

that it will hardly return into the abdomen. The intestine is next examined, thoroughly disinfected, and returned. Should it have contracted adhesions to the fundus of the sac or to the testis it is quite easy to turn the sac inside out and undo them. When the cæcum or sigmoid flexure is herniated their relations to the sac are sometimes very embarrassing. On several occasions I have under these circumstances divided the sac transversely below the adherent intestine, closed it, and returned it with the intestine into the abdomen. In addition to the facility with which the omental and intestinal adhesions can be dealt with through the high incision I have found that it renders the resection of gangrenous intestine a comparatively easy procedure.<sup>2</sup> The damaged bowel together with a sufficiency of healthy bowel and mesentery cannot always be pulled down through the scrotal incision; also the subsequent return of the sutured intestine is difficult when the wound is in the scrotum. Both the intestine and mesentery are easily dealt with through the inguinal incision and reduction is easy with the peritoneal cavity wide open.

The strangulated bowel or omentum having been dealt with, the hernial sac calls for attention. It is divided transversely about an inch from its opening into the abdomen and its upper part separated from the constituents of the spermatic cord, transfix with a silk ligature, and tied with a Staffordshire knot. It may be difficult to separate the sac from the cord, but this difficulty is less near the mouth of the sac because at that point the cord is less adherent to the peritoneum. The fundus of the sac need not, as a rule, be taken away. It is safe to let it fall back into the scrotum. However, if the sac is small and not adherent to the cord it may be taken away. Also it is advisable to remove it in any case if it forms a bulky mass likely to distend the inguinal canal. When the mouth of the sac is very capacious it may require to be laced up with a series of sutures which transfix it and interlock with one another. An operation for strangulated hernia is not complete until an attempt has been made to effect a radical cure. In congenital hernia this is done with excellent prospects of a permanently successful result. In acquired hernia it may be advisable after awhile to order a tight truss. But even in the last case the repair of the abdominal wall adds to the safety of the patient and makes the precautionary treatment with a truss much easier.

A satisfactory radical cure could not be done through the scrotal incision. Stitches passed without the aid of vision are not reliable. But when the whole inguinal canal is laid bare each step of a radical cure is done quickly and securely. The radical cure which I perform has been described elsewhere.<sup>3</sup> Briefly it is Bassini's operation with some modifications. It comprises the following stages:—First, the neck of the sac is, as I have just said, transfixed with a silk ligature. This is tied and its ends carried with a blunt needle through the transversalis fascia, transversalis muscle, internal oblique muscle, and aponeurosis of the external oblique. Then they are tied beneath the skin so as to fasten the stump of the sac beneath the muscles of the abdominal wall opposite the outer third of Poupart's ligament. Secondly, the spermatic cord is lifted up and the back of the inguinal canal closed by uniting the internal oblique and transversalis muscles and the transversalis fascia to the deep surface of Poupart's ligament by means of silk sutures. Thirdly, the inguinal canal is closed by uniting the cut edges of the aponeurosis of the external oblique muscle, and, finally, by closing the wound in the skin. In a great number of operations I have never known the division of the aponeurosis cause any ill results. An air-tight dressing, which exerts proper pressure, is easily applied to the wound. Scrotal wounds are notoriously difficult to dress and do not permit of any adequate pressure. Nearly every surgeon has his favourite dressing. A layer of carbolic gauze which has been soaked in a 1 in 2000 solution of biniodide of mercury in water supplemented with a layer of alembroth wool and covered with an outside dressing gives good results. The outside dressing ought to be cut to fit and fastened round the pelvis and thigh with straps and buckles. The whole is secured with a spica bandage. As this operation is directed by vision it is easy to perform and unattended with accidents.

Upper Berkeley-street, W.

<sup>2</sup> A Case of Resection and Immediate Suture of Intestine, &c. Transactions of the Royal Medical and Chirurgical Society, vol. lxxvii, p. 193, &c.

<sup>3</sup> The Radical Cure of Femoral and Inguinal Hernia.—THE LANCET, Nov. 25th, 1893.

## A NEW AND EASY METHOD OF PREPARING SERUM AGAR-AGAR: AN AID TO THE DIAGNOSIS OF DIPHTHERIA.

By A. A. KANTHACK, M.D. LOND.,

LECTURER ON PATHOLOGY, ST. BARTHOLOMEW'S HOSPITAL;

AND

J. W. W. STEPHENS, M.B.,

TREASURER'S STUDENT IN PATHOLOGY.

(From the Pathological Laboratory, St. Bartholomew's Hospital.)

