better condition than they were in before the operation, and they come round quickly and without discomfort. In no case of the 90 did post-anaesthetic vomiting occur, and this in spite of the fact that in a large number of the cases the operations were done for abdominal diseases of the gravest kind. In the subsequent discussion Hagemann referred to 11 cases in which the method had been used in the Greifswald clinic with satisfactory results. Claremont, Wendel, Beitmann, König, and von Sawadzki had also used it. Wendel of Magdeburg laid particular stress upon the value of infusion anaesthesia in operations upon the thorax with the hyperatmospheric apparatus; he had never seen any serious effects from the use of the method.

Technique.

Burckhardt, the originator of the method, used an ordinary infusion apparatus containing a 5 per cent. solution of ether in normal saline. He allowed enough of the solution to run in to produce surgical anaesthesia, and then interrupted the stream until the patient showed signs of coming round, when the dose was repeated. Kummel and his co-editor, Schmitz-Pföffer, soon realized that the total interruption of the stream of fluid brought with it a tendency to thrombosis in and about the cannula. To counteract this disadvantage they arranged two vessels, either of which could be put into communication with the cannula separately; one contained the ether solution and the other normal saline. The procedure followed was to run in a dose of the anaesthetic adequate to produce anaesthesia, then, in order to maintain the continuity of the stream, to continue the infusion with a slow stream of saline, repeating the process as necessary. The uneven anaesthesia produced in this way has disadvantages from the point of view of the anaesthetist as well as from that of the surgeon, and these are particularly obvious to those who have learnt by experience to appreciate the smooth anaesthesia which can be obtained with a regulating chloroform inhaler. To the anaesthetist the great objection to methods of administration by periodic doses of the anaesthetic is that there is necessarily produced a greater concentration of the anaesthetic in the blood after each dose than is essential for adequate anaesthesia. This principle has been so fully emphasized by those to whom we owe the introduction of the Vernon Harcourt apparatus that it is not necessary for it to be further laboured here. Fully aware of the importance of this principle, one recognized quite early that by the application of it the infusion method might be freed from a defect inconsistent with the best modern practice. The chief modification, therefore, which is introduced into the apparatus is an indicator rendering possible a minute graduation of the inflowing stream.

Apparatus.

A 5 per cent. solution of ether in normal saline flows from a reservoir, which is fixed 8 ft. above the floor level, through the indicator, and then through a warming chamber into the cannula, and so into the vein. The indicator consists of a cylindrical bulb with a capacity of 8 oz. When the apparatus is working, the lower half is full of the solution, while the upper half contains air. The solution flows from the reservoir into the bulb through a pipette, and drips on to the surface of the fluid below. The system being a closed one, the pressure within it is transmitted through the indicator by means of the air contained therein; hence it follows that the rate at which the solution drips from the pipette furnishes a satisfactory index of the rate at which it is entering the vein. The flow is entirely controlled by one tap placed immediately below the indicator. When once anaesthesia is established, the ease with which the apparatus is controlled leaves the anaesthetist more than usually free to watch the condition of his patient.

Method of Induction.

An hour before the induction a hypodermic injection is given, which consists of scopolamine gr. $\frac{1}{100}$, morphine gr. $\frac{1}{4}$, atropine gr. $\frac{1}{100}$.

These doses are to be regarded as typical of those required for a fairly robust adult; in other cases they may have to be modified according to the age and condition of the patient. The patient is placed on the operating table and the selected arm lightly bandaged to a splint to prevent flexion of the elbow; a few drops of eucaine having been injected into the skin, the vein is exposed through an incision of a third of an inch. The cannula having been tied in, it and the wound are packed round with sterile gauze. The strictest asepsis is, of course, preserved throughout this procedure. The solution is run in rapidly during the period of induction, which usually lasts about ten minutes.

Conclusions.

It is usually possible to attain surgical anaesthesia with the use of 8 oz. of the solution, while for the maintenance of the anaesthesia as little as a pint an hour (1 oz. of ether) is in most cases enough.

The most striking features of infusion anaesthesia are:

1. Extreme flexibility so that the condition of the patient can be adjusted with great nicety and can be changed in the direction of deepening or lightening of anaesthesia with really remarkable rapidity.

2. That the patient begins to come round very soon after the anaesthetic is stopped and is able to converse rationally within a few minutes.

3. That post-anaesthetic vomiting and pulmonary irritation are both of them extremely rare.

As might be expected in cases where the condition of the patient is extremely bad, saline infusion in itself has a beneficial effect.

In some of the earlier cases a transient haemoglobinuria occurred after the operation; since the establishment of the use of a 5 per cent. solution no such complication has been observed though it has been carefully looked for.

The accompanying table (see p. 975) gives a brief summary of the cases in which this method of anaesthesia has been used. Mr. C. W. Morris has assisted me in almost every case and rendered invaluable help. I should like to take this opportunity of thanking Messrs. Wilfred Trotter and Morriston Davies for the interest they have shown in the method and their help in elaborating the technique.

THE SYMPHYSEAL LIGAMENT OF THE PARTURIENT GUINEA-PIG.

By J. BLAND-SUTTON, F.R.C.S.ENG.,

SURGEON TO THE MIDDLESEX HOSPITAL.

