quite impossible for the teachers of anatomy in two short years to turn raw boys into anatomists who know everything about structure, or, indeed, know all the details of structure which possess definite clinical and pathological significance.

During the first year a student learns slowly; he is in a new world, and unfortunately his whole school training has too often had the effect of unfitting him to adjust himself readily to that new world. When he starts his anatomical study the average freshman is absolutely ignorant of everything beneath the skin. The heart?—a blank. The brain?—another blank. The circulation?—the word is meaningless. Muscle?—no conception that flesh is muscle. But that is not all. New methods of learning have to be brought into play; fingers, eyes, and nose have to be educated. Words, words, words are too often the weapons of the boys' school; but in spite of all the words they have suffered from, most students have to be taught how to use words accurately. A sense of form has to be inculcated. In short, anatomists are educationalists rather than technical instructors. They prepare the site and lay the foundations upon which the clinicians, pathologists, and physiologists rear the temple of medical knowledge.

In conclusion, just two questions to the clinicians:

1. Would it not be a great help to students if all clinical teachers took the trouble to learn at least one recognized name for each structure in the body, instead of making use of local or fancy names that are not to be found in any standard work?

2. Would it not be a great help to students if all clinical teachers were quite sure that the structures they describe at great length are of importance, and in fact really exist?

Remember that, though pedagogic anatomy is dying, it was full of vigour a short time ago, and that some of the things that the clinicians of to-day learnt yesterday when they were students were purely pedagogic in origin. It is no use beating about the bush. Some clinical teachers badger students about wretched little pseudo-anatomical, pedagogical points, and suggest that any student who does not know these alleged facts knows no anatomy. The bewildered student comes to the anatomist and asks with superficial innocence, What is So-and-so? The real answer to his question not infrequently is the single word "Rubbish." But anatomists have to be moderately tactful even in their appeal to reality. "Would it not be a good thing to dissect it out for yourself and really see?" is what they usually say. And two days later the student begins to doubt if the clinician is quite such an authority as he has announced himself to be. After two or three attempts to find what his clinical teacher has described as an essential and a touchstone of knowledge, the student's growing scepticism blossoms into certainty that the clinician was simply talking, and another teacher's reputation vanishes in a blaze of blasphemy. It is a way medical students have.

GOVERNOR DIX of New York recently signed the bill passed by the Legislature providing for the sterilization of certain classes of male criminals and defectives confined in State institutions. The new law, says the *Medical Record* of April 27th, which is in the form of an addition to the public health law, creates a board, to be known as the Board of Examiners of Feeble-minded Criminals and other Defectives, to have supervision over the matter, the board to be made up of one surgeon, one neurologist, and one other medical practitioner, each with ten years' experience. If, after examination, this board decides that an inmate of the class affected by the law would transmit to his offspring a tendency to crime, insanity, or feeble-mindedness, or that his own mental condition would be improved thereby, it is to appoint one of its members to perform the necessary operation. The law applies to those who have been convicted of rape or of such a succession of offences as the board may consider to afford sufficient evidence of confirmed criminal tendencies. The operations of the law are safeguarded by the provisions for a judicial review of the findings of the board before any operation is performed, and no order of the board can become effective until it has been on file for five days. Careful records are to be kept of the effect of the law's application. New York is the sixth State to adopt such a law, New Jersey and Illinois being among those in which such action has already been taken.

An Address

ON

PYELONEPHRITIS OF PREGNANCY.

DELIVERED BEFORE THE STRATFORD DIVISION OF THE
BRITISH MEDICAL ASSOCIATION.

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PYELITIS or pyelonephritis of pregnancy is a condition that has been recognized only comparatively recently, and some textbooks published within the last seven years contain no reference to it. Twenty years ago (1892) Robland reported 6 cases. During the last ten years a large number of papers on the subject has been written and many cases have been recorded, and it is gradually being recognized that the condition is common. Although not often causing danger to life, it may cause so much pain and impairment of health that its early recognition and treatment are important.

Symptoms and Physical Signs.

