do not quickly become alarming, and cases of this kind may last a fortnight or more before death occurs, as it invariably does unless relief is given by operation. The following is the history of such a case:

CASE III.—On July 16th, 1897, a boy aged 11, apparently in good health, fell from a wall. During the whole of the following week he complained frequently of pains in the belly. On July 22nd, as the pain was worse and he began to vomit and to pass slimy, offensive motions, a doctor was summoned. Under small doses of morphia he at first greatly improved, but on July 27th, eleven days after the fall from which he dated the first symptoms, he seemed worse, and I saw him in consultation. The boy was slightly flushed, but had a perfectly tranquil expression. Just before my arrival he had got out of bed and passed a normal motion. The mouth was dry; the abdomen showed slight general distension and marked rigidity and tenderness, the latter chiefly on the left side, to which most of the pain had also been referred. There was no localised swelling in the right iliac region, and no tenderness of McBurney's point. *Per rectum* there was a tense, elastic swelling in the recto-vesical pouch. The diagnosis hesitated between general peritonitis arising from the appendix, and intussusception only partially strangulated. On opening the abdomen, a large quantity of stinking pus was found in the pelvis and in both flanks. The appendix was perforated, and a small concretion which had escaped from it was found in the pelvic pouch. The appendix and a large piece of infiltrated omentum were removed. The boy made an excellent recovery, and is now quite well.

These three cases were all treated on the same plan, which I will now describe. In the first place the operation from start to finish was carried out with strict antiseptic precautions. It would hardly be necessary to mention this but for the fact that some surgeons, once satisfied of the existence of pus or stinking fluid, appear to permit themselves considerable laxity in the details of asepsis, thinking that in the presence of unlimited quantities of septic organisms the introduction of a few additional ones is a matter of no great consequence. In the case of abdominal suppuration this is certainly a mistake, for in many cases of this kind only the bacillus coli is present, and the introduction of staphylococci or streptococci may be a fatal complication. Certainly the presence of the former in the peritoneal cavity does not necessarily prevent the primary union of the parietal wound, and if suppuration occur in this, a mixed infection, original or added by the surgeon, may be suspected.

The abdomen was in each case opened by a median hypogastric incision. Without this it is impossible either to cleanse the left flank or to drain the pelvis. On the other hand, it is not difficult to reach and resect the appendix, and complete the operation through a median incision, as was done in two of the three cases which I have quoted. In the other, I found it necessary to make a second incision over the cæcum in order to remove the appendix, although I was able to find and examine it through the median incision.

With regard to the method of removing the appendix, I believe the quickest and best way is to make a circular incision round it, about an inch from the cæcum, and, after stripping the peritoneum and subserous layer back to the cæcum like the sleeve of a coat, to ligature the denuded appendix close to the cæcum with fine silk. The appendix having then been removed and the ends of the ligature cut short, the peritoneal sleeve is drawn down and ligatured over the stump. The meso-appendix and its vessels are ligatured with a separate ligature.

The removal of the appendix I consider to be an essential part of the treatment of cases of general peritonitis. In the case of a localised abscess it is generally held, and I believe rightly, to be unwise to disturb adhesions more than necessary for fear of generalising the infection. For the same reason it is not advisable to make a prolonged search for the appendix, after opening and draining a localised abscess, and it is certain that leaving it in such cases is no bar to recovery. In general peritonitis, on the other hand, the only chance of averting a fatal result is to remove the focus of infection and as much of the toxic products as possible. In other words, the appendix must be removed and all intestinal adhesions thoroughly separated in order to liberate and remove the collections of pus and lymph among the coils. In all my cases I found and removed large quantities of pus or semi-purulent fluid, not only from the neighbourhood of the cæcum but from the pelvis and the left flank.

The abdomen was cleansed in all cases by means of sponges on holders without the use of irrigation, which I have discarded. It is quite impossible either by sponges or by irrigation to remove all the septic matter from the abdomen, and experience has shown it to be unnecessary. If the greater part be removed, together with the infective focus, the peri-

toneum can deal with the remainder, even when this is considerable. The great objection to irrigation is the danger of carrying septic matter into the upper part of the abdomen, which, as we have seen, generally remains free even in the worst cases.

