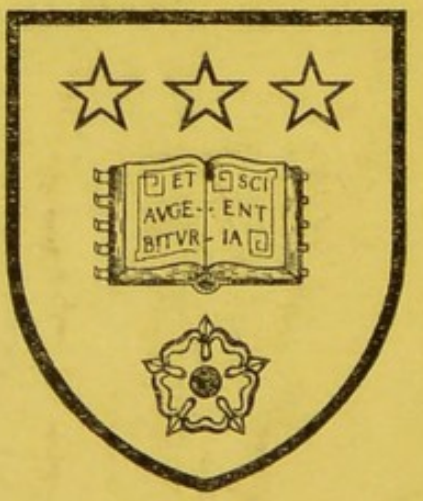
Fibroids of the uterus : their pathology, diagnosis and treatment / by Sir John Bland-Sutton.



FIBROIDS OF THE UTERUS:

THEIR PATHOLOGY, DIAGNOSIS AND TREATMENT.

BY

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WITH 39 ILLUSTRATIONS.

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PREFACE.

In this little book an attempt is made to set down in narrative form a summary of our knowledge of the extremely common tumours known as uterine fibroids. The description includes the Natural History, Diagnosis and the best methods of removing them. Hysterectomy for fibroids is unrivalled among surgical procedures for its ability to amend invalid women by thousands; it enables them to lead useful lives, and, if married, to be companions to their husbands. In this sense it is one of the most beneficent operations in the whole range of Surgery.

At the end of the more important chapters a list of references is added, as an acknowledgment of my obligations to surgeons, dead and alive, great and small. An inspection of such lists is instructive, for some of them serve as milestones indicating the progress of pelvic surgery.

JOHN BLAND-SUTTON.

47, Brook Street,
April, 1913.

TABLE OF CONTENTS.

LIST OF FIGURES.

FIBROIDS OF THE UTERUS: THEIR PATHOLOGY, DIAGNOSIS AND TREATMENT.

CHAPTER I.

Introduction.

Fibroids of the uterus are common tumours, and often cause much trouble to women, whether married or single, barren or fertile; on this account they have been studied from the pathological and clinical aspects with great care. Fibroids have no parallel among tumours in this important feature, they only arise in the uterus during menstrual life; after the natural cessation of menstruation many fibroids cease to grow, and some diminish in size. It was formerly taught that they completely disappeared but no proof of this is forthcoming, and no surgeon believes it to-day. The growth, development, and atrophy of uterine fibroids so closely follow the natural development and atrophy of the uterus that it is worth while to briefly review some points in the natural history of the organ which acts as host to these remarkable tumours. Until the advent of puberty the uterus is a functionless organ, but on the establishment of menstruation it becomes the seat of regular monthly change, interrupted occasionally by the occurrence of pregnancy, by

which its rhythm is altered from a period of 28 days to 36 weeks. This change is accompanied by an extraordinary alteration in the condition of the uterus, for, previous to conception it is in shape somewhat like a compressed fig, 3 inches long and 1 inch thick. In the middle of the organ there is a cleft known as the cavity of the uterus; the anterior and the posterior walls of the normal unimpregnated uterus are in contact. This cavity, from the os uteri to the fundus, measures 2½ inches, and the whole organ weighs 2 to 3 ounces. At the end of pregnancy a uterus is 13 inches long; the walls are ½ inch thick; it weighs 2 to 3 pounds, and the capacity of the uterine cavity varies from 1 to 1½ gallons. The weights and measurements afford some notion of the great changes produced in the uterus by pregnancy. In the unimpregnated condition the uterus is sheltered in the pelvis, its fundus reaching to the level of the pubic symphysis, but as pregnancy advances it ascends into the abdomen and becomes the most conspicuous organ in this cavity, and liable, in consequence of its size, to many forms of external violence. At the termination of a successful pregnancy the uterus in a few weeks returns to nearly the virgin size.

When the capacity for childbearing ceases, menstruation gradually stops; about the forty-eighth year the uterine tissues atrophy, and in old age the uterus becomes small and flattened. At the sixtieth year it may be only half the size of its representative in a virgin of sixteen, and in extreme old age it sometimes weighs only half an ounce. It is the peculiar structure

of the uterus which enables it to undergo these remarkable changes, and the blood vessels associated with it not only accommodate themselves to the alteration of the uterus, but play an important part in the pathological conditions, which are by no means rare in this organ.

In considering the behaviour of the uterus when it is occupied by fibroids, it is helpful to keep in mind the changes produced in it by pregnancy, for the gradual increase in size, the efforts made by the uterus to extrude the tumours, and the changes which follow their extrusion are often identical with those which ensue on normal pregnancy, parturition, and the puerperium ; moreover, they are attended with similar complications and dangers. These will be considered in appropriate chapters ; before doing this it will be necessary to review the nature of the tissues composing the uterus.

The uterus differs from all hollow viscera, except a gizzard, in the thickness and rigidity of its walls, and it would appear to be the last organ whose walls would yield to an expanding force within ; surgeons appreciate this when they attempt to dilate it with metal instruments, yet there are few physiological events so clearly recognised as the easy way in which the uterine walls soften, and dilate under the influence of an embryo or a fibroid growing within it. These changes may be described as increased vascularity, multiplication of the muscle cells and general softening of the uterine tissues. When the uterus is distended and enlarged in

pregnancy the cervical segment is gradually incorporated with the uterus proper, and towards the end of pregnancy (term) the distinction between the body of the uterus and its neck (cervix) is lost, the whole forming a common cavity of pyriform shape with the broad end uppermost; the walls of this cavity are soft and easily perforated with blunt instruments such as a catheter, uterine sound, curette, or the ends of forceps.

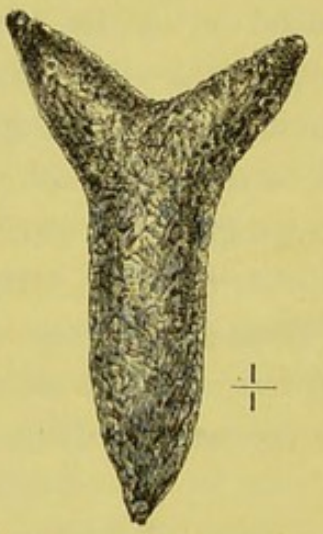

Fig. 1.—Menstrual cast from the uterus of a virgin. It accurately represents the shape and size of the uterine cavity.

On examining the normal uterus, studying its thick walls and the narrow chink which represents its cavity, it is somewhat surprising to realize that this apparently intractable organ can be inverted or turned inside out, but this astonishment abates when the softened condition of the organ is studied at the termination of pregnancy.

The unimpregnated uterus of a mature woman has thick rigid walls composed mainly of unstriped muscle

tissue. Those portions of the walls forming the boundaries of the uterine cavity are covered with columnar epithelium resting on a connective tissue stroma of peculiar character traversed by strands of unstriped muscle tissue ; the epithelial tubules known as the uterine glands are embedded in this stroma, which, with the glands, make up the endometrium. There is no sharp line of demarcation between it and the muscular tissue of the uterine wall. The thickness of the endometrium varies, for it is concerned in menstruation and in the formation of the decidua. The endometrium thickens as the uterus ripens during each menstrual rhythm to be shed in shreds, or, occasionally as a "cast," during menstruation (Fig. 1) or persisting when an ovum is fertilised. The epithelium lining the uterine cavity forms a paved causeway extending from the os uteri to the Fallopian tubes and onward to their abdominal ostia.

Although the uterus is a complex organ, with no sharp divisions between its various parts as mapped out by anatomists, it is convenient to use their arbitrary boundaries for descriptive and clinical purposes.

Fibroids.

Before describing the structural peculiarities of fibroids, it will be an advantage to study their distribution and gross anatomy. Fibroids arise in any part of the uterus, including its ligaments, but they are more common in the body of the uterus than its neck ; they are rarer in the ligaments of the uterus than its cervix, and in each situation offer peculiar features

and require separate consideration. The fibroids which grow from the body of the uterus are for clinical purposes divided into three sets :—Intramural, subserous, and submucous (Fig. 2). The distinction between these three varieties is often arbitrary, but it is very useful, more especially in relation to the subserous and the submucous set.

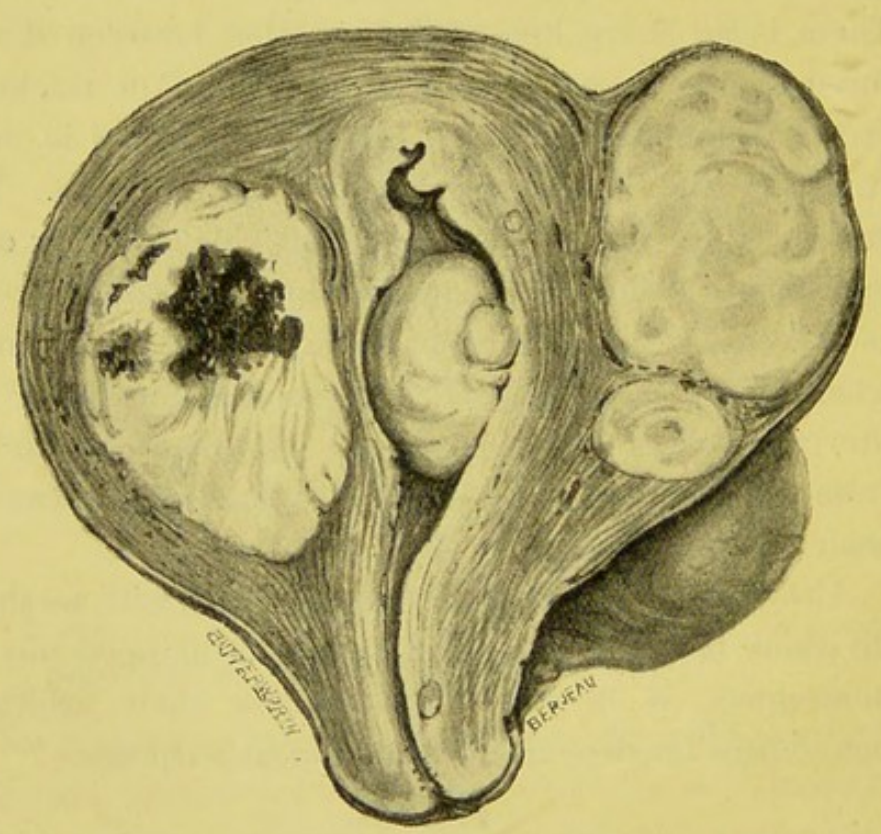

Fig. 2.—Uterus in sagittal section displaying submucous, intramural, and subserous fibroids. The œdema of the endometrium at the fundus is well shewn.

Fibroid tumours arise as solid knots in the tissue of the uterine wall, and at a very early stage are enclosed in a vascular capsule from which they receive their blood supply.

In the earliest stages, fibroids are round like mustard seed, and when the uterus is divided these rounded bodies are often bisected, then they appear in section like split peas, and being pale yellow, or white, stand out in contrast to the redness of the uterine tissue in which they are embedded. It is probable that the majority of fibroids which arise in the body of the uterus, or its neck, are at first intramural, and as they increase in size some remain intramural, but others, situated near the inner or the outer wall, bulge outwards into the peritoneal cavity and become subserous, or project into and occupy the uterine cavity and form submucous fibroids. These changes of position are important, because an interstitial fibroid has a complete muscular investment, whereas a subserous surface fibroid, extruded under the serous surface of the uterus, becomes almost completely invested with peritoneum, and its connection with the uterus sometimes assumes the form of a narrow stalk or pedicle. A fibroid growing from the side of the uterus sometimes pushes its way between the layers of the broad ligament, but does not receive an intimate investment of peritoneum like the common subserous form. Some of these have a narrow pedicle almost like a tendon.

Fibroids growing near the uterine cavity tend to invade it, and such submucous fibroids acquire an investment of endometrium, and, as will be shewn later, some of these tumours produce similar effects in the shape and disposition of the uterus like those accompanying pregnancy. A uterus may contain

one fibroid; as a rule, several are present, a dozen or even a score may be counted. I have seen one hundred and forty fibroids in a uterus, the tumours varied in size from a dove's egg to that of a duck. There is no limit to the number or size of fibroids, but, as a rule, when fibroids are numerous they remain small, or of moderate dimensions. A solitary fibroid has been reported to weigh a hundred pounds. A fibroid weighing thirty pounds is a formidable tumour.

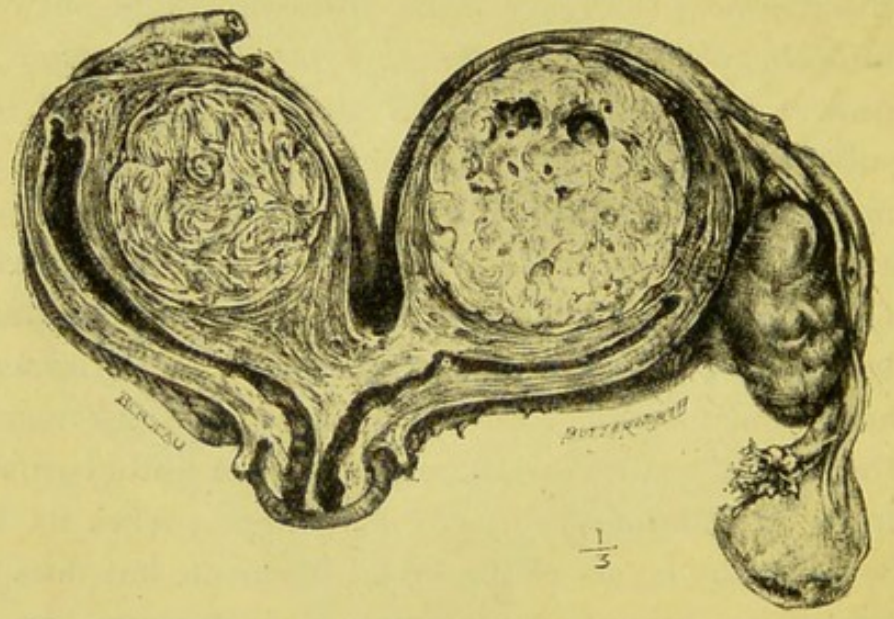

Fig. 3.—The cornua of a bicornate uterus in section; each cornu contains an intramural fibroid. Removed from a woman aged 32.

When fibroids are multiple in a uterus some may be intramural, others subserous, and one or more submucous; it is also to be borne in mind that the complications produced by the three varieties differ in many important particulars, especially in the manner in which they distort the uterus. Each of them will require separate consideration.

Fibroids which arise in the neck of the uterus (cervix-fibroids) differ in some important particulars from those which arise in the body of the uterus, that they demand a special chapter. This is also the case with fibroids which arise in the tissues of the broad, round, and utero-sacral ligaments, but it may be mentioned here that fibroids grow in double uteri of various kinds (Fig. 3), from the rudimentary cornu of the so-called unicorn uterus, and in the uterus of a pseudo-hermaphrodite. Indeed, there is reason to believe that a bifid uterus is more liable to fibroids than one of normal shape.

Disease occasionally makes distinctions where anatomists and pathologists fail to discern them. It is a curious fact that fibroids so common in the uterus are unknown in the Fallopian tubes.

BLAND-SUTTON, J.—Fibroids in a Unicorn Uterus. *Clin. Journ.*, Lond., 1901-2, xix. 8.

————————Case of Fibroids in both halves of a Bicornate Uterus. *Proc. Roy. Soc. of Medicine*, 1908, ii., Obstet. and Gyn. Sect., 95.

DORAN, A.—The Removal of a Fibroid from a Uterus Unicornis in a Parous Subject. *Brit. Med. Journ.*, 1899, 1, 1389.

KAMANN.—Uterus bicornis bicollis with a Myoma in the left Horn; Subtotal Extirpation of the Left Horn. *Centralbl. f. Gyn.*, 1905, xxix. 795.

PAUCHET, V.—Fibrome utérin chez une femme pseudo-hermaphrodite d'appearance masculine. *Soc. de Chir. de Paris*, 1911, xxxv, 680.

CHAPTER II.

On the Structure of Fibroids.

Uterine fibroids differ much in texture, for some are hard-like cartilage or of leathery toughness. A completely calcified fibroid resembles a piece of pumice and some fibroids are as soft as jelly. Between these extremes every degree of hardness or softness occurs, and the differences in texture account for the variety of names applied to them.

The typical tumours consist of tissue identical with that of the uterus, thus they contain smooth muscle fibre and a small proportion of connective tissue, the whole being surrounded by a fibrous capsule in which the blood vessels of the tumour ramify. A tumour of this type of structure is a myoma, and will have the same consistence as the walls of an unimpregnated uterus. When the muscle tissue is largely mixed with fibrous tissue the tumour is called a fibro-myoma; it will be very dense and display on section a peculiar whorled appearance, due to the arrangement of the tissue in bundles running in different planes; the centre of each whorl is usually occupied by a blood-vessel. (Fig. 4). The very soft tumours are composed of tissue like that of the common nasal polypus, such are called myxomas; when the only solid part of the tumour is its capsule and the contents are gelatinous and

structureless it is called a fibro-cystic tumour. Even among the moderately firm encapsuled tumours of the uterus there is difficulty in deciding between a myoma and a fibro-myoma. A differential stain (van Gieson's) employed by histologists colours unstriped muscle yellow and fibrous tissue pink, but a method is needed

Fig. 4.—The microscopic appearance of a seedling-fibroid the size of a mustard seed. The circular cells are spindle cells cut at right angles. (*From the author's book on Tumours*).

for the detection of the most dangerous of all the varieties, the sarcomatous fibroids, for it is a fact that an encapsuled tumour occasionally arises in the uterus and in its naked-eye and microscopic characters appears

to be a simple fibro-myoma ; such a tumour sometimes recurs rapidly after removal, disseminates and quickly kills the patient. The museum of the Royal College of Surgeons contains a submucous fibroid as big as a turkey's egg consisting almost entirely of fat.

