints in twenty-four hours.

28th.—During the whole twenty-four hours the temperature, which was taken four-hourly, never rose above 97°, and was occasionally as low as 96°. The pulse was also subnormal, being only 44 at 4 p.m. This marked depression of pulse and temperature is especially noteworthy.

The vomiting and retching continued. During the day she took 3 pints of milk and potass, and 4 pints of hot water in occasional sips. Only 8 ounces of urine were obtained by catheter during this period; it contained one-third albumen. Poultices and saline injections were continued. A mixture containing digitalis and strychnine was ordered, and for the vomiting a mustard-leaf was applied to the epigastrium.

29th.—The condition was practically unchanged. There was marked apathy. The treatment was continued, and in addition 2 drachms of whisky were ordered every three hours, as well as $\frac{1}{2}$ ounce of Hendry's solution of salts every four hours, which produced free action of the bowels. By catheterization 14 ounces of urine were obtained, showing one-fourth albumen.

30th.—Still apathetic and drowsy, but general condition improved. The temperature rose in the afternoon to nearly normal, while the pulse-rate increased. Vomiting and retching less severe, so that she was able to take about 8 pints of fluids, butter-milk, potass and milk, and hot water. Hendry's salts continued three times a day. She passed urine voluntarily throughout the day to the amount of 47 ounces, in which there was still one-sixth albumen. Bowels acted freely; lochia normal.

31st.—Still depressed and drowsy; vomiting much less frequent and severe. Quantity of urine 100 ounces, with one-tenth albumen; treatment as above.

November 1. — Continued improvement; little tendency to vomit; pulse 70; temperature normal; tongue furred; skin moist; complained of great thirst, though taking as much as 8 pints of fluid on an average per day. The quantity of urine was 84 ounces, with one-tenth albumen.

From this time the woman steadily improved. By November 4, or the ninth day, the urine was free from albumen, and so continued till she was dismissed from the hospital on November 11. She has since continued well.

The above case is interesting. The condition of the kidneys was probably similar to that in the other cases. She seems just to have escaped eclampsia through the premature onset of labour, and, it may be surmised, complete anuria, through artificial delivery under an anæsthetic.

The three previously published cases may be briefly presented as follows:

CASE 4. — *Uremic poisoning following suppression of urine after labour* (McCrea, *Canada Lancet*, Toronto, 1884, vol. xvi., p. 173).

On the evening of October 17 the author was called to attend a woman in her third confinement. Labour premature in eighth month; fœtus still-born; placenta and fœtus slightly decomposed. After delivery she com-

plained of pain in the lumbar region, and Dover's powder was administered.

18th.—The patient complained of sharp pain in the lumbar region, which was relieved by $\frac{1}{2}$ drachm of tincture opii in starch enema; pulse and temperature normal. As no urine passed since confinement, digitalis and sp. ætheris nitrosi every two hours.

19th.—Still no urine; passed the catheter, but none obtained; pulse 86, temperature 100°; vomiting; pulv. jalap co., 30 grains.

20th.—Restless; pupils contracted; no pain; alkalies, diuretics, and diaphoretics. On the following day the patient was much the same, the pulse being 120, and the temperature 101°.

22nd.—Pulse 101, temperature 102°; slight clonic spasms and headache; slight perspiration; passive delirium, vomiting, hiccough, and contracted pupils. Next day condition very similar; bowels acted loosely; catheter passed, but no urine; patient evidently sinking.

24th.—Pulse 120, temperature 103°; vomiting, but no hiccough; sinking; appears somnolent and listless. On the following day it was noted that the breath was foetid and ammoniacal, while there was free perspiration. The patient's condition became gradually worse; she became completely comatose, and died at midnight on the 27th, eleven days after the completion of labour.

CASE 5.—*Suppression of urine following a normal but very rapid labour at term in a primipara—Child still-born—No symptoms during pregnancy—Death on the fifth day* (J. T. Williams, *Lancet*, 1886, ii., p. 248).