PARTURITION in the guinea-pig is accompanied by an extraordinary change at the pubic symphysis. Owen described the change in this way: Prior to parturition the symphyseal ligaments become soft and extensible, and the innominate gliding on the sacro-iliac joints diverge at the symphysis. After this process the symphysis quickly returns to its former or normal state, and in a few days presents only a little thickness and mobility.¹ I have been unable to ascertain if this was an original observation on the part of Owen.

In 1902 the British Medical Association met at Manchester, and Professor Stirling communicated a note to the Section of Physiology and Anatomy entitled, Parturition in the Guinea-pig.² The very large size and relatively mature condition of the guinea-pig fetus and the narrow pelvic outlet of the female guinea-pig led Stirling to examine the condition of the pelvis at the time of parturition, and he was astonished to find the separation of the two halves of the symphysis and the wide expansion of the ligament.

Recently I endeavoured to satisfy myself on this matter. A pregnant guinea-pig was isolated and when the little

pigs were born she was decapitated. The pelvic parts are represented in Fig. 1. In this instance the ligament had

Fig. 1.—The pelvic organs of a parturient guinea-pig showing the extensibility of the symphyseal ligament during delivery.

become elongated into a wide band, 3 cm. long. In this instance only one cornu had become gravid, and this accounts for the inequality of the cornua in the figure.

After delivery the ligament contracts, and the pubes quickly return to the normal position, but the symphysis does not regain its firmness. In a female guinea-pig which has never been gravid the symphysis remains firm even after maceration, whereas in a guinea-pig which has borne young the bones at the pubic symphysis fly apart after maceration (Fig. 2). The specimens from which

Fig. 2.—The guinea-pig's pelvis. A, from a virgin; B, from a multipara.

these drawings were made are now in the museum of the Royal College of Surgeons. A microscopic examination of the symphyseal ligament from a parturient guinea-pig shows nothing to explain its extensibility.

REFERENCES.

¹ *Comparative Anatomy and Physiology of Vertebrates*, 1866, vol. ii, p. 380. ² *BRITISH MEDICAL JOURNAL* 1902, vol. ii, p. 777.

SEVENTY-NINTH ANNUAL MEETING

OF THE

British Medical Association.

Held in Birmingham on July 21st, 22nd, 24th, 25th, 26th, 27th, and 28th.

PROCEEDINGS OF SECTIONS.

SECTION OF OBSTETRICS AND GYNAECOLOGY.

Professor EDWARD MALINS, M.D., President.

PRESIDENT'S INTRODUCTORY REMARKS.

PROFESSOR MALINS said: My first duty is to welcome all those who are interested in the work of this Section; to say also that visitors are invited to take part in the discussions. I may remind you that the time allowed for the reading of papers is fifteen minutes, and for any subsequent speakers ten minutes.

In the present age we cannot, even if we would, dissociate ourselves from the spirit of progress. It is essential to our vitality, indispensable to our mental well-being. The pursuit of truth is an ever-absorbing quest; in our profession it opens to us a wide range of opportunity. We may congratulate ourselves that in the department we represent our position has been well maintained, and that our knowledge has advanced since the last meeting of our Association. Sound and substantial work is indicative of steady application, the outcome of which affects materially the success of our vocation. There is more to be done in various directions, in none more earnestly than in seeking to lessen the number of deaths in childbirth, and to diminish the amount of illness attendant upon this process—a process in itself natural, but so often binned by the penalties of civilization. We are told on high authority that “puerperal morbidity” “supplies at least one-third of all the cases which come under observation at our hospitals for diseases of women.” Are we indifferent to this? Should it reach our ears as the voice of one crying in the wilderness? Should we not rather pause to consider the seriousness of such an indictment, and lend our powers to the prevention of such evils? Should we not in striving to seek out causes also endeavour to “take arms against a sea of troubles, and, by opposing, end them”?

I cannot offer a better method of engaging in this combat than that afforded by the Midwives Act of 1902. As you know, this was enacted not without many difficulties; but by considerable patience, combined with tact, censure has been discouraged and misapprehensions corrected. By the courtesy of the secretary, Mr. G. W. Duncan, I am able to give some details of the development of the Central Midwives Board at the present date; the Board is now working upon a firm foundation with excellent results. The Midwives Roll for the year 1911 contains 31,625 names, of which number 10,408 have passed the examination of the Central Midwives Board; about another 10,000 appear from the fact of holding certificates from other bodies, such as the Obstetrical Society of London, etc. The remainder are of the old type of midwife, now generally known as the *Bona Fide*; these will gradually be eliminated, but they die hard, and often in country districts; from unpreventable reasons, are succeeded by others of the same type. Two thousand two hundred to 2,300 women annually pass the examination of the Central Midwives Board, though a proportion only of something like 55 per cent. intend to practise as midwives. The certificate is much sought after as a qualification for a post—for example, a hospital matron—and it is required in most of the Government appointments, in the army, Indian, and Colonial nursing services. At the present time the certificate is not only valuable, but it is indispensable for a maternity nurse who wishes to take a good place in the front rank of her profession.

Without doubt the efficient training and education of midwives will tend greatly to prevent the chances of