VARIOUS nutrient media have been recommended from time to time for the separation of diphtheria bacilli, and of these Löffler's serum agar-agar has generally been considered to be the best. There are, however, some difficulties, though perhaps slight, in obtaining the serum and in preparing the mixture. These are felt most in a busy laboratory insufficiently endowed with assistants. It is not always easy to procure serum without some or much loss of time. At a large general hospital there is always a copious supply of ascitic, pleuritic, or hydrocele fluids—albuminous exudations directly derived from the human blood—which are, as a rule, wasted after being measured into pints, ounces, and drachms. It struck us that these fluids might be used with advantage instead of serum. We soon found a ready method of preparing from them large quantities of beautifully clear and transparent agar-agar in less than an hour. We proceed as follows:—

To every 100 c.cm. of the serous exudation 2 c.cm. of a 10 per cent. solution of caustic potash must be added, thereby the serum albumin is converted into an alkali albumin which is not precipitated on boiling. To this we add 1.5 to 2 per cent. of agar-agar, previously soaked in acidulated water,<sup>1</sup> and boil the mixture in a Koch's steamer till the agar-agar is well dissolved. When this has happened the liquid in the flask will appear as transparent as if it had been cleared with white of egg. It must now be filtered through a hot-water funnel, and if a coarser kind of filter-paper be used it will generally run through very quickly and, at the same time, be marvellously clear. To the filtrate 4 to 5 per cent. of glycerine should be added. It may then be poured into test-tubes, and the contents of the latter after sterilisation will set firmly and often form a medium almost as transparent as gelatin. If the serous exudations are worked up as soon as possible after they have been received from the body the resultant agar-agar will be clear and light. Besides glycerine, 0.5 to 2 per cent. of grape sugar may be added; but we have not found that this in any way improves the medium, but on the contrary the combined presence of the sugar and the caustic alkali renders the agar-agar darker.

This serum agar-agar has the following advantages:—(1) it is quickly prepared with very little practice, often in about half an hour; (2) it is exceptionally clear and transparent; (3) its basis is derived from the human subject; (4) the serous exudations can be easily obtained, free of cost and trouble; (5) it does all that serum can do; (6) its selective action on the diphtheria bacilli is greater than that of any other serum preparation known to us; (7) its inhibitory action on staphylococci, bacillus coli communis, &c., is indeed extraordinary; (8) cultures which on ordinary media appear as uniform streaks in this medium develop as individual colonies, so that subsequent cultivation is rendered easy; (9) organisms which utterly refuse to grow on gelatin and agar-agar thrive well on this soil, and we have therewith separated certain bacterial forms which on other media have always escaped us; (10) this medium can be readily melted and be then used for the purpose of plate cultivations; the resulting plates are more transparent and drier than ordinary agar-agar plates. In a diphtheria diagnosis it has saved us a considerable amount of time, and now, after it has been tested for some months both in Dr. Klein's and our own laboratories, we feel that this short account may be of use to other workers.

We must add one word of advice. Before adding the caustic potash to the serous fluid we always boil a small quantity of it in a test tube. If it becomes practically solid

<sup>1</sup> Kanthack-Drysdale: A Course of Elementary Practical Bacteriology, Macmillan and Co., p. 90.

or contains large quantities of albumin, the fluid must be diluted with at least twice its bulk of distilled water, and then to every 100 c.cm. of the diluted fluid 2 c.cm. of KOH and 1.5 to 2 grammes of agar-agar are to be added. Unless this is done the whole mass will gelatinise and be utterly useless. This difficulty we did not recognise at first, because it is one which does not often arise. The serous exudation after the addition of the alkali forms also a good liquid nutrient medium for bacteria—useful because it is easily sterilised and because it favours the chemical activity of many pathogenetic organisms.

## FOUR CASES OF EARLY EXTRA-UTERINE GESTATION.<sup>1</sup>

By ALBAN DORAN, F.R.C.S. Eng.,  
SURGEON TO THE SAMARITAN FREE HOSPITAL.

ABOUT a year ago within the space of four months I had under my care four patients who consulted me for symptoms now very familiar to the reader of medical literature. These cases suggest a consideration of certain diagnostic features and of the justifiability of operative interference. The latter greatly depends upon the former. One case clearly required immediate operation. The second was in such suffering that surgical aid was sought and proved justifiable. The third was in a somewhat similar condition, but the patient was single, the clinical history not quite reliable, and the symptoms obscure in certain respects. The operation was, strictly speaking, exploratory. The fourth, which resembled the others in many ways, showed no acute symptoms and recovered after prolonged rest without any operation.

CASE 1.—The patient, aged twenty-five years, had been married three years and had borne one child eighteen months before operation. The periods had been regular, the last occurring fourteen weeks before the removal of the foetus. For two months several violent attacks of pain and syncope

FIG. 1.



Tubal sac, Case 1, showing position of foetus. (Specimen now in the Museum of the Royal College of Surgeons of England, No. 4695 G, Pathological Series.)