It is by no means uncommon to find a uterus containing a score of tumours, some of which are hard like fibro-myomas, some soft as myxomas, and others calcified ; moreover, a tumour will be found containing the three varieties of tissue, and, on rare occasions, a typical spindle-celled sarcoma will be found among them. Every genus of so-called benign tumours (except lipomas) contains varieties that shade away indefinitely from the type species and display malignancy ; it is for this reason that I have preferred in dealing with these tumours to classify them under the generic term, Fibroids, and it includes tumours which are typically benign and others very malignant. The differences in the texture of fibroids are usually ascribed to degenerative changes ; some surgeons believe that a sarcomatous change may arise in uterine fibroids ; I do not share this opinion, preferring to believe that many tumours reported as fibroids which have undergone sarcomatous degeneration, were in all probability sarcomatous from the beginning. They should be called sarcomatous fibroids, and I have satisfied myself that a sarcoma will sometimes arise in a uterus already occupied by common hard fibroids, and mock all the clinical varieties, appearing sometimes as a submucous polypus protruding at the mouth of the womb, or as an

interstitial tumour or a subserous fibroid with a thin stalk.

A comprehensive study of the question indicates that sarcomas may arise in the tissues of the uterus during intra-uterine life, infancy, and at any period up to extreme old age, but in comparison with the common fibroid they are fortunately rare tumours. They agree in structure with sarcomas arising in other organs, and consist of round cells, oat-shaped cells, or spindle cells. The uncommon variety, known as myosarcoma, in which the spindle cells are transversely striated, has been observed (Pernice). Sarcomas of the uterus differ in their gross characters according to their situation in the uterus, and it is convenient for clinical purposes to arrange them in two groups :—(a). Sarcomas of the uterine wall ; (b). Sarcomas of the endometrium.

(a). **Sarcomas of the Uterine Wall.**—A sarcoma occurs usually as a solitary tumour in the uterine wall, it is enclosed in a capsule and consists of compact tissue which to the naked eye resembles that of a hard fibro-myoma. Even under the microscope its tissue is indistinguishable from that of the common fibroid. Later, when its tissues become necrotic and friable then the suspicions of the surgeon are aroused. Occasionally a sarcoma grows in a uterus already occupied by fibroids, then the differences in its appearance, adhesions to adjacent organs and the œdematous condition of its capsule are sure to arrest attention. It is, however, a fact that a solitary encapsuled sarcomatous fibroid so resembles the interstitial variety of the common hard

fibroid, in its clinical and naked-eye characters, that the surgeon, after he has removed it, assures the patient and her friends that the tumour is of the non-recurrent variety. His astonishment is very great when she returns a few months later with the pelvis occupied with a hard mass of new growth. Sometimes it happens that the uterus and tumour have been preserved, it is then carefully examined histologically ; or, it may have been casually investigated at the time of its removal, then the thin sections are re-examined in the light of the new clinical features, still the microscopic features do not enable a definite opinion to be expressed. I have tested histologists in this way on several occasions. In many instances the naked eye and the microscopic characters of a sarcomatous fibroid clearly pronounce malignancy, but some hard, slow growing malignant fibroids are histologically so like the common innocent fibro-myoma that with our present methods it is impossible to distinguish between them, and the malignant nature of the tumour is not suspected until the patient comes under observation with signs of local recurrence.

Sarcomas of the uterine wall are most common after the age of forty, and are by no means infrequent after the menopause, so that a solid tumour arising in the uterus of a woman over fifty, and especially if it grows quickly accompanied by hydroperitoneum, is sure to be regarded with suspicion. As a rule, such a tumour resembles in its clinical features a rapidly growing ovarian tumour.

There are very few complete records of uterine sarcomas, complete in the sense of furnishing an account of the minute structure of the tumour and the subsequent history of the patients who survived operation. Sarcomas are so prone to disseminate, that a woman dying of such a tumour in the uterus would be expected to have secondary nodules in the lungs. Such cases have been described by Findlay and by Williamson. A score of similar careful records would be valuable.

(b). **Sarcomas of the Endometrium.**—These tumours though rare, present definite characters, for they tend to become polypoid. When they grow from the cervical endometrium clusters of grape-like bodies with slender stalks hang in the vagina. Often they are filled, with yellow fluid, and as they are semi-transparent these features have won for this kind of tumour the name of **Sarcoma botyroides,** or racemose sarcoma. This variety has been observed on several occasions in infants and girls, and the semi-transparency is due to œdema of the pedunculated processes of the tumour.

In women, sarcoma of the endometrium also assumes a polypoid form, and appears as a pedunculated œdematous body protruding through the cervix ; this is removed, and a few weeks later another polypus is extruded, then a more thorough investigation is made and the true nature of the trouble is appreciated. Here again histology fails us, for it is often difficult to decide whether the tissue of an œdematous polypus extruded from the uterus is innocent or malignant, especially when, as is so often the case, the tissues are septic and

everywhere invaded by exudation products. It occasionally happens that the surgeon removes a soft pedunculated growth from the endometrium of the cervical canal which he lightly regards as a septic polypus. In a few weeks the patient returns on account of the continued bleeding ; an examination is made, and he is distressed to find the cervix converted into a hard resistant nodular mass, which bleeds freely on examination, and realizes that he has to deal with a sarcomatous uterus.

In general terms it may be stated that the common age for sarcoma is from forty to sixty, and women who have had children are more liable to it than those who are barren. The leading signs of this disease are bleeding from the vagina, purulent discharge and pain ; hæmorrhage, the predominating sign of all severe uterine growths is due to the invasion of the tumour by pathogenic micro-organisms. Death in the majority of cases is due to septic poisoning. In a few life is prolonged sufficiently to allow of generalisation of the growth. Then secondary deposits occur in the abdomen and in the lungs. The only treatment available is early and complete removal of the uterus. Unfortunately, it is rarely successful. No uterine operation is attended with so little success as hysterectomy for sarcoma.

The racemose variety of sarcoma, met with in little girls, usually attracts attention when the mother, or the nurse, notices the escape of grape-like bodies from the vagina. This disease cannot be mistaken for fibroids, as these tumours are unknown before puberty.

Age-Changes in Fibroids.—The texture of fibroids is in a measure an indication of their age. Old fibroids undergo two remarkable changes, some become intensely hard and are often calcified ; this happens to the subserous and submucous varieties especially, but it may occur in any kind of fibroid—uterine, mesometric, or ovarian. The subserous fibroid is especially liable to soften, its tissues becoming gelatinous. The soft, rapidly growing fibroid is common in women between thirty and forty, but a remarkable example came under

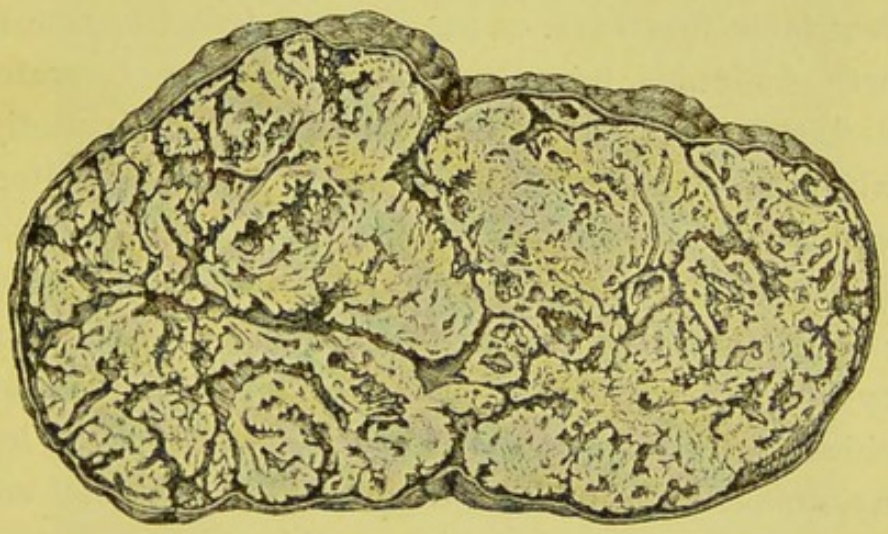

Fig. 5.—Calcified uterine fibroid in section. (Museum, Middlesex Hospital).

my care in a woman aged fifty-seven. She was known to have had a fibroid for thirty years ; then she began to suffer much trouble with micturition. The tumour which caused, for many years, a large and conspicuous swelling of her belly had become so small as to be scarcely noticeable. On examination, a soft tumour could be felt in the hypogastrium ; it resembled more than anything else the sensation produced by feeling a

uterus in the fourth month of gestation. When the operation was performed for the removal of this fibroid I found the pelvis filled with a large uterus of the consistence of dough, containing a tumour, the size of the patient's head ; it was an interstitial fibroid and so soft that it moulded itself to the pelvis as accurately as liquid wax, and in this way exerted unwonted pressure on the urethra. Needless to say the operation made the voiding of urine a simple act. Soft interstitial fibroids of this kind in old women are not common.

Few facts are forthcoming in regard to the rate of growth of fibroids, but in general terms it may be stated that soft fibroids grow quickly and the hard varieties slowly. When a hard tumour degenerates and softens it will occasionally increase in size very rapidly.

Calcification in a tumour is a sure indication that it has existed many years. This change, rare before forty, occurs in two forms. In some tumours the capsule calcifies and encloses the fibroid in a more or less complete shell ; fibroids in this condition are dead and on section exhibit the dirty yellow appearance of chamois leather and equal it in toughness. When the proper tissue of a fibroid calcifies, the earthy matter is not deposited in an irregular manner, but follows the disposition of the fibres and their whorled arrangement is obvious on the sawn surface of such a tumour. (Fig. 5). When incompletely calcified fibroids are macerated the material remains as a coherent skeleton of the tumour. This sometimes happens during life. A submucous fibroid in an old woman is liable to become

infected, then the soft tissues slough, but the calcific skeleton of the fibroid is retained in the uterus. These are known as "womb stones"; (Fig. 6); their extraction by art is tedious and requires care. Calcified

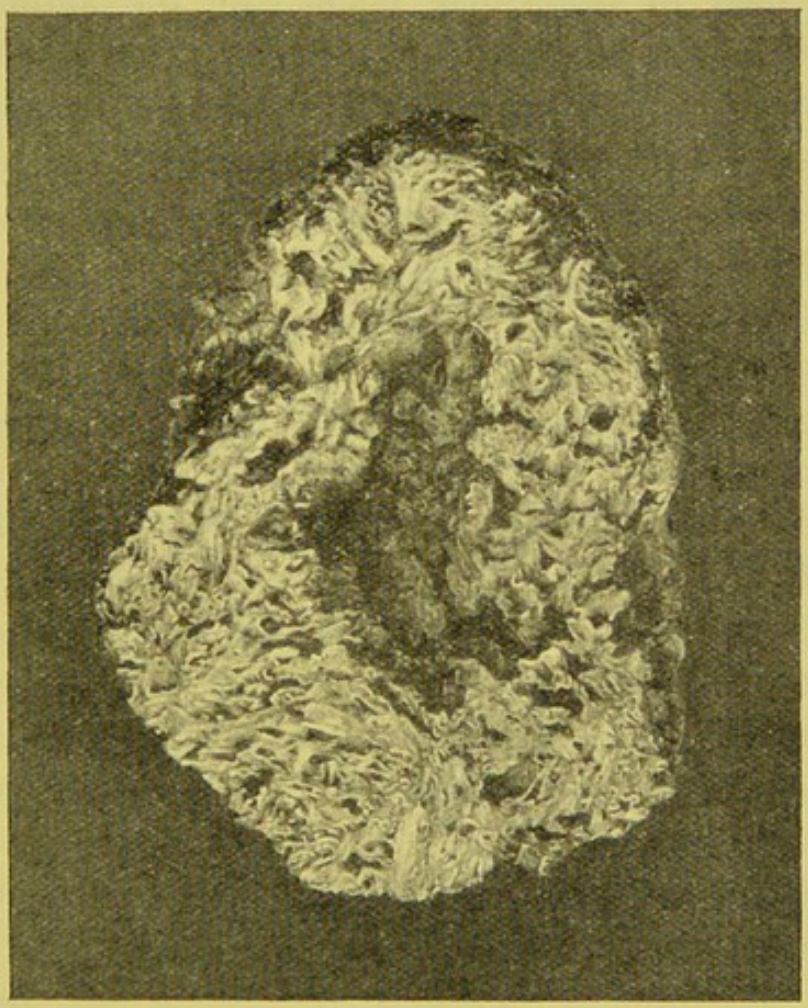

Fig. 6.—Calcific nucleus of an old fibroid, formerly called a womb stone. (Museum, Middlesex Hospital.)

fibroids found in old burying-grounds have been often mistaken for vesical calculi. Calcification in a fibroid can be detected by the use of the X Rays.

Calcified fibroids sometimes cause trouble in unexpected ways. A curious instance was recorded by Arnott. A spinster, aged seventy-two, was knocked down by a dog and fell forward on the pavement. She was seized with severe pain in the belly and died in thirty-four hours. At the autopsy a circular hole was found in a coil of ileum which lay between the anterior abdominal wall and a big calcified fibroid. There was extravasation of fæces and intense peritonitis. The tumour is preserved in the Museum of the Middlesex Hospital.

A large calcified submucous fibroid partially extruded from the uterus is a troublesome body to extract if too large to be removed entire. Patience and ingenuity in such circumstances will often overcome the difficulty, although the scalpels will be blunted and notched.

I have removed, by the abdominal route, a calcified subserous fibroid impacted in the pelvis and causing retention of urine in a woman aged seventy-three. It is also worth remembering that a calcified subserous fibroid with a thin pedicle may undergo axial rotation and twist the pedicle, and such an accident is announced by very acute symptoms (p. 25).

It was formerly imagined by medical men that a calcified fibroid is a harmless possession; the few facts mentioned shew that such tumours even in senescence are occasionally dangerous to life.

CHAPTER III.

Subserous Fibroids.

Fibroids growing in the uterine wall near its peritoneal covering project on the anterior, or the posterior wall; those which grow from the side of the uterus push between and separate the layers of the broad ligament. This difference in position leads to a variation in the relation of the tumours to the peritoneum; those which grow from the anterior or the posterior surface receive an investment from the overlying serous membrane and tend to become pedunculated, and, as they are often multiple, it is possible in one uterus to study various stages of the process by which subserous fibroids acquire stalks. There is great variation in the size of the peduncles, and they are independent of the size of the tumour. A fibroid the size of the fist may be connected to the uterus by a stalk an inch or more in length and half-an-inch or less in diameter. Such a pedicle confers great and dangerous mobility on the fibroid, for it allows the tumour to rotate on its axis and twist the stalk. Such a tumour can be incarcerated in the pelvis by a gravid uterus; or a coil of small intestine may be entangled by it, causing fatal intestinal strangulation. The uterus is not enlarged by a pedunculated

subserous fibroid, and it is odd to see such a tumour weighing many pounds attached to a uterus of normal size by a thin stalk. (Fig. 7).

The largest fibroids belong to the subserous variety and many of the big tumours are pedunculated. The stalks of such fibroids are worth studying, as they largely influence the condition of the tumour, for the blood supply passes through them. Some are so vascular that they resemble cavernous tissue. When this is borne in mind, it is easy to understand that a large mobile subserous fibroid, with a long peduncle, may have its nutrition interfered with when the movements of the tumour lead to compression or torsion of the peduncle. For example, partial twists lead to venous engorgement of the tumour and extravasations of blood, because the veins are obstructed more easily than arteries, but complete torsion arrests the circulation in the arteries of the pedicle, and, if persistent, will starve the fibroid of blood and lead to quiet necrosis and atrophy. In a small fibroid with a thin pedicle torsion will sometimes lead to its complete separation ; indeed, a small fibroid detached in this way has been seen free in the pelvis. A subserous fibroid the size of a cricket ball has been found completely detached from the uterus and adherent to the omentum. The literature of detached fibroids has been collected by Peterson under the title of "Migratory uterine Fibroids." I

have long entertained the opinion that the frequency with which degenerative changes and quiet necrosis occur in subserous fibroids depends on the precarious condition of their blood supply owing to frequent interruptions from strains and torsions, partial or complete, of their pedicles, due to movements of these tumours.

