fluid withdrawn. Temporary improvement was followed by recrudescence, and aspiration with washing out of the joint through two hollow needles was adopted. As this did not suffice, the joint was opened, a quantity of coagulated material washed out, and the wound closed. Improvement was slow but steady; bacteriological examination of his blood revealed the continued presence of pneumococci.

3. The so-called adult "secondary" type was severe and dangerous. It usually arose after the crisis of severe lobar pneumonia, but might occur earlier, and it might involve more than one large joint. After the crisis the temperature rose again, and the joint became hot, tender, full and painful on movement. In other cases the local signs were subacute, but the complication proved too much for the enfeebled patient, so that the prognosis of this type was always grave.

4. The variety in which the articular condition was but an expression of a general and overwhelming pneumonic toxæmia was rare. Intoxication might be so rapid and so profound that the patient neglected to draw attention to his joint at all. Such cases were always fatal. The temperature chart might show a plateau arrangement; in the other types the temperature swung daily between 99° and 103°.

5. A fifth variety sometimes seen had a more gradual onset, ran a slow, persistent, but ultimately favourable course, and was difficult to diagnose from tuberculosis.

Etiology.—Neither sex nor trauma seemed to have any causative influence. The disease was much commoner in infancy and childhood, and became progressively rarer as age advanced. It was relatively frequently associated with exanthemata.

The joint affected was usually the knee, shoulder, or hip—usually one of them, but sometimes all three. In mild cases the synovial membrane and subsynovial tissues alone were affected; they were reddened, juicy, and infiltrated. Frequently the periarticular tissues were oedematous and infiltrated. In bad cases the cartilages and bones might be eroded, and there was then danger of resulting limitation of function and even of ankylosis. The pneumococcus seemed to die out early in the synovial fluid, but could then sometimes still be found in the perisynovial tissues.

The fluid contained in the joint varied from a turbid, greenish, odourless serum to a thick debris containing fibrin that might be blood-stained in severe cases.

Local Treatment.—In mild cases rest alone sometimes sufficed, but aspiration was often necessary, and in many cases initiated a cure. It might be advisable to introduce two needles and to flush through with normal saline. If the inflammatory signs progressed, the joint should be opened, washed out, and closed; if that failed, drainage should be established, but the tubes removed at the earliest possible date lest secondary infection from the skin should occur. Movements, both passive and, later, slight active ones, should be instituted at an early date.

Before closing (Major Choyce continued) I should like to mention two other cases of secondary infections of joints at present in No. 19 General Hospital, which, though not pneumococcal, yet seem to me interesting. The first, a sergeant, is an object lesson on the dangers attendant on the use of beautiful gold American dental bridges. This man came in with a subacute arthritis of one knee with great effusion and pain and some elevation of temperature. In searching for a cause, we, of course, examined his beautiful set of teeth. At the edges of the bridges there was a blue line. So, having gained his consent, I removed £20 worth of work. Underneath was a collection of debris with the most appalling stench, which quite convinced the patient of the truth of my statement that it is practically impossible to keep bridges clean. His knee is now rapidly clearing up—effusion and pain have gone, and movements are returning.

The other case has caused me much speculation as to its etiology. The man was admitted with typhoid, which began with a good deal of bronchopneumonia. Then he developed staphylococcal pyelitis of one kidney, and this was followed by arthritis of one knee and hip. The effusion in the hip was sterile; that in the knee yielded staphylococci on bacteriological examination, and the same organism was found in his blood. The typhoid had been bacteriologically proved. Therefore he had both enteric

and staphylococcal pyæmia. Is it possible that the second organism gained access to the blood through a typhoid ulcer? I am glad to say that the patient recovered sufficiently to be sent to England.

DEATH AFTER NITROUS OXIDE-OXYGEN AND SPINAL ANAESTHESIA.

By WILLIAM E. ROBINSON, M.D. OXON.,
ANAESTHETIST TO THE WEST LONDON AND ROYAL WATERLOO HOSPITALS.

UNTIL I read the fatal case reported by Dr. W. J. McCardie in the *BRITISH MEDICAL JOURNAL* of July 22nd it had not occurred to me that there was a possibility of death from the continuous use of nitrous oxide gas and oxygen, so safe has it always seemed to me and so excellent a friend as an accompaniment to a spinal anaesthetic when the patient is nervous or likely to be subjected to the inconvenience of the Trendelenburg position during the operation. Yet following close on Dr. McCardie's case I have a similar fatality to report, occurring in my hospital practice on a particularly hot July afternoon.

The patient, a woman aged 45, had suffered from metrorrhagia for two years and was admitted to the Royal Waterloo Hospital for hysterectomy.

