thought not quite so efficient as zinc chloride, which has now been used seven times on six animals without once failing. Several other escharotics were thought of, but as the zinc chloride seemed to answer so well they were not tested.

The interval between the operation and the separation of the slough has not been quite definitely fixed. At 16 hours it was on the point of giving way. At 48 hours it was entirely removed, and strong union was present all round the opening. There were no other cases bearing upon this point.

The character of the union was very good in all the cases. The continuous suture was thoroughly embedded in a firm adhesion of plastic lymph which left nothing to be desired on the score of safety.

It has been difficult to decide as to the permanent efficiency of the anastomosis in dogs. In one the duodenum was divided, and gastro-enterostomy performed at the same sitting. The animal died at the end of two days from gangrene of the distal end of the duodenum, due presumably to division of the gastro-duodenal artery. Another in which the duodenum was greatly narrowed thrived well, but it seemed probable that some of the gastric contents continued to pass by the natural way, though the constriction of the bowel was sufficient to have produced dilatation above it. In a third, contraction of the pylorus was effected by destruction of the mucous membrane with zinc chloride, gastro-enterostomy being delayed until symptoms of pyloric obstruction were marked. After a few days' relief the severity of the symptoms increased, and the operation was a failure. At death a fortnight later the anastomosis was present, and would admit a little finger. It had either been made too late, or too small, or in a bad position, for it was high up near the lesser curvature towards the cardiac end. Probably all three conditions contributed to bring about failure. In this case the external coats of the stomach were incised only, and not cut out as I would now recommend, and the original incision itself was too small. Probably to get an orifice half an inch in diameter after complete recovery has taken place, one must operate on an area of twice that extent, and the loss of tissue should involve all the coats of the stomach if subsequent contraction is to be safely guarded against.

There was no evidence of regurgitation of intestinal contents into the stomach in any case. All the gastro-enterostomies were anterior, and in my limited experience in dogs and men this has not occurred in the anterior operation, though it did in one or two cases of the posterior operation in dogs which I performed in 1892.

In conclusion, I may say that I feel satisfied as to the safety of the operation I have proposed, and I believe there is a fair prospect that it will prove successful in effecting a satisfactory lateral anastomosis. The result of Murphy's operation in exhausted patients is sufficiently discouraging, in my judgment, to exclude it in this class of cases, though it is very successful under more favourable circumstances. I shall therefore feel justified in employing this method for my next gastro-enterostomy.

REFERENCE.

¹ *Liverpool Medico-Chirurgical Journal*, No. 1, p. 160, On Some of the Most Remote Effects of Syphilis.

THE OCCURRENCE OF MENSTRUAL SECRETION IN THE FALLOPIAN TUBES IN THE HUMAN SUBJECT AND ITS SIGNIFICANCE.

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I have published in the *Journal of Physiology* for February, 1898, a preliminary note on certain observations bearing on the normal and pathological secretions of the uterus and Fallopian tubes in the human female and in some of the mammalia. In the present communication I wish to draw attention to the subject as far only as it affects the human subject, and especially to the occurrence in some cases of a menstrual secretion in the Fallopian tubes.

Three years ago, on cutting across a Fallopian tube removed with the ovaries for uterine disease on the first day of the menstrual flow, I was struck by the fact that the tube contained a quantity of blood-stained mucus resembling

menstrual fluid. Further observations were then carried out on cases operated on during the menstrual periods. Immediately after removal the tube was cut across near the uterine end, and the contained fluid, which exuded on gentle pressure from the cut end, examined both in the fresh state, and by means of dried films stained with logwood and eosin.

Fig. 1.—Film preparation of normal menstrual fluid from the external os on the second day of menstruation. Stained logwood and eosin. $\frac{1}{2}$ obj. A. Leucocytes. B. Red blood corpuscles. C. Altered epithelial cells.

Portions of the tubes immediately after removal were also hardened in formol 5 or 10 per cent. solution, and sections cut and stained with the same reagents.

Fig. 2.—Film preparation of fluid from Fallopian tube on third day of menstruation. $\frac{1}{2}$ obj. Stained logwood and eosin. A. Leucocytes. B. Red corpuscles. C. Epithelial cells.

It is, of course, necessary to exclude all cases in which at the time of operation the tubes are evidently diseased; and in which there had been peritonitis with obliteration of the infundibular ostium and distension with either blood, serum, or pus. Consequently the observations have been limited to those cases in which the tubes appeared to be, and indeed were, healthy, and on which the operation was performed for other conditions, such as fibroids or cystic or diseased ovaries, etc.