Venous engorgement of a subserous fibroid caused by interference with the circulation through a narrow vascular pedicle is illustrated by the following observation :—

A woman, aged thirty-five years, had a tumour in her abdomen in shape like a spleen minus the notches. This tumour, which could be moved freely about the abdomen, exhibited marked alterations in size, and an increase was attended with pain. No area of splenic dulness could be made out on percussion. The pelvic viscera were apparently normal. On opening the abdomen for the purpose of removing the mass, a dark red body with a wrinkled capsule was exposed in shape and size so exactly like a spleen that the onlookers believed it to be an enlarged and displaced spleen. I satisfied them that the tumour was a subserous fibroid attached to the fundus of the uterus by a thin stalk. This tumour weighed five kilogrammes and had a pedicle no thicker than a finger, but it was composed mainly of venous channels. (Fig. 7).

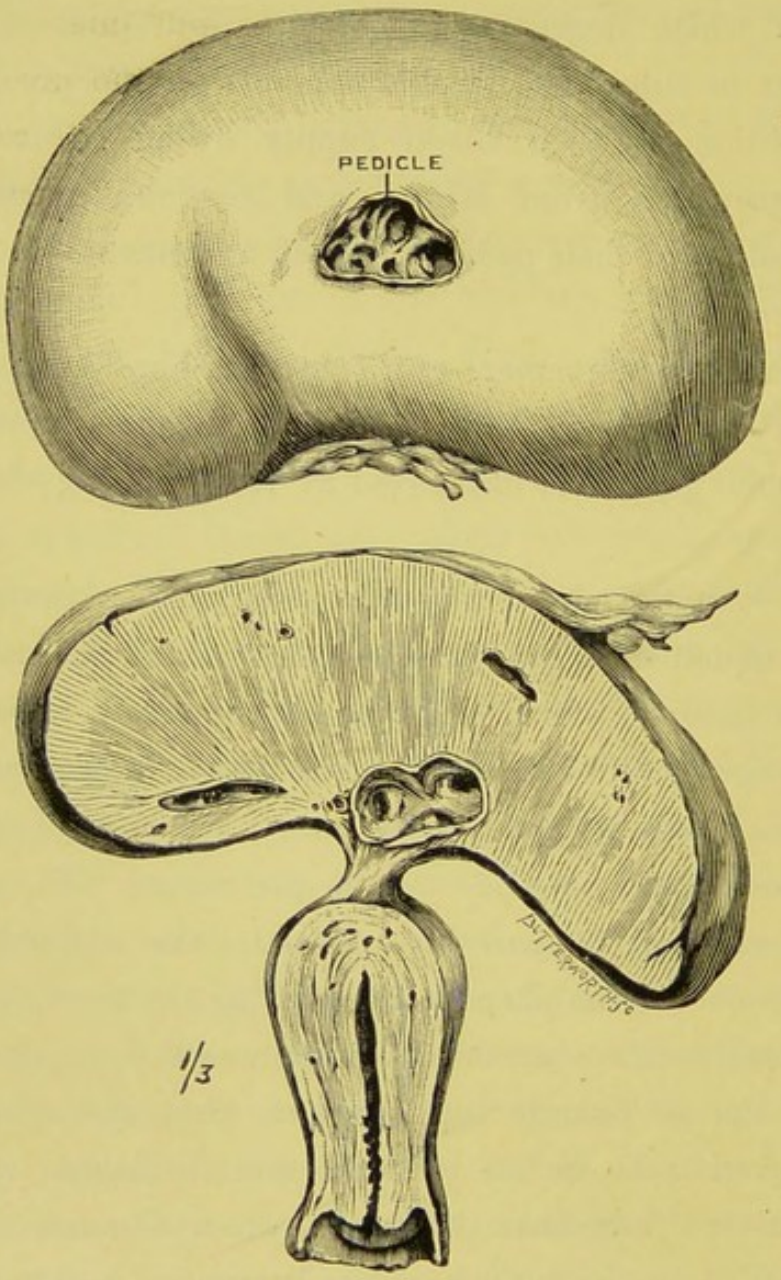

Fig. 7.—Uterus and subserous fibroid in section. The fibroid has a thin, vascular stalk. Clinically it resembled a wandering spleen, not only in shape but also in mobility and by variations in size The tumour weighed 5 kilogrammes. Pedunculated subserous fibroids do not enlarge the uterus.

A study of the structure of the pedicle shewed that the variations in the size of the fibroid depended on alternate torsion and relaxation of this thin and extremely vascular stalk. Twisting of the pedicle due to axial rotation of a fibroid in the complete style with which we are so familiar in the case of ovarian tumours is rare. Rotation occurs in two forms : A pedunculated fibroid may rotate and twist its stalk, but when rotation occurs in a sessile subserous fibroid, the uterus serves as a pedicle ; such a movement is facilitated when the supravaginal cervix is long and narrow. In some specimens the neck of the uterus has been tightly twisted and reduced to the dimensions of a quill at the point of greatest torsion. Thus we must distinguish between torsion of the pedicle of a fibroid and torsion of the uterus ; in the latter condition the ovaries, tubes, and ligaments are involved in the twist.

Axial rotation of a fibroid is a rare accident, so rare that in more than two thousand operations for fibroids I have only seen three examples.

One was a subserous fibroid the size of a tennis ball ; it had a thin stalk and a coil of ileum became entangled in the twist, producing symptoms of acute intestinal obstruction, which was relieved by operation. The patient recovered.

The second was a calcified subserous fibroid in a patient aged fifty-three. The uterus contained two large and twenty small fibroids ; one of them, as big as a fist, had twisted its pedicle producing sudden violent pain, frequent micturition and tenesmus.

Temperature 102 deg. Fahr., and pulse rate 120 per minute. Subtotal hysterectomy was successfully performed. The tumour with its stalk twisted is preserved in the Museum of the Royal College of Surgeons, England.

The third is a good example of the axial rotation of a subserous fibroid in which the uterus and its appendages were involved in the twist :

A spinster, aged sixty-seven, sought advice on account of pain, discomfort, and frequency of micturition associated with a tumour which could be felt in the hypogastrium. It presented the usual features of a fibroid. When exposed in the course of an operation, performed for its removal, the tumour was as big as the head of a new born child. Its anterior surface was pearly white in consequence of a deposit of organised fibrin produced by the friction of the tumour against the abdominal wall. On withdrawing the tumour from the belly, the pedicle was found to be twisted like a rope ; on untwisting it, the ovaries, Fallopian tubes, and uterus were recognised. Subtotal hysterectomy was performed, and after removing the parts I retorsioned the parts to the same degree as before removal, and hardened the specimen in a solution of formalin for preservation. The fibroid had undergone degenerative changes coincident with age, I think, and in no way a consequence of the torsion. The thickness of the tissue forming the milk-white-patch on the surface of the fibroid proves it to be an old tumour. In Figs. 8 and 9 the parts are represented twisted and untwisted.

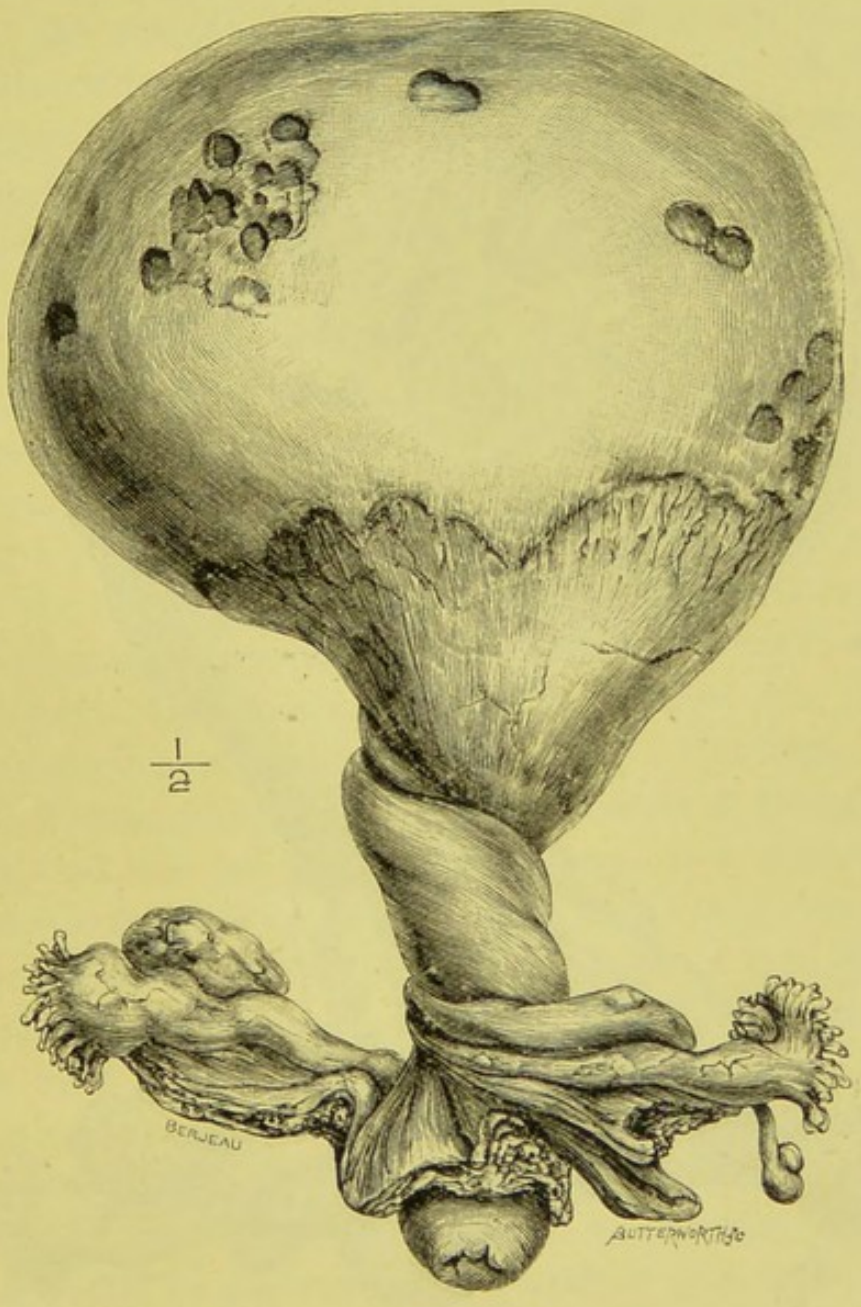

Fig. 8.—A sessile subserous fibroid which had undergone axial rotation involving the uterus and its appendages in the twist. From a spinster, aged 67. (Museum of the Royal College of Surgeons, England).

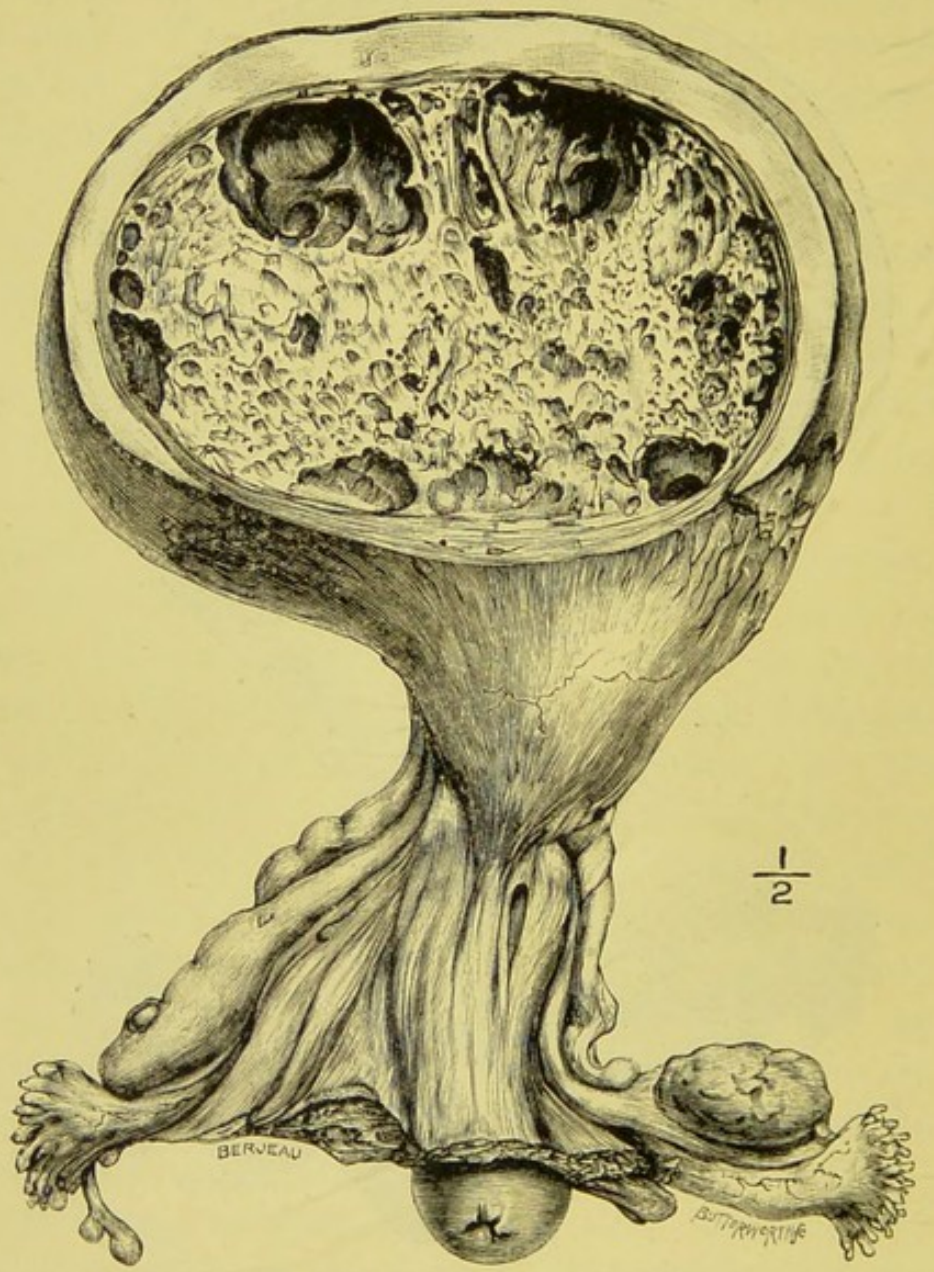

Fig. 9.—The same specimen as in the preceding figure. The tumour is shewn in section and the pedicle is untwisted.

It is conceivable that the involvement of the uterus was due to, if indeed, the whole movement was not

facilitated by its atrophic condition, and it is probable that the absence of acute symptoms depended on the senile condition of the uterus. B. S. Schultze collected the cases up to 1906, and Kynoch reported an interesting example in 1912. The accident in either form is rare. Axial rotation of an ovarian cyst with a short pedicle will sometimes involve the uterus in the twist.

On the whole the troubles caused by subserous fibroids are in the main mechanical, and it is in this aspect that they interfere with the functions of the uterus. A subserous fibroid does not disturb menstruation nor hinder conception, but if it grows near the neck of the uterus it may become impacted under the promontory of the sacrum and form an effectual bar to delivery. My observations have satisfied me that pregnancy is often inimical to subserous fibroids. In the chapter dealing with red degeneration of fibroids, it is stated that this change is very frequent in subserous fibroids connected with a pregnant uterus, and this is in part explained by the exiguous character of their blood supply. The leading features of red degeneration are set forth fully in Chapter XI., p. 117, but here it is necessary to discuss a sequel of pregnancy which only occurs in connection with subserous fibroids.

When the uterus is enlarged by fibroids of the interstitial or the submucous varieties it is extremely rare to find it adherent to the surrounding viscera; indeed, the uterus exhibits the same relationship in this respect to the abdominal organs as when it is pregnant. Subserous pedunculated fibroids on the

other hand often contract adhesions to the intestines, mesentery, and especially the omentum, and I have found a large fibroid of this kind firmly adherent to the liver. It is, however, the adhesions to the omentum which are important. When a large subserous fibroid adheres to the omentum, and especially if the stalk of the tumour be narrow, the epiploic arteries, veins and lymphatics increase enormously in size. Some of the arteries are as big as the radial and very tortuous; the veins are proportionate in size to the arteries; the lymphatics are conspicuous, some being equal in size to the median cephalic vein, and filled with straw-coloured fluid. The contrast of the maroon tint of the blood in the arteries, the deep blue of the engorged veins, and the pale yellow tint of the lymphatics forms an anatomical picture not likely to be forgotten by surgeons who have had to remove tumours where these conditions existed.

In all the patients which have come under my care with a complex rete mirabilis of this kind the tumour implicated was always of the subserous variety. Each patient also furnished a history of a troublesome miscarriage or labour which was followed by a tedious convalescence. In some, the Fallopian tubes were in the condition known as hydrosalpinx, sure sign of antecedent sepsis. It is a fair inference that the termination of the pregnancy in such cases was followed by sepsis, which spread from the endometrium to the tumour and led to adhesions between it and the omentum. These adhesions became vascularized from

the omental vessels, and eventually a free anastomosis arose between the vessels in the capsule of the fibroid and the epiploic arteries and veins. In nulliparous women the adhesions may be the legacy of a gonorrhœal peritonitis (Chap. VIII.).

