uterus. The peritoneal flaps were stitched together, the cavity carefully dried, and the abdominal wound closed.

She made an uninterrupted recovery and went home at the end of a fortnight. On slitting the uterus up a mass of sloughing tissue was seen half embedded in the wall, and half projecting into the uterine cavity. It was about the size of a small Tangerine orange. The half of the uterus containing the sloughing tumour was sent to the Clinical Research Association, and the following report was furnished: "This is a malignant growth arising in the endometrium and having the characters of a round-celled sarcoma. It is made up of rather large cells enclosed in a delicate stroma with thin-walled vessels, and is infiltrating the muscle. It is not in the least like a fibromyoma."

Hart and Barbour state that sarcoma of the uterus is extremely rare. Gessner in his article on sarcoma uteri, in Veit's *Handbuch d. Gyn.*, states that he found only 18 sarcomata in 9,133 cases. Roger Williams found only 2 sarcomata in 2,649 uterine tumours.

The diagnosis of the condition is not easy. In this case pain at intervals was a marked feature, and was of the character described by Gusserow as "intense and rending." Clay and A. R. Simpson, however, state that the absence of pain is a marked feature of sarcoma as opposed to carcinoma.

The absence of the "free rice-water discharge" was noteworthy, though during the later stages the blood-clot-like masses which were expelled would probably have shown sarcoma cells if they had been microscopically examined. The peculiar cachexia certainly suggested malignant disease, but the excessive loss of blood and severe attacks of pain appeared to account for that condition. Had I suspected malignancy at the time of operation I would certainly have done total hysterectomy.

THE AUTOPLASTIC OVARIAN GRAFT AND ITS CLINICAL VALUE.*

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A YEAR ago I showed before the Birmingham Branch of the British Medical Association a patient upon whom I had performed heteroplastic ovarian grafting—that is, the transplantation of the ovary from one patient to another. Shortly after reading this paper an opportunity occurred of trying the effect of an autoplasmic graft; in other words, the transference of ovarian tissue from its normal position in the pelvis to a site elsewhere in the same subject. The result of this experiment has so far been entirely successful.

The details of the case are as follows:

The patient, aged 29, was sent into the General Hospital, Birmingham, by Dr. Branday of Handsworth on April 3rd, 1912, with a history of repeated attacks of pelvic inflammation. The woman had been confined to bed for one or two months with severe pain during each year for the three years previous to admission. Dysmenorrhoea had been severe for the last two years, following the birth of her last child. During this time the catamenia had been regular.

On admission the patient looked anaemic and ill and was considerably wasted. Bimanual examination showed that the uterus was fixed by adhesions, and that a very tender rounded swelling was present in the region of each uterine appendage, occupying the corresponding posterior quadrant of the pelvis.

Operation.

On April 4th, 1912, I performed laparotomy through a vertical 4 in. incision over the right rectus muscle, and found both uterine appendages in a condition of severe chronic inflammation; in fact, far too advanced for any conservative measures to be employed. The right ovary was the seat of a suppurating leucine cyst, the size of a small orange and was firmly adherent to the corresponding Fallopian tube. The left ovary was strongly bound down to the left tube and had to be removed with the latter, which was also chronically inflamed. The uterus, although presenting numerous adhesions on the peritoneal aspect, appeared normal, and was left *in situ*. Both uterine appendages were removed, but before the abdominal wall was closed, a portion of the left ovary was grafted into it. The healthy half of the organ was cut into minute fragments, and these were scattered into the sub-peritoneal connective tissue and within the rectus muscle and rectus sheath. Care was taken never to remove the grafted material from the body fluids. Until it was required, it was

allowed to remain in Douglas's pouch. The abdominal incision was closed in layers and no antiseptics were applied to the wound.

The patient made an uninterrupted recovery and the incision healed by first intention. No undue tenderness has been noticed by the patient in the line of the incision either during convalescence or since.

After-History.

The after-history of the patient is quite satisfactory, and it appears certain that some of the ovarian grafts have established themselves and are functioning. I heard no more of her until the end of January, 1913, when I communicated with Dr. Branday, and he very kindly made arrangements for me to examine her. The patient told me that she had not suffered from any "flushing," palpitation, or nervous phenomena usually associated with the artificial menopause. The most important evidence, however, consists in the menstrual history since operation. The first period occurred from April 6th to 16th, 1912, commencing two days after the operation, when it was normally due. The next period began two months after leaving the hospital and lasted ten days. The following period occurred three months later, lasting six days. On January 12th, 1913, a normal period occurred, and on February 13th uterine haemorrhage again commenced. The last three periods have occurred at monthly intervals, and it appears, therefore, that regularity is established. During the catamenia rather severe headache has been present, but this has not been noted at other times. No dysmenorrhoea has occurred, and there has been no tenderness in the abdominal scar during the periods.