After cleansing the abdomen as thoroughly as possible the wound was sutured, and a large glass tube passed to the bottom of the pelvis. In one case a gauze drain was also passed through the lateral incision down to the stump of the appendix, but I believe it was unnecessary. Very little fluid came away through the tube, except in the third case, which continued to discharge pus for over a week. The glass tube was left in for two to four days, and then replaced by a small rubber one. I am not sure that in cases of operation within 36 to 48 hours of the onset of peritonitis, like the first case, it would not be better to close the abdominal wound and dispense with drainage. This has been done successfully, but I have not yet ventured to do so.

NEPHRECTOMY AND ITS RELATION TO PREGNANCY.

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DURING the last fifteen years, the energies of surgeons all over the world have been directed extensively to the disorders of the kidney. As a result, the removal of a diseased organ has more and more frequently been resorted to with success in a very large proportion of the cases. Such a result has necessarily permitted a fairly considerable number of the population to continue their existence under vastly improved conditions, and amongst these, women have formed a large percentage. To a number of such, when restored to health, the question, whether they are justified in marrying, or, if married, in bearing children, must have presented itself. I do not propose to enter into the question of how far the loss of one kidney affects all individuals subjected to the operation, but I purpose rather to see how far that loss may be expected to influence the after-life of such small proportion of women as may become pregnant. At present I know of no data which may lead one to judge how far such a loss may affect the question of length of life—taking all individuals so operated upon from an insurance standpoint. It is, however, possible to judge to some extent of the dangers to be run by a woman, who has had to undergo nephrectomy, should she afterwards become pregnant. Particulars of six pregnancies at full term in women under these circumstances are on record, and I wish to bring before you particulars of three more such pregnancies, as well as of one case of nephrectomy during pregnancy. From these, it is possible to draw some deductions as to what risks are run by the mother, so far as her own health is concerned, during the period of pregnancy and afterwards, and also whether the development of the child is in any way affected.

The cases on record are those of Schramm¹—one confinement; pregnancy occurred 2½ years after operation; Fritsch²—one confinement; no particulars given; Israel³—one confinement; the operation having been performed on a primipara when the woman was four months pregnant; Tridondani⁴—three pregnancies in the same woman; first confinement thirteen months after operation. In my three cases one woman has had one pregnancy, another has had two pregnancies, whilst in the third the operation was performed while the woman was in the third month of pregnancy.

CASE I.—*Calculus Pyelitis: Nephrotomy followed by Nephrectomy. Pregnancy seven months later.*—Mrs. F., aged 32, multipara, came into hospital in July, 1893, suffering from pain and swelling in the right loin. She had had vomiting in the morning for some months, and also night sweats. Menstruation had ceased for eleven months. When examined, a tense fluctuating tumour was felt, occupying the upper half of the right side of the abdomen. Dulness on percussion was continuous with that of the liver, and palpation was painful. The woman stated that she had passed gravel at times. The urine was acid, with a thick deposit of pus. The other organs were healthy.

On August 2nd, 1893, the abscess was opened in the loin by an incision parallel to the rib. The kidney consisted of a series of cysts full of pus.

* Read before the West London Medico-Chirurgical Society.

from which a large stone and also a smaller one were removed, and the whole wound was thoroughly syringed out and a large tube put in. She recovered rapidly.