On March 26, 1886, Williams was called to a woman, twenty-two years of age and married, in labour with her first child. He had not seen her before. The child was born before his arrival, after a very rapid labour: still-born, and apparently at term. In the evening she was very comfortable, and to all appearance going on well. On inquiry it was found that she had vomited several times since labour, and had passed no urine, but there was no pain or distension of the bladder. Hot fomentations were applied over the hypogastrium, and soda-water and diluents ordered. On the following day no urine had been voided, and only 3 drops were obtained by the catheter. There was no pain, but she had vomited two or three times. A careful inquiry was now made as to her condition and previous history. She had always been healthy, never had scarlet fever, and there was no history of previous renal disease. Her temperature was 99°, pulse 88; tongue dry, with yellow fur; skin hot and dry. She was very quiet and uncomplaining; heart-sounds weak; no anasarca or headache; pupils active; lochia small in quantity. Hot fomentations to the loins were ordered, a diuretic mixture containing digitalis and nitrate of potass, 1 drachm of pulv. jalap co., and soda-water and diluents to drink.

28th.—Condition much the same, save slight dyspnoea; she had passed about 4 drops of urine, the catheter yielding $\frac{1}{2}$ ounce, which was clear and pale, and contained one-sixth albumen. On the following day the bowels opened twice freely, but still no urine. By catheter 1 $\frac{1}{2}$ ounces obtained, which showed blood and hyaline casts, and a large quantity of spheroidal epithelial cells like renal epithelium; specific gravity 1020, albumen one-eighth.

30th.—She passed a restless night, and was much weaker. The total urine secreted up to this time (the fifth day) was 2 ounces. The bowels acted twice; breathing not impaired; temperature 99°, pulse 86. She had vomited once or twice the evening before.

At nine p.m. Williams was sent for, as she was thought to have fainted; he found her dead. A wineglassful of urine had been passed since visit. She died suddenly without convulsions. No necropsy performed.

CASE 6.—*Suppression of urine following premature labour at the seventh month—Child still-born* (F. F. Bond, *Lancet*, 1889, ii., p. 431).

On January 9, 1889, Bond was called at 2 p.m. to see a woman who had been delivered by a midwife at two o'clock the same morning of a still-born child. She had advanced to the seventh month. There had been two previous confinements, the first seemingly at term, child alive; the second of a dead child at the seventh month. The woman was of an extremely nervous temperament, and subject to epileptic attacks. The labour had been rapid, and followed by rather severe hæmorrhage, which soon abated. She had intense after-pains when seen, but her condition was otherwise good. Bicarbonate of soda and opium were given.

On the following day she was almost free from pain, but suffered from vomiting; there was little lochial discharge; pulse 84, temperature normal. No urine had been passed. An effervescing mixture was ordered.

11th.—No urine passed; pain and vomiting had ceased; pulse and temperature normal; tongue clean. The catheter was used, but only a few drops of urine were obtained. In the evening there was intense pain over the loins; lochia scanty; catheter again passed, but no urine in bladder. Vaginal examination gave negative results; breasts full. Hot fomentations to loins and vulva were ordered, and a strong calomel and jalap purge, a morphia and belladonna suppository, and an effervescing diuretic.

12th.—One free stool, but no urine; pain over the loins intense; tongue dry; pulse 99, temperature normal; restless; catheterized, but no urine. A Simpson's bath ordered, and also an effervescent diuretic—vin. antimonialis, 10 minims; tinct. jaborandi, 30 minims—every three hours. In the evening much easier, perspiring freely, but no urine. There was a vesicular rash over the body.

On the 13th and 14th she was much the same, but on the 15th the vomiting and retching returned, and she was very restless; pulse and temperature subnormal. The same treatment was continued. She remained in much the same condition for the next two days, but on the 18th was very much worse; pulse 84, tension increased, temperature normal; vomiting and retching continued. She was now very drowsy, with occasional delirium. For the first time the breath smelt of urine. Convulsions set in at two p.m., and she died at six o'clock the same evening. No necropsy was allowed.

