THE

# PATHOLOGY AND TREATMENT

OF

# DISEASES OF THE OVARIES;

BEING

The Hastings Prize Essay of 1873.

BY

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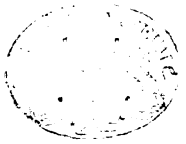

My dear Crichton Browne,

I dedicate the reprint of this short Essay to you, because I owe you more than I can ever repay, for encouragement and opportunities for experience in the early years of my professional life.

Yours faithfully,

LAWSON TAIT.

*Birmingham, June 12th*, 1874.

# ON THE PATHOLOGY AND TREATMENT OF DISEASES OF THE OVARIES.

BEFORE discussing the pathology and treatment of diseases of the ovary, even in such limits as this essay must be restricted to, it is necessary that some account should be given of the anatomy and physiology of the gland; for, in proportion as our knowledge of normal processes has grown, the riddles of pathology have come nearer to our understanding. For interest, there is, perhaps, no gland in the body which surpasses the ovary; for, though it may be of comparatively little importance to the life of the individual, yet it and its functions may well be said to be the pivot on which our race depends. Even in the individual, though life may be endangered only in a certain class of ovarian diseases, yet the frequency of, and the discomfort attending, all the others are enough to exalt the gland into a structure of extreme importance.

The human ovary makes its appearance as a blastema on the Wolffian body about the seventh week of intrauterine life, this early part of its existence being absolutely identical with that of the testicle; and, though throughout its after history it has many differences from the male gland, yet it has so many resemblances to it, in anatomical structure, physiological purpose, and pathological change, that we are perfectly justified in going back to the ancient notion that it is the "testis muliebris", differing in its process of development from the testicle by undergoing fewer changes in growth and position; it displays what the other sexual organs also show, that the development of the male organs is an advance to a higher process than is seen in those of the female. It has its gubernaculum, though its function is limited; an excretory duct, differing from that of the male in being only occasionally attached to the gland; and a peritoneal investment, practically the same, though differing in detail from that of the testicle. One distinguished writer has

further drawn a difference between these two glands, in that "the developing cells of the ovary are plastic or endermic, while the spermatic cells of the testis are epidermic". This view has really no sound meaning; for, seeing that the glands are originally identical, that they both carry on their functions by the formation and shedding of epithelium, and that it is only in these processes that they differ, it is impossible to give to them any difference in function. They are closely analogous even in their diseases, as we shall see; for, even in their malignant affections, the two great classes of cancer and cystic degeneration are conversely arranged, as might have been expected from the difference in the physiological processes. Thus cancer of the testicle is common, for the epithelial proliferation of that gland is rapid, and cystic degeneration is conversely rare; cystic degeneration in the ovary, on the other hand, is common, because the epithelial growth of the gland is one of slow cyst-formation, and cancer is correspondingly unusual.

In its development, the ovary becomes enclosed in a fold of peritoneum, known as the broad ligament of the uterus. Recent German writers, especially Waldeyer and Leopold, have asserted that, on the posterior surface of the ovary, the peritoneum does not exist. If so, it has become incorporated with the underlying coat, the tunica albuginea of after-life, for it must have that covering derived during its developmental transitions. A further analogy between the testicle and ovary has been asserted by Pflüger, that it has originally a tubular structure, and there are facts in comparative anatomy which support this view.

The ovaries at birth occupy the same relative anatomical position as they maintain in health throughout life; and they have, further, their peculiar physiological function, which they also continue to exercise, though its activity varies greatly at different stages of life. They are situated on a level with the inlet of the true pelvis, behind the Fallopian tubes and round ligaments. The left ovary is in front of the rectum, and the right in relation to a coil of small intestine which may occupy Douglas's pouch. They are outside the peritoneum really, that membrane, or its remaining epithelium, being ruptured at the escape of every ovum, and they are situated between the folds of the membrane, one on each side of the uterus, their posterior surfaces standing out beyond the plane of the broad ligament. They are attached to the uterus by a ligament of contractile tissue derived from the uterus and termed the ovarian ligament, and they are supplied by blood-vessels and nerves between the layers of the broad ligament, the blood-vessels corresponding in origin and distribution to the blood-vessels of the testis—the spermatic; and

the nerves are derived chiefly from the renal plexuses of the sympathetic. The size of the ovaries varies with the different periods of life, and, to a less extent, so does their distance from the uterus. Henning's table of measurements is given below, the chiefly noteworthy fact given there being that the ovary is largest in the first six weeks after parturition. This may have been due to some pathological condition in those examined; but in connection with this it is curious to note the statements of horse-breeders, that a mare is more readily impregnated soon after the birth of a foal than at any other time.

*Henning's Table of the Size and Position of the Ovaries at different Periods of Life and in various Social Conditions, in Centimètres.*

| — | | Childhood. | Virgins. | Unchaste. | Married. | Multipara. | Puerperal. | Widows. | Divorced. | Menopause. | Old Age. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Length of the ovary | Right.. | 1.3 to 3.2 | 3.8 | 3.4 | 3.0 | 2.5 | 4.4 | 3.5 | 3.5 | 3.1 | 2.9 |
| | Left.... | | 3.7 | 3.8 | 2.8 | 2.4 | 5.5 | 3.2 | 3.1 | 2.5 | 2.7 |
| Breadth „ „ | Right.. | 0.2 to 1.4 | 1.9 | 1.8 | 1.7 | 1.2 | 1.3 | 1.6 | 1.4 | 1.5 | 1.1 |
| | Left.... | | 1.5 | 1.7 | 1.5 | 1.2 | 1.4 | 1.7 | 1.4 | 1.4 | 1.0 |
| Thickness „ „ | Right.. | 0.2 to 0.6 | 1.0 | 0.9 | 1.0 | 0.8 | 0.8 | 0.8 | 0.9 | 0.8 | 0.8 |
| | Left.... | | 1.0 | 0.9 | 0.9 | 1.1 | 0.9 | 0.8 | 1.0 | 0.8 | 0.9 |
| Distance from the uterus ..... | Right.. | 1.0 to 4.0 | 3.4 | 4.4 | 4.7 | 5.5 | 8.0 | 3.8 | 4.0 | 4.0 | 4.0 |
| | Left.... | 1.2 to 3.7 | 3.3 | 4.5 | 4.7 | 5.0 | 7.0 | 4.2 | 4.2 | 3.7 | 4.5 |
| No. of cicatrices .. | Right.. | 0 | 6 | 14 | 21 | 22 | 8 | 24 | 17 | 15 | 14 |
| | Left.... | 0 | 9 | 13 | 21 | 21 | 8 | 26 | 18 | 24 | 11 |

Underneath the peritoneal covering of the ovary is the fibrous capsule, the tunica propria or albuginea, composed of ordinary fibrous connective tissue, and sending trabeculæ in all directions into the interior of the gland. Beneath this tunic is the "couche ovigène" of Sappey, which seems, however, to be only a layer of more active or more mature cells of the same kind as are found throughout the gland. These cells undergo a peculiar growth, enlarging, coming to the surface, and rupturing either under the influence of, or simultaneously with, menstrual excitement, when their contents are usually discharged into the uterus by the gland-duct; or this happens independently of such influence, when the contents are lost in the peritoneal cavity.

This peculiar cell-growth of the ovaries results in the formation of what are known as Graafian vesicles or the ovisacs of Martin Barry, and, although certain and specific names have been given to the different results of the process, it differs really only in degree from what takes place in any other epithelial gland. The Graafian vesicle is but a cell, the product of a gland formed, as all glands are, of basement-membrane,

blood-vessels, and epithelium. The cell bursts and discharges its nucleus, as other cells are seen to do, but that nucleus has specific powers and goes through specific processes under certain circumstances, differing in this from all other cells. The gland, therefore, and its cells, having more highly developed and complex functions to fulfil than any other gland, is more peculiarly apt to suffer from disturbance; and, these special functions being in action during part only of the life of the individual, we find ovarian disease chiefly distributed in that time. The periods of development and decay of these functions are also special times for ovarian troubles.

The cell-growth of the ovary is not, however, confined to the time of life between puberty and the climacteric change, during which the specific powers of the cell-nucleus are in existence; for Dr. Charles Ritchie has abundantly proved that the ovaries of newly born infants and children are occupied, sometimes numerously, by Graafian vesicles or ovisacs, which are highly vascular as early as the sixth year, and which vary in size from the bulk of a coriander-seed to that of a small raisin in the fourteenth year, at which time they are filled with their usual transparent granular fluid, and their contained ova can be detected. The Graafian vesicles contained in the ovaries prior to menstruation are found, as they also are in every other period of life, in continual progression towards the circumference of the gland, which they penetrate, and discharge themselves by openings in the peritoneal coat; the occurrence of the catamenial signs being thus not indispensable to their rupture. The ovisacs of a healthy menstruating woman are generally larger and more vascular than they are previously to puberty, and in their rupture there is a greater lesion of the peritoneum and a greater discharge of blood in the ruptured sac. The occurrence of pregnancy diminishes the activity of this ovarian cell-growth to something approaching its premoliminal state, and so also do certain diseases which have a wasting influence on the system, notably tubercular disease of the lungs and cancer. Lactation diminishes the activity of the cell-growth to a less extent. The cessation of the menses at the climacteric period, though it diminishes the activity of the cell-growth at once to a marked extent, never extinguishes it; for the development and extrusion of immature Graafian follicles ceases only with life itself. They are to be found of some size even fifteen or twenty years after the cessation of menstruation. In the early and late extrusion of immature cells, the hæmorrhage accompanying the process is either much less than it is during the period of greatest glandular activity, or it does not occur at

all. It differs in no way from any other kind of hæmorrhage. A coagulum is formed in the cavity left, the rent slowly closes, and the coagulum slowly disappears; these processes, having nothing peculiar in them through all their stages, have been specially described and named; and, finally, the old dead ovary is found to be a tough fibrous structure covered with scars and still containing evidence of cell-growth.

The ovary, then, is simply a gland, developed as other glands, and formed of similar elements; its peculiarity is, that its cell-nuclei have special powers during a certain time of life; and this simplification of its physiology does much to simplify its pathology.

One other structure must be referred to more at length before we pass to the diseases of the ovary—its duct, or the Fallopian tube. This structure is formed from Müller's duct, in the embryo, from which are also formed the corresponding halves of the uterus and vagina; so that the Fallopian tube may be considered as part of the uterus. Its fimbriated extremity is formed from the ampulla of Müller's duct, and opens directly into the peritoneal cavity; during menstrual life, it has the special function of embracing the ovary to seize and convey into the uterus the extruded ovum. It is attached to the ovary by one of its fimbriæ, is enclosed in the broad ligament, has muscular fibre in its walls, and is lined by ciliated epithelium. Between the Fallopian tube and the ovary, and between the layers of broad ligament, are to be seen the short tubes of the parovarium and the remains of the canalicules of the Wolffian body, and around these structures, between the layers of peritoneum, is some loose cellular tissue.

The most common diseases of the ovary are those due to incomplete or perverted functions. Some rare cases there have been of inflammatory attacks, of cystic degeneration, and even of cancer, of the ovary in infancy and childhood; but, as a rule, the ovary is free from disease till after the age of puberty. During infancy and childhood, the processes of cell-growth and shedding go on, but without any indication of their action until those mysterious changes take place which indicate that a new function of the organism is about to come into action, the maturation of the ovum, and the possibility of its impregnation. The chief external sign of this is the menstrual flow; but that this is no necessary part of the process is abundantly evidenced by the facts, that some women have large families without ever once having seen a catamenial discharge; that girls have become pregnant before the external evidences of puberty have appeared, a case of this kind having recently

come under my own notice; and, further, that women sometimes become pregnant after the entire cessation of the monthly flow for many years. Since we know, then, that the ovarian cell-growth is quite independent of the menstrual flux, and that it may even complete its functions without it, we can only regard the flow as an accompanying phenomenon, and as neither a cause nor a result. That this is really the case is further proved by disease; for, in cases where both ovaries have been removed for follicular dropsy, and where it has been absolutely impossible that any evolution of ova could have taken place for many months, if not years, before the operation, the menstrual flow has occurred in normal regularity and quantity up to the time of the ovariotomy. On the other hand, we know that the flow of blood is intimately associated with the ovaries, for it usually ceases after the removal of both, and continues with uninterrupted regularity after the removal of only one, if the other be healthy; further, that any interference with the ovarian nerves, as their division by the écraseur or their inclusion in a clamp, will bring on the flow in a few hours.

The accession of puberty alters the nutrition of the ovary to the extent that, at the monthly periods, it shares in the general state of hyperæmia and excitement then common to all the sexual organs, and the whole economy seems to share more or less in the disturbance. Normally, this change takes place in the fourteenth or fifteenth year of life in this country; at an earlier date in hot climates. In strong, healthy girls, especially those engaged in active out-door work, still more those living a life approaching to the primitive state, the moliminal change is effected without suffering; but in girls brought up in refinement, of delicate habit and strumous parentage, there is much trouble. As a rule, this seems to be due to the onset of menstruation and the other signs of the change while the ovary is still in its infantile or incompletely developed condition; that is, it is forming incomplete cells whose nuclei are incapable of fulfilling their great functions, and the whole mechanism of ovulation is out of gear. In such cases, we find that the menstrual flux comes on either at irregular times or in insufficient quantity; or that, if it come regularly, it is overabundant, and it is always accompanied by severe ovarian pain. This arrest of development may be so complete that the ovaries may be said to be absent, though, clinically, this condition cannot be said to exist. The entire absence of the ovaries has been proved only in deformed fœtuses. The arrest of development may, however, be so complete that menstruation may never occur at all, or only once or twice. In such extreme cases,

the development of the whole sexual apparatus is generally arrested, the sexual appetite is in abeyance, and there is comparatively little suffering after the first few months, during which an effort seems to be made by the system to establish the change. This is, provided epilepsy does not supervene; but it is only too common an accompaniment of arrested sexual development in women. Women who are thus affected have frequently an absence of those external peculiarities of their sex evident in roundness of form, a *prononcé* bust, smooth and hairless skin, and highly pitched voice; and they often partake in some slight degree of the characters of the opposite sex, especially in the growth of straggling tufts of hair on the upper lip and on the chin in a line with the canine and premolar teeth.

A greater number of cases have the arrest at a later stage, and in them menstruation is established, after much difficulty and suffering, between 16 and 19 years of age, and, though it may last with fair regularity, but deficient quantity, for four or five years, it then ceases completely. In many of these cases, however, if marriage should occur during the time that menstruation is in action, and if the patient should be fortunate enough to become pregnant, a cure may result; that is, her periods will become more abundant and her suffering less; her health will be improved, and she may go on menstruating for many years, and may even have a number of children. Even without the occurrence of pregnancy, marriage often establishes the health of a woman afflicted with arrest of ovarian development.

The great bulk of cases of this kind are those which are afflicted to a less degree, but whose sufferings are nearly always sufficient to require medical assistance; and it is a very singular fact that a very large percentage of the cases are found in women of splendid physical development, who, to any but one well acquainted with such cases, look the most likely to possess capacity for procreation. In these women, menstruation is established later than the normal time by a few months or a year or two. They have at first irregular times and much pain, but, after a while, the flow is established with normal quantity and regularity, and with but little suffering. In this way, they go on for eight or ten years, and, if they marry in the interval, their menstrual career may run an ordinary course. If they remain single, however, they begin to suffer from ovarian dysmenorrhœa between 25 and 30, and, after about ten years' suffering, they undergo a premature climacteric change. It is also noticeable in these women, that their menstrual function is suspended on slight provocation. Any chronic disease, even of

an unimportant nature, any occupation which necessitates an overstrain on their system, mental anxiety or sudden fright, will check their menstruation for months or years, or, perhaps, for ever. In fact, this slight excess of functional power which the ovary became possessed of at their puberty is readily and soon exhausted, and its extruded cells, on slight provocation, assume an immature form, and the systemic conditions become correlated. In fact, ovarian amenorrhœa, and similarly to a less extent ovarian dysmenorrhœa, is a temporary resumption of the infantile condition of the ovarian functions; or, it may be, a complete and premature assumption of its senility. The amenorrhœa of pregnancy and lactation are partial resumptions of the infantile condition. This view has been admirably expressed by Dr. Charles Ritchie: "In early infancy, extreme old age, and long-continued organic disease, the ova are minute, transparent, and structureless; and, in advanced childhood, soon after the critical age and during pregnancy and lactation, they are more or less organised, larger, and; in the latter stage, are often so well maturated, that about one-third of the renewed pregnancies of married women take place while they nurse."

In these slighter cases of ovarian dysmenorrhœa, the uterus is generally normally developed, and it is frequently so in some of the most severe cases. There is a converse condition, where the uterus is infantile and the ovaries normal, much more rare and far more severe in its symptoms.

In ovarian dysmenorrhœa, the general symptoms are pretty constant and distinctive. Besides the menstrual irregularities and deficiency, there is almost always a persistent, sickening, and well marked ovarian pain, occurring in the less severe cases only at the menstrual periods, but in others being seldom absent and always greatly increased at the periods. It originates in the ovarian region, and shoots down the thigh, often also down the leg and round to the back. There is also often present, especially on the accession of atrophy, the peculiar submammary pain of ovarian disease, generally felt in the left side only. Headache, nausea, or even sickness and great general discomfort, are always present more or less.