On September 6th, the ureter was catheterised to see if there was another stone present. The urine then was, sp. gr. 1014, acid, no albumen, all pus coming by the wound. She went home for six weeks, but was readmitted on October 30th, stating that whilst at home pain had been constant, and that micturition had been unduly frequent, with, on one occasion, blood, and that there was a marked increase in the sediment. The pain had been much more acute whenever she passed large quantities of pus, but no gravel or portions of stone were found. Temperature 103.2°, pulse 92, urine, sp. gr. 1010, alkaline, containing albumen and pus. The kidney was removed through the old incision on November 1st, 1893. In separating the kidney from the peritoneum, to which it was very adherent, the latter was torn for about two inches. After removal of the organ this was sewn up and healed perfectly. She made an excellent recovery, except for a sinus in the loin. On the Easter Monday following she fell into the sea, and on reaching home, found the ligature from the stump protruding from the orifice of the sinus, which closed within a fortnight.

This patient became pregnant in May, 1894, seven months after the operation. She suffered no more than she had done in her three previous pregnancies, except that the morning sickness was more severe, and that she felt very exhausted at times. The urine, when examined on September 6th, 1894, at the completion of four months' pregnancy, was neutral, sp. gr. 1012, faint trace of albumen, no sugar, with a deposit of mucus but no pus, urea 0.8 per cent. Examined again in December, at the completion of seven months, it was neutral, sp. gr. 1010, a trace of albumen, urea 1.1 per cent. Labour came on in February, 1895, the pains were exceedingly strong, and under her expulsive efforts the placenta yielded, and there was a large projection outwards of the abdominal contents. In order to prevent a ventral hernia, chloroform was given, and she was delivered by forceps as soon as possible. She is now perfectly well, with a healthy child. Though there was a large quantity of liquor amnii, it could hardly be called excessive.

CASE II.—*Periureteritis: Pyonephrosis: Nephrectomy: Two Pregnancies.*—For the notes of this case, I am much indebted to Dr. Collingwood, who sent the patient to me.—Mrs. K., aged 39, married fifteen years, mother of six children, all natural labours. Cystitis first occurred when the third child was four months old; and again, seven months after the birth of the fourth child, when she "caught cold in the bladder." Retroversion of the uterus occurred at this time, followed by a miscarriage and further bladder symptoms, such as incontinence; at the same time she noted that her eyesight was bad. After three months' treatment, the bladder was explored under chloroform, with no relief. In 1890 she complained of severe cutting pain, referred to the left ovarian region, incontinence of urine, straining and smarting during micturition, with pain in the left lumbar region. Some pus was found in the urine, which was acid. A calculus in the ureter was suspected.

An exploratory laparotomy was performed on December 26th, 1890, by Drs. Collingwood and McCormick. The kidneys were normal to palpation, as also the uterus and appendages. At the lower end of the left ureter, within three-quarters of an inch of the bladder, there existed a thickening from one-half to three-quarters of an inch long, involving the wall of the ureter, but as no calculus could be felt, the ureter was not opened. Some amelioration of symptoms followed until July, 1892, when pus in large quantities was noticed intermittently in the urine, and the left kidney was found by palpation to be much enlarged. The patient was admitted into the hospital, and on September 21st, 1892, I removed the left kidney. It is a point of interest that a uterine sound was passed from the bladder up to the kidney, the ureter being of the calibre of at least the femoral artery.

Mrs. K. became pregnant in November, 1893, fourteen months after the operation, quickened February 6th, 1894, and was confined in August. Urea tests taken during the pregnancy, and subsequently, gave the following figures:

February 7th	3rd month.	Urea	1.40 per cent.
March 21st	4th "	"	1.20 "
April 10th	5th "	"	1.15 "
May 12th	6th "	"	0.70 "
June 28th	7th "	"	0.55 "
July 7th	8th "	"	0.70 "
August 16th	9th "	"	1.20 "
" 24th	Confinement.		
October 14th	"	"	2.20 "
December 10th	"	"	1.60 "

A decrease in the percentage to the seventh month, with a rise to the normal after the confinement.

She again became pregnant in June, 1895, and was confined in March, 1896. On both occasions the labour was normal, and the amount of liquor amnii was not excessive. She nursed both children, and they are the healthiest she has had.