The symptoms usually begin during the second half of pregnancy, and vary greatly in severity. In some cases there is only aching in the lumbar regions with no constitutional disturbance. I believe that cases in which there are no acute symptoms are comparatively common. I see them fairly often in the out-patient department. If they are unrecognized, and therefore untreated, the patient undergoes a considerable amount of pain and discomfort, which might be relieved fairly easily.

The symptoms in more severe cases are pain in the loins and lower abdomen, sometimes very severe, with acute exacerbations, suggesting renal colic, and accompanied by vomiting. The pain may be so severe that the patient's sleep is interfered with to a serious extent. It may be impossible to say whether the affected kidney is enlarged or not, the presence of the pregnant uterus rendering palpation of the kidney regions difficult, but tenderness of one or both kidneys and tenderness along the course of the ureters is found on pressure. In some cases there is little impairment of general health and nutrition; in others the patient is obviously very ill. The temperature is usually raised, and there may be a high degree of pyrexia, usually with oscillations, and rigors may occur. The pulse-rate is, of course, rapid when there is much pyrexia. On vaginal examination the intrapelvic portion of the ureter may be found to be tender, and if there is cystitis the base of the bladder is tender to the touch.

Micturition may be frequent and painful. The urine is usually acid, and on superficial examination, even when severe symptoms are present, it may show little that is abnormal. After it has been allowed to stand for some time, however, or after centrifugalization, a deposit of pus is found. Sometimes there is a very large amount of pus, but pus may be almost or entirely absent on a single examination. It is possible that the occasional absence of pus may be accounted for by temporary blocking of the ureter on the affected side. Bacteriological examination reveals the presence of micro-organisms, most commonly the *Bacillus coli communis* or a "coliform" bacillus. Recurrence in subsequent pregnancies is common.

Etiology.

There is no consensus of opinion as to the method of infection of the kidney. The most obvious suggestion is that there is an ascending infection from the bladder—that is, a cysto-uretero-pyelonephritis, and there are a good many points in favour of this view.

Cystitis is certainly more common in women than in men, and often exists in pregnant women without its presence being suspected, frequency of micturition and discomfort being explained as results of pregnancy. Engellhorn examined the urine of 35 pregnant women and found it sterile in only 14 cases. In only 10 out of the 21 cases in which the urine was not sterile were there any symptoms of cystitis.

Dilatation of the ureters undoubtedly occurs fairly often in pregnancy, as is proved in *post-mortem* examinations of cases of eclampsia, and when present will favour ascent of micro-organisms from the bladder. This dilatation may be caused by the pressure of the uterus at the pelvic brim. The right ureter is more commonly pressed on by the uterus than the left, as it lies rather farther from the middle line and so gets less protection from the projecting promontory of the sacrum.

Pilcher is of opinion, from cystoscopic examination, that obstruction to the flow of urine along the ureters is due to a distortion of the vesical portion of the ureters in the middle months of pregnancy. In some cases he found that the bladder was pressed down from above by the pregnant uterus so that the ureter was made to bend sharply at the point of its entrance into the bladder, or was kinked in its passage through the bladder wall. In other cases compression of the bladder from before backwards also offered the possibility of distortion of the ureters. The presence of this distortion was proved by catheterization of the ureters. The rate of flow of urine through ureteric catheters was increased 15 to 20 times when the patient was raised into a sitting position.

Mirabeau considers that cystoscopic evidence proves that dilatation of the ureters in pregnancy is due not only to their compression against the brim of the pelvis, but also to pressure exerted by the swollen mucous membrane of the bladder. Saurage holds that compression of the intrapelvic portion of the ureter can cause kinking in the upper portion and that such kinking may cause permanent obstruction to the flow of purulent urine.

D. J. Evans says that in cases of pyelonephritis of pregnancy dilatation of the ureters is invariably present. Kendirjy believes that compression of the ureters by the uterus and the consequent dilatation of the ureters and the pelvis of the kidney is the cause of pyelonephritis. He quotes Olshausen as having found dilatation of the ureters in pregnancy in 25 cases out of 34, Löhlein in 8 out of 32, and Pollak in 35 out of 130. Opitz looks on the lower part of the ureter as containing a stagnant column of urine. He quotes experiments of Guyon and Albarran on animals, showing that when a stagnant column of urine is present in the ureter there is really a free communication between the bladder and ureter, so that organisms can pass upwards without any obstruction being offered by the valve-like opening of the ureter.