In the milder cases, treatment is generally successful in mitigating the sufferings, and often the ovary may be made, even in some very well marked cases of arrested development, to fulfil its functions completely. First of all therapeutic remedies there stands iron, which will be found in such cases to be of great use, even though there should be no general indications for its employment. There can be no doubt that many

forms of this remedy have a specific power over the sexual organs, male and female; for, in a case of chronic metritis or subinvolution, smart hæmorrhage may be induced by large doses of iron. In ovarian dysmenorrhœa, it is best given during the intermenstrual periods in small doses, one to five drops of the liquor ferri perchloridi, well diluted, and increased suddenly to fifteen or twenty for a day or two previous to and during the menstrual flow; or better still is the substitution for this large dose of an iron and aloes pill, there being few better combinations in the Pharmacopœia than that old-fashioned remedy. Hot hip-baths and leeches to the perinæum at the period are often useful additions, with an occasional blister on the sacrum. To such as this, the treatment of delayed or difficult menstruation at puberty, due to inefficient ovarian development, must be confined; for the other means are only allowable in very obstinate cases, after the patient has been married, or when there are indications of premature ovarian atrophy. Marriage is, perhaps, the most efficient remedy, and one we ought seldom to hesitate to recommend; for, even if the patients may not have children, they will have better health, and they may even become pregnant if they marry early enough and are not mismanaged.

The last and most powerful aid is mechanical irritation of the uterus; but, as it is not free from risk, and therefore requires careful use, it is not always to be recommended. It is, besides, in the class of cases where the uterus is most at fault that it is least risky and most serviceable. The method of irritation I generally employ, as the most convenient and least troublesome, is the insertion of Simpson's galvanic pessary. This instrument has by some writers been very much decried, but I think by those only who seem to have used it indiscriminately and without reference to a proper selection of cases.

The irritation set up by the presence of a galvanic stem in the uterus is communicated indirectly to the ovaries in a manner that is not as yet explicable, but that it has an influence is beyond doubt, and, if it remain within bounds, it is in a large number of cases beneficial. A large experience has shown me that it is only in occasional instances that the stem cannot be borne, and that, if carefully watched during the first few weeks of its use, these cases are easily eliminated. In a case where I have been led to regard the use of the stem as advisable, I always begin with a small size, and, after this has been worn for two or three months, I change it for a larger one. For the first week after its introduction, it is not unusual for the galvanic stem to give rise to considerable discomfort and even positive pain, but this usually passes off if the patient

keeps her bed for a few days, and there is no further trouble save from the leucorrhœal discharge, which is a part of the process. The action of the stem is not purely mechanical, as has been stated; for, very soon after its insertion, the zinc becomes coated with an albuminous deposit, from which the copper is free, and the zinc becomes corroded. It is certain, therefore, that there is a galvanic action set up, and the stimulating effects are due partly to this, and partly to the interior of the uterus being constantly bathed in a weak solution of chloride of zinc. However produced, it is certain that the uterus rapidly enlarges under the action, and there is every reason to believe that the ovaries take part in the increased activity. If once the uterus become accustomed to the presence of the galvanic stem, it may be worn for many months, and the longer it is retained the more permanent will be the benefit; but, if after a trial of a few months, say four or five, there is no apparent alteration for the better, the attempt may be given up and the case considered as hopeless.

In a very large number of cases of incompletely developed ovaries, another remnant of infantile life is met with in an exaggeration of the normal curve of the uterus, amounting sometimes to complete anteflexion, and in this class of cases the galvanic stem is especially serviceable.

The results of my attempts to arrest premature atrophy of the ovary from any cause, when once begun, have been far from satisfactory; but this has been more especially the case when that atrophy has been due to a constitutional disease, such as tubercle. Sir James Simpson had a belief that the pretubercular amenorrhœa, so often seen in young women, was a cause of the subsequent disease; and he, therefore, directed his attention to the restoration of the utero-ovarian function, as a means of treatment or prevention of the consumption. From the views previously expressed, it will easily be seen that I consider his theory to be based on error, though in some cases his treatment would seem to have been successful; but how much of his success was due to local and how much to general treatment cannot now be determined. It is not, however, a practice likely to meet with many followers.

A singular condition has been noticed recently by Dr. Priestley, of termenstrual pain occurring about midway between the periods, which is almost certainly due to an ovarian condition, though it is not clear of what kind. Since reading his paper, I have seen two cases, but have been unable to refer them to any category.

The ovaries are liable to certain displacements, which may give rise to many disagreeable symptoms without any actual disease of the glands. Thus one or other, or both, ovaries may, by a relaxation of their peritoneal investments, drop into the retro-uterine *cul-de-sac*, and there be sources of great trouble. This will be especially the case if there be at the same time retroflexion or retroversion of the uterus; for I have known such a displacement of an ovary to utterly prevent the application of any apparatus for the replacement of the uterus, and cause so much suffering as almost to make us discuss the question of ovariotomy. In such displacement, pressure on the gland gives rise to the same sickness and faintness as pressure on the testicle produces in the male, and the passage of a hard motion will give rise sometimes to most alarming symptoms. A more rare displacement of the ovary is forwards, this being generally an excess of embryonic transition, and it may be carried so far as to take the ovary into the labium, after the manner of the descent of the testicle. Cases of this kind are given by Oldham and Rigby; and Percival Pott (*Chirurgical Works*, by Earle, vol. ii, p. 210) actually removed both ovaries displaced in this way; and Dr. Meadows has removed one (*Obstet. Soc. Trans.*, vol. ii).* Cystic degeneration is said to have occurred in this position, and a Spanish surgeon has recorded the removal of a cystic ovarian tumour from outside the inguinal ring. I have had no experience of this displacement.

Klob has described a twisting of the ovary on its axis which is probably congenital, and has not yet been found to be of any pathological importance in an otherwise healthy ovary. In the cystic ovary, a similar twisting has been observed to a more complete extent and with disastrous results. The ovary is sometimes completely detached from its normal position and relations, and forms new attachments elsewhere. This occurs with the healthy ovary, and, as Mr. Spencer Wells has shown, also probably after it has undergone degeneration. How and when it occurs have not yet been satisfactorily explained. In uterine procidentia and prolapse, corresponding displacement of the ovaries occurs.

There is a large class of ovarian disease due to altered hæmic nutrition of the gland, which clinical experience proves to be far more common than pathological investigation has yet shown. Of the prime factors in these cases we are as yet ignorant; but, clinically, they range

* I have now to add a hitherto unrecorded displacement of the ovary in a case where it had become developed at the umbilicus during embryonic life and become cystic, and from which situation I successfully removed it.—May 18th.

themselves naturally into three groups, differing probably only in degree of severity, save in the cases where acute ovaritis has a specific origin. They are:

I. Ovarian Hyperæmia.
II. Chronic Ovaritis.
III. Acute Ovaritis.

It may seem a metaphysical refinement to make a distinction between the first and second of these classes, but I have long satisfied myself that it actually exists. Ovarian hyperæmia is the result of an over-sufficient and generally precocious ovarian activity, and is, therefore, the converse of the condition I have detailed under ovarian amenorrhœa and dysmenorrhœa. It is far from being a rare affection, and is invariably well marked in its history, the chief detail of which will generally be found to be menorrhagia. In a typical case which I have now under my care, the following is a summary of the facts. The young lady is the child of parents of markedly nervous temperament, is well-grown, I might almost say prematurely developed in every way, and, when little over 13, began to menstruate. From the first, her periods were profuse and at first painless. She enjoyed excellent health for many months after the accession of menstruation, during which time the flow continued profuse, generally lasting for six days or a week, and necessitating the use of from four to six napkins daily. By the time she was 14, it was, however, evident that her health was suffering. She became listless, sleepy, fainted when at her lessons, gave indications of loss of memory, and, when I saw her first, she was decidedly anæmic. At that time, it wanted but two or three days before the accession of her period, and steady pressure over the ovaries gave her great pain, which she described as turning her quite sick. During menstruation, this pain was induced by less pressure, and, in the intermenstrual period, it could not be produced at all. She always seemed better in health during the flow, and it was this very common peculiarity that prevented her parents from applying earlier for the much needed advice.

In such a case, there cannot be a doubt that there is hyperæmia, not only of the ovary, but of the whole sexual apparatus, due to, it may be, or more probably only accompanying, the increased ovarian activity. This of itself is not a source of danger, for that lies in the menstrual loss producing anæmia. I have not yet had an experience sufficiently extended to trace such a case throughout its course; but, meeting with many instances which I have had reason to regard as identically of the same nature in later stages, I believe that their menstrual history is much

the same as that of other women after they have had a child, the process of gestation seeming to rectify in great measure the abnormal excitement. If they remain unmarried, they go on suffering from menorrhagia, become extremely anæmic, and have the menopause at the usual time, but marked with abnormal profuseness, as might be expected. Marriage, even without resulting pregnancies, seems to modify the menorrhagia in very great measure, as I have repeatedly had occasion to observe.

The treatment of such cases should, if possible, be begun in the first stage. There is no cause of deteriorated general health so certain for a young woman as profuse menstruation due to ovarian hyperæmia. The spanæmic condition induced by a few years' continuation of it is one over which iron seems to have no control; indeed, all ferruginous preparations ought to be sedulously avoided until the menorrhagia has completely ceased.

In the case I have narrated, my first advice was, that the patient should be removed from school, and that, for six months, all instruction, especially in music, should cease. I notice music especially, for I am quite certain that instruction in that art, as carried out in boarding-schools, has to answer for a great deal of menstrual mischief. To keep a young girl, during her first efforts at sexual development, seated upright on a music-stool, with her back unsupported, drumming vigorously at a piano for several hours, can only be detrimental. It is usually the habit of those who superintend the education of girls to make no difference whatever in their physical and mental exercises during their menstrual periods; and at a time when the great necessity of the system is perfect rest, laborious efforts have to be made. This is most pernicious, and I have repeatedly had to trace to it the existence of serious disease in young ladies. Musical exercises are especially hurtful, for the further reason that music, in those who are devoted to it and gifted with its necessary peculiarities, is a strong excitant of the emotions; while, to those not so gifted, and who do not care for it, it is an intolerable and useless burden. Absolute rest is an essential part of the treatment of the early stage of ovarian hyperæmia, and I need scarcely say that it is in its early stage that the treatment is most likely to be successful. This rest ought to be rigorously carried out by the patient being confined to the prone position for a few days before, during and for a few days after the catamenial flow. The application of a counterirritant over the ovarian region just before the period is very useful; but the most potent part of the treatment consists in the administration of ergot

before and during the period, and of bromide of potassium continuously during the intermenstrual time. The ergot is best given in the form of ergotin, my favourite formula being half a grain of Bonjean's ergotin made into a pill with sufficient lupulin. The bromide I give night and morning, after meals, in doses from five to ten grains. There is a good deal to be done in moral treatment. It may be only a coincidence, but I have noticed this affection chiefly in girls who have had no brothers, or brothers only younger than themselves, and I am quite certain that great harm is done to many girls by their rigid social seclusion in youth from the companionship of boys. Under proper supervision, no wrong could happen from more unrestricted association of boys and girls at their critical periods; and it seems to me that it is a mischievous plan to draw wide barrier-lines between the sexes at a time when they ought to begin to understand themselves and each other, and, by harmless intercourse, many of the risks may be obviated which afterwards beset them when an unaccustomed association is opened out at an age when passion has the chief ascendancy.

All the cases of ovarian hyperæmia which I have met with at puberty have yielded to the treatment I have detailed, and many cases which I have had reason to regard as of this nature, but in a later stage, have been benefited by it. It is, however, in the perfect fulfilment of the function of the utero-ovarian organs that we have the radical cure.

Ovarian hyperæmia is sometimes met with as the result of marriage, but only when the marital acts have been indulged in to excess, and then especially when pregnancy has not resulted. This, in fact, is only the mildest form of a serious disease which may end in total inflammatory disorganisation of the ovaries of newly married women. It is not unusual to find a delicate woman, who had menstruated normally previous to her marriage, suffer from severe menorrhagia for the first three or four years of married life, and to find an explanation of this in the vigour of the husband. In these cases, ovarian tenderness is always present, and very frequently there are violent pain and tenesmus, lasting for hours after connection, so that soon the unfortunate sufferer dreads the idea of a marital embrace. The menstrual period becomes prolonged, so that there is left only an intermenstrual interval of a few days. In prostitutes of a tender age, this affection is of extreme frequency, and often ends in the chronic ovaritis with adhesion of the Fallopian fimbriæ to the ovary, and the subsequent atrophy of all the sexual structures so often found in their bodies. The cure depends, of course,

on the removal of the exciting cause and the employment of such treatment as has been before alluded to.

In these cases, no line can be drawn which will define where simple hyperæmia ends and acute or chronic ovaritis begins. As acute ovaritis is, however, always, or has been at least in my own experience, due to specific causes, it is more than likely that the ovarian hyperæmia passes into chronic ovaritis without an intermediate acute stage.

Concerning chronic inflammation of the ovary, but little is to be found in the writings of our authorities in gynæcology; and it has only been by the careful grouping of the symptoms of a large number of cases that I have been able to satisfy myself that the condition may be accurately defined and readily diagnosed, and, further, that it may be successfully treated in the majority of cases.

As I have already indicated, chronic ovaritis may be a later stage of moliminal hyperæmia. It may also be the result of acute ovaritis, but the majority of the cases occur from sexual excess and masturbation, or as a sequelæ of exanthemata and rheumatic fever, and probably of syphilis. I have only once had an opportunity of dissecting a case where I had recognised chronic ovaritis in life, and then it certainly was the result of acute rheumatism. It occurred in the case of a girl 17 years old, who had suffered from eight or nine attacks of rheumatic fever. In two of them, she was under my care as a dispensary patient; and, after the recession of the articular affection, an attack of pelvic pain came on, which was increased by pressure, and the attack was accompanied by an irregular menstrual flow. The whole passed off in a few days after the application of a blister, but ever afterwards her menstruation was irregular, profuse, and painful, and she suffered more or less from the symptoms I shall describe immediately. I regarded the attack as one of mild acute or subacute ovaritis, followed by a chronic stage. She died subsequently of embolism of a cerebral artery, and I found her ovaries large, soft, covered with lymph, and dotted with enlarged follicles, and the peritoneum thickened round them. The left ovary was partly adherent to the rectum, and it had nearly the whole of the fimbriæ of the corresponding tube glued on to it.

There is probably a chronic ovaritis of occasional occurrence in chronic phthisis; for, though the rule in that disease is to have ovarian atrophy, evinced first in dysmenorrhœa and finally in amenorrhœa, yet I have seen a few cases where the menstruation was profuse, irregular, and characterised by the other symptoms of chronic ovaritis. I have

seen such conditions temporarily after small-pox, and frequently after scarlet fever in adolescent women. One case I have also satisfied myself of in early acquired syphilis. There is a distinct form of syphilitic metritis, as pointed out long ago by Mr. Langston Parker, and no doubt in these cases the ovaries are involved. Chronic metritis, the result of subinvolution or other uterine accident, and chronic endometritis from catarrh or gonorrhœa, in all probability have some amount of accompanying chronic ovaritis.

Out of eighty-one dissections, Henning found the ovaries diseased in fifty-three cases, and of the latter number six had exudation over them that was, in all probability, inflammatory. Chronic ovaritis, then, is not an uncommon disease. Chronic ovaritis is very often unilateral, and in these cases it probably has had an origin more or less independently of the uterus. Thus, as the result of acute septic ovaritis, it has been, in my experience, invariably unilateral. When it is the result of sexual excess or moliminal hyperæmia, it is generally, though not invariably, symmetrical.

The symptoms which, in my experience, have enabled me to class a number of cases together as chronic ovaritis are, first, in the history of the case, that from the molimen the periods have been irregular, generally too frequent, and that they have been too profuse. If the affection have a subsequent origin, then there can be obtained some story of a reason for the disease, either in a gonorrhœal infection or a puerperal accident leading to acute inflammatory attack, or an overindulgence in sexual congress. There is always a sense of weight and fulness in the ilio-hypogastric regions, and there may be positive tympanitic swelling. The discomfort is often so great, that the patient cannot bear her stays tightened or the weight of her dress. Sickness and nausea are frequently present, and almost always for a few days before the menstrual periods. The sufferings from sick headache are often intense. There is always more or less tenderness on pressure over one or both ovaries, and this is invariably increased before, during, and after the catamenia. By tactile examination, this tenderness may easily be demonstrated to be ovarian, and in very many cases the ovaries may be found to be enlarged and tender by the bimanual method of examination. Sometimes examination by the rectum permits a better investigation, especially if the patient be anæsthetised. As a rule, there is not much menstrual pain; for the uterus, sympathising in the disturbance, is often enlarged, and the discharge comes away almost painlessly.

The treatment should consist mainly of organic and systemic rest as perfect as possible during the menstrual periods, and the administration of ergot. Between times, counterirritation may be used with advantage, and the best form of that I have found to be painting a circumscribed spot of skin in the inguinal region, about two and a half inches in diameter, with linimentum iodi every morning as long as the skin will bear it. When the spot has become too painful to allow a repetition of the painting, the cuticle is allowed to peel off and the skin to become firm, and then the process is repeated as often as may be found necessary. I have had patients going on with this for months, and it nearly always does them good. Further, I give bromide of potassium internally, sometimes combined with ergot. I have also found arsenic and cod-liver oil very useful, and one case yielded to large doses of quinine when everything else had failed.

It is probable that a good deal of the disturbance in these cases is kept up by the extravasations of small clots into the peritoneum by a want of adjustment to the ovary of the Fallopian mechanism, and the majority of the ova are lost in the retrouterine *cul-de-sac*.