CASE III.—*Pyonephrosis: Nephrectomy while Pregnant: Abortion: Uræmia.*—In this case, a rather delicate lady, aged 32, mother of four children, had never had any illness previous to her marriage in 1881, except that a horse fell and rolled on her when she was fourteen years old, with apparently no ill-effects. She miscarried three months after marriage, and pain in the left side began directly after. The attack was very severe, and persisted for weeks. She was taken to Melbourne for consultation, but got no relief, and was brought home in a moribund condition. After a very strong sleeping draught, a large quantity of water passed, and she was relieved, but had attacks of pain every fourteen days, for twelve months. Pain ceased after she quickened with the first child, born in April, 1883, but returned three days after confinement; and she then passed a quantity of what she described as "dirty brown water like nasty tea, with a curious white sediment." A large firm tumour was detected in the left hypogastric region, close to the umbilicus. She recovered from this, and was free from attacks for some years. In 1890-91 commencing myxedema was suspected, but passed off under liq. arsen. hydrochlor. She bore children in 1892 and 1893.

In 1893-94 the attacks returned, and in September, 1894, she passed urine thick with pus. The swelling in the loin was of the shape of a kidney,

but twice its size. Another attack followed a fortnight later, and the enlarged kidney was distinctly recognised before the discharge of the pus. An extremely severe attack followed in November, the tumour increasing perceptibly daily, till it was as large as a child's head, only 12 to 20 ozs. of urine being passed per diem. She was then in the third month of pregnancy.

No nourishment could be retained, nor could she sleep; having to be propped forward in bed in the position described by Dr. Newman.⁵ Nothing gave relief. When seen in consultation it was decided that, owing to her weakened condition, immediate interference was necessary.

This was done on December 4th, 1894, by the loin incision, and the kidney was found to consist of a huge cyst by the side of the spine, containing a quart of dirty brown purulent offensive fluid. The sac formed by the pelvis of the kidney extended down by the side of the ureter for from 2 to 3 inches—the kidney itself consisting of a series of cysts. The question whether such a kidney could be of any further service, the risks attendant on leaving in a weakly woman a foul mass which could not be properly drained, the certainty of a permanent fistula, and its eventual necessary removal, were considered. It was decided to remove it at once, which was accordingly done. No calculus was found. The wound was completely healed on the seventeenth day. The urine gave a result of 6 ozs. on the first day, and an average of 3 ozs. per day for the next fortnight. On examining the organ after removal, it was noticed that the ureter ran in the wall of the pelvis of the kidney, in a manner similar to that in which it enters the bladder; and consequently, the greater the tension in the cyst the more firmly the ureter was closed.

It was an exact instance of the condition described by Simon, of the alteration in the relationship of the kidney and its duct, quoted by Dr. Newman.⁶

It was quite expected that the interference with the kidney would have brought on a miscarriage, as the patient had already miscarried on three occasions, and had had severe pain in the pelvis, before the operation. However, this did not occur, and hence another serious difficulty arose—should the pregnancy be allowed to go on? At that time no cases had been published, and as there was no need for her to run any extra risk in order to have a child (she had four living), a miscarriage was brought on, and the ovum came away on December 31st, 1894. This patient had a mild uræmic attack, with semi-consciousness for some hours, and albuminuria when in New Zealand, recruiting, within two months of the operation, led up to a very rough passage across from Sydney. She was sent home at once, and on her arrival had only a trace of albumen. The husband, writing fifteen months later, stated she had not required medical attendance since I left, in June, 1895.

Each of the three cases has a point of interest. In the first, a ventral hernia was only prevented by rapid delivery. The second discloses an interesting pathological history. An inflammatory periureteritis, possibly originating from some pressure or injury during confinement (the marked symptoms began four months after the third child was born), was recognised at the lower end of the ureter by an exploratory laparotomy, and examined. The kidney on the affected side and other organs were found to be healthy. That this periureteritis continued upwards was proved by the state of the ureter at the time of operation, and it eventually led to the disorganisation of the kidney previously recognised as healthy. It may have been tuberculous in nature (though there was then no other evidence of that), for I have heard lately, that since her last confinement in March, 1896, she has had further bladder trouble, with an ulcer on the posterior wall, thought to be tuberculous, which was scraped, with relief of all her symptoms. At the same time it must be remembered that Hurry Fenwick⁷ states that solitary ulcers of the bladder are rarely tuberculous.