The most extraordinary example of a pathological rete of this kind which has come under my notice complicated a tubal pregnancy which went to term. The placental blood-vessels anastomosed with the enlarged blood-vessels in the great omentum.

The veins on the surface of a big subserous fibroid are sometimes large and conspicuous. Severe bleeding into the belly happens when one bursts spontaneously or from accident. For example, a spinster, aged forty-three, fell heavily on an asphalted walk and felt severe pain in the belly. An operation was performed and Littler removed a pedunculated fibroid weighing six pounds. The bleeding came from a vein on the surface of the tumour : it had been lacerated by the fall.

Intraperitoneal bleeding due to rupture of a superficial vein on a uterine fibroid is a rare accident. Wallace had such a case in a spinster aged thirty-one. The symptoms were acute and suggested an "Ovarian tumour, probably a dermoid cyst, the pedicle of which had undergone torsion," but at the operation a subserous fibroid growing from the posterior surface of the uterus was found. Myomectomy was performed, and on examining the tumour a superficial vein on its surface was found to have a varicosity ; this dilated portion had a small rent with thinned and ragged edges.

Wallace made the report of his case more valuable by collecting the records of similar accidents. He found but few; and this literary research indicates that intraperitoneal bleeding from laceration and rupture of veins on the surface of fibroids is an extremely rare accident. The history of some of the cases shew that the life of a woman from this cause may be gravely imperilled, and some women have been saved from bleeding to death by prompt surgical intervention.

Large subserous fibroids sometimes exert pressure on the veins at the brim of the pelvis. A remarkable example came under my notice in a spinster aged forty-three. She had a fibroid rising above the navel and œdema of both legs, which had existed many weeks and kept her confined to bed; it was unassociated with cardiac, renal or hepatic disorders, and appeared to depend on pressure in some form on the veins at the brim of the pelvis. Hysterectomy was performed; after removal, the uterus, which contained several subserous and interstitial fibroids, weighed twenty pounds. On the posterior surface of the uterus there was a sessile tumour, the size of a tennis ball, in such a position that it rested on the inferior vena cava, immediately above the junction of the iliac veins. This small tumour could do no harm, but the uterus, with its tumours resting on it, and the whole mass firmly impacted in the pelvis, made the venous stasis fairly complete. The œdema disappeared within forty-eight hours of the operation.

Latent Fibroids.—It was stated that small fibroids are often detected in uteri which have been examined after death or removed by operation. The small examples do not exceed the dimensions of a mustard seed. Such small tumours embedded in uterine tissue are not perceptible to the eye or finger in the course of an operation on the uterus. Indeed, ten or more such fibroids may exist in the uterus without distorting it, and such seedling tumours may never cause trouble, perhaps never pass beyond this stage, and may calcify in old age, but they may at any time grow and form troublesome tumours. They may be compared to the latent buds in trees known as knors, which remain quiescent for years and then without known cause assume active growth.

These latent fibroids have an important practical bearing, for it is by no means an uncommon experience for a surgeon to remove fibroids from the endometrium, or from the serous surface of the uterus and fail, on careful examination, to find others. A few years later the woman may again come under observation with a large fibroid in, or growing from the surface of the uterus. Many examples have come under my observation. This fact is especially to be remembered by those who advocate enucleation of fibroids in preference to hysterectomy when surgical intervention is deemed necessary. (See Chap. XVII.).

Although a large amount of histological investigation has been carried out on uterine fibroids it has failed to throw any light on their cause.

BLAND-SUTTON, J.—On a case of acute axial rotation of a calcified fibroid of the uterus. *Trans. Obstet. Soc., Lond.*, 1904, xlvi., 149.

BLAND-SUTTON, J.—On a case of axial rotation of a fibroid in which the uterus was involved in the twist. *Lancet*, 1911, ii., 1132.

KYNOCH, J. A.—Axial Rotation (Cervical Torsion) of the Myomatous Uterus. *Journ. Obstet. and Gyn. Brit: Empire*, 1912, xxii., 27.

LITTLER, R. M.—Rupture of Uterine Myoma, due to a fall, with intraperitoneal hæmorrhage. *Journ. Obstet. and Gyn. Brit. Empire*, 1910, xvii., 423.

PETERSON, R.—Migratory Uterine Fibroids. *Trans. Am. Gyn. Soc., Philadelphia*, 1905, xxx., p. 189.

SCHULTZE, B. S.—Die Axendrehung (Cervixtorsion) des myomatösen Uterus. *Sammlung Klinischer Vörtrage, Leipzic*, 1906, No. 410 (*Gynäk.*, No. 152, 505-554).

WALLACE, A. J.—Intraperitoneal hæmorrhage in cases of fibromyomata of the Uterus. *Journ. Obstet. and Gyn. Brit. Empire*, 1910, xviii., 357.

CHAPTER IV.

Submucous Fibroids.

When a fibroid arises in the uterine wall near the endometrium it tends to project into the uterine cavity. All fibroids in their early stages are sessile; those growing near the endometrium receive a partial investment from it, and, as they increase in size, the contractions of the uterus tend to push them more and more into the uterine cavity. The uterus endeavours to expel the growing tumour, and these efforts lead to many interesting events, some of which are of vital importance to the patient. The first result of this uterine action is the conversion of a sessile into a stalked or pedunculated tumour. At first the stalk is broad and short, then it lengthens and becomes thin or cord-like. When the expulsive efforts are successful the tumour is extruded through the os uteri, the length of the stalk varying according to the position of the tumour; if it grows from the fundus the stalk is longer than when the fibroid grows near the mouth of the uterus. A stalked fibroid, or polypus, is surrounded with endometrium, and the stalk consists of an axis of fibrous tissue containing blood-vessels, and a covering of mucous membrane. Often a fibroid will be so firmly embedded in the wall of the uterus that the contractions cannot detach it, but they mould the tumour as it grows to the shape of the uterine cavity. In some text-books submucous fibroids are represented

hanging freely in the uterine cavity; this is erroneous; a fibroid which projects into this cavity is firmly embraced by the uterine wall. As a submucous fibroid grows, the walls of the uterus thicken; this adds to their expulsive power; the cervical canal becomes shortened as the uterine cavity enlarges to accommodate the growing fibroid and dilates in response to the

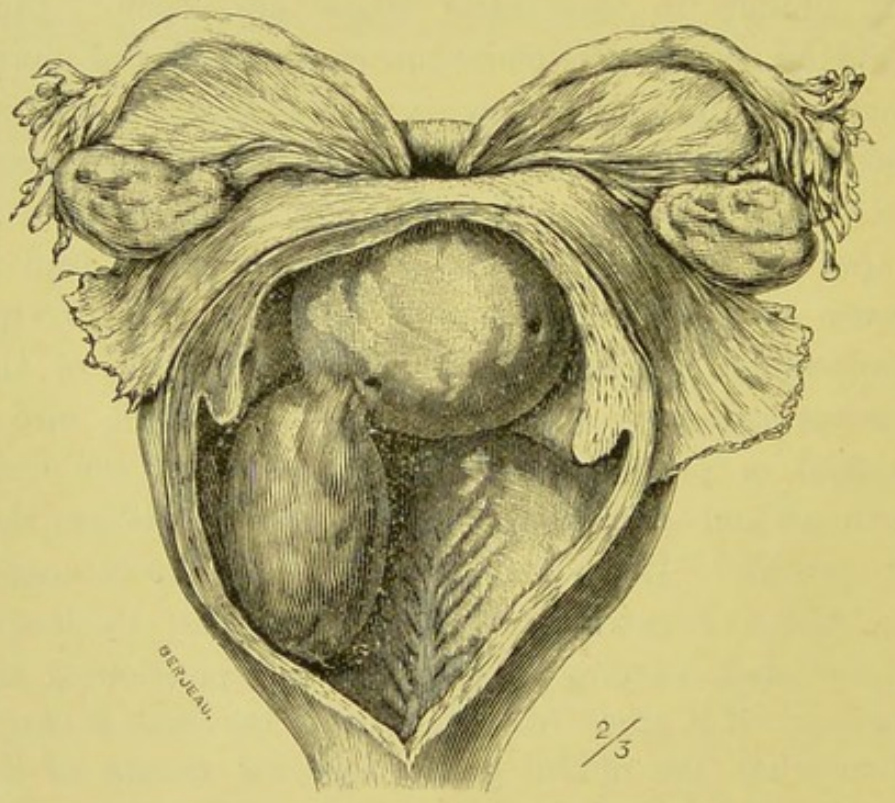

Fig. 10.—Uterus and vagina. The uterus is partially inverted by a sessile fibroid growing from the fundus.

contractions. In some instances, where the conditions are favourable, a sessile polypus at the fundus will become engaged in the cervix and its attachments being too firm to allow of its detachment, the uterus becomes gradually inverted and the fibroid, with the fundus uteri, appears in the vagina. (Fig. 10.).

When many submucous fibroids are present, the contractions of the uterus and the mutual pressure of the fibroids mould their apposed surfaces; gall-stones are facetted under similar conditions in the gall-bladder. When six or seven submucous fibroids are present, if the uterus be hardened and divided, the cut surface resembles a horizontal section through the wrist joint, the cut fibroids look like divided carpal bones. Twenty submucous fibroids is not an uncommon number to find in one uterus, and I have counted one hundred and twenty. When numerous, they are invariably small, some of them are no larger than mustard seed, and others may be as big as ripe gooseberries.

The condition of the endometrium on these tumours is of interest. A conical fibroid, the size of a gooseberry, projecting in the uterine cavity, will be invested with normal endometrium, and its epithelial covering will be columnar in shape. If the tumour be extruded through the os uteri into the vagina the epithelium covering the fibroid becomes converted into squamous epithelium; this change in the shape only affects the surface epithelium, that which lines the recesses not only remains columnar but retains its cilia. When a woman with a submucous fibroid conceives, the endometrium investing the tumour takes its share in forming the decidua. When the uterus succeeds in extruding a fibroid the stalk may become completely detached, but this is extremely rare. Usually the fibroid will be found hanging in the vagina. Although

this spontaneous action is, in a measure, curative, the changes which sometimes occur in an extruded fibroid often lead to complications which place the patient's life in the gravest danger, and sometimes end in death. Moreover, the act of expulsion is accompanied with hæmorrhage ; when the tumour is large, for example, as big as a fist, the signs are like those accompanying a miscarriage, and for which I have known it to be mistaken. In such circumstances the bleeding is abundant and sometimes dangerous.

An elongated, extruded fibroid, projecting beyond the vulva, resembles a phallus ; Virchow mentions that a woman in this predicament has been regarded as an hermaphrodite.

When a woman with a submucous fibroid conceives and the pregnancy goes to term, the uterus sometimes expels the tumour as well as the baby. In such a case the doctor may be puzzled by the fibroid. For example : A woman, aged 40, had been married fourteen years before she conceived ; the child was born in due time and coincident with the expulsion of the placenta an oval body, shaped like a foetal head, presented at the os ; this was regarded as the head of a twin, and ineffectual attempts were made to deliver it ; then some nodular outgrowths were detected on the uterus, and it was realised that the protruding body was a submucous fibroid. (See also p. 114). The tumour became septic and the woman died on the thirteenth day after delivery. Sepsis is the greatest danger to which extruded fibroids are liable ; it is a serious complication even when it does not cause death.

Infection of a fibroid arises in a variety of ways : when the tumour remains within the uterine cavity, the constant efforts made by the uterus to expel it

lead to dilatation of the os and exposure of the fibroid, or the lower pole of the tumour becomes nipped in the cervical canal and this leads to œdema of the endometrium. Normally the uterus and its cervix are sterile, but in married, and especially parous women, pathogenic micro-organisms are often present. (See Chapter VIII.). If the surface of the endometrial covering of a fibroid is damaged either by instruments, normal labour, or in the process of extrusion, the epithelial protecting barrier is broken down and micro-organisms gain access to it and set up septic changes. The fibroid, instead of remaining a compact body, swells, softens, becomes gangrenous and sloughs. These changes are accompanied by great constitutional disturbance, hæmorrhage from the vagina and stinking discharges. The polypus, when large, becomes detached piecemeal. The mode by which death occurs from the sloughing of a large submucous fibroid is the same as in puerperal infections. The effects are illustrated by the following case :—

A woman sought relief on account of excessive and persistent bleeding from the vagina. On examination a soft dark red mass as big as a fist protruded into the vagina, its stalk could be felt running upwards into the uterus. She was ill, sallow, with a rapid pulse, fever, and a tympanitic belly. Under anæsthesia the sloughing mass was removed from the uterus, but she died in a few days, with the usual signs of septic peritonitis. After death putrid fluid was found in the recesses of the pelvis. The uterus was removed and examined. (Fig. 11). It resembled in many respects the uterus of a woman recently delivered and which had become septic. The cervical canal is dilated in consequence of the delivery of the fibroid and the stalk of the tumour may be seen near the fundus. The endometrium and portions

of the capsule of the fibroid were loose in the uterine cavity as sloughs. The coelomic ostia of the Fallopian tubes were unclosed, and stinking fluid oozed from them, indicating the route by which the septic fluid had travelled from the uterine to the peritoneal cavity and thus destroyed the woman's life.

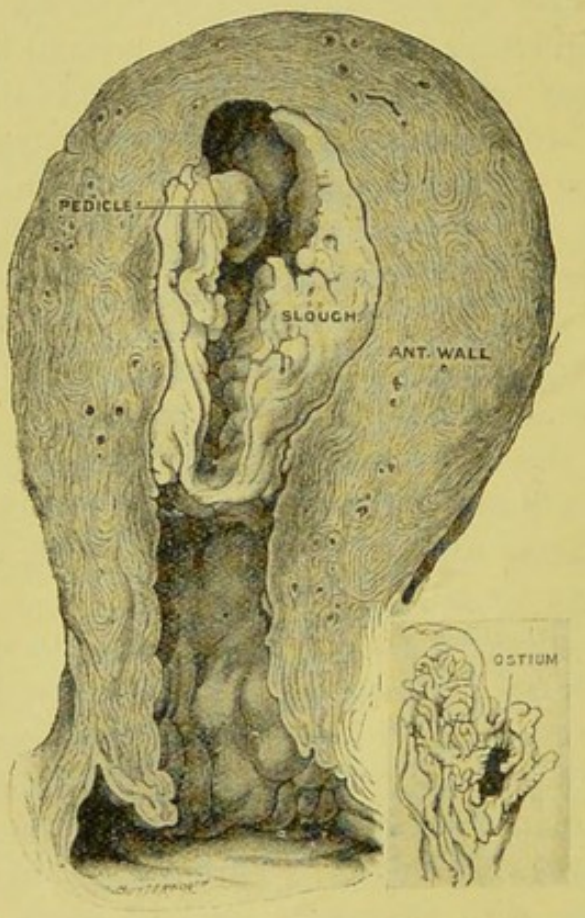

Fig. 11.—A uterus in section from which a septic fibroid had been removed. The endometrium is in the condition of a slough. Infective material had leaked into the pelvic cavity through the unclosed abdominal ostium and caused fatal peritonitis.

This specimen is of interest to me, because it was the first occasion on which I had an opportunity of satisfying myself that septic material could pass from the uterine cavity into the abdomen through the tubes.

The baneful effects which follow the infection of fibroids vary with the agent as will be explained in Chapter VIII., but here it may be stated that a submucous fibroid may become septic without destroying life, but it sets up changes which are not to the patient's advantage.

It is established that septic infection of the endometrium of a mild type following delivery at term, or abortion, or due to gonorrhœa, extends into the Fallopian tubes and causes pelvic peritonitis ; occlusion of the cœlomic ostia follows, the tubes becoming converted into sacs filled with pus (pyosalpinx). All varieties of acute and chronic tubal disease complicate submucous fibroids.

Women with submucous fibroids can contract gonorrhœa, and if they conceive they are more liable to miscarry than other women, and they share the same liability to puerperal infections. In many instances a submucous fibroid acts like a piece of retained placenta and serves as a focus for septic infection. Even more serious imputations are made against submucous fibroids, for the chronic changes they incite in the endometrium probably render it more vulnerable to cancer (see Chapter VII).

The natural history of a submucous fibroid resembles that of a uterine pregnancy, and occasionally the two conditions simulate each other so closely as to render diagnosis uncertain.

A submucous fibroid grows slowly and insidiously ; many women with such a tumour in the womb are

ignorant of its existence until it causes complications which lead to its detection. When nothing unpleasant happens during the growing stage of the fibroid, the enlarging uterus rises out of the pelvis into the abdomen, and its fundus may reach a point midway between the pubes and the umbilicus before attracting attention. The time a submucous fibroid requires to enlarge the uterus to a size as big as a man's head is about ten years, but a soft (myxomatous) tumour will attain such proportions in five years. When a submucous fibroid is so big that the uterus containing it can be easily felt in the hypogastrium, and especially when the fibroid is soft, the resemblance to a gravid uterus at the fourth month is very close. The contour of the uterus is smooth, and the tumour painless and often soft. On auscultation, a hum like the placental souffle is occasionally heard, especially a few days before a menstrual period. When the fibroid has arrived at this stage, the condition of the uterus is instructive. On several occasions after removing a uterus containing a very soft submucous fibroid I have placed the organ before my assistants and asked them to decide from manipulation whether the uterus was gravid or contained a fibroid. Sometimes it is difficult to decide, and being a matter of great clinical importance, it will be discussed in detail in Chapter XI., but here let me mention that on incising the walls of the uterus and enucleating the tumour, the uterine tissue contracts as rapidly as after a normal labour, although the tumour may have been growing in the uterus several years.