It is to be regretted that in not one of the cases was a post-mortem examination obtained. In endeavouring to explain the causation of the anuria, we are thus compelled to rely on the clinical records, which, though sufficiently full as to the symptoms accompanying the complication, are necessarily incomplete in respect to the condition of the kidneys which led up to it. Though there is a general similarity in the features of the cases, it is more than probable that they were not all dependent on precisely the same cause, or, to put it more correctly, as the causation is undoubtedly of a complex nature, that the contributing factors were variously combined in the different cases.

It may assist in the elucidation of the causal problem if a comparison is made of the leading features of the cases, and attention drawn to the more striking points of resemblance. This I propose to do under the following headings :

1. *Age*.—The age is noted in five of the cases, and with one exception the patients were young women under thirty. In the case in which the age is not stated it may with probability be inferred from the number of her pregnancies that the woman was young. Assuming her age was thirty, we get an average age of twenty-six, an age at which it is unlikely that they were the subject of chronic Bright's disease, the possibility of which is further excluded by examination of the urine during pregnancy, and by the subsequent history in the cases which recovered.

2. *Puerperal History*.—Two of the patients were young primiparæ, two were pregnant for the second time, while one was in her third and one in her fourth pregnancy. An inquiry into the history of the earlier pregnancies discloses several important facts which seem to have a bearing on the subsequent complication. In all the four multiparous women some abnormality, pointing to renal inadequacy, is found in the puerperal history.

In Case 1 the first pregnancy terminated prematurely in the birth of a macerated fœtus. The urine was tested a few days before the onset of premature labour, and found to be nearly solid with albumen. In Case 2, the first pregnancy, though resulting in the birth of a living child, was accompanied with great sickness and prostration; while the two following, during which the woman suffered even more acutely, terminated at the sixth month in the birth of dead children. In our fourth the condition of the woman is not noted, but, while the first child was born alive, the second was still-born at the eighth month. The history of the sixth case is very similar, the first child being born alive, the second still-born at the seventh month. The woman was subject to epileptic attacks, and was highly neurotic, a temperament which was specially noted in three of the other cases.

3. *History of Present Pregnancy*.—In two only of the cases were symptoms present of a severity to induce the patient to seek medical advice. In Case 3—that of partial suppression—the woman continued in excellent health till the beginning of the ninth month, when she was seized, quite suddenly, with sickness and vomiting, accompanied by severe headache and pain in the back. The urine, tested a few hours before the onset of labour, was almost solid with albumen. My own is the only other case in which the urine was examined during pregnancy. No symptoms were present, the woman expressing herself as in very good health, while the urine, tested on several occasions, was always found free from albumen.

In the other cases inquiry elicited nothing unusual in the course

of pregnancy, and the patients seem not to have been seen by the medical attendant before labour.

It is a noteworthy fact that in one case only did the pregnancy continue to term. In this case the child, though still-born, seems to have been recently dead. In three labour came on at the seventh month, in one at the eighth, while in the case of partial suppression labour was two weeks before term.

Equally striking, and of more importance in its bearing on the question of causation, is the mortality among the children. In the five labours which were followed by complete suppression the children were still-born, and in two, at least, the foetus had evidently been dead for some time. In all, the women were fourteen times pregnant, and four times only did the pregnancy terminate in the birth of a living child.

In regard to the character of the labour, there is a very important ætiological fact to be noted. In four of the cases of total suppression the labour was unusually rapid, if not precipitate; the importance of this will be referred to later. In the fifth case the duration is not mentioned.

Slight accidental hæmorrhage immediately preceded the onset of labour in two of the cases, in one of which it was accompanied by excruciating pain. In only one case was there hæmorrhage in excess of the normal amount after labour.

4. *Post-partum Symptoms and Character of Urine.*—It is a well-known but none the less remarkable fact that total suppression of urine may exist for several days without giving rise to any urgent symptom. This was strikingly illustrated in almost all our cases. So well was the patient apparently and so free from symptoms that it was with difficulty that the friends could be persuaded of the gravity of the condition. As a rule, the woman expressed herself as comfortable and well. Pain in the back and headache, but not severe, were present in all save one, in which there was severe abdominal and precordial pain. The most uniform and striking symptom was vomiting. In my own case for the first few days, and in the second case all through, practically everything was rejected. In two of the cases there was well-marked depression of the pulse and temperature.