In the third case, the combination of pregnancy with pyonephrosis was sufficiently serious, but when complete obstruction to the discharge of the pus occurred, it added considerably to its gravity. The removal of the kidney at the time I believe to have been the better course, although the immediate shock was greater. As to the miscarriage, the after-history of the case seemed to justify the course then taken. The risk of throwing the function of deparating the blood of a mother and her child, at a stage at which the latter was beginning to develop rapidly, on a single kidney, which had not had time to hypertrophy, is very considerable. That the remaining kidney was scarcely able to meet the requirements of the mother's system alone is shown by the uræmic attack from which she suffered, when the action of the skin was interfered with during the stormy passage to New Zealand. Had the pregnancy been allowed to continue, eclampsia or uræmic coma would have supervened, and the foetus would have been lost at a later period in all probability.

Tridondani⁸ when discussing the effects of the loss of one kidney, admittedly greater in a pregnant woman, does not accept the belief that there is sufficient compensating power in the other kidney simply by hypertrophy to deal with the excrementitious materials of the body. He states that the elimination through it is greater of retrograde tissues, [and especially of urea. If, on the one hand, the

work of elimination is more active at other times than in pregnancy, on the other, this creates conditions by which the renal activity can be more or less interfered with.

The nutrition of the glomeruli is affected by the venous stasis in the kidneys and the irritation caused by an excessive amount of urea, and a nephritis results, followed by the albuminuria of pregnancy; and Tridondani quotes Murri as supporting Heidenhain that albuminuria depends on slowing of the blood current in the kidneys. Such stasis Tridondani believes is induced (1) by the pressure of the enlarged uterus on the renal veins; (2) by the engorgement of the abdominal vessels which follows on the emptying of the uterus, and (3) by the fact that the uterine arteries, arising so close to the renal, take off a large proportion of blood from the kidneys during pregnancy. He believes that such stasis is prevented by an increased *vis a tergo* by hypertrophy of the left ventricle of the heart, and that by that the dangers of pregnancy are avoided, and, if the heart be sound, women may expect to get through a confinement without undue risk.

If his contention be right, that such a venous stasis in the kidney occurs during the pregnancy by pressure from the uterus, it is evident that pressure cannot occur before the seventh month, or the sixth, at the earliest, from the anatomical position of the vein. Further, if the uterus presses on the renal vein, it presses surely more on the vena cava and iliac veins, and should cause a similar stasis below the point of pressure, but oedema of the legs is specially remarked as being absent in several of the cases, and not mentioned in the others. As to the engorgement after confinement, it is to be noted that the albuminuria of pregnancy usually disappears in the first week or so after the emptying of the uterus.

Again, if hypertrophy of the heart be the means of safety for a pregnant woman, one would expect to find a hypertrophy, possibly not as great, but present in all cases in whom only one kidney remains. That hypertrophy of the heart takes place in all pregnant women, to a certain extent, is now generally accepted; but such hypertrophy does not free them from eclampsia or uræmia, although they possess two kidneys.

That hypertrophy of the sound kidney occurs in cases of disease unoperated on, has been proved by necropsy, but I have seen no *post-mortem* record of any case some months after nephrectomy. But by experiments on animals, Bradford⁹ showed that if two-thirds of the total kidney substance remained, the animals were not affected, and that he could not be sure of cardiac hypertrophy even after six months, though in dogs it was difficult to decide.