The corpus luteum of pregnancy is a familiar object ; when the uterus contains a rapidly growing submucous fibroid a large corpus luteum will be found occasionally in one of the ovaries. The largest corpus luteum I have ever seen was associated with such a tumour.

When a submucous fibroid of moderate size ceases to grow, and the uterus fails to expel it, and micro-organisms do not succeed in colonizing it, then, with the cessation of menstruation, the tumour dies. The period of obsolescence is associated with some interesting changes. During menstrual life, sessile submucous fibroids enjoy an abundant blood supply ; some are as vascular as nævi. After the menopause there is an abatement of the blood supply to the tumour, which shrinks, gradually dies, and sometimes calcifies. A dead interstitial fibroid may remain for many years sequestered in the walls of the uterus ; so may a submucous fibroid, but if putrefactive micro-organisms gain access to it the results are often serious for the patient. When a uterus contains a dead submucous fibroid it attempts to extrude the dead mass, and sometimes succeeds, although it failed to do so when the tumour was quick and growing, for as the fibroid dies, it shrinks. The expulsive efforts of the uterus dilate the cervical canal and facilitate the ingress of micro-organisms, then putrefactive changes ensue with all the woes which follow in their train. Thus, even in obsolescence a submucous fibroid is often a mischievous thing.

Sometimes fibroids rapidly increase in size after the menopause, but this is often due to septic changes in

the tumour. A submucous fibroid has a malicious influence in delaying the menopause, and a woman with such a tumour in her womb may have the monthly fluxes of blood beyond the age at which menstruation normally disappears. These issues of blood from a uterus containing an obsolescent fibroid are not to be accounted menstruation in its true meaning; they are the result of the septic invasion of the dying fibroid, and sometimes they announce the supervention of cancer in the corporeal endometrium.

The fact that a fibroid may shrink after the menopause is in itself occasionally a source of danger, for the tumour, when growing actively, may be so big that it cannot fall into the pelvis, but the shrinking coincident with the cessation of menstruation will allow the uterus with the fibroid to settle in the true pelvis and become impacted. Sometimes a tumour settling in this way will fit the pelvis so tightly that it squeezes the urethra and causes retention of urine. In performing hysterectomy in women of fifty-five years and onwards the tumour will sometimes be so tightly impacted as to need the expenditure of much force for its extraction.

There is nothing in the whole range of surgery more ironical than a woman spending twenty, or even thirty years of her life as a chronic invalid, on account of a uterine fibroid, in the hope of being restored to health and begin a new life after the menopause, and then to realize when her menstruation has ceased that the tumour has become necrotic and septic, conditions which place her life in the gravest peril, and she may die in spite of surgical intervention.

CHAPTER V.

Cervix-Fibroids.

Before 1897 fibroids arising in the neck of the uterus received scanty attention at the hands of systematic writers ; in that year I exhibited a series of such tumours at the Obstetrical Society, London, and shewed that cervical fibroids are not rare ; they possess characteristic features, often attain a large size and produce serious symptoms. They constitute in my series 5 per cent. of uterine fibroids.

In its early stage a fibroid growing in the neck of the uterus is globular, but on attaining the size of a fist becomes ovoid, the long axis of the tumour being vertical, so that on section it exhibits an elliptical outline. (Fig. 12). The ovoid shape of a large cervix-fibroid is determined by the osseous boundaries of the true pelvis.

In a normal woman, the pelvic diameters at the level of the middle of the cervix measure, with the soft parts in position, about ten centimetres (four inches). The lower segment of a large cervix-fibroid is a solid cast of the true pelvis. In one of my specimens the minor (transverse) axis of the tumour measured 12.5 cm., this excessive measurement being due to the expanding effects of the tumour on the walls of the

pelvis. The oval condition of the vaginal pole of a large cervix-fibroid corresponds with the shape of the occiput of a recently delivered fœtus at term, and the presenting shoulder of a fœtus which has been expelled in the process known as spontaneous evolution. When

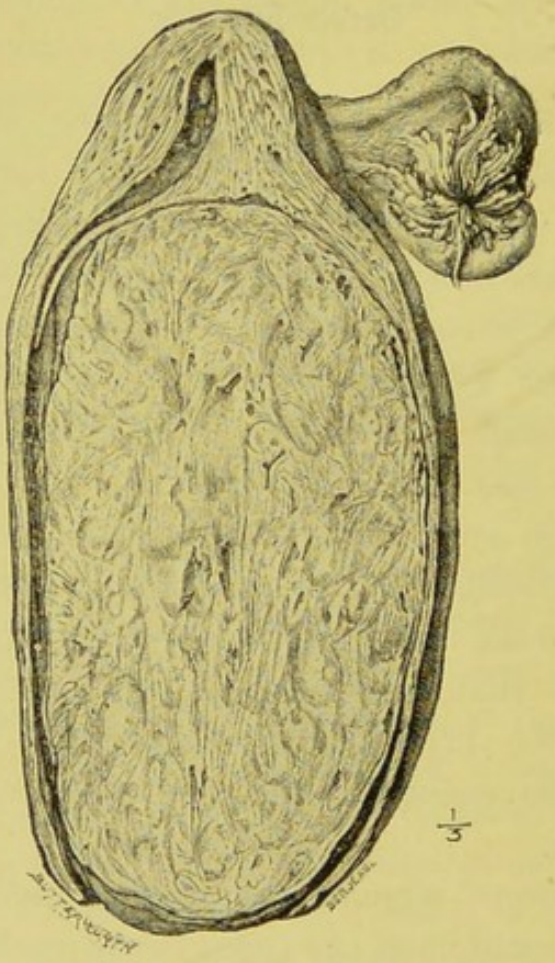

Fig. 12.—A large intracervical fibroid in sagittal section, shewing the elliptical outline so characteristic of large tumours in this part of the uterus.

a cervix-fibroid has attained a horizontal diameter equal to that of the true pelvis, it increases in length and gradually pushes the body of the uterus out of the

pelvis, and the fundus of the uterus will sometimes reach above the umbilicus. In such a specimen the body of the uterus remains of normal size perched on the upper pole of the fibroid. The relations of the tumours to the cervix vary and are of practical interest ; like fibroids which grow in the body of the uterus, they may be submucous and subserous.

A submucous or intra-cervical fibroid expands the cervix equally (Fig. 13), although it is only attached to a portion of its circumference, but a subserous cervical fibroid growing from the posterior wall of the cervix will have the whole of the neck of the uterus in front of it (Fig. 14), and a covering of peritoneum posteriorly, such a tumour will, like an intra-cervical fibroid, be ovoid. Fibroids growing from the anterior aspect of the cervix (Fig. 15), do not, as a rule, distort it, and often remain globular ; when of large size they push their way upwards between the peritoneum and the anterior abdominal wall ; very large tumours sometimes creep upwards between the peritoneum and the anterior abdominal wall, and can sometimes be removed without opening the peritoneal cavity. Fibroids growing from the anterior aspect of the neck of the uterus do not distort it much ; those which grow from the posterior wall and the intra-cervical variety, when they become large enough to stretch it, cause the vaginal portion of the cervix to assume the shape of the broad end of an egg ; then the os appears as a mere dimple. (Fig. 16). The appreciation of this change is useful, for on making a vaginal examinat'on, the

rounded globular mass feels like a subserous fibroid impacted in the pelvis, and the surgeon will hunt about for the cervix expecting to find it drawn up behind the pubic symphysis. The discovery of the dimple-like os is the clue to the nature of the fibroid.

The cervix-fibroid is usually solitary, but it may be associated with a fibroid in the body of the uterus. In

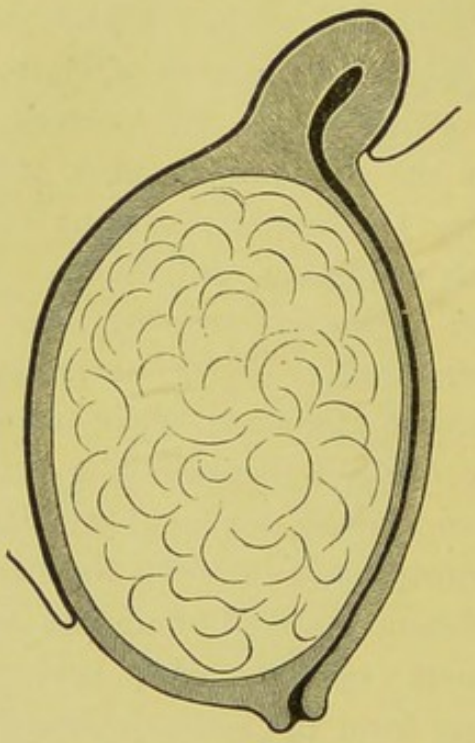

Fig. 13.—Diagram to show the relation of an intracervical fibroid to the cervical canal.

structure it agrees with fibroids in other parts of the uterus and is liable to the same forms of degeneration and infections, but it differs from them in its relations to the bladder, ureters and rectum.

It is obvious that when a cervix-fibroid attains sufficient size to block the outlet of the pelvis it will

exercise injurious pressure on the urethra. A fibroid grows in the neck of the uterus so insidiously that one of the first symptoms connected with its presence is retention of urine. This may be due to direct pressure of the tumour on the urethra, or to the bladder being drawn upwards as the uterus rises into the abdomen. The displacement, enlargement, thickening and disorganisation of the bladder, ureters and pelvis of the

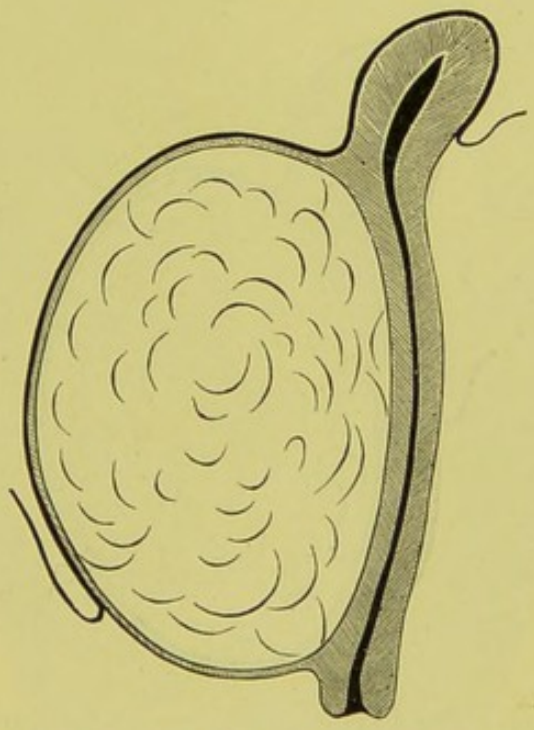

Fig. 14.—Diagram of a fibroid growing from the posterior wall of the cervix, showing its relation to the peritoneum.

kidney caused by large cervix-fibroids greatly adds to the risks of operative interference. (See Chapter XVI.).

A large cervix-fibroid leads to chronic constipation, and occasionly a shallow longitudinal groove may be seen on its posterior surface where it lies in contact with the rectum.

The Museum of the Royal College of Surgeons, England, contains some well preserved and admirably prepared cervical fibroids, including a Hunterian specimen in which the tumour is 12 inches long and 5 wide, but it lacks a history.

The largest cervical fibroid which I have removed weighed 13 pounds. Mr. E. E. Ware removed from a spinster, aged 45, a uterus, with a tumour weighing ten

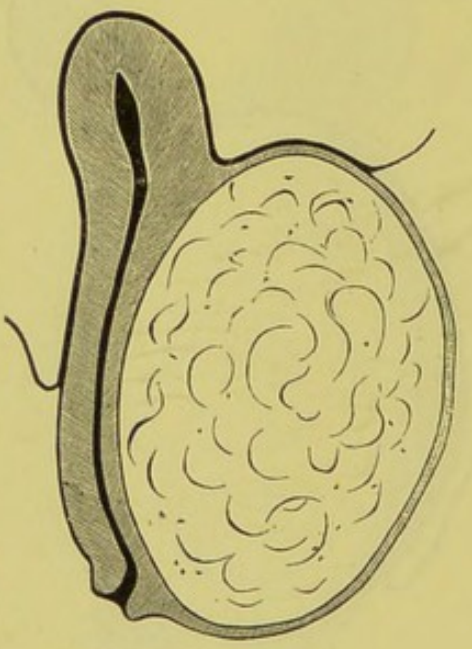

Fig. 15.—Diagram of a fibroid growing from the anterior wall of the cervix, showing its relation to the peritoneum as it passes from the anterior wall of the uterus to the bladder.

pounds in its neck. In Fig. 16 the anterior aspect of the specimen is represented, with the peritoneum divided at the level where it turns upwards on to the posterior surface of the bladder. The expansion of the vaginal end of the cervix and the os uteri are well shewn. The point where the uterine artery comes into relation with

side of the cervix also indicates the spot where the ureter comes in contact with the neck of the uterus.

In Fig. 17 the cervical canal is laid open in order to shew its increased length and relation to the tumour,

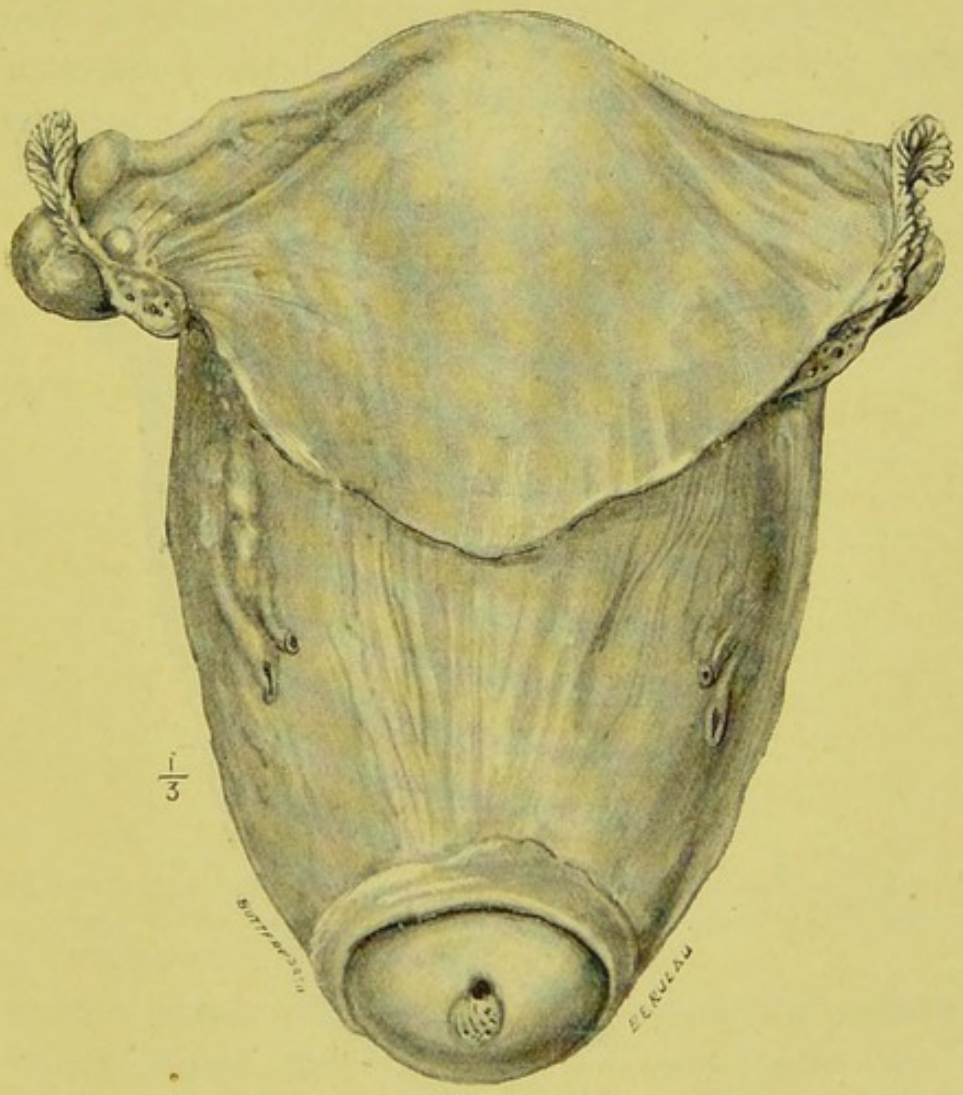

Fig. 16.—Uterus with an intra-cervical fibroid which weighed 10 pounds. Removed by abdominal section from a spinster aged 45.

the true cavity of the uterus is of normal size. The fibroid arose in the posterior wall of the cervix.