As far as I know, acute ovaritis is the result of three conditions only:

I. Injury;

II. Gonorrhœal infection;

III. Septic poisoning in the parturient condition.

In one woman, I diagnosed acute ovaritis following injuries inflicted by her husband kicking her; and, though it may have been general pelvic peritonitis, yet the uterus never became fixed as it does in that condition, and the subsequent permanent disturbance of menstruation, accompanied by other signs of chronic ovaritis, confirmed me in my opinion.

Acute ovaritis from gonorrhœa is a common result of the infection, and is a frequent cause of sterility. It seems to be precisely similar to the acute epididymitis of the male, as first pointed out by Bernutz and Victor de Méric. In this affection, the patient is found with an anxious face, agonising pelvic pain generally only on one side, the knees drawn up, and all the signs of a severe inflammatory attack. The patient can lie with comfort only on the back, and micturition and defæcation are productive sometimes of excruciating pain. It is often impossible to make a vaginal examination without anæsthesia, and this had better be used at once, for it is a matter of consequence to diagnose between acute ovaritis and pelvic cellulitis. In the latter case the tumour will be found at-

tached to the uterus and moving with it and with the whole roof of the pelvis, will be found to be more or less fixed, while in ovaritis the enlarged ovary may usually be easily made out. The treatment should consist in leeches to the perinæum, a blister over the ovary, diuretics and small frequent doses of opium. The rectum should be well evacuated by an enema, and the bowels kept quiet for a few days. This affection, as far as is known, generally results in disorganisation of the gland and the formation of adhesions round it; if both glands be affected, permanent amenorrhœa may result. I have seen this in one case. I have not met with any indication of the formation of abscess in this affection, nor do I know of any record of such a result. I do not think the hypothetical stages and varieties into which the affection has been divided of any practical use.

Of acute ovaritis from septic causes in childbed, I have had no experience; but Simpson, Bernutz, and others, give cases, and in some of them abscesses have resulted. The symptoms are shivering, pain, increased temperature, night-sweats, drawing up of the knees, inframammary pain, and pain shooting down the thigh and leg. When an abscess forms the result seems always fatal from its bursting and producing general peritonitis. The chief remedies are counterirritants, as turpentine stupes and blisters, together with the administration of quinine and opium. If the presence of pus can be determined it ought to be removed by the aspirator *per vaginam*. A large number of cases are on record of so-called ovarian abscesses which were only suppurating ovarian cysts, frequently dermoid.

The ovary is, of course, always, or at least frequently, involved in pelvi-peritonitis or perimetritis; but I do not regard this as an ovarian disease. Ovarian apoplexy would seem to be an occasional accident of ovulation, found in *post mortem* examination, but without much clinical importance, unless, by the same process, a pelvic hæmatocele is formed. Hæmorrhage into an ovarian cyst, described by Kiwisch as a variety of ovarian apoplexy, cannot be considered in any such light.

Hypertrophy of the ovaries occurs in two forms, as it affects the follicles of the gland or its fibrous tissue. There may be, as Dr. Ritchie and Dr. Fox have pointed out, an increased formation of the number of follicles, this, in all probability, forming a pathological feature of the ovarian hyperæmia I have described. Follicular hypertrophy may take the form of increase in size of individual follicles, and form, as first shown by Rokitansky, a variety of cystic formations. Hypertrophy of the

stroma of the ovary is a more common affection than is supposed, and seems to be one especially frequent in the better ranks of life. Cases may partake of a combination of one or other variety of the follicular hypertrophy along with the fibrous.

The fibrous hyperplasia is probably very often the result of chronic ovaritis of a kind which attacks less the peritoneal surface of the gland, and more its internal structure. It results in follicular atrophy, or arrest of development of the proper ovarian cells, and cirrhosis of the trabeculæ.

The cases which I have seen have all been in the middle and upper ranks of life, with one exception in a hospital patient, but even she had a look and air of delicacy and refinement that belied her station; and she, moreover, is the only one in whom I have yet succeeded in getting the utero-ovarian function fulfilled. She is now pregnant. To illustrate my observations, I may quote at length from my note-book the case of Mrs.——, as illustrating many of the points of ovarian pathology on which I have dwelt, and as a typical case of fibrous hypertrophy of the ovaries, resulting probably from chronic ovaritis. She is now 24 years of age; is a pretty delicate blonde of nervous temperament and most refined caste of features, and has been married nearly three years. She has a history of hyperæmia of the ovaries at an early age, and has had always very profuse, and generally irregular, menstruation until within the last three or four years, when it has been scantier and less frequent. From November 1871, until she came under my care, she had had only one normal period (in seven months), and another in April 1872. Since the former date, a constant, offensive, brown discharge had been present, which was increased by exertion. She had pain and straining after coitus, pain on defæcation, loss of appetite and frequent sickness. Examination revealed a condition of enlargement and tenderness of the uterus, openness of the cervix, and decided retroflexion of the fundus, with a tendency to retroversion of the whole organ. The cavity was not larger than normal, but the passage of the sound gave great pain. The displacement was easily reduced, and then it was found that both ovaries were very much enlarged and tender, the left especially. They could both be distinguished by bimanual touch as quite free from adhesion, readily moving about. I introduced a ring pessary to rectify the displacement, much to her comfort, and directed the use of iodine paint in the manner previously described. She also took a tonic mixture consisting of cinchona and angostura, and the uterine cavity was occasionally washed out with a weak solution of neutral acetate of lead. The latter part of the treatment was discontinued after a few months,

but the counterirritation and the pessary were persevered in, along with occasional recourse to tonics. In October last, the brown discharge had almost disappeared, and the right ovary could be felt to have distinctly diminished in size. The uterus was also straight and the cervix closed, and the whole organ of a much less size. Early in November, there was a slight menstruation lasting three days, and, in January of this year, there occurred quite a normal period of four days, followed by rather profuse leucorrhœa. In February, as the expected period did not occur, I ordered her small doses of iron in the form of ten drops of Parrish's syrup of the phosphates, taken thrice daily. In March, she was unwell from the 16th to the 20th, and I have little doubt that her patience will be rewarded by complete recovery of the functions of the right ovary, and possibly the occurrence of pregnancy.

Such a condition of the ovaries as I believe exists in a case like this is frequently met with in *post mortem* examinations, and has recently been twice found by Chantreuil, who does not, however, give its microscopical characters. I have not been fortunate enough to have examined an ovary so affected.

I have met with a small group of cases which I can only class under the head of ovarian neuralgia. They have been characterised by acute lancinating pain referred to the region of the ovaries, generally on both sides, coming on paroxysmally without any reference to the ovarian functions. No physical signs of disease have been found in these cases, and they have all occurred in women approaching the menopause. They have all been addicted to outbursts of overindulgence in drink, taken, as they allege, to deaden the pain. Whether this inebriety was a cause or a result of the neuralgia, or whether the neuralgia in some of the cases may have had any actual existence, I am unable to say; though the special character of the pain and its site have been described by the sufferers with a constancy which would seem to vouch for its reality. In connection with this affection, I would here strongly urge the necessity for the medical profession combating strongly against the wrong women are often allowed to do themselves by taking spirits to relieve ovarian and menstrual pain. No habit can be more pernicious, or more likely to lead to the most deadly mischief, both physical and moral.

As one of the unusual conditions described in connection with ovarian abnormalities, I may here just allude to ovarian gestation, only to say that I cannot recognise its occurrence. With the solitary exception of a case referred to by Ritchie, as reported by Dr. Willigk in the *Prager*

*Vierteljahrschrift* for 1859, all the cases have broken down on examination. I have been unable to gain access to the original account of this case, so that I am not in a position to give an opinion on it. I have had occasion elsewhere to investigate the pathology of extrauterine gestation, and I have quite satisfied myself that all such cases are tubal in their origin, and that even those cases where it has been asserted that the sac was formed by the trumpet-like expansion of the tube united to the ovary are open to suspicion.

The remaining affections of the ovary are those which are included in the results of increased growth, taking the form, in the largest number of instances, of cystic degeneration; in some rarer instances, the growth is solid, and may be either fibro-myomatous or more commonly cancer. So much has been written lately, and so much done for the pathology and treatment of Ovarian Tumours, that I can scarcely hope to add anything new in this essay; but, as I have had a special experience in the investigation and treatment of ovarian tumours, I shall limit myself to the discussion of what I have seen and done myself, in preference to making a mere summary of what is to be found in perfection in the recent publications of Spencer Wells, Atlee, Peaslee, and Gallez.

For this purpose, I shall first discuss the diagnosis of ovarian tumours and their varieties; their therapeutic and surgical treatment. I shall also describe such ovarian tumours as I have met with which have not admitted of surgical treatment; and, finally, I shall give the results of some original investigations in the pathology and method of growth of these tumours.

There are, perhaps, no diseases in the province of surgery where so much caution is necessary in weighing carefully every point in the history, every symptom and every sign, for the purpose of establishing an accurate diagnosis as in those usually classed under the head of ovarian tumours. There are so many conditions which mimic them, and so few facts in connection with them upon which implicit reliance can be placed, that the only safety is to be found in the process of reasoning by exclusion; that is, for a proper diagnosis in the case of an ovarian tumour it will be found the best plan, first of all, to make a mental list of all the conditions that it might be, and exclude them one after another until no alternative is left. Anyone who habitually follows a converse plan will sooner or later be led into some fatal blunder. Our anxiety should always be, not to prove that a given tumour is ovarian, but to show that it cannot by any chance be anything else.

It may be said with perfect certainty that from the history alone no ovarian tumour could be diagnosed, so various are the stories told by the patients about their cases. Thus one patient will present herself totally unaware of the fact that there is any tumour, her only sensation being one of discomfort from the swelling, whilst another may have known for many years of the presence of a small lump which had long remained quiescent and had taken to enlarging only for a few weeks or months. The rate of increase gives no guide, either in unilocular or in multilocular tumours; for I have removed two multilocular tumours which had been in progress respectively seven and eleven years, and I have removed one of great size from a patient aged 66 which had grown in four months. I have removed, on the other hand, a large unilocular tumour which had been in existence for more than ten years, and the structure of which showed that it always had been unilocular; and I have removed two unilocular tumours, one of which grew so as to completely distend the abdomen in seven weeks, and another, almost as large, which had not been noticed for more than five weeks.

The details given by the patients as to the region in which the tumours were first observed are often very misleading, and no dependence whatever can be placed on some. One patient, in whom there exists an undoubted fibroid tumour of the uterus, asserted that it originally grew somewhere in the neighbourhood of the spleen, and gradually descended to its present uterine situation. Tumours of one ovary are often stated by their bearers to have originated in the side opposite to that from which they are found to grow. One condition which on rare occasions comes under our notice, hydatids of the peritoneum, beginning as it does generally by rupture of the acephalocyst of the liver, presents usually a history of origin at the upper part of the abdomen; so that, when such a story is given with subsequent general enlargement of the abdomen, caution is necessary before excluding hydatids from the possibilities. A tumour which began centrally and remains so is, of course, likely to be uterine; but this is far from being constantly the rule. I have heard a patient state that an ovarian tumour of considerable size had appeared suddenly; and this might have really happened, for its escape from the pelvis might have been sudden. More than once I have pushed an ovarian tumour out of the pelvis that had been impacted there, but I never saw a fibroid tumour of the uterus so impacted.*

* Since writing this essay, I have, however, seen two fibroid tumours of the uterus impacted in the pelvis, and capable of being pushed out of it; but in both cases the tumours were fundal and the uterus was retroflexed.

The menstrual histories given by patients with ovarian tumours have been so various in my experience, as to lead me almost entirely to disregard them in the diagnosis. Dubois asserted that he had not known an ovarian cystic tumour accompanied by hæmorrhage, but this has been repeatedly noticed in my practice; and the explanation of the apparent discrepancy is that, when the great obstetrician wrote, the diagnosis of pelvic tumours had not arrived at its present state. I have known complete arrest of menstruation coincident with the growth of an extremely rapidly formed unilocular cyst, in a case to which I have already alluded; and, from the presence of an impacted mass in the pelvis behind the uterus, the diagnosis was complicated by the possibility of an extrauterine gestation, *plus* an ovarian cyst. The real condition was revealed only at the operation, when the pelvic mass was found to be a dermoid cyst of the other ovary. In this case, the diagnosis was one of great difficulty, chiefly owing to the suspicious indication of the cessation of the menses. Such a fact in the history of any case ought to make us especially careful to eliminate pregnancy, more especially the condition of hydramnios, which I have known to be treated fatally on two occasions by tapping, once as an ovarian tumour and once as ascites. The uterus, in the early months of normal pregnancy, is not unfrequently displaced to one or other side, and has been often mistaken for an ovarian cyst; in one case, by myself, for an abscess in the broad ligament. In this latter case, I was led astray by the general symptoms of hectic from which the patient suffered. It was to me a lesson to trust to no one symptom, nor to any group of symptoms, in a pelvic diagnosis; and fortunately the patient recovered completely after a miscarriage.

For the diagnosis of ovarian tumours, either subjective or differential, there are varieties of symptoms, almost numberless, the great majority being of little or no consequence for accuracy, and none of them alone being trustworthy. The symptoms vary in their character and intensity very much, according to the size of the tumour, though this is far from being the rule. Thus the largest ovarian tumour which I have removed, somewhere over one hundred pounds in weight, gave rise to no other symptoms than the inability of the patient to get about from its immense weight; while the smallest, only six and a half ounces, was the source of agonising pain and a great variety of reflex symptoms, including aphonia, and it had completely disabled the patient for some years. In the early growth of a simple cyst, symptoms of any kind are seldom met with until the tumour is sufficiently large to be impacted in the pelvis. The growth of dermoid cysts, on the contrary, is often accompanied by pain

of a most intense kind, for which no explanation can be advanced. As a rule, pain is not met with until cystic tumours are large enough, if out of the pelvis, to press on important viscera, or unless the surface of the tumour undergoes inflammatory change. Then pain and increase of pulse and temperature are the indications, though it is surprising to what an extent a tumour may be found to be adherent, and yet, throughout its history, no indications of inflammatory attacks have been given. Until the tumour is sufficiently large to interfere with nutrition, and if it be not of a cancerous character, there are rarely any symptoms of constitutional disturbance, though sometimes I have seen a small tumour very loose in the cavity of the abdomen give rise to great pain and discomfort. The appetite is usually not interfered with until the case is far advanced; nor is sleep, though it is often found that the patient can lie only on one side; nor do we find that either the temperature or the pulse is affected to any appreciable extent. Hysteria is sometimes found in connection with ovarian tumours, and to depend directly upon them. In one of my cases this was markedly the fact, for the hysteria disappeared entirely after recovery from ovariotomy. Hysteria is a constant symptom of phantom tumours, and these cases, in the days of the early ovariotomists, were in several instances cut into by mistake.

As the tumour enlarges, the symptoms become more numerous and various; thus in the pelvis, by pressure on the rectum, bladder, and nerves, it may give rise to dysuria or incontinence, to constipation or diarrhœa, and to various neuralgiæ. In the abdominal cavity, by pressure on the stomach, liver and diaphragm, it produces very frequently nausea and vomiting, distaste for food; in one case in my own experience, jaundice; and very often difficulty of breathing, amounting in the later stages to orthopnœa. Coincidently with the production of these visceral symptoms, there come on gradually indications of great systemic alterations, due partly to direct interference with nutrition and partly to its perversion. Thus the patient becomes thinner and the skin dry and often hot; the eyes sink, and the features become pinched, and then comes on the peculiar expression of face named by Mr. Wells the "facies ovariana". The legs at this stage generally become œdematous, from the mechanical obstruction to the return of the blood from the limbs, and the œdema extends to the vulva and over the lower and central walls of the abdomen. When the tumour has reached such extreme size as indicated by these symptoms, if then seen for the first time, its diagnosis becomes a matter of some difficulty, even by the careful consideration of its signs; for it is in the very small and in the very large

ovarian tumours that the diagnosis is most difficult. In those of medium size, the task is much more easy.

The physical signs which indicate the presence of an ovarian tumour come under the notice of the surgeon, as a rule, only when the tumour has reached a size sufficient to have obliged it to rise out of the pelvis, and appear as an abdominal enlargement. It is sometimes, however, necessary to determine the nature of a small pelvic tumour, and, as I have already said, to remove it. Such a diagnosis is a matter of no great difficulty to one accustomed to make the bimanual examination, more especially if it be conducted while the patient is under the influence of an anæsthetic. An ovarian tumour will be found to be almost invariably behind the uterus, that viscus being pressed forwards close to the pubes; and its fundus may, save in exceptionally obese patients, be felt just above the pubes. Usually the uterus can be fixed between the two hands, and then no doubt can be entertained as to what it is. Behind it is the tumour, and if the uterus can be moved independently of it, and if the tumour can also be raised out of the pelvis independently of the uterus, no doubt need be felt that it is a tumour of the ovary or of the broad ligament. How to determine between these two I do not know, nor do I think it can be of much consequence. It may be possible, as I have repeatedly experienced, to determine fluctuation by this method of examination.