My own view as to wherein the safety of women under these conditions lies, is that the answer is to be found in an increased action of all the emunctories of the body and not in hypertrophy of the remaining kidney or heart only. I fully allow that these conditions are large factors in the question, but have we not been too long under the impression that eclampsia depends solely on the work done by the kidneys? Dr. Clifford Allbutt¹⁰ and Mr. Simpson¹¹ have brought forward the question of the possibility of a serum toxin in pregnancy and its elimination by the liver and bowels. The toxin acts as an irritant to the kidneys leading to albuminuria, which thus becomes the symptom of the depth of the intoxication of the system, and not the real cause of the eclampsia. They point out that eclampsia is more common in primiparæ as they have not become inured to the poison, but in subsequent pregnancies the same women usually escape owing to their inoculation in their first pregnancy. I believe that the skin, bowels, and lungs all do an extra amount of work. That the skin does so, is shown by the effect of the chill on my patient No. 3, who developed a mild attack of uræmia consequent on diminished action of the skin, caused by the cold wet passage from a warm to a cooler climate. There is also a very interesting case reported by Mr. Bartlett,¹² in which uræmia came on four days after nephrectomy, and was relieved by profuse action of the skin. This increased action of the other emunctories is also, I believe, further shown by the analysis of the excretion of urea.

Winckel¹³ states that in normal pregnancy the secretion of urine is increased from 1,500 c.cm. to 1,750 c.cm., while the

daily excretion of urea (28 g. = 432 gr.) is as great as in the non-pregnant state. The urine, for this reason, is lower in sp. gr. and simply shows an increased excretion of water. Many other authors practically agree with this, but Drs. Liscia and Passigli¹⁴ have made a careful examination of this point. From thirty-seven observations they came to the conclusion that the quantity and density agree with the figures for normal urine. Urea is diminished, chlorides remain normal, acids (sulphuric and phosphoric) are slightly diminished, kreatinin slightly increased. A comparison of the percentage of urea from their normal cases with mine after a nephrectomy (if one may judge from so small a number) seems to point to the excretion of urea by the kidney under these circumstances as being less than normal.

Percentage of Urea in Normal Pregnancy and after Nephrectomy.

In Normal Pregnancy (Liscia and Passigli).				After Nephrectomy.		
No. of Cases.	Months of Pregnancy	Average per cent. of Urea.	Lowest per cent. of Urea.	No. of Cases.	Average per cent. of Urea.	Lowest per cent. of Urea.
3	3	1.30	1.080	1	1.40	—
2	4	1.23	0.910	2	1.00	0.80
1	5	1.42	—	1	1.15	—
1	6	2.00	—	1	0.70	—
—	7	—	—	2	0.82	0.55
22	8	1.51	0.522	1	0.70	—
8	9	1.73	1.200	1	1.20	—
				2 months after confinement 2.2		
				4 months after confinement 1.6		

This comparison shows, so far as it goes, that the percentage in my cases only equals the lowest percentage in their normal pregnancies, instead of a higher one as was expected. Should this prove correct upon further examination, the balance of urea must be got rid of by other organs. Analysing all these cases it will be found that:

1. All the women made good recoveries who went to term, although Schramm notes a long recovery.
 2. Slight albuminuria was noticed in Schramm's case and in No. 1 of mine.
 3. A tendency to ventral hernia in one case.
 4. Liquor amnii was not excessive in any case.
 5. Marked oedema is not noticed in any case.
 6. Schramm notes an irregularity of the pulse shortly after the confinement, although hypertrophy of the left ventricle was present.
 7. Morning vomiting was severe, but not dangerous, in one case.
 8. The forceps were used in one case only, and then merely to prevent ventral hernia.
 9. Eclampsia or uræmia did not occur in any case that went to full term, but did in my case No. 3 shortly after the miscarriage.
 10. All the children were healthy, and in Tridondani's and my case No. 2, it is specially remarked that they were the healthiest the women bore.
 11. In all the cases the mothers nursed their children.
- Hence I think we may fairly conclude that women can, after a nephrectomy, bear children without very great danger to themselves, provided their organs and the remaining kidney are healthy.

I may add that I have heard of another case in which mother and child did well, but I have not been able to obtain particulars as yet. The cases show that seven women have undergone the ordeal, and that ten healthy children have been born at term.

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