The later symptoms in the fatal cases were those that usually precede a fatal issue in suppression of urine: vomiting, drowsiness passing on to coma, muscular twitching, and contraction of the pupils. In two cases there were convulsions towards the close.

In regard to the urine, we find that in one only of the fatal cases

was any obtained. Half an ounce was drawn off by catheter on the third day; it was pale, clear, and contained one-sixth albumen. On the fourth day $1\frac{1}{2}$ ounces were obtained, with a specific gravity of 1020, and showing blood and hyaline casts and a 'large quantity of spheroidal cells like renal epithelium.' About two hours before death, which took place suddenly and unexpectedly on the fifth day, 1 ounce was spontaneously passed.

Of the two cases which recovered it will be noted that in the first only $30\frac{1}{2}$ ounces of urine were secreted during the first eight days. Save $\frac{1}{2}$ ounce obtained by the catheter on the day following labour, and which was probably in the bladder during it, no urine was obtained till the fourth day, when $8\frac{1}{2}$ ounces were passed after a saline injection into the rectum. This contained only 0.01 per cent. of urea, a trace of albumen, and a few blood corpuscles in the deposit. On the following day 4 ounces were passed, with the following analysis: specific gravity, 1016; urea, 0.6 per cent.; albumen, 0.15 per cent.; and still a few blood cells.

On the next three days $5\frac{1}{2}$ ounces, 12 ounces, and 49 ounces were passed respectively, with an increase in the urea percentage and a diminution in the albumen. After this there was well-marked polyuria. Convalescence was slow, and the albumen did not entirely disappear for six weeks. In the second successful case the urine was solid with albumen a few hours before the onset of labour. During the first twenty-four hours after its completion none was voided, and with the catheter only 4 ounces were obtained, which on boiling deposited $\frac{1}{3}$ albumen; on the next day 8 ounces, with still $\frac{1}{3}$ albumen; on the next 14 ounces, with one-quarter albumen; and on the following day 47 ounces, and thereafter polyuria. By the ninth day the albumen had entirely disappeared, and from that time the woman made a very rapid recovery.

The re-establishment of the renal secretion in these two cases was preceded by a distinct amelioration in the sickness and vomiting, and this may, I think, be regarded as one of the earliest favourable signs.

5. *General Conclusions.*—It will be observed that in all the cases of complete suppression—with the exception, perhaps, of Case 2—the symptoms conform to those usually ascribed to the obstructive form, the anuria extending over five to eleven days, and being unattended at the outset with any urgent symptoms. Though Bond was of opinion that the complication was the result of the impaction of calculi in both ureters, there are facts in connection with the cases which make it very difficult to accept the view that they were instances

of so-called obstructive anuria. In the case of partial suppression, for example, there was evidently a condition of the kidneys similar to that underlying eclampsia, and which brought the woman after labour to the brink of complete suppression; but a stronger objection is furnished by the fact that in all five cases of complete suppression the children were not only still-born, but in every instance save one were premature. It is obvious that there existed some cause which led to the death of the fœtus. In this cause we shall find the explanation of the suppression. McCrea was of opinion that the anuria was due to the absorption of decomposing matter in connection with the dead fœtus *in utero*, which he thought had given rise to blood-poisoning, a conclusion to which, he held, the symptoms strongly pointed. In no other case, however, is the fœtus described as decomposing. In my own it was fresh, and death was known to be recent, as movements had been felt on the previous day.

It is much more likely that the fœtal death and the post-partum anuria were dependent on a common cause. What this cause was can only be conjectured, but in all probability there was toxæmia from nephritis of a character similar to that which is now believed to produce eclampsia. That renal inadequacy existed before the occurrence of the last pregnancy is at once suggested by the puerperal history. In all the four multiparous women the previous labour resulted in the premature birth of a still-born child.