In four such cases, in which the tubes were removed and

examined on the first, third, fourth, and fifth days of the menstrual flow respectively, the contents were blood-stained mucus, while in healthy tubes removed in the intermenstrual period, the contents were either clear, or slightly opaque mucus from the admixture of epithelial cells. The secretion itself is apparently identical with menstrual fluid. To the naked eye it

Fig. 3.—Transverse section of Fallopian tube, third day of menstruation, $\frac{1}{4}$ obj. Stained logwood and eosin. Lumen of tube occupied by mucus and blood corpuscles, with very numerous leucocytes. A. Mucus and blood.

is a viscid purple-coloured fluid, like a mixture of mucus and venous blood.

Under the microscope it consists of red blood corpuscles

Fig. 4.—Same section, $\frac{1}{4}$ obj. A. Leucocytes.

and a variable quantity of leucocytes, some epithelial cells in various stages of mucoid degeneration. The number of leucocytes varies; in one case examined on the third day of the flow, and in which marked clinical symptoms of dysmenorrhœa had been present, the leucocytes were very numerous.

A specimen of menstrual fluid removed from the external os on the third day of the flow in a healthy person, and examined for comparison, showed the same characters as the fluid removed from the tubes. Transverse sections across the uterine third of the same tubes show the following conditions of the mucous membrane. In addition to the mucus and

blood which occupies the lumen, and is entangled amongst the villous processes, the tubal mucosa itself is altered; the fringe-like processes of membrane which cover the rugæ or villi are swollen and thickened in transverse diameter, and are infiltrated with leucocytes which can be traced passing in from the muscular and submucous coats, up the villi, and

Fig. 5.—Transverse section of Fallopian tube, second day of menstruation, obj $\frac{1}{4}$. Stained logwood and eosin. A and B. Mucus and blood covering the fringes and occupying lumen of tube.

between and among the ciliated epithelial cells. The epithelium itself is not shed or absent to any extent, but many cells show signs of mucoid degeneration.

On the other hand, in the intermenstrual period the leuco-

Fig. 6.—Same section, $\frac{1}{4}$ obj. Two of the villi, highly magnified. Shows marked leucocytic infiltration of villi. Mucoid degeneration of some epithelial cells A, and mucus and blood in the tube B and C.

cytes are few in number, the villi are shrunken, and consist only of an epithelial covering on the fibrovascular pedicle, and no red blood corpuscles are found free in the lumen of the tubes. Thus, increased blood supply, turgid vessels, and a marked leucocytic infiltration, with escape of red and white blood corpuscles, are the chief characteristics of the changes in the tubal mucosa at the uterine third during menstruation.

As stated above, the tubal secretion was found bloodstained on the first day of the external appearance of menstruation; it continued so throughout the period, and in one case,

examined twenty-four hours after the cessation of the flow externally, but in which the uterus (removed) still contained some bloody mucus, the tubal secretion was free from blood, thus suggesting that the menstrual process begins in the tubal membrane, and spreads downwards to the uterus, and ceases in the like order.

The presence of bloodstained mucus-like menstrual fluid in the lower portions of the Fallopian tubes during uterine menstruation having been thus shown to occur in some cases, the question arises whether it originates in the tubes, or is due to backward regurgitation from the uterine cavity.

This latter is a conceivable explanation, especially as in some of the cases in which the tubes were removed mechanical conditions, such as retroversion, were present, which might possibly favour such a process. Against this explanation is the fact that:

1. The secretion appears so early in the tubes coinciding with or even preceding the appearance of the flow externally.
2. That definite changes are found in the Fallopian mucous membrane itself.
3. Examinations of the uterus in women dying during menstruation are not common. But in a case of a young girl with healthy uterus in which at the *post-mortem* examination made ten hours after death the uterus contained menstrual fluid, blood-stained mucus was also found in the Fallopian tubes.
4. In cases of imperforate hymen with uterine distension, backward regurgitation does not occur, as a rule, into the Fallopian tubes unless there be infection and the contents be purulent.
5. Experimental evidence derived from the study of the subject in animals shows that no backward regurgitation from uterus to Fallopian tubes occurs; this forms the subject of further research, and will be brought forward later.

Assuming, then, that the fluid originates in the Fallopian tubes as a true Fallopian menstruation, this at first sight seems at variance with the established fact that the fluid of a hydrosalpinx, or the accumulated secretion in a blocked and distended tube is a colourless watery fluid containing no blood. I have, however, ascertained that such fluid contains a very large percentage of chloride of sodium in solution; this has a marked effect in breaking up red corpuscles and liberating hæmoglobin, which may be thus absorbed. Possibly, also, a very slight increase of intra-tubular pressure, if constant, such as would arise early in a commencing hydrosalpinx, is sufficient to arrest the menstrual process in the very delicate tubal mucosa.