As the tumour increases in size and rises out of the pelvis, it becomes somewhat more difficult to determine that it is not intimately associated with the uterus. It is often necessary to introduce the sound in order to determine this point, but this, as a rule to which I think there can scarcely be an exception, ought never to be done at the first examination. I have known a miscarriage, in more than one instance, brought on by neglect of this rule by competent surgeons. It not unfrequently happens that menstruation, or some loss resembling it, goes on for the first few months of pregnancy; and to assert the diagnosis between early pregnancy and an ovarian tumour just rising out of the pelvis, at a first examination, is a task which only the rash or the greatly experienced will undertake. If, with the patient on her back, one forefinger in the os uteri and the other in the fundus of the tumour, the two be found to embrace something which moves *en masse*, then it is, of course, certainly uterine. But, if the two fingers seem to be in relation with different structures, then the outside finger must search for the fundus uteri, and, after it has been found and after it has been ascertained that the uterus is not enlarged, *and then only*, the sound

may be introduced into the uterus and its relation with the tumour readily ascertained. The first matter, then, is to be certain that the tumour is not uterine. If it be not, and it be rounded, elastic, and capable of being raised to some extent out of the pelvis, then it is almost certainly ovarian. It still may be ovarian, even if fixed to the pelvis, though it is rare that ovarian tumours contract adhesions at such an early stage of their growth. If fixed, then, it may be a hæmatocele, or an abscess, or a soft tumour growing from bone; but the diagnosis of all these may be greatly assisted by the previous history and the general symptoms; and, finally, they may be set at rest by what may always be resorted to in cases of doubt—an appeal to exploration by the aspirator. The contents of an abscess, of a hæmatocele, or of an ovarian cyst will reveal their origin, and a solid tumour will be indicated by negative results. I have punctured many pelvic tumours with the aspirator, and have never seen any ill results; the practice I adopt being to make the puncture from the vagina, and if a cavity be found to ensure that its contents be evacuated as far as possible.

I may here say, that I have never found, in an ovarian tumour, that examination by the rectum revealed anything undiscoverable by the vagina.*

When an ovarian tumour has risen out of the pelvis, and has as yet met with none of the accidents to which they are liable, and which lead to complications, its diagnosis is a matter of ease. First of all, palpation will discover that it is a tumour by its resistance, and firm pressure on it with the fingers of one hand, and percussion on them with the fingers of the other yielding a dull note, will exclude the possibility of the case being one of phantom tumour; and, as the tumour pushes the intestines before it upwards and to each side, in these regions a tympanic note will give the indications by percussion peculiar to uterine and ovarian tumours. To exclude the possibility of its being an uterine tumour, some care is necessary; but it is not difficult, when the educated touch has determined that the tumour fluctuates and that, throughout its extent, the peculiar wave passes which is found on gently striking any part of a bag of fluid while the hand rests on some other part of its circumference. A knowledge of what fluctuation is, and what this peculiar thrill is, cannot be communicated by description.

* Since writing this, I have had the advantage of the instruction of my friend Professor Simon, in his *clinique* at Heidelberg, and my opinion of the value of rectal examinations has been very materially altered by subsequent experience.

If this wave be sharply communicated in every direction all over the tumour, then, in all probability, it is unilocular. A multilocular tumour, or one composed of two or three large cysts, may often be recognised by the practised fingers detecting a difference in intensity of the wave along different diameters of the tumour. There are two conditions, however, which must be carefully excluded from the possibilities, and, just because they are both very uncommon, their probabilities are every now and then overlooked. They are cystic disease of the uterus and hydramnios. In the former, the tumour will be found associated with the uterus, the latter moving along with it when moved, and being dragged upwards by it to an extent that ought always to make us cautious, and warn us to wait and watch.

Solid uterine tumours, besides the absence of fluctuation, have in addition two vascular signs which I have never met with in ovarian tumours; namely, an aortic impulse, which may be seen and felt, and an enlargement of the uterine arteries to be felt in the vagina. In one case, I satisfied myself that the tumour was uterine, mainly because, at the flexure of the vagina on one side, I felt an artery as large as the radial.

Hydramnios generally occurs with twins, and, where there is any doubt in the case, it is easily determined by getting the patient into the erect position and then making a vaginal examination. The child or children will be found settling down on the point of the finger, and can be easily felt through the thinned uterus. A slight push will send the mass floating up towards the fundus, whence it will sink in a few seconds. In this way, I have made a differential diagnosis between a unilocular ovarian cyst and a distended uterus.

If the tumour be found to be not uterine and solid, yet attached to the uterus and moving it to an extent which may lead to the belief that it is ovarian, then we have a choice between a dermoid cyst, a fibrous tumour of the ovary, cancer of the ovary, or a pedunculated fibrous tumour of the uterus. A dermoid cyst is rarely so constituted that it will not give fluctuation at some part or other, and its peculiar nodulated character, with here and there spots of bony hardness, may often betray it. Fibrous tumours of the ovary are very rare, and cancer of the ovary alone occurs in only one form, the fibroid, which is of extreme rarity. I have been fortunate enough to meet with one case of it, and to diagnose it in life. The signs on which I depended were, that the uterus was free; that the tumours were large, smooth, oval, and solid; that they grew rapidly, and that the patient's failure in health was not commen-

surate with the idea of a non-malignant tumour. The fibroid tumour of the ovary may be diagnosed by its slow growth and small size. There are, of course, a great many tumours that have been confounded with ovarian growths, and may be again ; but to exhaust a consideration of them would be to exceed by far the limits of this essay, and to wander out of my own experience.

It is in the subsequent stages of the growth of an ovarian tumour that the main difficulties in diagnosis are met with ; that is, between the time when a tumour has escaped from the pelvis and risen above its brim as far as the umbilicus, until it has reached its extremest size possible by the distension of the abdomen. Thus the sign of fluctuation, of so great use in the earlier period of growth, comes to have a decreasing value, because it is common to other diseases from which a large ovarian tumour must be carefully diagnosed, and a consideration of other signs is requisite. Thus inspection will reveal that in ascites the abdomen is usually enlarged uniformly, and this may also be the case in a large unilocular cyst ; while in a multilocular tumour, as a rule, the irregularities of the surface will reveal the nature of the case either to the eye or to the fingers. Percussion will generally show, in an ovarian tumour, the characteristic distribution of dulness, though the accidental adhesion of a coil of intestine in front of the tumour may vitiate this indication. There is a very simple and neat way of confirming the value of the sign of percussion in such a case which I have had occasion to practise, and which will almost always decide between ascites and ovarian dropsy in such exceptional cases. It consists in mapping out the marginal area of clear percussion-note by a pen-and-ink line, and then ascertaining whether a clear note, obtained by percussing on a finger laid gently on the skin immediately outside that line, can be altered to a dull note by increasing the pressure. If this alteration take place generally round the line or throughout its greater part, then it may be taken for certain that an ovarian tumour is present. On the other hand, if there be a clear note somewhere over the area of the swelling which is not removed by firm pressure, but rather extended, still more if pressure bring out a clear note when dulness existed without it, then it will be evident that ascites is present, and not an ovarian cyst. The explanation of these signs is, that pressure round the margin of an ovarian tumour will bring it into more extensive relation with the abdominal wall, displacing the intestines, and this is most easily accomplished in the epigastrium ; in the converse condition, when a clear note is produced by pressure in ascites, the abdominal wall is brought

into contact with floating intestine, the mesentery of which is so short and the quantity of fluid so great, as to keep the structures apart without the pressure. We have, further, a difference between the percussion-notes of ascites and ovarian dropsy, in that the former readily alters its position, always appearing at the part of the tumour highest in relation to the patient's position. Thus, in a doubtful case, if there be a corona of clearness above the supposed tumour, extending from the hepatic to the splenic regions, and any alteration of position, such as lowering the shoulders and raising the pelvis, should alter the position of the area of clearness to the region of the umbilicus, then the case is almost certainly one of peritoneal dropsy. It very frequently happens that we have both ascites and an ovarian tumour present at the same time, and then it requires a careful consideration of the signs to prevent mistakes.

The *tactus eruditus* of a practised ovariotomist can recognise at once that there is a double wave of fluctuation; one superficial and rapid, due to the ascitic fluid, and another, deeper and perceptibly less rapid, due to the fluid in the cyst; but, to the beginner, such a complication is puzzling. If the fluid outside the cyst be small in quantity, its diagnosis is of no great consequence; but, if large, its non-recognition may lead to serious mistakes. For instance, in one of my recent cases, I satisfied myself that there was an ovarian tumour from the signs given by percussion, and that there was evidently some ascites from the double wave of fluctuation. The patient was of an enormous size, and the growth had not existed for more than six months. It was a grave question whether I had to deal with a multilocular tumour with one or two very large cysts and a small quantity of ascitic fluid, or with a small tumour and a large quantity of ascitic fluid. The only method of deciding the question would have been to tap the abdomen above the tumour by Mr. Wells's blunt trocar, and to have evacuated the ascitic fluid only; but to this the patient would not accede, and I had to begin the operation in serious doubt. The result showed that the plan referred to would have been a wise one, for it turned out to be a comparatively small tumour with an enormous ascitic collection, all the intestines having been pushed above the tumour. There are some minor signs which often serve to indicate the presence or absence of ascites to any marked extent, as the protrusion of fluid through the omphalic ring, carrying in front of it a layer of peritoneum like the finger of a glove. The uniformity of enlargement with ascitic fluid is greater than that with ovarian dropsy, though in the case just referred to this indi-

cation failed me; for it was the want of symmetry in the measurement that chiefly suggested that the great enlargement was cystic. The readiness of alteration of the form usual in an abdomen distended with peritoneal dropsy was also absent; for, in whatever position the patient lay, the same outlines were preserved; and the greatest proportional increment of measurement had occurred between the umbilicus and the pubes. This peculiarity is usually an indication of ovarian cysts or uterine tumours.

The enlargement of the veins often seen in the skin of the abdomen in cases of ovarian tumour is of no great assistance as a diagnostic sign, for it is present in almost every other disease simulating ovarian dropsy. Vaginal examination of a case in such a stage as we have been discussing gives very often totally negative signs, and these are generally satisfactory. Thus, if the uterus be normally placed and freely movable, then the indications are in favour of a long pedicle and the absence of pelvic complications. If, on the other hand, the uterus be drawn up out of reach, or is fixed and can be moved only with the tumour, more especially if it be tilted to one side, then the pedicle will probably be short. Some minor cysts may be felt at the roof of the pelvis, and, if there be much fluid outside the tumour, the recto-vaginal *cul-de-sac* may be felt distended. I have not yet, however, met with this sign of ascites; not even in the exceptional case I have referred to did it help me.

Auscultation of ovarian tumours gives chiefly negative signs, but these are often of value, as in the case of perfect absence of intestinal gurgling over the tumour. A loud friction-sound is often heard, but this is only an indication of a dryness of the peritoneal surfaces where it is heard, and there is sure to be an absence of adhesions at the spot. The hydatid fremitus, so well described by Mr. Wells, I have not been fortunate enough ever to meet with.

Tapping, either for the removal of ascitic fluid or the contents of a cyst, is often a great help towards an accurate diagnosis. By the removal of peritoneal dropsy, we may discover the actual relations of an ovarian tumour, or we may even find that the supposed tumour has no existence. By the removal of the contents of a large unilocular tumour, or of the contents of one or more of the major cysts of a multilocular growth, we may determine the existence of pelvic adhesions, the existence of pregnancy, or of some other condition that may alter in great measure our views as to treatment. I am strongly of opinion that preliminary tapping in doubtful cases is not resorted to

with sufficient frequency; for Mr. Spencer Wells has certainly disabused us of the idea that it is such a very formidable proceeding as was once taught and believed, and he has shown that it is very efficacious in gaining time and in clearing up difficulties. The chemical and microscopic examination of fluid withdrawn by tapping has not as yet yielded any greater certainty than any of the other signs I have previously referred to. No one can speak more authoritatively than Mr. Wells on any subject connected with ovarian disease, and he has written on this point as follows. "While it is certain, therefore, that, in cases of doubtful diagnosis, complete reliance cannot be placed on the chemical characters of fluid removed from the abdomen, and that the rule of paralbumen being the characteristic of ovarian fluids, and fibrin of serous fluid, and the conjoint presence of paralbumen and fibrin pointing to a mixture of the two fluids, is open to many exceptions, it is still true that the rule is sufficiently often correct to become an aid of some value in arriving at a diagnosis, and to encourage us to attain more accurate knowledge by more extensive observation and more complete research."

Great stress used to be laid in former times on the diagnosis of adhesions; but, with greater experience of the disease, we are now led to disregard almost wholly any adhesions that are not visceral or pelvic. Parietal adhesions seem to be of very little consequence; and, if of any great extent, they may be diagnosed, provided the tumour be not of extreme size, by carefully watching the movements of the tumour during respiration. If it be free in front, its upper margin may be seen gliding under the abdominal wall synchronously with the play of the diaphragm. Mr. Wells states he has seen the umbilicus move with an adherent tumour during respiration. Perhaps the most trustworthy point in the diagnosis of adhesions is a careful inquiry into the patient's history, for the occurrence of febrile attacks accompanied by localised abdominal or pelvic pain.

The diagnosis of the variety of tumour in each case is of importance in guiding us to its treatment; therefore, it is not for the mere exercise of ingenuity that I recommend every practitioner dealing with a case of ovarian tumour to exhaust every point on which I have dwelt, together with many others to which I have not alluded, but which the individual peculiarities of his case and his personal shrewdness may suggest. Above all, let me urge the necessity of reasoning by exclusion, and of making repeated examinations at intervals before any certainty of diagnosis is felt. Three times it has occurred to me to remove ovarian tumours

which had hastily been set down at an early period of their history as floating kidneys, that diagnosis being made in all three cases because the wish was father to the thought, and because the practitioners who made it had not learned the value of patience. It is this want of patience that is to blame for those melancholy instances of blunders, altogether unpardonable, where the abdomen has been opened in cases of normal pregnancy mistaken for ovarian tumours.

A final means to be employed in the diagnosis of ovarian tumours, a *dernier ressort* in cases of doubt, is the exploratory incision. Such a proceeding is quite justifiable in any case of abdominal tumour which has been watched for some time, and where none of the ordinary indications suffice to make its nature certain. It is also to be recommended as a preliminary to the surgical treatment of some tumours, either uterine or ovarian, when the possibility of removal is doubtful, and the relations of the tumour can be ascertained only by exploration. The mortality of exploratory incisions has, in Mr. Wells's practice, seemed to have been small enough to support this opinion, and out of five I have not lost one.

Mr. Spencer Wells has characterised the condition of the medical treatment of ovarian tumours as one of hopeless impotence; and, if we except the general treatment by chalybeates, tonics, hygiene, by which we guard against too rapid exhaustion, and at the same time prepare our patients against the great trial by which alone they can be cured, we may at once accept his statement. Sometimes we are the victims of singular coincidences, which seem to militate against the general experience in such matters, and only within a few days, I have met with such an instance. More than a year ago, I was consulted by a woman with an enormous unilocular tumour, whose husband declined all operative proposals. Lately, she received from the hands of a physician some inert *placebo* in the shape of an ointment, and soon afterwards the cyst burst and its contents were absorbed. Possibly, she may be permanently cured, but more probably she is not; but, meantime, nature has apparently secured for medicine a triumph which it is only to be regretted is not more common.

The surgical treatment of ovarian tumours has now been simplified into two operations: the minor operation of tapping, which is palliative and, on some rare occasions, curative, and the major operation of ovariotomy, which is either curative or fatal. In the process of development through which the surgical treatment of ovarian tumours has

passed, many various and injudiciously strong opinions have been expressed on one or other, or both, of these operations; but during the last fourteen years there has grown up an experience in the hands of one man, incomparable with anything else in the annals of surgery, and that experience has been so conscientiously detailed and so critically examined, and its conclusions have been so irresistibly drawn, that there is from it at present no appeal. In my own practice, I have found that, when I have differed from Mr. Spencer Wells, I have only exhibited my inexperience; for case after case has opened out for me the fact, that he had encountered everything before me; that he had previously tried what I have tried, and that there seems but little hope that anyone can surpass his magnificent results.

The operation of simple tapping was formerly regarded as much more serious than we now consider it, for no operation is at present more common in the hands of the ovariotomist. Generally, it is adopted either to gain time, in order that the patient's health may improve, or, paradoxical though it may seem, that the patient's robust condition may somewhat deteriorate; or it may be employed for diagnostic purposes. Sometimes it is curative—a fortunate result that I have met with twice in cases where I have tapped pelvic unilocular cysts through the vagina. It has sometimes happened, as noticed by Mr. Wells, that the tapping of large cysts through the abdominal walls has been followed by cure. It is more than probable that cases which have had a fortunate ending have been cysts of the broad ligament; for a truly unilocular tumour of the ovary—that is, a tumour of one cyst, with nothing else that would be likely to subsequently develope into another cyst, even if the first were cured—I have not yet met with.

Tapping by the vagina is not usually attended with good results in ovarian tumours. I have seen death result three times after it in the practice of others. Mr. Wells has found it better to keep the opening patent, and to encourage suppuration and discharge, than to allow the puncture to close. In the two cases to which I have referred, I fully exhausted the cyst by the aspirator, and to this, perhaps, may be attributed the fortunate result. In tapping through the abdominal walls, whether for the purpose of diagnosis or treatment, the point of puncture should be in the linea alba.

If the cyst be small, the ordinary aspirator will be found a most efficient instrument; but, if the cyst be large, the tapping will be best performed by Mr. Wells's small-sized syphon trocar.

Sometimes I have punctured above the umbilicus, but generally it is

better to keep between the umbilicus and the pubes, going above the former spot only when there is some solid matter below, or some suspicious circumstances that may warrant the exception. I have always adopted Mr. Wells's plan of first puncturing the integuments with a lancet, and then introducing the trocar. In cases where ascitic fluid has to be removed, or where a cyst is tapped to help in the diagnosis, Mr. Wells's blunt trocar will be found of great use, for it will serve as a sound to explore the relations of the tumour. I never take any special precautions for tapping, beyond having the patient laid comfortably on her side with the abdomen hanging slightly over the edge of the bed. After having pressed the wound together with my fingers for a few minutes, I seal it with a piece of lint dipped in styptic colloid.