However, if dilatation of the ureter is accepted as a factor in the development of pyelonephritis, it is not necessary to postulate the presence of a column of stagnant urine to explain the ascent of micro-organisms from the inflamed bladder to the kidney. The researches of Bond of Leicester, recorded a few years ago at the annual meeting of the British Medical Association, show that micro-organisms may travel along the mucous membrane of the ureter against the stream.

The main objection to this obvious suggestion, that the cause of pyelonephritis of pregnancy is ascent of micro-organisms from an inflamed bladder along a dilated ureter to the kidney, is that in the majority of cases there is no cystitis present. Many observers are agreed on this point while admitting that pyelonephritis occurring during the puerperium may arise from cystitis. However, Engelhorn's evidence, quoted above, shows that absence of clinical signs and symptoms of cystitis is no proof that the bladder does not contain micro-organisms.

The explanation which receives most support is that which accepts the fact that there is some dilatation of the ureter and pelvis of the kidney, but attributes the origin of the micro-organisms to the blood or bowel rather than to the bladder. The renal epithelium is damaged partly as the result of increased pressure from below and partly from toxæmia of pregnancy, that is, its resistance is lowered.

C. B. Reed does not agree that pyelonephritis of pregnancy is due to urinary stasis from compression of the ureters by the growing uterus, and infection by micro-organisms through the systemic channels or by ascent from the lower urinary passages, but considers that pyelonephritis may be regarded as a distinct disease of gestation due to degenerative changes in the renal epithelia or parenchyma from transudation or excretion of toxins of pregnancy together with bacterial invasion, probably of vesical origin.

The frequent occurrence of constipation during pregnancy may explain the entrance of the *Bacillus coli communis* into the pelvis of the kidney. The close relation of the ascending colon, often containing an accumulation of faeces, to the right kidney is held by Mirabeau to account for the frequency of right-sided pyelonephritis. Cumston suggests that there may be an exalted virulence of the colon bacillus due to some gastro-intestinal disturbance. It must be remembered that a statement made by the patient that the bowels are open regularly is not inconsistent with the presence of chronic constipation. The bowels may be open daily, but each evacuation may be a day or two late.

Diagnosis.

From consideration of the symptoms it will be seen that diagnosis of the condition may be simple and easy. In other cases it may be difficult, usually, however, because pyelonephritis is not thought of. Suspicion of the presence of pyelonephritis should always be raised by complaint of pain in the abdomen, loins, or back, or by pyrexia during pregnancy. If the pain and tenderness are confined to the right side appendicitis may be wrongly diagnosed. I have known a case in which the appendix was removed before the correct diagnosis was made. Sometimes enteric fever has been diagnosed, also other gastro-intestinal troubles and influenza. In some cases which were at first thought to be pyelonephritis of pregnancy it has been proved later that a renal calculus was the cause of the trouble.

As a rule, careful abdominal and vaginal examination, and examination of the urine, if necessary on more than one occasion, including bacteriological examination, will leave no doubt as to the correct diagnosis.

Treatment.

Almost all writers on the subject are in agreement that the treatment of pyelonephritis of pregnancy should be as conservative as possible.

The general treatment consists of rest in bed, milk diet with plenty of harmless fluids to drink, and regulation of the action of the bowels. Violent purgation must be avoided as being likely to cause miscarriage. Some authorities advise administration of small doses of calomel—for example, grain $\frac{1}{2}$ t.d.s.

More special treatment includes administration of diuretics, and urinary antiseptics, alteration of the reaction of the urine, etc. Diuresis is secured by administration of infusion of buchu and sometimes by digitalis. Several writers mention distension of the bladder as causing a reflex diuresis. I have no experience of this method of treatment. The most popular urinary antiseptic is urotropin, grains xv to xxx of which may be given daily. As the organisms are growing in an acid medium the urine should be rendered alkaline or neutral. This is done by administration of potassium citrate, grains xx to xxx t.d.s., or of alkaline waters. Antitoxin treatment has been tried with good results (Dudgeon quoted by Thomson Walker). Results of vaccine treatment are disappointing, at any rate in acute cases.