She was a fat, unhealthy-looking subject, very anaemic and very nervous. She had never enjoyed good health, having had many attacks of bronchitis. Her heart was apparently of normal size, but of this one could not be sure owing to the size of the breasts. The heart sounds were normal; there were no adventitious sounds. The pulse was small, rapid, and thready. It was not a nice case for a general anaesthetic, but one in which, in my opinion, an intraspinal injection followed by continuous gas and oxygen would give an excellent anaesthesia for the operation and a quick recovery afterwards. No morphine had been injected previously to the operation. At 3.15 p.m. I injected 0.6 c.cm. of stovaine (Billon), a solution composed of 10 cg. stovaine in 1 c.cm. of normal saline.

The anaesthetic acted almost at once, and at the same time the patient became even more pale; she was extremely nervous and begged me to give her something to send her to sleep. At 3.25, ten minutes after the injection of stovaine, I commenced giving gas and oxygen. This I give in an ordinary gas bag, into which are two tubes—one for oxygen and one for gas. After one bagful of pure gas, I turn in oxygen and gas and then start rebreathing. In this way the patient is quickly anaesthetized, and continues unconscious and of a good pink colour. The mixture in the bag I change about every five minutes. In the present case the bagful of gas was more than enough to anaesthetize the patient. I went further than usual—that is, to jactitation—but the admission of oxygen quickly relieved her, and she commenced the regular snoring breathing one is accustomed to.

The patient had meanwhile been got ready for operation; I therefore gave the signal for starting and the patient was turned into the Trendelenburg position. At the first incision the patient's blood was noticed to be extremely watery in appearance—a very pale red.

At 3.30—exactly fifteen minutes after the injection—the patient vomited. This vomit was due to the stovaine, evidence of toxicity which invariably comes on at the same time after every injection, and which usually passes off leaving the patient a little faint, but nothing more; when this period is over, I have never seen any further cause for anxiety in a subject anaesthetized in this way. The mask was removed from the patient during the vomiting, and she became partly conscious. The vomit over, I restarted the gas and oxygen, and the patient breathed beautifully, was a perfectly good colour, and apparently everything was as it should be. At 3.40, whilst the uterus was being pulled up from the pelvis, the patient again vomited. I again removed the mask and wiped out the mouth, but this time her breathing did not recover; she made a few swallowing movements, and that was all. Her colour was perfectly good; her pupils partially dilated. There was no obstruction by vomit in the larynx.

I immediately felt for heart beat, but there was none. Strychnine was at once injected, ether was poured into the abdominal cavity, and the heart was massaged through the abdominal wound.

Attempts at artificial respiration failed to arouse any response. It was clear the patient had died from syncope during the attack of vomiting, death occurring just under half an hour after the injection of stovaine, and after twenty minutes of gas and oxygen, during which there had been one break.

Post-mortem Examination.

Dr. R. C. Jewesbury reported as follows: Right lung adherent to chest wall; bases of both lungs congested. Heart large and very fat; walls extremely flabby and soft; no valvular disease. Liver very fat, weighing 58 oz. Uterus weighed 2 lb., showing a large fibroid in its anterior wall. Brain and other organs healthy.

Reviewing this case, it seems to me that the stovaine was not directly responsible for death, for the time limit when its toxicity gives cause for anxiety (fifteen minutes) had passed. The vomiting had ceased and the patient was apparently perfectly well and breathing regularly and deeply under gas and oxygen for ten minutes after this vomiting had ceased. The second attack of vomiting apparently caused the fatal attack of syncope; this vomiting was, I think, still due to stovaine, as I have seen other cases vomit a second time from this. Yet never has this second vomit been accompanied by the faintness which invariably accompanies the onset of the toxic symptoms of stovaine. It has always been in my experience more of the nature of a regurgitation—this, of course, in cases when no other anaesthetic but the spinal has been used. Shock from pulling up the uterus I consider out of court. The anaesthesia was perfect, and all sensory nerves must have been blocked.

This leaves us, therefore, with the nitrous oxide gas as more directly the cause of death. No doubt the patient's heart was acutely dilated on the induction to anaesthesia by the gas; this she recovered from, as her regular breathing and good colour showed. But, owing to her anaemic condition, the oxygen was not able to enter into her tissues to any great extent, and the nitrous oxide gas therefore acted on her heart muscle, causing it to fail at the critical moment, when, owing to the act of vomiting, there was again increased intrathoracic pressure and so a dilated right side.

Dr. Dudley Buxton throws out this conjecture in his criticism of Dr. McCardie's case, and from what I saw in my own I think he is undoubtedly right. We should, then, be guarded in our choice of gas and oxygen, for, though perfectly harmless in the majority of cases, yet given much anaemia there is a risk in adding it to a spinal anaesthetic.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

TREATMENT OF WOUNDS BY NASCENT OZONE.

THE treatment of wounds by nascent ozone is a method which has been in use for some time. Several years ago, on the advice and under the direction of Dr. Stoker (London), I treated by ozone, with complete success, a case of ethmoidal, antral frontal suppuration, in which a prominent rhinologist had advised a radical operation.