I have had no personal experience of such plans of treating ovarian cysts as injecting them with iodine or forming fistulous openings into them. The former I have seen several times fatal, years ago, in the practice of others. The great success of the radical cure by ovariotomy will soon, I think, entirely supersede any such methods, save in very exceptional cases.

The proper selection of cases for the performance of ovariotomy is one of the many difficulties we have to encounter in practice, and can alone be based on experience. The proper consideration of the various symptoms and signs of the tumour, the age and health of the patient, and, most of all, a careful watching of each case for some time, are one and all essential conditions for the success of the operation. Ovariotomy is an operation for the success of which it is not very easy to pick cases; that is, that a surgeon who selects some cases and rejects others, simply with a view to a good mortality bill, will, in all probability, find himself egregiously mistaken. In my opinion, there can be only two reasons for refusing to do ovariotomy in any case; and these are either that the case is not far enough advanced, or that the tumour, in all probability, could not be removed.

It is in my own experience, and I am glad to find it is also in that of Mr. Wells, that about the most unfavourable case for ovariotomy is to be found in a young healthy woman with a medium sized tumour. A woman past the middle age, or pulled down in health by the growth and the confinement necessarily incident to its later stages, has a far better chance of recovery than the other; and, in the case of the younger and healthier woman, it will be found advantageous to temporise by tapping or other advisable expedient. Indeed, as Mr. Spencer Wells has laid down, as long as the patient's visceral functions are not

interfered with by the pressure of the growth, nor her life made uncomfortable by her unwieldy size, or by her disfigurement, or by pain, it is unwise to interfere with an ovarian tumour. In fact, the rule ought to be to delay an ovariotomy as long as is consistent with the patient's chances of recovery, bearing in mind that it is not the healthiest that recover best. On the other hand, the major operation must not be too long delayed; for, though Mr. Wells's statistics show that one or two tappings do not affect the mortality of subsequent ovariotomies, yet the results of multiplied evacuations of the cyst are far from favourable.

It is almost a matter of routine in the major operations of surgery, that it should be carefully ascertained that the patient is not suffering from organic or serious functional disease of any important organ, and this, for ovariotomy, must never be neglected. Especial care must be taken to examine the condition of the urine, for the condition both of kidneys and bladder are most important factors in its success.

Presupposing that a proper case has been selected, and that any defect discovered has been rectified, we come to discuss the stages of the operation, the precautions to be taken before and the treatment after it. First of all, there is the position of the patient—where shall she be? Experience answers that the more nearly her surroundings resemble those of a healthy private house the better; and the statistics show that the performance of ovariotomies in a large general hospital is altogether unjustifiable. There is no operation in the whole range of surgery where the patient seems to be so apt to be infected by septic influences, and no precautions against them can be too great. The room in which the patient is to be treated ought to be fairly large, and so arranged that ventilation may be possible from window or door to the fireplace without the current crossing the bed of the patient. There should be no unnecessary furniture, and as little upholstery work as possible. Two small iron couches, with firm hair-mattresses and a water-pillow, are needed; and an intelligent woman for nurse, who will do as she is told, *and nothing more*, is absolutely essential. If two such can be got to act as relays for the first eighty hours after the operation, it will be found a great advantage.

The patient herself requires a little preparation for the change that is about to be made in her alvine actions. For this purpose, I direct that her food should be limited to soup and a very little bread for forty-eight hours before the operation, and that on the morning of the day previous she shall have a small dose of castor-oil, followed, early on the morning of the operation, by a dose of eight or ten drops of laudanum. I

generally operate in the afternoon, and I do so, almost invariably, on the bed the patient is to occupy, the only precaution taken being to place a thick draw-sheet under the patient. The time of the operation should be about midway between two menstrual periods. The instruments for the operation are chiefly scalpels, dissecting, artery, and vulsellum forceps, two syphon trocars of different sizes, various sizes of clamps, a chain *écraseur*, cautery irons, needles, silk thread and wire, some solid perchloride of iron, and good sponges. As the operator grows in experience, he will find that there are many other instruments that he may have near him with advantage, such as an aspirator. Especial care must be taken to have the sponges clean and of good quality. To secure this, I generally get a very large and fine cup-shaped Turkey sponge and cut it into four, six, or eight pieces. These I soak for twenty-four hours in a solution of muriatic acid sufficiently strong to be disagreeably acid to the taste, and thus get rid of the chalky sand which infests them. It used to be my custom to use fresh sponges for every case, but I find that, after being used, if they be well cleansed in cold water, and then soaked for a day or two, first in a strong solution of sulphurous acid and then in a strong brine, and afterwards once more well washed, they are quite as good as new.

There cannot be a doubt that an important item of success in ovariotomies lies in the anæsthetic employed; and however valuable chloroform may be in obstetric work or in general surgery, in this operation its use is quite inadmissible, on account of the frequent and very persistent vomiting which follows its use. I have seen this vomiting have a fatal result, and it has so often given me great anxiety that I strongly urge the discontinuance of Simpson's anæsthetic for ovariotomy. Sulphuric ether is not much better, and has other disadvantages. The safest and most satisfactory anæsthetics are the bichloride of methylene and the methylene ether of Dr. B. W. Richardson.

The patient having been completely anæsthetised, and properly placed, and the bladder emptied, I make an incision in the median line between the umbilicus and the pubes, the latter having been shaved, not less than four inches long. This incision should go at once through skin and subcutaneous fat. A pause then is made, and any bleeding point of the slightest consequence is seized by Mr. Spencer Wells's scissor-handled forceps, than which I do not know a more valuable instrument. The bleeding having been entirely checked, the central tendinous line is sought for, and not always so easily found as might be imagined. The easiest way to find it is first to make a short diagonal cut across it, and

then to follow it. The tendinous expansion is laid open, as is also the extraperitoneal fat until the peritoneum is reached. Another pause is then made, and again all bleeding points must be secured. While the surgeon makes this incision, he will find a soft towel in his own left hand far more useful in letting him see what he is about, than any number of sponges in the hands of assistants. To open the peritoneum, a variety of devices are in use; but I trust to nothing but a sharp knife, and open the cavity at the middle of the wound to as great an extent as will admit my left forefinger. Passing this downwards, I extend the wound in that direction by a probe-pointed bistoury. In this way, there is no possibility of cutting anything the forefinger cannot feel, and that always must be the best director. The wound should be brought down as close to the pubes as is consistent with the safety of the bladder, so as to diminish the subsequent strain on the pedicle, if it should happen to be short, and have a clamp applied to it. If there be no adhesions between the cyst and the peritoneum in front, this part of the operation is very simple; but, if there be adhesions, it is no easy matter, in some cases, to find the point of union, and, in spite of the greatest care, occasional instances will probably happen of mistaking the peritoneum for the cyst. The peritoneum is often so altered in appearance, being thick, leathery, and gelatinous, as to deceive any but the most experienced operator. When the cyst is reached, it should be tapped by a large-sized syphon trocar, and emptied as quickly as possible. Sometimes the cyst-contents are glairy, or even gelatinous, and will not pass through a trocar; in which case the cyst must be laid open for three inches, either edge of the wound into it seized and dragged outwards by forceps, and the contents scooped out as well as may be. After the major cyst has been emptied, traction should be made on it, so as to ease it gently out through the wound. Two kinds of obstacles may hinder its exit—secondary cysts or adhesions. The secondary cysts should be punctured or broken down from within the cavity of the major sac, thus preventing as much as possible the escape of the morbid fluid into the cavity of the peritoneum—a most important matter. Adhesions are mediate or immediate, the former being generally parietal or omental, existing in the shape of round or flattened bands of peritoneum. They seem to be formed by isolated patches of adhesion, dragging off the peritoneum from the abdominal wall by pieces of adherent omentum. They are seldom large, and are only of any moment when traversed by a large blood-vessel, which, however, may generally be secured by torsion or by ligature. The immediate ad-

hesions, if of old date, are often very serious, so much so as to render it sometimes impossible to complete an operation when they occur in the pelvis or to some important organ, as the liver or stomach. When the tumour is adherent only to the anterior wall of the abdomen, the complication does not seem to be of great moment. I have, in one case, separated very extensive adhesions in the pelvis successfully, but I have also seen an iliac vessel torn across, fatal hæmorrhage being the result. I have removed a very large tumour which was adherent almost universally, but the patient died in forty hours of shock. I had diagnosed extensive adhesion before the operation.

Hæmorrhage from adhesions is sometimes troublesome, and may require considerable patience to overcome it. If a bleeding point be within sight, and it be limited to one mouth, it had better be secured by a ligature cut short, if torsion fail to stop it. If it consist of oozing from a surface, either a touch with the solid perchloride of iron or the hot cautery is better.

If there be no adhesions and no large secondary cysts, ovariotomy thus far is a very simple operation, which seldom takes above five or six minutes to complete, and this simplicity has been a great snare to many; for there is no operation usually performed which requires the surgeon to be more alive to possibilities, and to be prepared for them, than ovariotomy. The complications and unexpected difficulties are endless, and sometimes extremely trying to the presence of mind and ingenuity of the operator. Thus a second dermoid cyst may be found packed down in the pelvis, as has twice happened to me, and to get it out may be a matter of no little trouble. For such a condition, the aspirator will be found invaluable, and it ought always to be within reach. The cyst-walls may be found so thin, that any kind of forceps will tear them, and the contents so glairy, that they will not run through a trocar, as I have more than once experienced; or the secondary cysts may be found so numerous and so small, that there is no alternative but to bring them one by one to the surface and slit them open, brushing the escaped contents immediately off with a sponge. This has occurred in my practice several times, and I have always adopted this plan rather than carry the incision above the umbilicus.

As the tumour is being withdrawn, an assistant should be ready, on the left side of the patient, to insert the forefinger of his right hand into the wound, and, by grasping the integuments on the one side with his thumb and on the other with the remaining fingers, to close the wound, and thus prevent the escape of the intestines. If he be sufficiently alert,

the bowels need never be seen in a well conducted ovariotomy. Having got the tumour fairly out, the surgeon's first duty is to examine the pedicle and decide how it is to be treated. I have tried four methods of treating the pedicle, namely, by the long and short ligatures, division by the *écraseur*, and inclusion in the clamp, and I have arrived at the firm conviction that the clamp is the best in every way when it can be applied. The form I prefer, after a trial of all the kinds I have seen, is the calliper-clamp of Mr. Wells. I have divided the pedicle ten times with the *écraseur*, and only one of these patients has died, the case being that of the very adherent tumour I have referred to, and which would have died no matter how the pedicle had been treated. I have a distrust of the *écraseur*, however, because, in two of my cases, pelvic hæmatoceles formed coincidently with menstruation a few weeks after the operation. In neither of them was there any danger to life produced by the hæmatocele; but considering how frequently an irregular menstruation occurs a day or two after ovariotomy, I have given up the use of the *écraseur* in the treatment of the pedicle, dreading an unfortunate result. Moreover, Mr. Wells has shown that a divided pedicle dropped in back is very apt to contract adhesions to the intestines, and give rise to serious trouble. One case I treated by carbolised ligatures, and she died on the fifth day from pelvic peritonitis and suppuration. In one case, there was no pedicle, and I removed the tumour as well as I could, partly by the *écraseur* and partly by scissors, tying the bleeding points as I found them. This patient died on the fourth day. Any similar case I may meet with in future, I shall treat by Dr. Miner's plan of enucleation. In two cases, I tied the pedicle with silver wire and dropped it back. Both these patients made excellent recoveries, and both carry their wire-rings to this day without inconvenience; and I think I shall adopt this plan when I cannot use a clamp. In one case, I used the long ligature, and she died on the fourth day. She will be the last in which I shall so treat the pedicle. I have had no experience in the use of the cautery.

After the pedicle has been satisfactorily dealt with, the state of the peritoneal cavity ought to be the subject of the surgeon's attention; for it is certain that the careful removal of any clots or cystic fluid that may be there, is a necessary part of the success of any operation. Large flat sponges are best for this, and they should be stuffed well down into the pelvis and round into the lumbar regions, and left there for a few minutes. The operator should always know how many sponges are in use, and they should be counted before the wound is closed. Previously

to this last step of the operation, it must be carefully ascertained that the other ovary is healthy. If it be enlarged by cysts, it had better be removed, or, if it contain only one or two small cysts, they may be opened and their contents pressed out. Any tumour of the uterus had better be left alone, unless it be markedly pedunculated. If the uterus be found enlarged by pregnancy, it must be left alone; but, if unfortunately punctured in mistake for a cyst, as has happened several times, the safest treatment is to lay it open and empty it, as has been done successfully by Mr. Spencer Wells. The closure of the wound I usually effect by silver sutures passed by a handled needle; and, when a clamp has been applied to the pedicle, I pass the first stitch as a double wire immediately above the clamp, and fasten it at once. I always act on Mr. Wells's suggestion, and leave a sponge in the abdomen, just within the wound, until the other stitches are passed, and withdraw it before they are fastened. Care must be taken to include the peritoneum on both sides in the stitches, and to enclose no intestine or omentum in them, nor in the clamp. In fastening the deep sutures, the lips of the skin-wound must be carefully adjusted, and, if necessary, superficial sutures should be inserted. For the closed wound, a variety of dressings may be used. In my own practice, when I have treated the pedicle by returning it within the peritoneum, I have always used Lister's lac plaster, and I have found it a very convenient form of dressing. I may say that I did not take any other antiseptic precautions, nor have I ever seen a case where they seem to have done any good. In cases where the operation has been done under a carbolic spray, the only difference observable was in the comfort of the operating surgeon, and this difference was no advantage. When I have used the clamp, I have always adopted Mr. Wells's dressing, which consists of little squares of dry lint tucked in under the clamp and laid over the wound. It is extremely neat and convenient, and, if covered by little bags containing Skinner's disinfecting powder or a pad of oakum, it is, perhaps, the best of all. Instead of Mr. Wells's strapping, I employ a linen binder fastened by safety-pins. The wound rarely requires to be dressed more than once in twenty-four hours, and, for cleansing it, some old linen or lint should be used without moisture. The wound generally heals by first intention, and the stitches may all be removed on the seventh or eighth day, except the one nearest the pedicle, which had better be kept in somewhat longer. The clamp generally comes away between the eighth and twelfth days, but its separation ought never to be hastened. In one or two cases where I have helped it a little, I have had reason to

regret my haste by seeing the stump slowly sink downwards, keeping me in suspense for a few days as to whether or not the peritoneum would again be opened. When the clamp has come away, the dry lint dressings should be continued until the wound has healed, and the patient should be warned that the wound may open up slightly and discharge some menstrual fluid for a few months after the operation. In a case where I removed both ovaries and included both pedicles in one clamp, this after-discharge did not occur.

The after-course of a case of ovariotomy is subject to many rude checks, which alter its history very much from the fortunate career supposed in the preceding sentences. There are many dangers in the path of every patient submitted to this operation, and there are many indications of their approach, but none so trustworthy as those derived from a close observation of the patient's temperature-curve. It should be the invariable practice of the surgeon to have a temperature observation of his patient made night and morning for a few days before the operation, and afterwards this ought to be repeated every four hours. Nothing has been to me more instructive than a comparison of a group of such charts; and I have repeatedly seen grounds for a prognosis in a case by the comparison of its temperature-range with those of former cases. It will almost invariably be found that, immediately after the operation, the temperature falls considerably. I have seen it do so as much as two degrees, indicating the risk the patient has to run in the form of shock. To obviate this, it is always well to place hot-water bottles to the sides and feet, and, if depression be severely marked, to administer a diffusible stimulant. By far the best is an enema of diluted champagne with a little brandy. I make it a rule always to administer a small dose of morphia, a third or a fourth of a grain, immediately after the operation by subcutaneous injection, and by this I believe I ward off shock, in great measure, and prevent the after-sickness which is often so distressing a condition. Since I have discontinued the use of chloroform, this latter accident has been almost entirely absent from my practice. From the twelfth to the twentieth hour after the operation, the temperature slowly rises, unless the patient succumb to the shock; or, in the still rarer condition, where the operation has had to be undertaken on an emergency due to cyst-inflammation or an attack of peritonitis, in which case the temperature falls. In a case of the latter, where I operated with a temperature of nearly 40 degs. centigrade, it fell in twenty-four hours to 37 degs.

After the recovery from shock, the patient generally breaks out into a gentle perspiration, and this should be slightly encouraged, and the temperature may vary from 36.8 deg. cent. to 38.5 without giving rise to any alarm. If it rise, however, above the latter point, especially if accompanied by an increased pulse frequency, dry tongue, pain, and inflation of the abdomen, green vomiting or hiccup, and anxious face, the access of peritonitis, in some form or other, may be taken for granted. The treatment of this must vary very much according to the circumstances of each case. Where I thought bleeding would be borne, I would not hesitate to put two or three dozen leeches over the abdomen, or even to bleed from the arm. I have several times painted large surfaces with blistering fluid with most excellent effect, but my staple remedy is opium. This may be given either as laudanum by the mouth, or in a rectal injection or suppository, and is most useful in small doses frequently repeated. Some authorities recommend calomel and opium in pill at the onset of peritonitis, but usually there is too little time to afford delay for the action of such a remedy; and, if mercury is to be of any use, it must be given in the form of mercurial inunction. I have found a combination of opium and quinine of signal service.