A case also occurs to me in which, after an abdominal section for tuberculous peritonitis in a young girl, a sinus remained, leading down to the pelvis. In this case the uterus was healthy, and there was no stenosis of os, or retroversion. A bloodstained discharge, menstrual in character, however, appeared at the sinus at the beginning of the menstrual period on several occasions until the sinus closed. This must have come from the open end of the Fallopian tube. Whatever be the true explanation, however, of the presence of blood in the Fallopian tubes in the human female during menstruation, a somewhat prolonged inquiry in the case of the lower mammalia, which I hope to publish later, has demonstrated the fact that in these cases the tubal mucosa as well as the uterine participates in the increased vascular engorgement, the increased leucocytosis, and the increased secretion, the three factors which accompany ovulation, and constitute the essential characteristics of the periods of sexual activity.

There are other interesting and suggestive points in the normal uterine and tubal secretion in animals, both in the ordinary condition, in pregnancy, and in artificial conditions experimentally produced, which have come out in the course of this investigation, which I hope to publish elsewhere, and of which a preliminary note has appeared in the *Journal of Physiology*.

The occurrence of menstruation in the Fallopian tubes has an important bearing on certain points in human pathology. It is, for instance, possible that an abnormal menstruation in a tube may predispose to the occurrence of extrauterine or tubal pregnancy by providing a surface on which the ovum in its passage through the tube may become grafted. It is I think likely that much of the pain of dysmenorrhœa is tubal in origin, and due to tubal colic, or

efforts to expel the tenacious bloody mucus, especially in those cases in which the pain precedes and coincides with the first day or two of the establishment of the flow. It may also throw light on certain cases of recurring local pelvic peritonitis in which the inflammatory process is started by exudation from the fimbriated opening of the tubes of tubal secretion at the menstrual period, even in the absence of gonorrhœa and other infective processes.

The occurrence of tubal menstruation, too, has an important bearing on certain cases of hæmato-salpinx, in which careful search fails to reveal the presence of any tubal pregnancy.

THE ACTION OF THE VAGINAL PLUG IN ACCIDENTAL HÆMORRHAGE.*

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ACCIDENTAL hæmorrhage is one of the few complications in midwifery concerning which a marked disagreement as regards treatment exists. Before discussing this question, however, it is well to draw a distinction between those hæmorrhages associated with an atonic uterus and those not so associated.

In the absence of labour, the diagnosis between these conditions may present some difficulty; but should labour be in progress, the presence or absence of a contracting uterus will at once decide the point.

If labour pains are strong and the os dilated the prognosis is decidedly good, and to rupture the membranes or turn and bring down a foot will as a rule suffice. Forceps may at times be indicated, and even *accouchement forcé* can under the circumstances be often successfully accomplished. But in the presence of an atonic or inert uterus with a long uncontracted cervix and a partially-opened os, how can we hope to improve matters by any of the above proceedings?

Rupture of the membranes, with or without podalic version, does not excite the uterus to contract for many hours; the hæmorrhage, therefore, is most likely to continue, and the operator, in spite of his better judgment, is not infrequently compelled to employ forcible dilatation of the cervix and rapid delivery.

In doing this, the cervix is liable to be torn, and large branches of the uterine artery to be laid open, but even should the latter accident be avoided, the performance of forced delivery produces a condition of shock which proves but too frequently greater than the patient can bear. It is no exaggeration to say that the performance of Porro's operation even would, under the circumstances, be a less hazardous proceeding. In the vaginal plug, however, we have an alternative to the above line of treatment capable, I believe, of obviating the worst dangers arising from accidental hæmorrhage.

It is curious to note that on few devices has greater obloquy been heaped than on this, and yet it seemed to Dr. Smyly during the latter years of his Mastership in the Rotunda Hospital to present fewer disadvantages than any other proceeding, and accordingly it became the "routine" treatment in that institution. Dr. Smyly dealt with this subject in a paper read before the Obstetrical Section of the British Medical Association at the annual meeting held in Bristol, and in it maintained that a properly-applied tampon prevented external bleeding, excited labour pains, and induced rapid dilatation of the os, this latter taking place without any fear of laceration or loss of its single layer of epithelium so necessary to it, as a barrier against germ invasion. He also stated that in the event of concealed hæmorrhage still flowing, the intrauterine tension would thereby be increased, and a greater and greater difficulty would thus arise against a systemic leak, and that this would be more readily brought about were a tight abdominal binder also applied. He did not advocate the plug save when the membranes were intact, a condition of course found in the majority of cases.

Few I think will deny any of the claims so far made in

* Read before the Section of Obstetrics, Royal Academy of Medicine in Ireland.