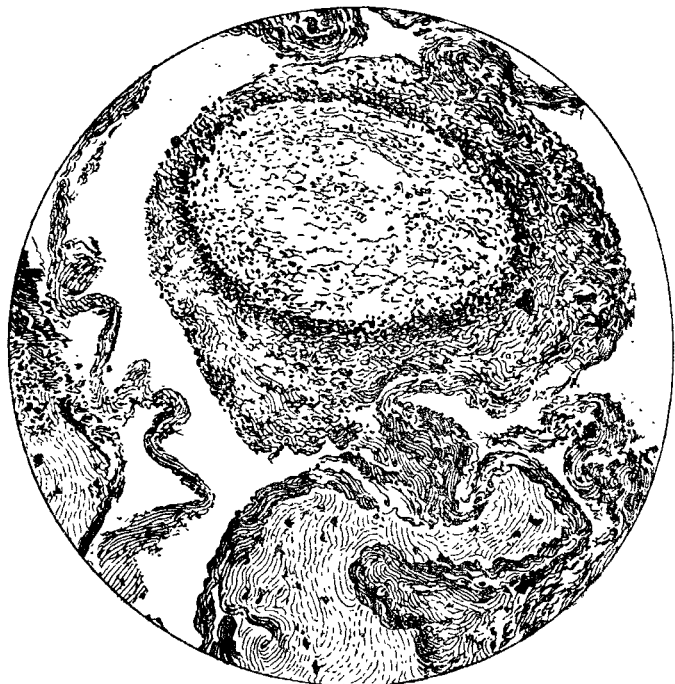
had occurred. Dr. Hubert Roberts detected a very tender swelling in the right iliac fossa pushing the uterus upwards and to the left. The patient was admitted into the Samaritan Free Hospital under Dr. Boulton. A characteristic seizure took place one night, and as she was very pale and weak I decided on operating at once, being assisted by Dr. Hubert Roberts and Dr. Walter Tate. After clearing away a quantity of clot and liquid blood I came upon a ruptured cyst bleeding very freely. A foetus five and a half inches in length protruded from the rupture. (Fig. 1.) I succeeded in making a pedicle between the right side of the uterus and the cyst, which was then removed. It had developed in the

infundibulum of the tube. I cleared out all free clots, leaving alone the half-organised coagula, which adhered firmly to the peritoneum, and closed the abdominal wound. The patient was suffering at the time from acute bronchitis, which retarded convalescence. At present, eleven months after the operation, she is in good health.

CASE 2.—The second patient was a thin, sallow woman aged forty years. She had been married fourteen years, her only pregnancy occurring a year after marriage. Usually quite regular, she missed a period, and three weeks later the right iliac fossa became tender. Two days afterwards a very severe attack of pain, with pallor and collapse, set in and radiated down the front of the thigh. Called in by Mr. Nourse of Holloway to examine her, I detected a distinct tender swelling in the right fornix. After a week's rest several more paroxysmal attacks occurred, suspicious shreddy structures were passed from the uterus, and the swelling grew larger. The temperature rose to 100.8° F. The breasts were flaccid. I operated on March 23rd, 1895, exactly a calendar month after the first attack of pain. The patient had grown very weak from the pain, but was not distinctly anæmic. I found several ounces of dark blood in the pelvis. A spherical sac of the isthmus of the tube, two and a half inches in long diameter, was plainly adherent to the small intestine and the vermiform appendix. On separating the adhesions I exposed a laceration in the upper part of the sac which at once bled very freely. The inflammatory changes had stopped the hæmorrhage. The affected tube and ovary were removed. I cleared the pelvis of clots and closed the abdominal wound. The period reappeared on the fortieth day after the operation, and the patient, who has gained flesh, has been regular ever since. Though no foetus was found the microscope confirmed my suspicions that there had been ectopic gestation. (See Figs. 3 and 4.)

CASE 3.—I am indebted for the third case to Dr. Rasch. She was a naturally anæmic Polish Jewess, aged eighteen years

FIG. 2.



Chorionic villus in clot adherent to wall of tube, Case 3. The dark border represents the trophoblast.

and unmarried. After suffering cruel privations from sudden expulsion from the Russian Empire she settled in the East-end with her mother, who one night scolded her for coming home late and expressed suspicion about her conduct. The girl flew into a passion and stamped on the ground, upon which a paroxysm of intense pelvic pain set in. Another attack came on a few days later with a show of blood, which she believed, or wanted others to believe, to be a period. Dr. Rasch discovered a painful swelling in the right iliac fossa. A free show of blood began about a month after the first attack of pain. Rest was of no avail. I operated on Jan. 8th, 1895. After separating the adherent omentum, small intestine, and vermiform appendix I drew up a cyst of the infundibular part of the right tube full of tarry blood and about three inches in diameter. The rest of the operation was easy; a good pedicle could be made as there was

<sup>1</sup> Read at a meeting of the Medical Society of London, March 23rd, 1896.