For the first twenty-four hours after an ovariotomy, I allow the patient no other sustenance than ice or iced water, and, perhaps, in the case of sickness, a little soda-water and brandy, or champagne. Nutriment may be given cautiously on the second day in the form of chicken-broth or beef-tea, in small quantities frequently administered, so as to obviate vomiting. I seldom allow any solid food to be taken till after the fourth day, which seems to be a sort of critical time; and I have found fish, such as a plain boiled sole, to be the best form to begin with. After that time, more latitude of dietary is admissible, but always with the precaution that any fresh article is to be tried carefully in very small quantities, lest it be found to disagree.

During the second or third day we may find symptoms of exhaustion appearing in the form of restlessness, vomiting, and hiccup, sunken and pinched features, and frequent sighing. Under such circumstances, food and stimulants may be allowed more liberally, especially champagne with a little brandy in it; and very often great benefit may be derived from frequent small enemata of beef-tea and brandy.

In the event of the occurrence of symptoms of peritonitis, special interference may be requisite, such as opening the recto-uterine *cul-de-sac* from the vagina, for the purpose of draining any purulent or other fluid that may be collecting in the peritoneal cavity. Dr. Marion Sims has

recently proposed to pass a drainage-tube in this way in every case of ovariotomy, before the closure of the abdomen, in order to prevent such collections. He is of opinion that they are the cause of the peritonitis instead of, as it seems to me, the result; and, though it is extremely probable that their evacuation may prevent subsequent purulent infection, yet the presence of a seton in the peritoneal cavity in every case of ovariotomy is far more likely to increase the number of cases of peritonitis than to diminish them. In none of the *post mortem* examinations that I have seen of fatal cases of peritonitis after ovariotomy, could Dr. Marion Sims's suggestion have been of the slightest use in securing the escape of the effusion. In all of them, the lymph and pus were out of reach of any tube which would pass between the parietal wound and an aperture in Douglas's pouch.

Septic poisoning is no more a peculiarity of the after-course of a case of ovariotomy than it is of an amputation; but it seems an accident to which it is liable with extreme readiness, if submitted to any sources of infection. Thus we find the mortality of ovariotomy in large hospitals so great as to render its performance in such institutions perfectly unjustifiable. Before operating, and during the period of his attendance on a case of ovariotomy, the surgeon ought to take the most especial pains not to perform any *post mortem* examination or dissection, nor to handle any patient suffering from purulent infection. Indeed, he ought to conduct himself as if he were engaged in a large midwifery practice.

Septicæmia is generally ushered in by rigors, and is indicated by an exaltation of temperature. If it take an acute form, a few hours may suffice to end the case. If it be of the subacute variety, beginning on the fourth or fifth day after the operation, it runs a longer course, and is more marked by nocturnal exaltation of the temperature curve, night-sweats, diarrhœa, dry, brown and furred tongue, green or coffee-ground vomiting, hay-smelling breath, and tenderness over the liver; pneumonia often occurs in its course, and death usually takes place in four or five days. The chronic pyæmia, resulting in abscesses of joints, etc., is rare after ovariotomy; there seems not to be time enough for its development.

Vomiting is a frequent and often troublesome symptom after ovariotomy, and may arise from any of the complications I have mentioned. It is absolutely necessary to stop it, if possible, for I have seen the straining tear the wound open. There are many remedies that may be employed, as prussic acid, creasote, iced champagne, sinapisms over the

stomach, etc.; but by far the most useful, in my experience, has been Morson's pepsine wine, given in drachm-doses every ten minutes with a little ice-water. This has been especially beneficial in bilious vomiting.

Flatulence is often a very distressing symptom, and, if accompanied by a high temperature, is pathognomonic of peritonitis. Milk and lime-water often mitigates it very much, and the passage of an O'Beirne's tube as far as possible up the rectum will often give much relief. Failing that, I have several times punctured the distended bowels with a fine exploring trocar, and kept it in for some hours with great relief. An irregular menstruation comes on very generally within forty-eight hours after ovariotomy, and seems to be a relief; for many of my cases where it has not occurred have died. It is often a source of alarm for the patients, and they ought always to be informed of the probability of its occurrence.

Inflammatory attacks in the chest sometimes occur during the convalescence after ovariotomy, and they are always sources of anxiety. After an operation in which a very large tumour has been removed, especially in a patient advanced in life, a short irritating cough is not unusually noticed in a few hours. This rapidly increases in severity, and I have seen it carry off a patient in thirty hours. It is evident that we have, in such cases, to deal with something very like the passive suffocative catarrh of old age. The expiratory muscles, probably chiefly the diaphragm, from long want of use have become atrophied, and, missing their *point d'appui* in the tumour, are unable to carry on the process of expectoration of mucus. It is one of the many reasons for preliminary tapping, that we may gain time for the muscles to recover their strength.

Acute pneumonia, bronchitis, and pleurisy are sometimes met with, and two of my patients have been nearly lost by the first of these complications. In one case, I hesitated for some hours as to whether I should not bleed from the arm; and, though the case recovered without it, I think the issue would not so long have been doubtful if I had bled her. The full administration of nutriment and stimulants is most to be trusted to, aided by the wrapping of the whole chest of the patient in jacket-poultices, with this necessary precaution, if once begun, they must not be left off until the crisis is over; and, in their use, it is most essential that, in changing them, the old poultice shall not be disturbed until the fresh one is ready for immediate application.

Diarrhœa may set in about the third or fourth day, and prove most irksome. It is often the indication of septicæmia, but more frequently

it originates in some hard fæces lodged in the lower bowel. In the latter case, it is easily remedied by warm water enemata, followed each time by a morphia suppository.

For three or four days after the operation, the patient should not be allowed to pass urine without the catheter, which ought to be used every six or seven hours. Great care must be taken to clean the catheter well after each time it is used, for it is not unusual to see severe cystitis set in from the introduction of an uncleaned catheter containing a drop of fœtid urine. If this accident should happen, its most appropriate treatment consists in the liberal administration of quinine, and the washing out of the bladder every six or eight hours with a weak solution of acetate of lead at about 38 degs. cent.

The intention of the use of the catheter is to keep the pelvis as quiet as possible, and for this purpose it is also well to administer occasional small doses of opium, to prevent any action of the bowel for seven or eight days, even though there be no pain to necessitate the opiate. In some cases, the bowels may remain without action for ten, twelve, or fourteen days after the operation without giving rise to any uneasiness. After such a time, the fæces which have collected in the lower gut may have become hardened; so that, when there does come on an inclination to have a motion, a small emollient enema ought to be given to facilitate its passage.

After the action of the bladder and rectum have been fairly established, the clamp loosened, and the wound healed, the further convalescence of the patient does not differ materially from that of one on whom any other serious operation has been performed. I have sometimes noticed a peculiar rapid emaciation, which comes on about the end of the second and beginning of the third week of recovery, which, on one occasion, the first time I saw it, was a source of anxiety to me. After the wound has so far healed that it has begun to contract, the patient may be allowed to leave her bed for a little every day, and in due time to assume the erect position. There is one precaution always advisable, that the patient should wear a tight-fitting abdominal belt instead of stays; for, in spite of all care in inserting stitches to include all the layers, and to have immediate union of the abdominal walls, there is a proneness to the formation of ventral hernia in the cicatrix for many months after the newness of the union has passed off.

Sometimes we open the abdomen to remove an ovarian tumour, and find that we are unable to complete the operation. This has happened

only once to me, the first time I attempted ovariotomy, and the case was an instructive one in many respects. In May 1868, I saw Mrs. H. in consultation with Mr. Kemp of Castleford. She was 37 years of age, considerably emaciated, had always menstruated regularly, had been married seven years, and was the mother of four children. About six months previously to my seeing her, she had noticed a lump in the left iliac fossa. This increased very rapidly, and, on her consulting Mr. Kemp, he diagnosed an ovarian tumour. The increase was so rapid, that he tapped her, removing a large quantity of clear straw-coloured fluid; and I saw her seven days afterwards, when there was a considerable reaccumulation. Percussion elicited a perfectly dull note all over the abdominal wall, below a transverse line passing an inch and a half above the umbilicus. Partly above this line, but mostly below it and to the right of the umbilicus, I felt through the thin parietes a floating tumour, about four inches in transverse and three inches in vertical measurement, which I believed to be secondary growth in the wall of the major cyst, the latter being regarded as unilocular. The uterus was normal in position and freely mobile. She had a very well marked ovarian face and a shrunken dry skin.

I made the usual incision, but I had much difficulty in recognising the peritoneum from the cyst-wall. I found that they were intimately adherent, and it was only by diverging a good deal to the right under the rectus muscle that I came upon a point of separation. Slitting open the peritoneum, I found that on the right side the tumour was free, and that I could readily reach the ovary and fundus uteri on that side. The ovary was healthy, but the uterus was tuberculated and somewhat fixed in front. I found that the cyst was adherent throughout to the left side and above the umbilicus, and that it had a long pedicle running from the left corner of the uterus into a firm mass at the brim of the pelvis. The flat floating tumour which I had felt near the umbilicus was a mass of soft cancer in the omentum. Long before I had made out these details, I had satisfied myself that the case was one of unilocular ovarian cyst complicated by general cancer of the peritoneum; for all over the peritoneum of the pelvis, and less abundantly on the parietal peritoneum, and on the free cyst-wall, were scattered little flat and wart-like patches of a light pinkish red colour, and very friable. They did not bleed when torn in breaking down the adhesions. This process I only partially attempted, and soon desisted. I then emptied the cyst, and, finding its contents perfectly limpid, I removed a piece of it, so that its cavity should communicate with that of the peritoneum.

This I did because the fluid in the peritoneum was darker and more dense than that of the cyst, and it seemed possible that the exhaustive process of tapping would not be so frequently required, if the effused ovarian fluid were drained into the peritoneum to dilute the denser liquid. I had to secure two large vessels in the parietal wound, and it was closed by silver wire sutures after the cavity had been carefully sponged. I saw her ten days afterwards, and found that the wound had suppurated profusely, the two ligatures had come away, and that there was no reaccumulation of fluid in the peritoneum. The wound closed completely in three weeks, and she died a month afterwards from extension of the cancer, Mr. Kemp having written to me, to say that the enlargement of the omental tumour had been most marked, and that there had been no re-secretion of fluid. We were not allowed to examine the body.

The piece of cyst-wall which I removed I placed in a one per cent-solution of chromic acid, and then examined thin sections of it, stained and unstained, to determine the character of the peritoneal patches.

I found that they were cellular throughout, and that the cells were more or less flattened, irregular, and of an epithelial character. The patches seemed to be continuous with the epithelial layer of the peritoneum, and, indeed, to be constituted by a malignant proliferation of the normal epithelial cells, many of which were evidently immaturely formed and abundantly intermixed with free nuclei. I could trace no vessels in the patches, which peculiarity would explain the absence of hæmorrhage when the adhesions of the tumour were broken down, these adhesions being evidently the coherence of opposing peritoneal surfaces by cancerous cell-growth. In some places, the patches, varying in size from a millet-seed to a pea, had split on the surface, and presented a villous appearance. Occasionally, a patch undergoing fatty degeneration was found. Nowhere was any capsulation of the cells noticed, as is seen in skin-cancer, though otherwise the microscopic appearances strongly resembled those of ordinary epithelioma.

Since writing the foregoing part of the essay, I have met with another case, where none of the ordinary signs were available for an accurate diagnosis, and where an exploratory incision was the only course. I am quite sure that each exploratory incision an ovariotomist makes gives him a great addition to his personal skill in diagnosis, and will lessen for the future of his practice the need for such a tentative measure. Not that I recommend all beginners to practise needless abdominal sections, but that, having carefully considered the propriety of an

exploratory incision and performed it, the experience the operator has gained from it ought to assist him in avoiding its necessity in similar doubtful cases.

A month ago, I saw Mrs. C., aged 32, in consultation with Mr. Croft of Snitterfield. She had a large abdominal tumour with the intestines above it and to each side, forming the characteristic ovarian coronal clearness of percussion. The tumour was fairly movable, and gave indistinct indications of fluid contents. It had no intimate relation to the uterus; it filled the pelvis, could be pushed upwards out of it, and extended three inches above the umbilicus. I saw her again in a month, when I found the tumour had much increased in size, and that some of the other conditions had been much altered. She was suffering a good deal, and we were anxious to relieve her. I expressed the opinion that the tumour was either a colloid semi-solid tumour of the ovary, or malignant cystic degeneration of the kidney. By none of the signs present could I determine which, for the tumour seemed to me much too pelvic to be a tumour of the kidney, and its relation to the intestines was indicative of an ovarian origin. Further, the history given, both by patient and by attendant, pointed to the right ovary as the seat of disease. There was, however, a fixity about its upper part that made me hesitate between the two alternatives and recommend an exploratory incision. As soon as the peritoneum was opened, the dull pinky-white colour of the tumour decided me to the view that it was a case of encephaloid cancer of the kidney, probably with cysts; and, passing my hand into the pelvis, I found the uterus and ovaries healthy. The area of attachment of the tumour was the position of the right kidney, and, of course, I closed the wound at once.

I have had two cases where I declined to attempt the removal of tumours diagnosed as ovarian, and where *post mortem* examinations have justified my refusals and the grounds for them.

The first occurred in the case of a young woman of 24 years of age, in whom there existed a multilocular tumour, lying chiefly to the left side of the abdomen and fixed there. She gave a history which showed that, on three or four occasions, cysts had ruptured into the peritoneum, and that the rupture had been followed by some peritonitis on each occasion. She entreated that an operation should be attempted to relieve the sufferings she had to undergo on defæcation. I declined to attempt an ovariotomy, being quite certain that the tumour was so adherent as to render its removal an impossibility, and the contents of the cysts were found to be too viscid to be removed by tapping. She died

during an attack of peritonitis due to the rupture of a cyst, which, on *post mortem* examination, was found to be adherent to the bladder. The tumour was found to be so intimately attached to the sigmoid flexure of the colon, some coils of small intestine, to the brim of the pelvis and to the bladder, that its removal would have been impossible.

In October 1869, I saw Mrs. C. in consultation with Dr. Hollings of Wakefield. She had a large oval tumour, solid, hard, and smooth, moving freely in the abdomen, centrally situated, with a similar smaller one to the right side. The larger tumour reached about two inches above the umbilicus, could be felt high in the pelvis, and had no attachment to the uterus. I diagnosed it as a case of solid cancer of the ovary, and declined to operate. The abdomen was free from ascites or other complication. I saw her a second time in a few weeks, and found that the tumours had both increased in size, and then, having made myself more familiar with the subject, I gave it as my opinion that it was an instance of the rarest of all forms of cancer—the fibroid. On December 5th, I found her with symptoms of peritonitis, and a considerable effusion of ascetic fluid. I tapped her, to relieve the breathing, and found a large soft semi-fluctuating mass extending from near the xiphoid cartilage to within three inches of the pubis, masking the outlines of the tumours. This I recognised as possibly a fungoid growth of the omentum. I tapped her again on the 9th, and she died next day. Twenty-four hours after death, I examined the body, and, on opening the abdomen, I found adhesions everywhere to the large deep-coloured fungous mass which I had correctly regarded as growing from the omentum. It was adherent behind to the intestines and to the tumours. The larger of these latter was found to be perfectly loose, save from the omental mass and the right corner of the uterus, to which it was attached by a short thick pedicle; in fact, it was the right ovary, as no other trace of the gland could be found. The smaller tumour was similarly the left ovary, and a still smaller tumour seemed to grow from the same pedicle. Scattered over the surface of the peritoneum were patches very similar to those previously described in a case of cancer of the peritoneum. These patches were also found on the surfaces of the tumours, and were stripped easily off with their investing epithelial coverings. In the right or largest tumour were a few cavities containing fluid, and also some curious cretification at the base and in the pedicle. It weighed probably twelve or thirteen pounds, so that I could not remove it conveniently for preservation. I removed and carefully examined

the smaller tumours, some peritoneum, with specimens of the patches and a piece of the omental fungus.

In the piece of omentum, nothing but blood-detritus, a few scant fibres, and some irregular cells were found. The nodules on the peritoneum showed all the characters of cancerous tissue, being composed of large irregularly shaped and irregularly sized cells, containing variously shaped nuclei in varying numbers. There seemed to be no fibrous tissue in them at all, and their elements readily separated by gentle pressure between the cover and the glass slide. A careful section showed the epithelium of the free surface of the peritoneal layer to be undergoing interesting changes. The cells of the upper layer were normal; but, at two or three layers' depth, they were seen to be larger, more irregular, and the number of nuclei increased, the latter fact being most clearly displayed on the addition of acetic acid.

The ovarian tumours removed were ovoid, smooth, and glistening, and here and there the surfaces were marked with the peculiar patches above described. Together, they weighed nearly three pounds. When cut into, no juice exuded from them, and the scant moisture scraped from the cut surface showed no cells. The tissue was pearly white and very tough. Teasing with needles did not give any satisfactory results, and a great many sections had to be made before one thin enough for examination was obtained. I then found that the texture was purely fibrous, there being nowhere, under the epithelial layers, any cells discoverable. The fibres were extremely fine, closely and regularly packed, without any appearance of undulation or interweaving, but seemed to lie parallel with only faint curvings in their general direction. They were readily stained by carmine. Acetic acid showed no nuclei, and did not influence the fibres beyond a slight clearing of the section.