Inquiries as to the sexual life since operation showed that no dyspareunia is present, and that the sexual functions are exercised in a perfectly normal manner.

The case has not been recorded until almost a year after the operation in order that a fair estimate might be made of the result. So far this is as satisfactory as could be desired. Various criticisms may, of course, be urged against the acceptance of the graft as the cause of success. It is well known, for example, that even after double oophorectomy menstruation may continue for a few months. It rarely continues, however, as long as ten months after the operation, and furthermore, the periods progressively decrease in duration. In the present case there is certainly no diminution, and, if anything, the flow is excessive. Again, it may be asked whether the uterine haemorrhage is really of the nature of menstruation. The periodicity and the association of moulins in the form of headaches certainly strongly favour this view. The point may be settled by an examination of the menstrual fluid, and the demonstration in the same of an excess of calcium salts and absence of fibrin. This investigation will shortly be undertaken. Another criticism may be offered in the suggestion that all ovarian tissue was not removed from the pelvis, and that it is particularly easy to leave a portion or an accessory ovary when numerous adhesions are present. In the case here recorded I am inclined to think that this fact need not be entertained. The uterine appendages were removed without difficulty, the right ovary was replaced entirely by an abscess cavity, and the left organ was adherent to the corresponding Fallopian tube only and not to the neighbouring viscera. At the time a careful search was made for any displaced ovarian tissue or accessory ovary, and none was seen as far as macroscopical appearances were concerned.

Literature.

The subject of ovarian grafting is a fascinating one, and I am convinced that it can take a very definite and important place in gynaecological surgery. The literature upon the subject is scattered, but is yearly increasing in amount, and a sufficient number of authentic cases are now recorded to prove that autoplasmic grafts can be successfully made, and that for a time at least they will functionate. The work of Scott Carmichael of Edinburgh,¹ Higuchi of Tokyo,² Nattrass of Melbourne,³ and others, has proved that in animals, especially in the dog and rabbit, it is possible to transplant ovarian tissue, and that the grafts are usually successful in producing the specific internal secretion. Nattrass's³ experiments are extremely important in this respect. He was able in the case of the rabbit to transplant ovarian tissue into the subcutaneous tissues, and on to the peritoneum, kidney, spleen, and periosteum. At first, fatty degeneration of the stroma cells takes place, and it appears that this occurs in inverse ratio to the vascularity of the tissues into which the graft is made. When the tissue is examined at a later period, absorption and repair of the pathological products has occurred, and the production and maturation of Graafian follicles takes place. That the transplanted organ exerts its influence

* A paper read before the Birmingham Branch of the British Medical Association.

over the sexual function has been proved by the same author in the case of a fox-terrier bitch, in which oestrus was observed several times, and the ovary was found to contain large Graafian follicles 370 days after the grafting had been performed.

Evidence is not lacking, moreover, that grafting may be successfully accomplished in the human subject. Franklin H. Martin⁴ has published the histories of six patients who continued to menstruate after transplantation of the ovaries; and Davidson⁵ has recently recorded before the Edinburgh Obstetrical Society the case of a patient who began to menstruate three months after the operation and has continued to do so since without either local or pelvic pain. To those interested in the subject the valuable monograph of Sauvé,⁶ published in 1909, may be recommended as containing a full account of the history and earlier experiments in this field of investigation.

"Seedling" Grafts.

In almost all cases recorded in the literature, with the exception of those of Scott Carmichael, the graft has consisted of the whole or a very large portion of the ovary. I am inclined to think that much greater success will attend the use of small portions of tissue, as is done in the case of the thyroid and other glandular tissues. Because the ovary is a small gland, it does not necessarily follow that it can be lifted bodily and placed in a new position. The vitality of the tissue is much more likely to be maintained if "seedling" grafts are made. Furthermore, the chances of success are proportionately increased by the number of grafts made.

Site of Implantation.