Pain is treated by warm applications to the loins, and if necessary to the abdomen, by administration of tincture of hyoscyamus mxxx t.d.s., and by posture. Sometimes great relief is obtained by having the foot of the bed raised 1 or 2 ft., while in other cases a sitting posture may be found to give relief. As a rule the pain soon yields to treatment.

Interruption of the pregnancy should be avoided if possible, and expectant treatment always given a fair trial. Some writers emphasize the increased risk of puerperal infection on account of the septicity of the urine, but in Leguen's 52 cases there was no puerperal sepsis. If both kidneys are affected, and the condition does not yield to medical treatment, and the patient's general condition is going from bad to worse, it may be necessary to empty the uterus.

Surgical treatment, nephrotomy (which is seldom called for in pyelonephritis of pregnancy), does not come within the scope of this paper.

I have collected the records of 19 cases treated in the wards of the London Hospital.

The average age was 26.

Eight of the patients were primigravidae; 9 had been pregnant before.

The average time at which the trouble began was during the

sixth month, in 2 cases it began during the fourth, and in 5 cases during the fifth month.

In 6 cases the presence of constipation was noted. In 5 others it was stated that the bowels had been opened regularly.

In 8 cases the trouble was right-sided, in 8 cases the symptoms and signs pointed to an involvement of both kidneys, and in 1 case the left kidney seemed to be affected alone.

One patient gave a history of a similar attack in former pregnancy.

In 2 cases there was no rise of temperature. In 11 the others there was pyrexia, in 14 cases as high as 102° F., and in 6 cases as high as 104°. In cases where there were rigors, which did not occur as frequently as I had expected, the temperature sometimes reached 105° or 106° F.

The urine was acid in 18 cases, alkaline in 1.

In 13 cases bacteriological examination of the urine was made. In 7 cases the *Bacillus coli communis* was found, in 5 cases a coliform bacillus, and in 1 case *Streptococcus albus* and a diphtheroid bacillus.

The symptoms complained of were pain in one or both loins, pain and tenderness along the course of one or both ureters, sometimes pain at the end of micturition, sleeplessness on account of the pain, malaise, etc.

There was 1 case of spontaneous abortion at five months and there was 1 case of spontaneous premature labour. In the latter case the temperature became normal thirty-six hours after labour, and all the symptoms disappeared, although the urine still contained pus. The case in which miscarriage occurred was the only one in which the patient did not make a good recovery.

She was a primigravida, aged 32, five months pregnant. Both kidneys were affected, and the *Bacillus coli communis* was found in the urine. Miscarriage occurred four days after the operation of exploration of the left kidney, and the patient died the next day. At the post-mortem examination pyelonephritis was found on the right side, pyonephrosis on the left side, the kidney being a mere shell filled with pus.

Premature labour was induced only once:

The patient was a primigravida, aged 27, seven and a half months pregnant on admission. She had been ill at home for some weeks, with pain in the loins so severe that she screamed when paroxysms came on, and had been unable to sleep. Raising the foot of the bed gave immediate relief from the pain, she slept well, and her general condition improved a little, but the pain became so acute again that it was thought necessary to empty the uterus. The patient made a good recovery, but the child lived only a few hours.

In none of the other 17 cases was it found necessary to bring the pregnancy to an end or to resort to surgical treatment, medical measures—that is, complete rest in bed, diet consisting chiefly of milk, and administration of urotropin, sometimes potassium citrate, sometimes acid sodium phosphate, with vaccines in a few cases—freeing the patients from pain and pyrexia, though not always from pyuria.

The success of conservative treatment was well shown in the case of a multipara, aged 28. For the first five weeks after admission she had a high degree of pyrexia, the temperature reaching 104° F., and there were several rigors. The question of emptying the uterus was considered, but under medical treatment the temperature eventually came down and stayed down. About fourteen weeks after admission labour came on naturally at term, and both mother and child did well.