In order to complete the description of a large cervix fibroid, the neck of the uterus, shewn in Fig. 16, is represented transversely divided at a point well above its middle in order to include the uterine arteries ; the

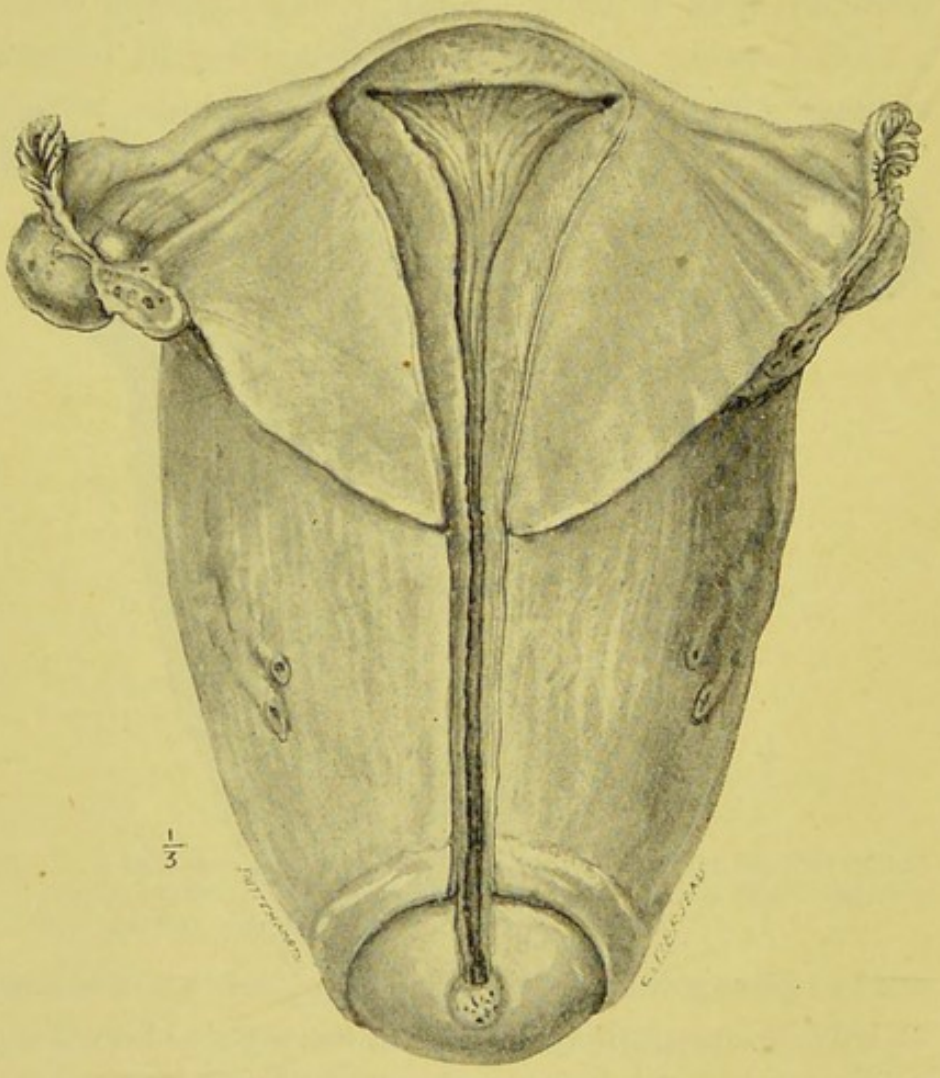

Fig. 17.—The uterus represented in the preceding figure with the cervical canal laid open.

relations of the tumour to the neck of the uterus and to the cervical canal are well shewn. (Fig. 18).

It has been mentioned already that cervix-fibroids are insidious tumours, and this is in a measure due to the slight disturbance they cause to menstruation; a fibroid growing from the anterior or posterior aspect of the cervix behaves like a subserous fibroid and does not interfere with the corporeal endometrium. A submucous cervix-fibroid will not interfere with menstruation, because the endometrium lining the

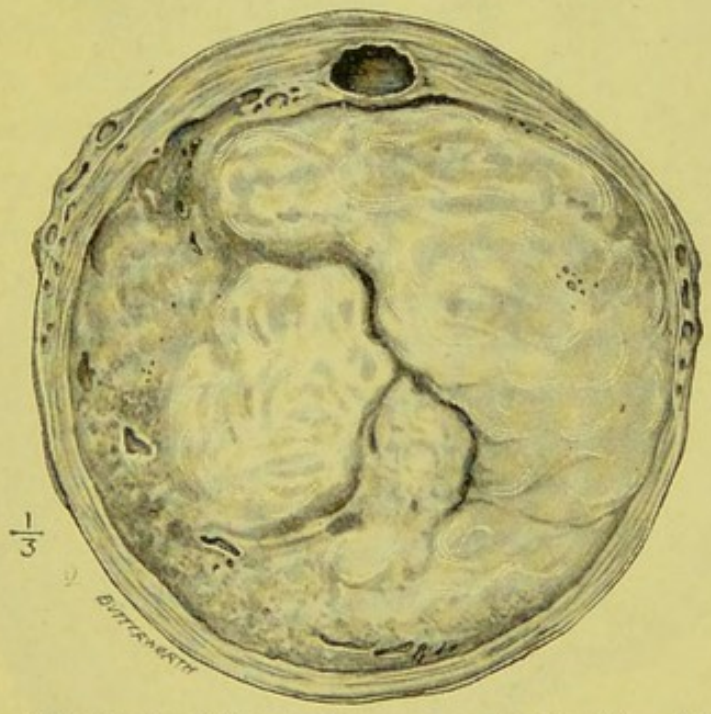

Fig. 18.—The neck of the uterus represented in Figs. 16 and 17 is here shewn in transverse section. The tumour arose in the posterior wall of the cervix.

cervical canal does not share in the menstrual process, but a fibroid growing in the cervical canal like a submucous fibroid in the body of the uterus is liable to be extruded, when this happens the tumour becomes septic and menorrhagia and metrorrhagia are the inevitable consequences.

When a woman has a fibroid in the neck of the uterus and the os is a mere dimple, menstruation remains unaffected: the woman from whom the uterus with

Fig. 19.—A gravid uterus in section. The neck of the uterus is occupied by a large fibroid which blocked the pelvis and rendered hysterectomy necessary at the fourth month. The fibroid was in the condition known as "red degeneration."

the very large intra-cervical fibroid (Fig. 16) was removed never had a severe menstrual loss. Such women are, as

a rule, nulliparous. When a woman with an intra-cervical fibroid complains of bleeding, this fibroid is either extruded, or she has borne children, or the os is widely patulous and the tumour has become septic. It should also be borne in mind that cervical fibroids, though commonly solitary tumours, are occasionally associated with a submucous fibroid, and such a tumour is a notorious agent in producing metrorrhagia.

When a fibroid grows from the anterior aspect of the cervix it sometimes encroaches on the vagina and prevents coitus. I have operated on two patients who sought relief from the tumour for this impediment.

Although a fibroid in the neck of the uterus is unfavourable to conception, it by no means prevents it, and the pregnancy may go to term, a combination very dangerous for mother and child. For example: A woman aged thirty-five was allowed to marry, although it was known that she had a large fibroid in her womb. Within a year she became pregnant, and at the fourth month serious pelvic complications arose, which were only relieved by hysterectomy. A large fibroid in an advanced stage of red degeneration occupied the neck of the womb, and had the pregnancy been allowed to continue this tumour would have effectually obstructed delivery (Fig. 19).

A study of the fibroids and the fœtus in this specimen leads one to reflect upon the difficulty which would have arisen if under somewhat less adverse circumstances the pregnancy had continued to term. Here is the answer :—

A woman, aged thirty-three, recently married, was delighted to find herself pregnant, but her happiness was disturbed when her doctor discovered that she had a fibroid as big as a man's fist low in the pelvis. She

Fig. 20.—Gravid uterus in sagittal section. The patient miscarried at the thirtieth week and the arm presented. Delivery being impossible on account of a large cervical fibroid, total hysterectomy was successfully performed. The œdema of the presenting arm is well shewn.

was very anxious to have a baby, and we recommended her to keep under observation. This she failed to do,

but when pregnancy had advanced to the thirtieth week labour came on, and, as delivery was impossible, I removed the uterus and its neck (Fig. 20). The cervix contained a large fibroid which blocked the way ; the presenting arm is œdematous. The fibroid in the anterior wall of the uterus was in the condition known as red degeneration.

This case is of great interest to me because it was the first recorded instance of total hysterectomy being performed for obstruction due to fibroids during labour. In the course of the operation it was difficult to determine the point where the neck of the uterus ended and the vaginal wall began. I saw the woman two years after the operation in excellent health.

Extra-Uterine Fibroids.

In addition to the walls of the uterus fibroids arise in the various strands and strata of unstriped muscle tissue connected with it. Of these, the three most important are the broad ligament, the round ligament, and the utero-sacral ligament.

The mesometrium, or broad ligament, contains between its layers a large quantity of loose connective tissue which is continuous with that directly underlying the peritoneal investment of the uterus. This tissue is occasionally the source of tumours identical in structure with uterine fibroids. These tumours are oval, encapsuled and often bilateral ; they do not cause much inconvenience until they attain the size of cocoa-nuts. Sometimes they grow with great rapidity,

and in a few months form tumours weighing twenty pounds, or more, and as they rise into the abdomen drag the uterus and its appendages out of the pelvis. Clinically they are indistinguishable from subserous

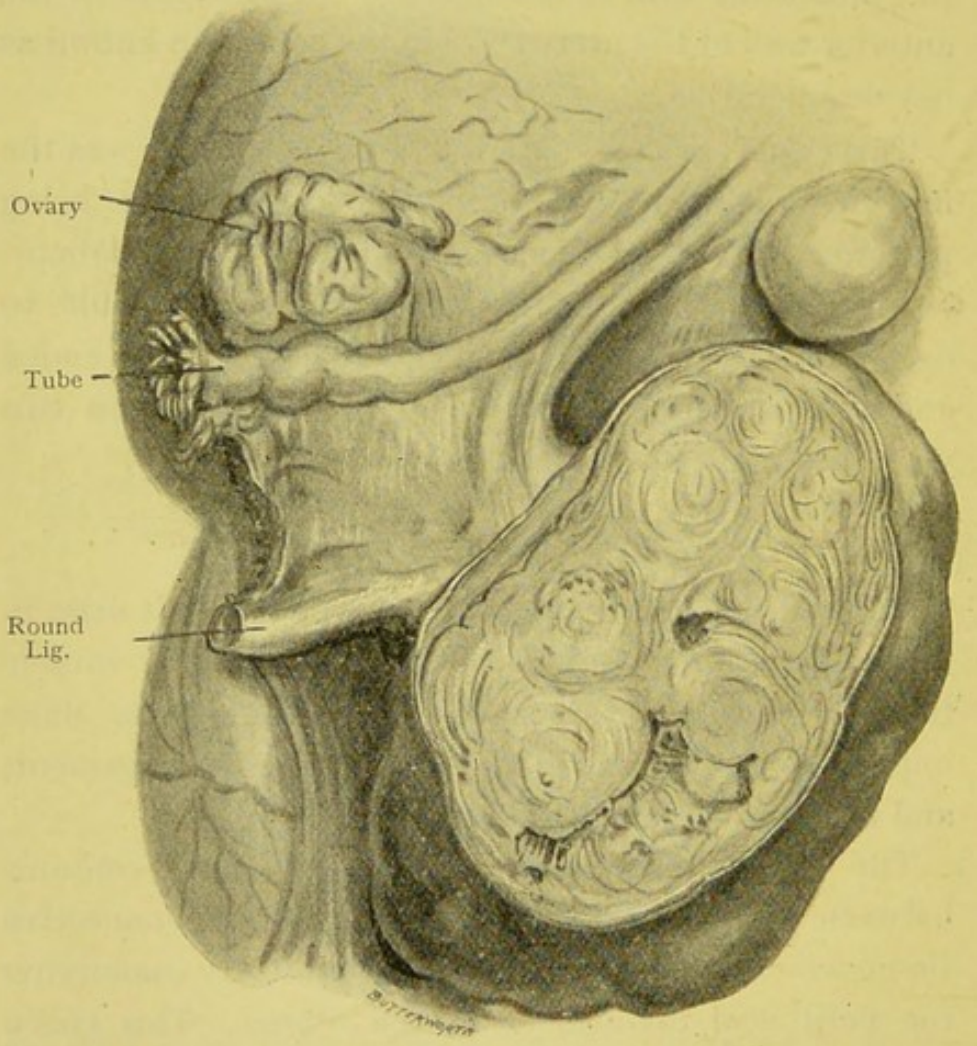

Fig. 21.—A fibroid the size of a duck's egg growing from the right round ligament of the uterus.

fibroids, but they are easily recognised when the abdomen is opened, because, instead of projecting freely into the general peritoneal cavity, like a subserous

fibroid, they are covered over with a thin transparent layer of peritoneum which represents the expanded broad ligament (Fig. 33). When the tumours are bilateral, the uterus lies anterior to the tumours and usually slightly sunk in a valley between and unconnected with them.

Doran described some interesting cases and collected the literature : he has found records of broad ligament fibroids occurring as early as the twentieth year. According to my observations they are most frequent after the thirty-fourth year. They are formidable tumours to remove, but they enucleate easily. The largest example in my own practice weighed nearly thirty pounds. Big tumours seriously interfere with the bladder. On first becoming acquainted with this variety of fibroid I regarded them as sarcomatous. Having been able to watch some patients for several years from whom I removed huge tumours of this kind, and find them remain healthy and free from recurrence, I have become satisfied that these tumours are non-malignant.

Mesometric fibroids are greyish white : large specimens are honeycombed with irregular cavities, due to degeneration of the tissue ; calcareous patches are not uncommon. Large rapidly growing tumours are œdematous and exude a yellow albuminous fluid in great quantity. With rapidly growing tumours the health of the patient suffers and the pressure they exert on the vessels in the pelvis causes œdema of the lower limbs.

The tumours most commonly mistaken for broad ligament fibroids are fibroids arising from the neck and side of the uterus burrowing between the layers of the mesometrium.

Tumours also arise in the round ligament of the uterus and exhibit the same strucure as a subserous or an interstitial fibroid. They arise not only in the part of the ligament that lies between the layers of the mesometrium, but also in the terminal portion which traverses the inguinal canal. Fibroids of this kind in the canal have often been described as desmoid tumours and sometimes as sarcomas.

Fibroids in the mesometric portions of the round ligament, though unusual tumours, sometimes attain the size of a tennis or a cricket ball. They occur as solitary tumours or they appear in association with uterine fibroids. (Fig. 21).

Fibroids also grow in the utero-sacral ligament; in this situation they have a peculiar relation to the peritoneum, for, as they grow, they burrow under its posterior layer and form a flattened tumour lying on the side of the pelvis. When such a fibroid is enucleated it is found to be attached by a tendon-like stalk to the side of the uterus. Such tumours are rare, and usually assume the shape of a disc three inches in diameter and two in thickness. It is unsafe to enucleate them without removing the uterus at the same time, because the sac must be drained, and often leaves in consequence a troublesome sinus.

CHAPTER VI.

The Modes in which Fibroids Impair Health and Imperil Life.

A uterus containing one or many fibroids may cause neither inconvenience nor suffering, indeed the woman owning them is often ignorant of the existence of tumours in her womb ; but it is equally true that they are often the source of much suffering and occasionally cause death, directly and indirectly, in a variety of ways.

Uterine fibroids often remain for many years without producing more than temporary inconvenience, but the number which remain harmless form a very small minority. The most obvious disturbances caused by fibroids may be conveniently considered under the headings of hæmorrhage, pelvic complications (when these tumours interfere with the bladder, rectum or the big blood vessels) and obstructive effects when they become impacted in the pelvis, or undergo axial rotation and twist their pedicles. Disastrous consequences arise when fibroids interfere with the function of the uterus. A woman with a large fibroid is debarred from marriage ; a small fibroid in the neck of the uterus will hinder conception, a large cervix fibroid sometimes prevents convenient coitus, and if

pregnancy ensue, an embarrassing and occasionally perilous combination is the consequence. Many puzzling symptoms are produced when morbid swellings connected with the ovaries, uterine tubes and broad ligament co-exist with fibroids ; and abnormal conditions of the viscera, such as cancer of the rectum, a pelvic kidney, or a displaced spleen all help to make combinations which render accurate clinical work difficult.

Among important changes associated with the presence of submucous fibroids there is reason to believe that they predispose the endometrium to cancerous changes. (Chapter VII.).

Many of the conditions mentioned in this indictment of uterine fibroids are of sufficient interest and importance to demand consideration in separate chapters. A correct appreciation of them is the key to accurate diagnosis. Although the clinical recognition of a uterine fibroid is often a simple exercise, it is sometimes perplexing. It is also true that an illness which is puzzling a physician is sometimes made clear by the discovery that the patient has a fibroid in the uterus.