It will be found that this description differs in some important particulars from that given by Sir James Paget of similar structures, especially in the absence of nuclei; but the rarity of opportunities for the examination of such peculiar growths stands much in the way of their proper investigation.*

The pathology of ovarian cysts involves a number of questions that have been raised and discussed by observers of the greatest eminence; but, up to the time of writing this, I have found little that has either

* I have fully examined a fibroma of the ovary, in which the ordinary processes revealed nothing but fibres, but which my litmus staining showed to be a compact mass of immature nuclei.

harmonised with my own observations, or seemed to me to give any very satisfactory explanations of the growths. I have had opportunities of examining a large number of tumours removed in the operation of ovariotomy, and I have come to some conclusions which are at variance with those of many observers, but which, nevertheless, seem to me to be founded on fact, and to have at least this recommendation, that they simplify matters very much.

First of all, we may dismiss what we know of the causes of ovarian dropsy in the confession that we know nothing about them. The most common form, the adenoid or proliferous, and also the rare multiple tumours, occur during the period of life when ovarian cell-growth is mature; the more rare unilocular cystic growths, besides being met with during this period, occur at the extremes of life; for I have seen one at 9 years of age, and I have now under my care a unilocular tumour in a patient aged 72. I have also removed a tumour from a lady aged 66, which, though it was composed of several sacs, I have placed under the category of the unilocular tumours, for reasons which I shall afterwards discuss.

I have already said that I have not yet met with an ovarian tumour that was unilocular, and I have just perused, in the *Lancet*, an extract from a paper by Dr. Granville Bantock which strongly confirms the view I hold, that all unilocular tumours in the neighbourhood of the ovary are not of ovarian, but of parovarian, origin. The parovarium consists of a few closed linear sacs, the remains of the tubules of the Wolffian body in fœtal life, which may readily be seen on holding the broad ligament, with the ovary and Fallopian tube *in situ*, up to the light. These tubules frequently contain a perceptible amount of fluid, and I have repeatedly seen them, accidentally in *post mortem* examinations, distended to the size of beans or filbert-nuts, and have disregarded them as "Wolffian sacs" of no pathological importance. Three years ago, I had occasion to make a medico-legal examination of the body of a woman far advanced in life, and I found in her left broad ligament a cyst as large as an orange, filled with clear limpid serum. It was pressing upwards and backwards out of the pelvis, the ovary being at its lower and anterior aspect, and the Fallopian tube arched over its anterior surface. On the side next the uterus, two smaller cysts were lying close to it, and, nearer still, a very minute sac, which was evidently, by shape even, a distended parovarian tubule. The ovary was white, puckered, and shrivelled, and had not a continuous relation to any of the cysts, though it touched the largest at its hilum. The Fal-

lopian tube was normal, and had no other relation to the tumours than slight connection by loose areolar tissue. There was in my mind no doubt that this was a pathological indication of value; for, in an ovariotomy that I had performed not long before, I was struck by the fact, that the ovary was perfectly healthy and separated from the tumour, as was also the tube, by a mesovarium of some extent; in fact, I did not do ovariotomy at all in the removal of the tumour, for, in passing the chain of the *écraseur* round its base, I did not include either the tube or the ovary, and they were both returned into the abdominal cavity.

The consideration of these facts led me to examine some tumours I had removed previously and others removed by friends, and I have since subjected specimens to careful examination for confirmation of my accidental observation. The result has been that in every truly unilocular tumour I have found the ovary unaffected, though on several occasions I have found it stretched over the cyst-wall. I have three or four times found the ovary separated from the cyst by a more or less distinct mesovarium, and on one occasion I found in that fold some unaffected parovarian tubules in the case of a lady, a patient of Mr. Hall Wright, from whom I removed a large unilocular cyst about eighteen months ago. In one instance where I operated a few days ago, the healthy ovary was left at least an inch below the clamp; and in another case, to which I have already alluded when speaking of adhesions, the ovary and tube were found glued on to the cyst, but forming no part of it. In this cyst the walls were extremely thick and contained large quantities of involuntary muscular fibre—a fact which I do not think militates against my view that it was of parovarian origin, for nucleated muscular fibre-cells exist in the broad ligament to some considerable extent.

The case to which I have alluded as presenting a tumour with many cysts, but which ought to be placed under the same category as the unilocular cysts, occurred in the person of a lady aged 66. She was a widow, having been married forty-three years before the tumour appeared. The menses had ceased for nearly twenty years, and her youngest child was aged 25. There was every reason to believe, therefore, that the condition of the cell-growth of her ovaries would be one of very low activity. The tumour was first discovered about five years before I saw her, and had grown slowly for four years and a half, but with extreme rapidity for six months. The abdominal parietes were very thin, and the percussion-wave was communicated with extreme and uniform rapidity in every direction. I diagnosed, from my former ex-

perience, that it was a unilocular Wolffian cyst, and that the ovary would, in all probability, be found uninvolved. I was right about the ovary, for that was found, along with the tube, almost undisturbed, and not in any way involved in the tumour, the latter having apparently escaped from between them backwards and upwards. I had made a mistake, however, about the tumour being unilocular, for it was composed of five or six sacs. The walls of these were very peculiar, in being of uniform thickness, or rather thinness, for they were like tissue-paper, and had no thickening towards the base of the tumour, as is always the case in the multicystic adenoid or multifollicular tumour. My belief was, and is, that this tumour was a specimen of dropsy of a number of the parovarian tubules; for, if one alone may become dropsical, there can be no reason why a number should not be so coincidently. My opinion has been greatly strengthened, however, by a re-examination of the tumour for the special investigation of one point drawn attention to by Dr. Bantock; that is, the possibility of separating the outer coat of the tumour. This can readily be done towards its base for a short distance up from the ovary, discovering the fact, that the gland and its duct can be stripped off the tumour without damaging its walls. The rapid growth during the later periods of its existence, however, seems to have so stretched the walls, that, beyond two or three inches from its base, the peritoneal layer cannot be separated from the cyst-wall proper. I have quite satisfied myself that this case is really one of multilocular parovarian tumour; and I am the more strengthened in this view when I find that Dr. Bantock refers to a case of Mr. Spencer Wells's, which the great ovariotomist recognises as one of bilocular parovarian cyst.

Considering this, it is a point for investigation whether or not the curious little pedunculated cyst, representing the terminal bulb of the Wolffian tube, and generally known as the organ of Rosenmüller, may not sometimes form a unilocular tumour of morbid size and be removed as an ovarian growth. All these rudimental structures are lined with epithelium, and may, therefore, conduct themselves as other tubes so provided are known to do. I suspect that the tumour, in the case I have mentioned where I actually left the ovary on the affected side, may have been an instance of dropsy of this little cyst.

I do not mean to assert that such a thing as a unilocular tumour of the ovary proper may not occur, but I am certain that, in my experience—limited certainly—it has not been met with; and before such a tumour is accepted, the specimen must be rigidly examined to ascertain

whether or not the ovary is involved. I have met with a case in a patient 52 years of age, who had ceased menstruating for two years before the discovery of the tumour, where I diagnosed a unilocular tumour; but when I came to operate, I found at the base a large number of minor cysts representing the ovary, from one of which originally, I have no doubt, the major cyst was developed. I believe that at the base of all the unilocular tumours which are really ovarian, minor growths will be found that will substantiate the true origin of the tumour.

This leads me to speak of a variety of tumours, the origin of which has been fully traced by Rokitansky and Ritchie, and with an example of which I have been fortunate enough to meet, thereby having been enabled to confirm their observations.

I cannot here enter into full details of the curious and most instructive case to which I now refer, for they have formed the basis of a paper elsewhere. (See *Obstet. Soc. Trans.*, vol. xv.) It will suffice to say, that it occurred in the person of a hospital patient from whom I removed both ovaries. Both tumours were multilocular, and had one or two major with innumerable minor cysts, graduating down to the most minute size. The fluid contents of all were limpid, and what was evacuated from three or four cysts at the time of the operation, together with the solid masses of both tumours, did not weigh quite ten pounds. The right tumour seemed to be about one-fourth larger than the left, so that they were probably four and six pounds in weight respectively—small-sized tumours. Both pedicles were included in one clamp, and the patient made an uninterrupted recovery.

After removal, the most careful examination of the tumours failed to discover any remnant of the ovaries outside them, nor did I find any trace of either of the Fallopian tubes. The tumours were pearly white and glistening; but the thin parts of the major cysts had a peculiar transparency that I had never noticed in any other tumours before, and columnar bands stood out here and there in relief on the walls. I may say that the tumours had been of extremely slow growth; for I had had her under notice for nearly a year before the operation, and had not discovered any increase in the size of the tumours, though they had been in existence probably five or six years.

The interiors of the large cysts were lined with regular pavement-epithelium, and the walls seemed composed of fibrous tissue with some nucleated fusiform cells, probably involuntary muscular fibre. The smaller cysts were densely packed together, and at some places where

they were of an uniform size, the tumours had much the appearance of huge white raspberries. I was struck with the resemblance the tumours presented to what I recollected of those in which Rokitansky and Ritchie had found ova, and I at once turned to Dr. Ritchie's admirable monograph and found that the tumours answered the descriptions completely. I, therefore, examined the contents of as large a number of the cysts as I could, and in every one, I think without exception, I found more or less distinct remains of an ovum.

It will serve my purpose best to quote at length from Dr. Ritchie's book, for our experiences are almost identical, and he also gives the observations of Rokitansky.

"In the first volume of the *Wochenblatt der Zeitschrift der K. K. Gesellschaft der Aerzte zu Wien*, Rokitansky describes the appearances observed in the *post mortem* examination of a woman, 26 years of age, who died with diseased ovaries. Both ovaries were affected. The tumour on the right side was as large as a child's head, that on the left as large as a man's fist. Both ovaries were composed of a number of cysts as large as a cherry, which, for the most part, lay closely packed together, here and there had become flattened by mutual compression, and occasionally even projected into each other. The surfaces of the tumours were thus slightly lobulated, and between the protuberances were seen, at intervals, cysts as large as a barleycorn, a pea, or a bean. These latter cysts, on being punctured, gave exit to a greenish-coloured fluid containing membranous flocculi, and in all of them the ovum was found. In each of them, however, the ovum was softened, very dull-coloured, easily disintegrated. The zona pellucida had for the most part lost its sharp contour, and, except in one case, no germinal vesicle was discoverable.

"As far as I am aware, this observation of Rokitansky was never publicly confirmed until July 1864, when the reporter to the *Medical Times and Gazette* of four cases of ovariotomy performed by Mr. Spencer Wells in the Samaritan Hospital, mentioned that, in two of the tumours removed, Dr. Webb and myself had been fortunate enough to discover many ova.

"The patient from whom the tumours in question were removed was 54 years of age, and had been for some time suffering from double ovarian disease. The tumours were easily extirpated, and the patient recovered. Each tumour was of the size of the head of a child 4 years of age. Each contained several large central cavities, and a number of smaller ones in the wall of the central cavity, the wall itself never ex-

ceeding one inch in thickness. In the *Medical Times and Gazette* for August 6th, 1864, Mr. Spencer Wells wrote as follows.

" 'The two tumours in question were examined directly after their removal by Dr. Ritchie, who pointed out to me, in each of them, a number of small cysts, which were evidently enlarged Graafian follicles. Knowing the great and long familiarity which Dr. Woodham Webb has had with the ova of various species of animals since his researches in conjunction with Barry, I asked him to examine some of the cysts, in order to ascertain whether they did, or did not, contain ova, knowing that, on this point, no higher authority could be appealed to.

" 'As one friend has suggested that we may have mistaken a blood-corpuscle for an ovum, there was evidently some reason for my caution; but I trust that the following note from Dr. Webb will set all such doubts at rest.

" : " Both the tumours you sent me, after their removal from a woman 54 years old, were growths in excess of true ovarian structure. The multilocular character was produced by clusters of ovisacs of various sizes. Ova, with the other natural contents, were to be found in all the small sacs. The fibrous coats of the larger sacs were thickened, and had many other secondary sacs developed in them. The interior was lined with epithelium, which, in some instances, had, by parthenogenetic enlargement and successive budding of the cells, given rise to bunches of grape-like growths, repeated generations of imperfect ova."

" 'The whole, then, was nothing more than a reproduction in the human subject of conditions which are natural in some of the lower creatures. I suppose the description, in your orthodox pathological terms, would be, "hypertrophy of the ovaries, with arrested development of the contents." '

"This letter, coming from a gentleman of Dr. Webb's known experience, is of great interest. Dr. Webb evidently inclines to the belief that the ovum is only an altered epithelium-cell. He also seems to believe that the grape-like growths, those described further down as dendritic growths, are repeated generations of imperfect ova."

Dr. Ritchie's unfortunate death, and my want of acquaintance at that time with Dr. Webb, hindered me from becoming acquainted with their method of manipulation; but that which I devised for myself answered my purpose completely. It consists in slitting open the cyst freely with a cataract-knife over a conical glass, collecting the whole contents, and afterwards syringing out the cavity of the cyst gently with a solution of sulphate of magnesia in distilled water of a density something near that

of the cyst-contents. The fluid with which the cyst is syringed out is allowed also to fall into the vessel, and the whole to stand for a few hours, at the end of which time a little flocculent sediment will have collected at the bottom of the vessel. This is to be carefully lifted by a pipette, deposited in a clean watch-glass, and the ovum searched for under the microscope. What I found in every case I could not, of course, assert was an ovum; but having found one or two specimens about which there could be no doubt, and in every case something that was more or less like one, I am perfectly satisfied that in those tumours every cyst was a dilated ovisac. The smaller the sac, the more perfect the ovum seemed to be, and consequently I assumed that these were the more recent growths. Not only were these dilated ovisacs in the periphery of the tumours, but they were found throughout its substance. In fact, it seemed to me as if, for a long period of her ovarian history, the ova had been garnered up in cysts instead of being shed in the usual manner. Her youngest child was 6 years old, and if we assume that an ovum is shed from each ovary monthly, then we should get the number of ova so retained as about one hundred and fifty. The number of cysts was, however, much greater, probably two or three times as many; so that we may choose between two explanations—either that the tumours had existed before her last pregnancy, or that more than two ova are shed in the month. My own belief is, that both these suppositions are correct; for, when speaking of ovulation at the beginning of the essay, I gave reasons for my belief that ovulation and menstruation had only a connection of coincidence. I am of opinion that ovulation takes place far more frequently than menstruation does.

It is a somewhat singular fact that the observation of Rokitansky has not been confirmed, as far as I have yet seen, by any others than Ritchie and Webb, and by my own case. Still more curious is it that all three cases are almost identical, presenting small multilocular tumours of slow growth, and that in all three cases both ovaries were affected. This inclines me to believe that, in these cases, we have to deal with a special kind of ovarian tumour, occurring rarely and differing from the ordinary adenoid growth. Whether this be so or not, further experience alone can show. Dr. Ritchie says, immediately following the quotation I have given above, that he subsequently succeeded in finding ova in some of the loculi of a large number of ovarian cysts, but never in a loculus larger than a cherry, nor in one that had jelly-like contents. This observation I cannot confirm; for, though I have made many searches in the endogenous and subjacent secondary cysts of ordinary

polycystic tumours, I have never found an ovum or anything resembling one. Perhaps my method is defective. Dr. Ritchie further says that, when no ovum is to be found, a single minor cyst is to be seen embedded in one part of the wall, and he has thought himself justified in concluding that this appearance represents dropsy of the blastodermic vesicle. I have certainly seen such vesicles in the walls of small cysts, but I have as often found them multiple as single, and I have never seen reason to interpret them as Dr. Ritchie has done. My view of the origin of such growths I shall explain afterwards.

There cannot be a doubt that there are some ovarian growths due to dropsy of the whole or the greater number of the ovisacs produced—a true follicular cystic degeneration; but it would seem that these growths are rare.

Partaking of the nature of the cysts last described, to some extent and in some way yet inexplicable, are the mysterious productions known as dermoid cysts.

That these tumours are the result of change in an ovum is about the only part of their history regarding which there can be any certainty. But there may be doubt as to whether the abnormality takes origin in an ovum of the individual bearing the tumour, or in the ovum from which she herself was developed; in other words, whether the tumours are abnormally developed ova or are due to inclusion. That they have any origin in impregnation, we may at once dismiss as excluded from serious consideration, since they have been frequently found in newly-born children, and their most common seat is in the ovaries of young women, chiefly, according to Mr. Spencer Wells, of fair complexion.

The question of their origin, then, lies between the hypothesis of an effort on the part of some overactive ovum in the direction of parthenogenesis which has been based by Dr. Ritchie on Blumenbach's less scientific and more scholastic expression of "excess of formative nisus", and the equally hypothetical process of inclusion. As far as we know anything about inclusion, it follows the usual law of teratology, that any attached individual, whether developed or blighted, is symmetrically connected. Thus the Siamese Twins and the Millie-Christine monstrosity have the attachment in similar and identical structures, the one to the other (see Vrolik, Von Baer, etc.). I have found nowhere on record that any fœtal remains have been found attached to an ovary, or situated in an ovary in any way which could find it a classification under

this law. The tissues found are always rudimental, and such as, while they are the product of the ovum after conception, have no anatomical analogy whatever to the tissues of the ovary. I am disposed, therefore, to set aside entirely the view of their origin by inclusion, as the ovary is about the most unlikely structure in the embryo for such a process; and, if they had their origin in such a way, we ought to find dermoid cysts in the testicles of the male quite as often as in the ovaries of women.