It is unfortunate that in two of the cases only was the urine examined during pregnancy. In one, a secundipara, no albumen was found six weeks before labour, though in the previous pregnancy the urine contained a large quantity of albumen; in the other the urine, tested a few hours before labour, became solid on boiling.

The whole puerperal history seems, then, to point to the existence of some defect in one or in both kidneys which rendered them unequal to the increased strain of pregnancy and exposed them during it to nephritis. But, while the nephritis of pregnancy is common and the condition of the kidneys which obtained in our cases probably not infrequent, complete suppression of urine after labour is very rare. In general, even in the most serious cases of nephritis which result in eclampsia, the activity of the kidneys is rapidly restored after the uterus has been emptied. In these complete suppression is rare, and in not one of our cases did convulsions precede suppression.

It is clear, then, that we must look for some other factor to explain the occurrence of anuria. That, I think, is to be found in the character of the labour. In five cases this is noted, and in all the labour was unusually rapid. In my own case it might fairly be

described as precipitate. Though little danger is, in general, to be apprehended from undue rapidity of labour, yet in highly neurotic women it occasionally produces an unexpected degree of shock and collapse, more especially when it is the result, not of a diminished resistance, but of an undue severity of the pains. Having recently seen a case of this kind, I am the more inclined to believe that the pain and shock, associated with precipitate labour, constitute an important element in the causation. In discussing the ætiology of non-obstructive suppression Fagge* mentions that the shock accompanying rupture of the uterus may produce a temporary anuria, which passes off as the patient recovers. It is probable that he had in view an actual case, but no reference is given, and I can nowhere find record of such a case.

It is only in nervous, high-strung women that undue rapidity of labour is liable to occasion alarming symptoms, and there can be no doubt that a neurotic temperament plays a considerable part in the production of anuria following labour. In four of the cases the women were expressly stated to be neurotic.

It should be observed that in Case 2 suppression seems to have preceded the onset of labour, but here the woman suffered both before and during labour from intense pain, which was probably the immediate cause of the suspension of the renal function.

In the absence of post-mortem evidence the causation must still be regarded as obscure. While this is so, the following would seem, from an analysis of the clinical conditions present, to be the more important factors concerned in the production of post-partum anuria:

1. A pathological condition of the kidneys—probably nephritis—resulting from pregnancy, but in some cases dependent on a pre-existing defect of the organs, congenital or acquired.
2. A neurotic temperament. The influence of this on the renal secretion is seen in hysterical suppression.
3. The shock incident to an undue rapidity of labour, or arising from excessive pain. This seems in all the cases to have been the exciting cause.

The *treatment* of suppression of urine after labour does not differ in any way from that to be followed in the same condition apart from pregnancy, and is so fully described in text-books of medicine that it need not be further discussed. Attention may, however, be called to one or two points suggested by a perusal of the cases.

It is very important that efforts to restore the function of the kidneys, and to supplement them till that is accomplished by

* 'Principles and Practice of Medicine,' vol. ii., p. 669. Second edition.

increasing the activity of the accessory channels of excretion, should be instituted *without delay*. In almost all the cases much valuable time was lost through failure to immediately realize the gravity of the condition. Whether the result would have been different if energetic treatment had been resorted to earlier it is impossible to say. As an addition to the measures usually recommended, the injection of saline solution into the rectum will be found useful. It proved the most effective remedy in my own case, though it was tried by Dr. Gordon without success.

Another interesting and important point arises in connection with the use of opium. In all the fatal cases save one it was given chiefly for the relief of abdominal or lumbar pain, and it becomes a question whether it had any detrimental influence on the kidney secretion, and was in reality a factor in the production of suppression. Did it in any way interfere with the restoration of the renal function? While admitting the possibility, I am disposed to think that it did not, for the reason that in one of the fatal cases opium was not given, and, further, that morphia does not produce this effect in cases of eclampsia, in which, probably, the condition of the kidneys is very similar. At the same time, I am of opinion that opium should be rigidly withheld in cases in which anuria is to be feared.