Hæmorrhage is a very frequent inconvenience caused by fibroids, but it is confined to those which implicate the endometrium. The bleeding assumes two forms : Commonly it occurs as an exceesive loss at the menstrual periods (menorrhagia) ; it may be irregular, or almost continuous, so that all relationship to a monthly loss disappears. It is an important fact that the size of a fibroid bears no relation to the amount of bleeding

which it may cause. A subserous fibroid weighing many pounds will not interfere with menstruation, but a fibroid polypus the size of a chestnut will produce profuse menorrhagia. It is instructive to remove a uterus enlarged and tuberose with ten or twenty fibroids because the patient is a chronic invalid on account of severe losses at the menstrual periods, then,

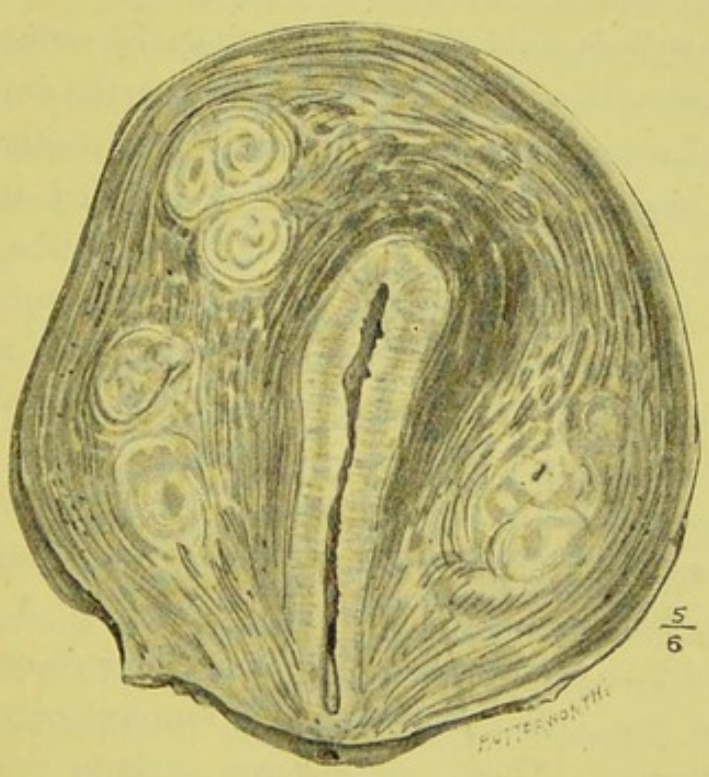

Fig. 22.—Uterus in sagittal section containing small fibroids; the section displays an œdematous condition of the endometrium often associated with submucous fibroids and profuse menorrhagia.

on exposing the uterine cavity to find a fibroid, perhaps no bigger than a large ripe grape, hanging by a small pedicle and acting as the exciting cause of the bleeding. The condition of the endometrium in such a uterus varies. In a normal uterus the endometrium is 2

millimetres thick: when it has been irritated by a fibroid and the patient is profoundly anæmic from severe menorrhagia, the endometrium sometimes measures a centimetre, or more in thickness. (Fig. 22). This increase is due to œdema; when œdematous endometrium is examined microscopically the cell elements will be found spread out and the acini of the glands widely separated.

Some writers hold the opinion that the menorrhagia associated with submucous fibroids is partly due to the increased size of the menstrual area and partly to the greater size of the uterus. I am satisfied that the increase of menstruation and the alteration of its rhythm connected with the presence of a submucous fibroid, or a mucous polypus, depend in the main on disturbance of the endometrium; the chief disturbing agents being pathogenic micro-organisms.

The most severe form of uterine bleeding connected with fibroids is the result of septic infection. Submucous fibroids become septic in many ways. A fibroid extruded into the vagina is exposed to micro-organisms such as the colon bacillus, the staphylococcus and streptococcus. These pathogenic agents not only colonize the tumour and convert it into a putrescent fœtid mass, but the cervical canal being wide and patulous the micro-organisms invade the endometrium and the uterine tissues generally. In some cases the sloughs which escape with the offensive discharges are not merely fragments of tumours, but they are gangrenous strips of endometrium. A woman with a

sloughing fibroid of this kind is like a patient suffering from pyæmia after a wound. Until surgeons were taught to appreciate the importance of cleanliness in investigating patients, a fibroid was often infected as a consequence of being injured by a dirty sound or dilator. Infection of a submucous fibroid was a common sequel of childbirth or miscarriage, because its soft and degenerate condition in these circumstances rendered it peculiarly liable to this complication.

It is quite probable that in nearly all instances where excessive uterine hæmorrhage is due to a fibroid the endometrium is septic, and the severity of the bleeding varies with the degree of virulence of the micro-organism present. A spinster may have a submucous fibroid in the neck of the womb, and her menstruation be regular and small in amount, so long as the os uteri remains contracted, or as the clinical phrase defines it "a mere dimple." These conditions may continue for several years. Suddenly and without any warning she is seized with pain and hæmorrhage, and then she becomes the victim of profuse menorrhagia. On examination an extruded fibroid is found, or the os, instead of being a mere dimple, now admits easily the tip of the finger.

Sepsis is a powerful factor in producing bleeding from wounded surfaces. All septic wounds bleed, and hæmorrhage from this cause is the most intractable of all, and an infected endometrium like a septic wound bleeds profusely. Before discussing the flora of the uterus, we may usefully consider some morbid conditions

which complicate fibroids, and which have an important bearing on their operative treatment.

Fibroids being common tumours, are often present in patients suffering from diseases in organs which have no intimate connection with the uterus. From time to time attention is drawn to the remote effects which rapidly growing uterine fibroids may exert on the heart, or the thyroid gland. We know that the pressure of a large fibroid can and often does exert a deleterious effect on the bladder, but albuminuria may be present and have no relation to the fibroid. Another disease occasionally associated with fibroids is diabetes.

It is necessary to discuss some of these conditions. It has been maintained by several writers that fibroids in a uterus exert a causative influence in the production of heart disease. It is quite true that many patients with fibroids in their uterus have valvular lesions as the result of rheumatic fever, and in many who have been reduced to a condition of profound anæmia by a submucous fibroid, the heart will furnish a hæmic murmur on auscultation. I have had careful observations made on the cardiac condition of patients with fibroids under my care; there is nothing that can be described as peculiar to the influence of these tumours.

On a dozen occasions I have removed the uterus containing large tumours, when the heart has furnished a murmur clearly due to a valvular lesion. In such circumstances the patient is always submitted to a careful examination at the hands of a physician, and if the compensation be satisfactory, the operation is under-

taken. There are conditions when the removal of a large fibroid may benefit a patient with heart disease. For example: A stout patient, aged 50, with a huge ovarian cyst and a fibroid as large as a football, suffered from severe attacks of dyspnœa, due to a dilated heart and myocarditis. The anæsthetist would not give her a general anæsthetic, but I felt if the tumour could be removed great relief would follow. Chloroform, in any form, or in any combination, being out of the question, I resorted to an intradural injection of novocain and removed the tumours. The operation was followed by a rapid convalescence; the cardiac symptoms disappeared, and within three months the woman was robust and well, leading an active useful life.

When we consider the enormous size and vascularity of some fibroids we might readily believe that the extra duty thrown upon the heart would lead to its enlargement. The heart is an adaptable organ, it was formerly taught that it enlarged during pregnancy and returned to its natural size during the puerperium, but statements of this kind could only be founded on speculation. I satisfied myself that after such an operation as amputation at the hip-joint, whereby nearly one-fourth of the body is removed, the heart becomes reduced in weight. I have had two opportunities of testing this on adults who died twelve months after such a severe operation; in each instance the heart was two ounces below the average weight. When a vascular fibroid, weighing thirty pounds, has been removed from an otherwise

healthy woman it is not unreasonable to expect that the amount of work required of the left ventricle would be reduced, therefore the muscle tissue in that part of the heart would undergo a corresponding reduction.

The thyroid body is another organ believed for ages to be in correlation with the reproductive organs, and modern physiological and pathological researches confirm the tradition.

On three occasions I have removed a uterus containing large fibroids from women who, at the time of the operation, possessed enlarged thyroid glands. The goitres being of the parenchymatous type, I have been surprised on seeing the patients six months after the hysterectomy to notice marked diminution in the size of the goitrous thyroids.

In 1908, a spinster, aged forty-four, suffered from menorrhagia due to multiple fibroids, but she also suffered from exophthalmic goitre and the thyroid was enlarged and pulsated strongly. It occurred to me that as the removal of the uterus for fibroids caused goitrous thyroids to shrink, such a sequel might be expected if the uterus were removed from this patient. After a careful consideration of the circumstances I decided to remove the uterus with the ovaries and tubes by the subtotal method. The operation was carried out in the Middlesex Hospital; it lasted twelve minutes. Chloroform was employed for the anæsthesia. Before operation the patient's temperature was 99° Fahr., and the pulse rate 130. Twenty hours after the operation her temperature was 102° Fahr., and the pulse rate

140 per minute, but the thyroid gland had markedly diminished and the eyeballs were less prominent. Forty-eight hours after the operation she was in a desperate condition ; the temperature was 104° Fahr. ; pulse rate 180 per minute, the thyroid gland had further diminished in size, and a condition of acute thyroidism prevailed. The patient died fifty-six hours after the operation. A post mortem examination was not permitted by the patient's friends.

Diabetes is another condition which will sometimes place the surgeon in a quandary when he is considering the propriety of advising hysterectomy for fibroids. I have performed this operation on three occasions in diabetics. One case is in some ways instructive. A widow, aged forty-three, passed sugar in her urine to the extent of 5 grains per ounce. She also suffered from menorrhagia, her menstrual periods lasting on an average ten days ; the elongation depending on a large submucous fibroid. She wished to re-marry and was deterred from doing so, not by the glycosuria, but by the menorrhagia. She wished to have the tumour removed. I performed subtotal hysterectomy. The patient made a quick and uneventful convalescence, re-married and was in good health three years after the operation.

All patients who come under my care for hysterectomy have their urine examined for sugar. It is a serious responsibility to operate upon a patient whose urine contains sugar, but the risk must be faced in exceptional cases of which the following is an example :—

A married woman, aged 69, had a fibroid as big as a football. There was free bleeding from the vagina at frequent, but irregular intervals, which led us to suspect that cancer existed in the body of the uterus as well as a fibroid. The condition was complicated by diabetes, the sugar amounting to ten grains per ounce of urine. Abdominal hysterectomy was performed in 1904. The uterus contained a large submucous fibroid and a cancerous mass as big as a tennis ball. The patient recovered quickly and was reported to be alive and well in December, 1912.

CHAPTER VII.

Fibroids in Relation to Cancer of the Uterus.

In discussing septic infection of the uterus as a complication of fibroids, it was stated that the part played by pathogenic micro-organisms in causing hæmorrhage is emphasized by a study of uterine cancer. This chapter will be devoted to a consideration of this question: also to a description of the serious combination of submucous fibroids and cancer of the corporeal endometrium.

There is no necessity to enter into a detailed account of such a familiar disease as cancer of the uterus, except to mention that it may arise in any part of the epithelial covering of the uterine mucous membrane. Although any part of this epithelial surface may be the starting point of cancer, from the external orifice of the cervical canal to the cœlomic ostia of the tubes, the vulnerability of the epithelium varies greatly in different parts. The age-incidence also shews wide variations, and the social state of the patient has a remarkable influence in determining its precise situation in the uterus. It may seem arbitrary to divide uterine cancer into two classes according to its situation in the neck, or in the body of the organ, but the arrangement is well justified. Cancer is very common in the neck of the uterus,

especially in the vicinity of the external "os," but it is uncommon in that part of the endometrium which lines the canal in the supra-vaginal section of the cervix uteri, and in this situation it is insidious and treacherous.

Cancer in the neck of the uterus is closely associated with coition and child-bearing, whereas fibroids are more common in barren than in fertile women, and careful observations support the opinion that **fertility protects against fibroids, but predisposes to cancer of the neck of the uterus.**

Statistics clearly show that cancer of the cervix occasionally arises in a uterus containing submucous fibroids ; it is a combination requiring careful consideration, and its importance has been forced on the notice of surgeons in a remarkable way.

When subtotal hysterectomy came to be widely performed, some of the patients who had been submitted to this operation complained of irregular recurrent bleeding, sometimes within a few weeks of the operation, and the surgeon was surprised to find the cervical stump cancerous. This induced some surgeons to decry the subtotal method and advocate the complete ablation of the uterus—neck as well as body—in order to protect the patient against such a serious invasion.

A great deal has been written on this subject, and it has been clearly proved that in the majority of these unhappy cases cancer existed in the neck of the uterus at the time of the operation, but it was overlooked.

The result of this experience has been crystallized in practice; to-day, when a surgeon performs subtotal hysterectomy, on dividing the neck of the uterus he critically examines the cut surface, and if cancer be present, or the uterus appear suspicious, he removes the neck of the uterus also. Surgeons who have had extensive experience of subtotal hysterectomy for fibroids, are unanimous that **there is no special liability of the cervical stump left after this operation to become cancerous.**

When a uterus occupied by a submucous fibroid becomes cancerous there is a modification in the symptoms which sometimes warns the surgeon of the complication, for example:—A woman known to have fibroids often leads a tolerably comfortable existence, in spite of fairly profuse and long drawn out menstrual periods. Suddenly she gets a "flooding," and this recurs at irregular intervals. Such a condition leads the surgeon to examine the patient carefully, for if she is married and barren, cancer may have arisen in the corporeal endometrium or rarely in a Fallopian tube. When a woman with a fibroid attains the menopause, and subsequently suffers irregular issues of blood, it is a sign that her obsolescent fibroid has become septic, or cancer has arisen in the corporeal endometrium, or in the mucous membrane of the Fallopian tube.

A study of conditions surrounding primary cancer of the corporeal endometrium proves that the social state of the patient plays here a conspicuous part, for they are the reverse of those surrounding its origin in the

cervical endometrium. In clinical phraseology we may say that "cancer of the body of the uterus" is more common in virgin-spinsters and barren married women than in mothers; it is commoner after the menopause than at any other period.

Accurate pathological investigations have revealed some epithelial perversions in the endometrium which may predispose to cancer. Piquand (1905) drew attention to the frequency with which a submucous fibroid is associated with cancer of the corporeal endometrium, especially in women of fifty years and upwards. In this connection he also emphasises what other observers had pointed out, namely, that a submucous fibroid is usually associated with changes in the endometrium, which not only cause bleeding, but leucorrhœa, salpingitis, pyosalpinx and such changes in the epithelium as render it susceptible to cancer. Piquand collected and analysed the statistics of a thousand cases of uterine fibroids and found cancer of the corporeal endometrium in fifteen. In 1906, I examined the records of 500 consecutive cases of hysterectomy for fibroids in my own practice, and found 8 instances of this unfortunate combination, the nature of the disease being verified in each instance by a microscopic examination. All the patients were over 50 years of age. This complication of fibroids is most common between the fiftieth and the sixtieth years.

The age incidence and relative frequency of cancer of the body of the uterus and fibroids in my list is best expressed in this way :—

There were sixty-three women who had attained the age of fifty years and upwards; among these women there were 8 who had cancer of the corporeal endometrium, as well as fibroids. This shews that among women, over 50 years of age, who submit to hysterectomy, in more than 10 per cent. the tumours will be complicated with cancer of the body of the uterus.

The statistics on which this statement is founded were published in 1906; since that date, I have made a careful study of uteri with this sinister combination which have occurred in my practice; these new observations support the conclusion expressed in the preceding paragraph. Among my series the following case may be mentioned:—A spinster, aged 60, came under my care with her uterus so enlarged by a submucous fibroid that its fundus reached high above the navel. The existence of the fibroid had been detected by Sir Spencer Wells when the patient was 30 years of age. She complained to me of irregular issues of blood and the increasing size of the tumour. On examining the uterus after its removal, cancer of the endometrium was found in addition to a large fibroid. The patient survived the operation fifteen months.

Until hysterectomy began to be freely practised for fibroids, cancer of the corporeal endometrium was regarded as somewhat rare. We know that this supposed rareness depended upon incomplete methods of clinical investigation, and the leading features of the disease differ in several particulars from those presented by cancer of the neck of the uterus, but in each

situation the predominant sign which attracts attention to it is hæmorrhage. Whether cancer is situated in the cervix or in the body of the uterus the hæmorrhage associated with it depends on sepsis.

When cancer arises in an organ like the liver, not easily accessible to micro-organisms, it sometimes forms a massive tumour, but in situations like the neck of the uterus or the tongue where the cancerous tissue is exposed to pathogenic and saprophytic micro-organisms it is easily disintegrated, and in the tissue destruction which follows blood-vessels are destroyed and bleeding with all its exhausting effects is the usual consequence.

The presence of pathogenic micro-organisms is inimical in another way. The cervical canal of a nulliparous spinster is normally free from microbes; a subtotal hysterectomy conducted with aseptic precautions is usually followed with an afebrile recovery. The removal of a uterus when cancer of the neck of the uterus co-exists with a fibroid is rarely followed by feverless recovery; convalescence is slow and sometimes fails. The risks under such conditions can be in a rough measure estimated, for if the cancer is colonized by staphylococci the patient will probably recover, and they sometimes recover when it is pervaded by the colon bacillus, but when streptococcus prevails the patients nearly always die. These findings are easily translated into practice. The cautious surgeon determines the character of the prevailing flora in a given case of uterine cancer. When the streptococcus reigns supreme he will be wise to abandon the operation, or

postpone it and take steps to sterilize the cancerous tissue before attempting the removal of the uterus.