As regards the site of implantation, my own preference is for the rectus muscle and subperitoneal tissue. The reasons for this are as follows: In the first place, a good vascular supply is assured; secondly, the grafting may be most easily accomplished in this position, and involves very little increase in the time of the operation; lastly, should the graft require removal at any time, either from late suppuration or the development of a neoplasm, it may be reached easily and without the risk of opening the peritoneum. Further observation, of course, must show in what proportion of cases it is necessary to interfere at a later period for morbid changes occurring in the graft. So far as published records point, this eventuality is extremely slight.

Indications.

The indications for ovarian grafting will naturally be limited. One of the most important uses for the operation is indicated in the case recorded earlier in this paper—namely, as a conservative measure when it is necessary in a young woman to remove both uterine appendages for old-standing inflammatory disease without having to sacrifice the uterus.

Opinions will undoubtedly differ as to the proportion of cases in which this is possible. Undoubtedly a large number of cases occur where the uterus has to be removed with the appendages. Nevertheless, it is remarkable sometimes how rapidly and completely adhesions disappear when the inflammatory foci in the tubes and ovaries are removed. Furthermore, observations that I have recently made upon the bacteriology of the uterus in cases of chronic pyosalpinx have led me to believe that the endometrium is, as a rule, sterile, and therefore I have no compunction in leaving the uterus in such cases, especially when it may be possible to graft ovarian tissue into the abdominal wall. Another indication which I put forward as a suggestion is the possibility of transplanting fragments of ovarian tissue in cases of severe dysmenorrhoea. Instances of most intense menstrual pain undoubtedly occur where the source of discomfort lies, not in the uterus, but in the ovaries. Curetting and drugs rarely cure such patients, and if an examination is conducted during the height of the attack the ovaries can frequently be palpated as extremely tender bodies occupying the posterior quadrants of the pelvis. In more than one case oöphorectomy has been and is still practised for this condition, and I know of instances where panhysterectomy has been performed. A cure is undoubtedly effected thus, but may not it be possible to bring about the same result without unsexing the patient, by substituting ovarian grafting? Many of these patients are young women, and

it appears more rational to attempt a cure by conservative measures rather than acknowledge the failure of our art by subjecting the patient to a radical operation in which she loses those very organs which produce the hormones characteristic of her sex.

Conclusions.

In conclusion may be summarized those points which I regard as essential to the success of a grafting operation:

1. Absolute asepticity and the avoidance of strong antiseptics which would destroy the vitality of the tissues. The apparent contradiction to this maxim in the case of chronic pyosalpinx and salpingo-oöphoritis is met by the fact that the pus in such cases is usually sterile, and the tissues may be treated as surgically "clean."

2. The employment of minute or "seedling" grafts.

3. The presence of a good vascular supply in the tissue used as the bed for the graft. Muscle is entirely satisfactory for the purpose.

4. The ovarian tissue should be left in contact with the body fluids within the peritoneal cavity until it is required for the purposes of the grafts. In the case recorded in this paper the ovary was placed in Douglas's pouch until the time arrived for closure of the abdominal wound.

The object of this communication will have been attained if it serves to draw attention to the investigations of the various workers in this field throughout the world, and to the possibilities that underlie the wider adoption of the principle. Laboratory researches have already demonstrated the success that may be obtained, and it now remains for the gynaecological surgeon to apply these results, to glean fresh details from the after-results of his operations, and to formulate indications for the future employment of this branch of our art.

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NOTES OF A SUPPOSED CASE OF PELLAGRA.

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The patient, James K., is a farmer, aged 66, residing some five or six miles from Belfast. He has generally been healthy, but has been liable all his life to frontal headaches, lasting one to two days, with relief after vomiting. For the past three or four years he has consulted Dr. Reid during spring and autumn for a dermatitis resembling eczema on the back of his hands and on the chin and parts about the mouth. This spring and summer the condition became much worse, especially on the hands; the back of the hand down to the finger-tips became brawny and much darker in colour; they had, he said, been black since May, and the discoloration had been most marked during the fortnight before he came under observation; the palms were free; there was desquamation at intervals of the skin of the nose and chest, and Dr. Reid suspected pellagra. The patient was seen by Dr. Calwell on July 15th, 1913, and subsequently in hospital in his skin clinic.

The patient's intelligence is good, but his memory had recently failed and he was apt to worry unduly about trifles; he was rather feeble in bodily health; although always spare, he had recently become thinner and was somewhat nervous; his gait was shuffling, his steps short, and his movements stiff; the right pupil was smaller than the left, and both reacted to light; there was no rigidity; the knee-jerk was feebly marked in the right leg and absent in the left. The back of the hands was darkish brown, as if stained with walnut-juice, and where