There is only left, then, the explanation that dermoid cysts are the result of an altered nutrition of one or more ova; and, if I may lay down a dogma from my own dissections, I should say, of one ovum only. Dermoid cysts are generally unilocular, and, when they are not so, it is not difficult to show, as has been done by Dr. Ritchie, and has been evident in one or two specimens that I have examined, that the secondary cysts are formed by the mother cyst being partitioned off by the growth of ridge-like walls on the inside of the cyst.

The occurrence of cysts having a structure somewhat resembling the dermoid cysts of the ovary in other parts of the body, especially in the neighbourhood of the orbit, has led to confusion in the discussion of the origin of the ovarian cysts. In the orbital cysts we have only aberrations of the normal process of the involution of epithelium from which the structures are developed, and there is no mention, as far as I can find, of these extremely small congenital cysts, which never enlarge in after life, having been found to contain anything but purely epithelial products, such as hair, dead epithelial cells, and fat. In ovarian cysts, however, the variety of products is so great, as to put all analogy between them and inclusive cysts out of the possibilities. Thus, in one ovarian cyst which I examined under the direction of my friend and teacher Dr. Grainger Stewart, many years ago, in the substance of a wall between two loculi, were spread out flat bones which were undoubtedly some of the bones of the skull, and near them could be felt the representatives of the bones of a limb arranged in order. True bone is frequently found in ovarian cysts, and in some that have in them no dermoid structures at all.

Sir James Paget refers to a remarkable specimen in the museum of St. George's Hospital, which exhibits a mass of fatty matter and a lock of dark hair, one and a half or two inches long, attached to the inner surface of the dura mater at the torcular Herophili, found in a child 2½ years old, in whom it appeared to be congenital. He adds, in a footnote, that Dr. John Ogle, who had carefully examined the specimen, and

described it to the Pathological Society, was of opinion that the cyst was originally of extracranial formation, but that, at an early period of fœtal life, before ossification of the occipital bone had taken place, the cerebral membranes and scalp had become adherent, and that, as the development of the bone went on, the outer integument was drawn in by retirement of the cerebral membranes. In this way some of the cutaneous structures had become included within the cranium. He considers that the cyst possesses characters which warrant the above supposition, and he adds that, in a similar manner, cysts within the orbit may extend into the cranial cavity. No such explanation could include the phenomena of the ovarian tumours which contain such structures as teeth, bone, cartilage, striped muscular fibre, brain and nerve-tissue, etc. The true solution can only be found in a hyperchetic development of an ovum, a cell which has in it the power of formative origin of all these structures. The process of growth of the ovum after impregnation can be followed only after the assumption, either expressed or unconsciously accepted, of such a hypothesis as is contained in Mr. Darwin's "Pangenesis". The germ contributed by the male contains, we know only too well from pathological experience, gemmules having certain powers and functions; and we may, therefore, assume, as indeed we also know, that the female germ contains also such gemmules. It may be that the ovum has in it the origin-buds of certain tissues, and that, under exceptional hypererchetic action, they may go on to the rudimental formation of these tissues without a fusion with the male germ. More careful and accurate description of what is found in dermoid cysts may help to solve this riddle; still better, perhaps, a careful consideration of what tissues are not found in them.

Sir James Paget has, it seems to me, struck the key-note of the pathology of dermoid cysts when he wrote, "It is, perhaps, only during the vigour of the formative forces in the fœtal or earliest extrauterine periods of life that cysts thus highly organised and productive are ever formed." A most important point in the pathology hangs on this sentence, and can be decided only by a determination of the age at which such tumours are most frequently found. It is, of course, evident that the ages at which these tumours are removed by the operating surgeon cannot be taken into account, as they are of slow growth, and have often been recognised as being present for many years without perceptible increase. They are quite unlike, in this respect, the ordinary adenoid tumours. Their contents even show that their existence must often have been con-

emporaneous with the life of their bearers; for we find large balls of hair, the result of the epithelial growth and shedding of a nipple-like process not bigger than the tip of one's finger; and in one sac over three hundred teeth have been found, resembling in many respects milk-teeth; so that we may reasonably suppose that they were the repeated products of a limited dentigenous area. In one of Mr. Spencer Wells's cases, the preparation of which is in the Hunterian Museum, a piece of bone was found resembling greatly a part of the upper maxilla and sphenoid bones, and containing mature molar teeth. In fact, inspection of the specimen almost carries conviction to the mind that the bone and tooth-sacs were produced at an early, perhaps intrauterine, period of the life of the patient, and that they grew and matured as she did till the tumour was removed, at the age of 39.

Dermoid and dentigenous cysts have been so frequently found in children, that it may be suspected that, if the histories of all such as are removed by operation could be traced, they would be found to be, as Paget suggests, either congenital or originating very early in life. Indeed, it seems to me to be impossible that it can be otherwise when we remember how soon after birth all processes of development must cease, and those of growth alone are continued; impossible that new tissues, so strange and displaced, should be developed after the formative powers have ceased to produce new tissues in normal positions. The more we know of pathology, the more we find its processes resemble those of physiology; and it seems to me far more simple to explain the occurrence of dermoid cysts in the ovary by hypererchetic action of an ovum at a time of life when such processes are in vogue in the economy than at some other time when they have entirely ceased everywhere else. In the former part of my paper, I have shown that the formation and destruction of ovarian cells goes on from the earliest to the latest times of existence, the degree of their maturity varying with the periods of life. Fully dilated Graafian follicles have been seen in the ovaries of newly born children, containing ova which are minute, transparent, and structureless cells. But supposing that, during the developmental period of life, some stimulus be given to one Graafian follicle and its contained ovum, which for want of better knowledge we shall call accidental, and that this should lead to the premature maturation of the ovum, so that, were the rest of the organism ready for the process, it might be carried into the uterus and then be impregnated; instead of destruction by rupture of the ovisac, suppose that it remain in the ovisac and share alike with the rest of the economy in developmental

activity, there can be only one result, and that is the formation of structures in an incomplete way, which it would evolve completely under more favourable conditions.

In support of my supposition, I may draw attention to the fact, that dermoid cysts have been found in the peritoneum with attachments to its surface, but without connection to either of the ovaries. Such a tumour may be one which I attempted to remove a few days ago, and which, while so intimately and most extensively adherent to the peritoneum that I had to leave it, I had reason to suspect had no ovarian connection. Might not such be developed from an ovum which had escaped from the ovaries in early life, and become attached to the peritoneum, as we know they do in after life, and there have carried on its attempt at parthenogenesis?

The logical conclusion of this view is, of course, that if such an ovum could get into its uterus after its escape, it would develope into a perfect instance of parthenogenesis—a speculation, of course, but no wilder than some of the facts of embryology seemed to us before we understood them.

Whatever be the value of the suggestions I have thrown out, they are certainly consistent with my own clinical experience; for, in one case where I removed a dermoid cyst in a young woman, there were many reasons for believing that it had existed long before puberty. The oldest patient from whom I know that a dermoid cyst has been removed is a case of my own, the woman being in her forty-fifth year. The tumour weighed only six and a half ounces, and was full of hair, which had grown and been shed from one little spot of skin not bigger than the tip of my little finger. The amount of hair in the sac, had it grown from a similarly sized area of scalp, would have taken almost a lifetime to grow and be shed. In Mr. Wells's oldest case (38), the tumour had been recognised for eighteen years; and, in a case (37) not operated upon, but examined after death, the tumour had existed twelve years. The usual age for dermoid cysts to come under the notice of the surgeon is from 17 to 20 years, and then it is generally certain that they have been long in existence. After puberty, the recurrent congestion of the whole sexual apparatus must stimulate into growth what is in readiness for it after having been developed long previously, as I have suggested in my hypothesis. The results of that development may remain of minute, or even microscopic, size, until the stimulus of the menstrual hyperæmia so increases them as to make them of surgical importance; just as Hunter's celebrated experiment of the transplanta-

tion of the spur of the cock into his comb resulted in an extraordinary increase in length and size of the spur by the altered character of its hæmic nutrition.

Briefly, then, I believe dermoid cysts to be the result of hypererchetic development of an ovum in fœtal or infantile life, growing into a tumour during and subsequently to puberty.

Of the modes of origin of the other forms of ovarian cystic tumour, many ingenious explanations have been given, though not one has yet met with general acceptation; indeed, all are too vague and incapable of ready demonstration to commend themselves to practical minds. For this reason, and, further, because my space is getting nearly run out, I think it needless to recapitulate even briefly the various views of the pathology of adenoid ovarian cysts which have been recently advanced. I retain the term adenoid, because it conveniently classes the tumours by reference to the tissue from which they originate, and by the hyperplasia of which they are formed, without giving any theoretical explanation of their formation. All non-cancerous tumours of the ovary are, therefore, adenoid; even the dermoid tumours are so to a certain extent, for they are the result of increased growth of one or other normal constituent of the gland, without alteration, save in quantity. Cancerous growths, on the other hand, introduce tissue which is either not found in the gland normally, or they produce it in a form which is immature.

There are two methods of origin for pathological cysts which are universally accepted, and both of which are instanced in the ovary. The first is by occlusion of normal ducts or tubes, as best seen, perhaps, in the kidney and salivary glands, and in connection with the ovary in the form of cystic dilatation of the Fallopian tube or of its trumpet-shaped extremity, after adhesion to the ovary—tubal and tubo-ovarian cysts. Of these I shall not speak, as I have not met with a case of either. The other form of cyst-growth consists in the dilatation of a physiological cyst-cavity by its own secretion poured out to an abnormal extent; and this secretion may either retain its original character and constitution, or be altered by the addition of blood or of some of its usual or exceptional albuminous products. This is the common form of cyst-formation in the ovary; and, in the multiple adenoid tumour and in the dermoid, we have already seen instances of it. The former illustrates the formation of cysts by the retention of its products in the cavity of the normal sac of the gland, these products being the fluid

cell-substance and its nucleus the ovum. This is accomplished, as far as I could discover from the specimen I have described, by hypertrophy of the fibrous covering of the gland—a cirrhosis of the ovary; and the nucleus, the ovum, seems to have retained its normal appearance until destroyed by prolonged maceration and pressure. It is, however, possible that some defect of action in the nucleus may have to do with the non-rupture of the sac; for, under healthy conditions, it is undoubtedly the maturation of this nucleus that governs the rupture of the wall of the ovisac, and enables the perfect ovum to escape.

The dermoid cysts, I have suggested, are due, on the other hand, to an altered and increased activity of the cell-nucleus in early life, the results remaining latent for years, until re-excited by the great systemic change. We may look, then, to some other altered condition of the cell-elements for explanation of the remaining variety of cystic tumour of the ovary which has been termed by Mr. Wells and others "proliferous".

I do not like this term as applied to the compound cysts of any kind, for it assumes, what I am quite certain is not true, that the large cysts are directly the parents of the small ones. Thus Mr. Wells, at page 25, defines: "Proliferous cysts—parent-cysts with secondary cysts growing from the interior of the cyst-wall." These minor cysts are secondary, as far as date of growth is concerned; but they are the younger brothers and sisters, not the children, of the larger sacs. In fact, the very caution which Paget gave his hearers in using the term *proliferous* is disregarded in such an application of it, as may be seen from the following quotation.

"In an ovary, it is not unfrequent to find many small cysts, formed apparently by the coincident enlargement of separate Graafian vesicles. These lie close and mutually compressed, and, as they all enlarge together, and sometimes, by the wasting of their partition-walls, come into communication, they may at length look like a single many-chambered cyst, having its one proper wall formed by the extended fibrous covering of the ovary. Many multilocular cysts, as they are named, are only groups of close-packed single cysts; though, when examined in late periods of their growth, and especially when one of the groups of cysts enlarges much more than the rest, it may be difficult to distinguish them from some of the proliferous cysts." (*Surgical Pathology*, p. 415.)

The formation of a compound cystic tumour in the ovary, whether it be of the multiple variety or of the less complete kind of which I am

about to speak, may be very well illustrated by blowing soap-bubbles in a basin. If the fluid be not viscid enough to enable the bells to retain their form, then the normal condition of the ovary is represented, its cells bursting and disappearing. The cell-growth is constantly going on, and there occurs some alteration in the state of matters which prevents the cell-walls bursting; the fluid in the basin is so viscid, that the bells do not break, and bubble after bubble is formed, some larger, some smaller, until a large multicystic tumour is the result. The actual appearances of the cystic ovary may be very well imitated in the basin of soap-lees. A large cyst can be made with little ones crowding into it, looking like its offspring, and the walls between two or three may be broken down, making one larger multilocular—the remains of the intervening walls not being left in the instance of the soap-bubbles. If they had been left, the appearances would be identical with what is represented diagrammatically for ovarian tumours in Mr. Wells's book on page 39. In the ovary, we have the continual production of cells, representing the continuous blowing of the bubbles; and we have only to discover what it is that is analogous in the ovary to the increased viscidity in the solution of soap; what it is that keeps the cysts in their entirety, perverting a physiological into a pathological process.

I have already said that I have failed to find anything like ova in any cysts of the tumours I have examined, except the one which I have described; and I have mentioned that I have not seen any reason to believe that the little secondary cysts met with in the walls of some of the larger sacs are what Dr. Ritchie has interpreted them to be, dropsy of the blastodermic vesicles; chiefly because I have failed to see round them anything like remains of the membrana granulosa, and I have seen three or four of them on more than one occasion on the wall of the same sac. In searching for ova in the cysts of the two tumours where I found them, I had seldom occasion to look for them in the walls of the cysts, as they seemed to have been floating about loose, or to have been set free by the opening of the sacs. In other cases, not finding them by the method I have already described, I adopted the further plan of first isolating the cyst to be examined, and, having opened it, I searched carefully in every sediment of its contents for the ovum. Not finding it, I turned the sac inside out over a ball of cotton-wool soaked in glycerine, smeared its everted surface with the same substance, and, covering it piecemeal with a thin glass, I carefully examined it over its whole extent by reflected light. I never found anything I thought was an ovum.

I cannôt reconcile this discrepancy between my observations and those of Dr. Ritchie otherwise than by supposing that, having been one of the discoverers of ova in a certain kind of ovarian tumour, he was too anxious to apply his principle of explanation to all; or he must have had a plan of examination more successful than mine.

The fact that I never found ova in any of the sacs of these multicystic tumours, even the smallest or in those with the most limpid contents, led me to entertain the opinion that in this we have an explanation of their formation. The function of the ovary is one of cyst-formation from its earliest existence to its latest, and in its pathology we need not go far away from its physiology. It seems to me, therefore, *à priori*, very unnecessary to resort to the ingenious explanations of cyst-formation advanced by Dr. Wilson Fox, though they may be fitted to exceptional cases. Experience in the examination of the growths themselves has strengthened this view; for my wonder is greater the more I see of them, that they do not occur more commonly, and with more complexity than they do, considering the apparently reckless amount of ovarian cyst-production that goes on throughout life.

The aim and object of this cyst-formation is the production, maturation, and discharge of the ovum. But if the ovum be not formed, or if it be produced only to a rudimental extent, may it not happen that the cyst will not be ruptured, but go on aimlessly expanding? Whatever be the source of the change, we know that it does not affect one ovisac alone, but may influence them in great numbers, whether it be in a tumour where the ova have been matured and subsequently prevented from escaping by sclerosis of the coat of the ovisac, or in a growth where the ova are not to be found. There is a great clinical difference between these two kinds of tumour; for in the one the growth is very limited and slow, and in the other it may be, and often is, extremely rapid, and is practically unlimited in extent. In fact, the growth of these cysts without ova partakes somewhat of the character of malignancy, assigned to them originally by Bright for clinical reasons. Malignancy, apart from any association with cancerous structure, is always indicated histologically by a tendency to the production of a form of tissue which is young and immature, and this is certainly the condition of these ovaless ovisacs.

There is in fact a reversion to the premoliminal condition of the ovary, as far as the ova of the affected ovisacs are concerned. The whole ovary does not, of course, become simultaneously implicated, and matured ova may be given off by some ovisacs still unaffected and within

reach of the Fallopian fimbriæ. Impregnation may thus occur from a degenerated ovary, though it is, of course, much more likely to occur from the one which remains healthy.

We have in these facts the reason that these adenoid tumours occur with greatest frequency during menstrual life, if indeed a future experience may not yet show that they do so exclusively. The menstrual congestion and excitement induces a dropsical distension and growth of a cell which would not be so perverted during childhood or senility, when its blood-supply would be sufficient only for passive nutrition.

The growth of cysts in the wall of the major sacs, appearing sometimes outside and sometimes within in great numbers, depends wholly on the relation of the original adenoid tissue to the cyst-wall; and, as that wall grew primarily in that tissue and surrounded by it, it would be indeed surprising if it did not carry along with it in its expansion some of the cells of the *couche ovigène* from which it sprang. These displaced cells have in their turn a stimulus for development, prematurely, perhaps, on account of the increased hæmic activity of their abnormal surroundings, due to the growth of the sac. They also go through the process of dropsical distension, developing no ovum, not rupturing, but becoming secondary cysts, perhaps ultimately to rival, or even to excel, that which has preceded them, on which they grew, and of which they have been supposed to be the offspring.

The views which I have here advanced are such as do not admit of detailed evidence in support of them within the limits of such an essay as this. They are the results of some years of study and much personal investigation, but even still they are so crude as to be unlikely to meet with general acceptation.

There are, I know, ovarian growths to which none of my explanations would be, in their present form, applicable; and, as my experience grows, I know I may have to alter or altogether abandon them. As they are at present, I submit them for criticism with a faint hope that I may receive encouragement to continue in a line of investigation and practice to which I have devoted myself.