Pyelonephritis in the Puerperium.

In cases that occur for the first time during the puerperium the diagnosis may be difficult at first, mainly because pyelonephritis is not thought of. If it is always borne in mind in cases of pyrexia coming on at the end of the first week of the puerperium—that is, at a time when uterine infection is improbable, the correct diagnosis will be made fairly often. This was taught by Olshausen ten years ago. Pyelonephritis occurring during the puerperium is likely to be mistaken for puerperal infection of the uterus, especially in cases in which there is no complaint of pain.

In cases in which there is localized pain a wrong diagnosis of appendicitis or of salpingitis may be made.

The fact that in spite of high temperature with great oscillations for several days the patient's general condition remains fairly good, points to pyelonephritis rather than puerperal infection.

I have seen a case in which the correct diagnosis was not made for many weeks.

Ten days after a normal labour the patient became ill with a fairly high degree of pyrexia. No abnormal physical signs could be found, the uterus was well involuted, the lochia had almost entirely ceased, there was no evidence of any inflamma-

tory trouble in the pelvis, there was no evidence of cystitis, and the urine was apparently normal. After a few days all the untoward symptoms subsided, and the patient got up and about. After a chill contracted when driving the symptoms returned, fever, sweating, and abdominal pain not specially localized. A normal appendix was removed without any benefit to the patient, and then, and not till then, was a deposit of pus found in the urine. With appropriate treatment all the symptoms disappeared and did not return.

A month or two ago I saw a patient who, after induction of premature labour, had no rise of temperature during the first six days of the puerperium. On the seventh day I was called to see her, as she had had a shivering fit and a temperature of 102° F. at 8 a.m. For twelve hours before this she had had great frequency of micturition. There had been nothing else complained of. No catheter had been passed since the confinement. The uterus was rather flabby, and larger than it should have been on the seventh day, but it was not tender, and the lochia were sweet and not unduly profuse. The urine contained pus, and I made a diagnosis of cystitis. In the evening of the same day the patient had a severe rigor, the temperature rising to 105° F. Two hours later, in spite of profuse sweating, the temperature was 106.8° F., pulse 160. The uterus was explored, and nothing was found in its cavity except a small fragment of inoffensive clot. She had had no urinary symptoms whatever during the day, and it seemed unlikely that pyelitis, with no tenderness to be felt in either kidney region, could produce this amount of pyrexia. The temperature next day was normal, and continued to be normal, but the right kidney became tender, and bacteriological examination revealed the presence of the *Bacillus coli communis*. The condition soon cleared up.

The occurrence of pyelonephritis in the puerperium emphasizes the importance of preventing retention during the second stage of labour and the avoidance of catheterization as far as possible after labour.

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THE ETIOLOGY OF THE EXCESSIVE VOMITING OF PREGNANCY.

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By most authorities it is agreed that the cause of the excessive vomiting of pregnancy arises within the uterus and acts through the nervous system, chiefly the sympathetic. Others consider that it is reflex, while some hold that a neurotic temperament is the cause. I have heard it stated that in the early months it is due to a neurosis, and in the later months of pregnancy to toxæmia. The various explanations may therefore be classified under three main groups: (1) Toxæmic; (2) reflex; (3) neurotic.

Toxæmic.

The toxæmic seems to be the most rational explanation of this complication of pregnancy, so that it may be considered first. The questions then arise, Where are these toxins produced, and by what channels do they act?

Dirmosér¹ has given what seems to me the most feasible explanation of the origin and progress of the toxæmic condition. He considers that the excessive vomiting is a reflex irritation of the sympathetic nervous system, commencing in the internal sexual organs, and through the secretory and motor fibres of the sympathetic leading to the production of changes in the biochemical processes, more particularly of the digestive tract, followed by atony of the gut and increased production and absorption of toxins in the gut. In the urine of patients suffering from this complication of pregnancy he found an increased amount of uric acid, aromatic sulphates, indoxyl, phenols,