In August, 1915, when in temporary charge of a barge and tent hospital in France, I treated several wounds by this method, and in some instances the effects were extraordinary. After a very few applications the wounds, previously very septic, began to be more healthy, the discharge became much less viscid and fetid, and healing commenced.

The method of producing ozone is simple. Oxygen is passed from a cylinder through an "ozonizer." The latter consists of a glass tube containing inside it another glass tube, round which are wrapped copper wires. The copper wires are connected to a coil, accumulator, and rheostat, the latter graduating the strength of the current. As the oxygen flows through the tube and comes in contact with the wires it picks up two molecules and emerges as ozone. By means of tubing and metal Eustachian catheter it can then be applied to the wound.

I am convinced that the method is of wide application, and every nook and cranny of a deep wound can be reached in a way that no liquid antiseptic can possibly do.

Jedburgh.

JOHN JEFFREY, M.B., F.R.C.S.E.

A CASE OF ABDOMINAL OR BILOCULAR HYDROCELE.

THE following case is a good example of abdominal or bilocular hydrocele, a condition of comparative rarity.

A patient in one of the ankylostomiasis wards of the C.M.S. Hospital at Old Cairo was found to be suffering from double hydrocele. The left sac communicated with an abdominal cyst-like tumour, the size of a small football, occupying a large part of the abdomen; its uppermost limit reaching a level slightly above the umbilicus. Communi-

cation between the scrotal sac of fluid and that in the abdomen was free. On palpating the one swelling, a fluctuation impulse was conveyed to the other, and pressure on either sac caused the other to increase in tensity.

The patient, an Egyptian peasant, aged about 30, spoke of having had a swelling on the left side of the scrotum since boyhood; he referred it to an injury sustained by a slip down the muddy bank of a small waterway. He, however, suffered little inconvenience until four years ago, when the swelling on the left side of the scrotum began to increase, being followed ere long by a sensation of weight and pressure in the lower part of the abdomen; and eventually by the appearance of an abdominal tumour, which enlarged rapidly, eventually incapacitating the patient for agricultural work. The hydrocele on the right side also commenced about four years ago. After the patient had undergone a course of treatment for ankylostomiasis, the following operation was performed:

An incision about $3\frac{1}{2}$ in. long was made over the swelling on the antero-lateral aspect of the left side of the scrotum, and the hydrocele sac was delivered from the wound after having been separated from its coverings. The neck of the sac was also freed as much as possible by introducing a finger into the inguinal canal and breaking down the adhesions by digital dissection. The isolation of the scrotal portion of the hydrocele, without rupturing it, was found to be a somewhat delicate process, as the sac was almost transparent and extremely thin in several parts; but to facilitate the removal of the abdominal portion it was regarded as important to guard against the escape of the fluid contents. A vertical incision was then made $1\frac{1}{2}$ in. to the left of the middle line of the anterior abdominal wall, about $4\frac{1}{2}$ in. long, its lower end being about an inch and a half above the crest of the pubis. Skin, superficial fascia, and the anterior sheath of the rectus were incised, the rectus muscle retracted towards the middle line, and a like incision made in its posterior sheath. The anterior parietal peritoneal layer was then opened, and also the posterior layer. These two membranes were lying in apposition, the posterior layer having been gradually pushed forward by the growing tumour, the space between obliterated by pressure, and the abdominal contents pushed upwards. The abdominal locule of the hydrocele was thus found to be retroperitoneal, which, judging from reports on several other examples of the condition, is usually the case. The upper sac was freed as far as possible in every direction, the adhesions yielding easily to blunt dissection, except at one or two points. The hydrocele was tapped with a trocar and cannula, the greater part of the fluid contents removed, and the puncture tied. Slight traction and sponge dissection sufficed to complete the isolation of the upper sac, which, after the remaining fluid had been displaced, was drawn through the inguinal canal and delivered through the scrotal wound.

The fluid removed measured 90 oz. It was very rich in cholesterol. On separating the vas deferens, which stretched over a large portion of the tumour, it was found to be extremely elongated, and likewise the vessels supplying the testicle. Moreover, as the blood supply of the latter seemed deficient, it was decided to remove it with the hydrocele.

The two layers of peritoneum were repaired with silk sutures, those of the rectal sheath with catgut, and the skin and superficial fascia of both abdomen and scrotum with silkworm gut and horsehair. A small drain was inserted in the scrotal wound and left for twenty-four hours. Primary healing took place and uninterrupted recovery.

The right hydrocele was dealt with some days later, the sac being excised in the usual way.

I was assisted in the operation by my colleague, Mr. R. B. Coleman.

F. O. LASBREY, M.B., Ch.B. Edin.,
P.M.O., Church Missionary Society's Hospital, Old
Cairo, Egypt.

DR. FREDERICK CHURCHILL, of Cranley Gardens, South Kensington, left estate valued at £23,032, the net personality being £22,701.

THE New York State Legislature has passed a bill providing that all pupils in the public and private schools of the State of 8 years of age and over shall have not less than twenty minutes of physical training every day.