Certainly the virulence of cancer is in a large measure determined by its particular flora, for in situations where micro-organisms are debarred access, cancer may require years to destroy the life of the individual, and the truth of this statement can be demonstrated by a study of cancer of the corporeal endometrium.

When cancer arises in the body of a uterus in which cervical canal is narrowed as in a nulliparous woman, the uterine cavity is, as a rule, germ free. The cancer grows freely and may form a mass as big as a tennis ball, or even bigger, and the body of the uterus will rise in the hypogastrium, and attention will be drawn to it merely as a tumour, and on examination, the physical signs will be those presented by a submucous fibroid. When the cancerous mass remains germ-free the uterus will continue to expand its walls, then the cervical canal dilates and forms part of the general cavity of the uterus. This continues until the os uteri opens widely and a portion of the growth is extruded into the vagina, then micro-organisms invade the tissue, disintegrate it, and as a result of these putrefactive changes the exposed tissue begins to bleed—the inevitable sequel—and the patient often in alarm seeks medical aid.

It will be gathered from this account that the clinical signs of cancer of the body of the uterus are similar to those caused by a submucous fibroid ; indeed, there is often so much difficulty in distinguishing between the two conditions that frequently surgeons are unable

to distinguish between a massive cancer of the corporeal endometrium and a septic submucous fibroid in women over fifty years of age. The only method of establishing a diagnosis is to remove a fragment of tissue from the interior of the uterus by a curette and examine it with the aid of a microscope.

It is not uncommon for surgeons to perform hysterectomy on women over fifty under the impression that the uterus contains a fibroid, and find the uterus filled with cancer. On the other hand, the uterus is sometimes extirpated under the impression that it is cancerous, and a degenerating fibroid is found. There is a third picture. Women known to have a fibroid in the uterus for many years are submitted to hysterectomy, because "the tumour has of late become troublesome"; after the operation, the uterus is examined and the surgeon is surprised to find a patch of cancer in the endometrium as well as the fibroid.

It is necessary to point out that cancer of the endometrium may be associated with very small submucous fibroids. Size does not count. I have seen the combination in a small atrophic uterus containing a submucous fibroid no bigger than a ripe cherry.

In most instances the cancer is in close proximity to the fibroid; occasionally a fibroid is embedded in the cancerous tissue, and is sometimes invaded by it. So far I have not been able to satisfy myself that the cancer arose in the endometrium covering a submucous fibroid, but it is not improbable. I am not satisfied with the evidence of certain published cases in which the

epithelium covering the surface of an extruded fibroid has become cancerous. The observers had not considered duly the mutation of epithelium to which extruded fibroids are liable. (See page 37).

The rarest combination of uterine fibroids is cancer of the Fallopian tube. I have met with two cases In each the operation was undertaken under the impression that the women were suffering from a large submucous fibroid, and the cancerous tube was discovered in the course of the hysterectomy. The condition of the tube did not complicate the operation.

Although it is premature to assert that interstitial and submucous fibroids exert such a malign influence as to predispose the corporeal endometrium to cancer, it may be true and my observations incline me to believe that the suspicions are likely to be transformed into grim reality. This should warn us of the danger of allowing women to retain fibroids which are troublesome at the time of the menopause.

CHAPTER VIII.

The Flora of the Uterus in Relation to Fibroids.

Micro-organisms play a great part in the production of uterine disease. Injuries of the uterus of all kinds are often more serious from sepsis which follows such accidents than from actual damage to the organ. Many benign tumours become a serious menace to life when they are invaded by pathogenic bacilli and cocci.

The invasion of cancerous tissue by micro-organisms accelerates the fatal course of the disease by causing gangrene and sloughing; this leads to hæmorrhages, some of which may be rapidly fatal when due to the opening up of large veins or arteries.

Until the advent of puberty, the uterus is functionless and free from micro-organisms; when the girl becomes pubic and sexual life is established she runs risks from two sources:—

(1) Infection conveyed during sexual congress when the male suffers from urethritis, especially gonorrhœa.

(2) If she become pregnant, the danger of accidental sepsis at the lying-in.

Infection of the uterus has unfortunate results; some of the patients die: in many the infective agents die and the inflammation subsides, but the tissues of

the essential organs of reproduction are often so damaged that the patients become chronic invalids incapable of conceiving.

A large amount of patient labour has been expended in investigating the bacteriology of the female genital tract. The varieties of micro-organisms found there are numerous, but the chief are the gonococcus, streptococcus and the tubercle bacillus; each affects the tissues in a different way.

The gonococcus attacks mainly the mucous membrane and is more destructive to function than to life. The streptococcus flourishes in the loose connective tissue in the neighbourhood of the uterus as well as in the tissues of the uterus, and invades blood-vessels and lymphatics. It gains access to these tissues through breaches of continuity in the genital tract, resulting from childbirth, miscarriage, surgical operations, and criminal abortion. The streptococcus is especially destructive to life.

The tubercle bacillus reaches the uterus in an indirect way. The infection, in many cases, is primary in the intestines, the peritoneum becoming infected from intestinal ulcers or from caseous lymph nodes in the mesentery; the bacilli mixed with the peritoneal fluid reach the recesses of the pelvis and come into relation with the abdominal ostia of the Fallopian tubes.

In many instances these three infecting agents leave such legible marks on the internal reproductive organs of women that they are easily read. Often, however, the signs are complicated with secondary infections

due to the colon bacillus, pneumococcus, staphylococcus, and B. pyocyaneus.

Many of the most serious diseases to which the uterus is liable are connected with the exercise of its chief function—child-bearing. For centuries the Christian Church has prayed for the deliverance of women "from the great pain and peril of child-birth," but it was not till the last quarter of the Nineteenth Century men began to understand that the greatest peril of child-birth did nor rest with a Supreme Being to which they impotently raised their prayers, but to their own acts! The inoculation of the uterine tissues with pathogenic micro-organisms is the cause of puerperal fever which has destroyed the lives of myriads of women in civilized countries; it still takes a large toll in spite of efforts to instil antiseptic principles into doctors, midwives and nurses. In the middle of the Nineteenth Century, outbreaks of puerperal fever in Lying-in Hospitals had a mortality of sixty per cent.: it is estimated that the death-rate of this disease never fell below ten per cent. Puerperal fever is still responsible for many deaths; the Registrar-General's returns shew that in the year 1910, in England, 1,113 women died from puerperal fever.

Many women, after recovering from acute puerperal infections suffer from chronic forms of uterine disease and sterility, due to the inflammatory changes induced in the tubal mucous membrane. The effects of such infections lead to important alterations in the uterine tissues and in the tissues of uterine tumours.

It is established by bacteriologists that puerperal fever and wound infection are due to the same agents, the common forms being the **streptococcus pyogenes, the bacillus coli communis,** and the **staphylococcus.** These minute bodies are universal in civilized communities, being present in dust, soiled clothes, dirty instruments, etc. They exist in suppurating sores on the fingers of doctors, nurses, or midwives; and on the body of the patient. The transmission of septic micro-organisms can only be avoided by scrupulous cleanliness.

The streptococcus is the most dangerous agent and quickly infects the surface left by the detachment of the placenta, and abraided or torn surfaces in the genital canal caused by the passage of the fœtus, or by the use of obstetric or gynaecological implements.

After delivery the uterine cavity contains blood clot, and this is, in due course, expelled by the uterine contractions. When antiseptic precautions are ineffectively taken, or neglected, this blood and exudate become putrescent from the growth of bacteria and cocci; the decomposing fluid finds its way into the Fallopian tubes, and infects them, causing salpingitis. The infective material leaking through the cœlomic ostia of the tubes into the peritoneal cavity causes peritonitis, which is often rapidly fatal. In order to appreciate the effects of puerperal infection it is useful to enumerate the pathways by which the disease spreads.

1. The infective material reaches the general peritoneal cavity through the Fallopian tubes, or an accidental perforation in the wall of the uterus made by a sound, forceps or curette, etc.
2. Direct infection of the uterine tissues from surfaces exposed by the detachment of the placenta, or accidental rents and abrasions of the neck of the uterus.

The symptoms produced by this mode of infection are those common to pyæmia supervening on a wound, or a surgical operation. Thrombosis, or the intravascular clotting of blood, is due to the action of pathogenic microbes, or their toxins. It is true that micro-oganisms enter the blood stream through lymphatics, but it is undeniable that veins are the chief channels by which the blood is invaded. The small veins near the infected area are denuded of epithelium and filled with thrombi containing bacteria; the clot extending into the larger veins becomes softened by the micro-organisms. Portions are detached by the blood stream and carried away: such septic emboli lodge in distant organs and establish secondary foci of suppuration. The fragments of septic clot which enter the general circulation produce the recurring rigors which are such a striking clinical feature of general septic infection. When the blood is colonized in this way, the condition is sometimes described as metastatic bacteriæmia.

Although it is recognised that there are two chief methods by which septic infection originating in the

uterus will encompass the death of a puerperal woman, namely, leakage into the peritoneum, or by systematic infection through the circulation. it is important to remember that leakage and thrombosis often co-exist This greatly increases the risks of operative treatment, and our methods of clinical diagnosis are unable to aid us in determining, in a given case, whether the symptoms are due to blood infection, or to peritoneal infection, or whether the two conditions co-exist.

In addition to the obvious modes by which septic infection destroys life there is a tragic form of sudden death due to the same cause : it is known as pulmonary embolism.

In this chapter the leading features of septic infection of the puerperal uterus have been described because a woman, with a submucous fibroid in her uterus, is in the same condition as a pregnant woman, but with this difference : Pregnancy terminates at some date within a period of thirty-six weeks, but a fibroid may be retained thirty-six years, and during the whole of this period the uterus persistently endeavours to extrude it. (See Chapter IV.). These extruding efforts dilate the mouth of the womb and thus open the door to pathogenic micro-organisms. Thus a woman with a submucous fibroid is like a parturient woman with a retained piece of placenta, and is menaced with the liability of septic infection as long as she retains it.

When a woman with a septic submucous fibroid successfully extrudes it, or the tumour is removed by Art, and she recovers, the condition of her pelvic organs

is very like that in women who have recovered from septic infection of the uterus as a sequel to child-birth.

Subserous fibroids which have been inflamed adhere to the intestines, omentum, bladder, or adjacent peritoneum; many are complicated with bilateral hydrosalpinx. These conditions admit of three explanations. In parous women, they may be septic sequences of pregnancy; in others, they may be the sequelæ of gonorrhœa, and some are the result of intra-uterine treatment.

In very rare instances a subserous fibroid adherent to a coil of intestine becomes infected by micro-organisms from the intestine. Or a pyosalpinx may contain sterile pus for a long period and then be re-infected through an accidental communication with the bowel; in this event the pus usually contains the colon bacillus.

A study of the results of hysterectomy for fibroids compared with those which follow removal of the uterus for cancer reveals some extraordinary differences. This led me to investigate the flora of the uterus with the hope that it would throw some light on the great mortality which follows the removal of the uterus when it is cancerous, as compared with the extremely low death rate of this operation when performed for fibroids. The difference in the risks of hysterectomy in these diseases is shewn in the following statistics :—

In the year 1910, at the Middlesex Hospital, London, the uterus was removed for fibroids on 65 occasions, and all these women recovered. During the same period the uterus was extirpated for cancer of its neck in 17

women, and of these 4 died. Great care was exercised in the selection of the cancerous patients for operation; the Hospital Reports for that year shews that thirteen women were examined under an anæsthetic and found to be unsuited for operation. In five more patients the condition of the pelvic organs was examined through an incision in the abdominal wall and found to be unsuitable for hysterectomy.

Thus, out of thirty-five women with cancer of the uterus, 17 selected with great care as suitable for operative treatment, 4 died as the result of the operation.

Although the facts are from the practice of one hospital the results are by no means peculiar to it; an examination of the reports of the various hospitals in London where hysterectomy is carried out reveals practically the same picture.

In the year 1910, abdominal hysterectomy was performed for **fibroids** in seven hospitals in London on 368 patients with 9 deaths :—

Middlesex	65	0
Chelsea (for Women) ...	113	2
Samaritan (for Women) ...	51	3
New (for Women)	41	1
University	14	0
St. Thomas's	50	3
St. Bartholomew's ...	34	0
	368	9

In the year 1910, abdominal hysterectomy was performed for **cancer** of the neck of the uterus in the

same hospitals as in the preceding table on 81 patients with 13 deaths :—

Middlesex	17	4
Chelsea (for Women) ...	12	2
Samaritan (for Women) ...	17	1
New (for Women)	12	0
University	9	2
St. Thomas's	11	3
St. Bartholomew's ...	3	1
	81	13

The explanation of the difference in the results of hysterectomy for fibroids and for cancer of the uterus is interesting and in a sense simple ; it depends mainly on the flora of the uterus.

The uterus of virgins, as a rule, contains no micro-organisms. Being desirous of ascertaining the bacteriologic condition of the cervical canal and the uterine cavity of women with fibroids I had a series of observations made in cases of subtotal hysterectomy. The investigation was conducted by two independent observers (Somerville Hastings and C. H. S. Webb), and their findings tallied uniformly and were confirmed by the clinical course of the patients. In the majority, especially nulliparous spinsters, the cervical canal and uterine cavity were sterile. Married women who have had children, and in whom the mouth of the womb is patulous, staphylococcus, bacillus coli and Döderlein's bacillus occur. In extruded fibroids streptococci exist sometimes in pure culture and occasionally mixed with the colon bacillus. The proportion of cases is small in which pathogenic micro-organisms are found, but they

are more common in a uterus containing a submucous fibroid when the patient is multiparous, than in that of a nulliparous spinster with a narrow cervical canal.

In regard to the fibroids: I have had very many examined, especially those which have undergone degenerative changes, such as softening and red degeneration. In all cases, except one, where the red degeneration was associated with pregnancy, the fibroids have been sterile. The exception occurred in a subserous fibroid which was associated with pregnancy and was the most acute example of red degeneration I have seen. A staphylococcus was grown from it. The comparative freedom of the uterus from pathogenic micro-organisms explains the great success of subtotal hysterectomy. In spite of this, I shall have to set out some facts to prove that micro-organisms do exist in the cervical canal sufficiently often to entail on this important operation a risk of a peculiar kind; they hinder convalescence in a considerable number of patients, and entail the death of a few. (See page 222).

When we turn to cancer of the neck of the uterus, the picture is quite different, for the morbid tissue in this disease abounds in micro-organisms, such as the staphylococcus, streptococcus, the colon bacillus, bacillus pyocyaneus, &c. The streptococcus occurs either in pure culture in carcinoma of the cervix or in company with the staphylococcus and colon bacillus; it is extremely virulent for the peritoneum. The presence of the streptococcus is important in another aspect. This micro-organism not only infects the

pelvic tissues in the course of the operation, but the gloves of the surgeon are contaminated ; this leads to infection of the sutures used to close the wound, and it is a fact that in a large proportion of cases the abdominal incision fails to heal by primary union and occasionally the tissues, especially the belly of the rectus muscle, comes away as a slough. The infection of the sutures by the surgeon in the course of the operation is a matter of such importance that it is considered in detail in Chapters XXII., XXIII., and XXIV. Before dismissing the streptococcus, it is necessary to mention that it is this micro-organism which makes puerperal fever so fatal, and it is this microbe which colonizes extruded submucous fibroids when they slough, infects the endometrium and causes pyæmia. Among all the varieties of micro-organisms found in infected uteri, the streptococcus holds the greatest " emnity with blood of man."

BLAND-SUTTON, J.—Gonorrhœal Peritonitis. *Trans. Obstet. Soc.*, 1901, xliii. 251.

BLAND-SUTTON, J.—Surgical Diseases of the Ovaries and Fallopian Tubes, 1896.

BLAND-SUTTON, J.—The Exotic Flora of the Uterus in relation to Fibroids and Cancer. *Brit. Med. Jour.*, 1913, i., 205.

LOCK, N. F.—Pelvic Inflammation in Women. *Journal of Obstet. and Gyn.*, 1912, xxii. 1.

WEBB, C. H. S.—A note on the Bacteriology of the Uterine Cavity in Fibromyomatous Disease. *Arch. Middlesex Hospital*, 1912. Clinical Series, No. x., 5.

CHAPTER IX.

Fibrosis Uteri.

In 1899, I described under this term an affection of the uterus in which the leading clinical feature is uncontrollable menorrhagia. The regular abundant loss of blood is not merely rebellious from the point of view of drugs, for curetting and hot douching are equally useless methods of treatment. This disease occurs in parous women from thirty-five to fifty years of age, and is associated with structural changes in the uterus. In a typical example of fibrosis the uterus is larger than normal, and its walls are sometimes 6 centimetres thick and extremely tough and hard. When such a uterus is bisected, the divided arteries in the uterine tissue stand out prominently, exposing their thickened walls. As a rule, the endometrium is thin and atrophic; occasionally it is thick and spongy. From my first acquaintance with this disease I have strongly held the opinion that the thickened condition of the uterine wall is a sequence of septic infection, and that the peculiar hardness of the tissues is like that seen in syphilitic fibrosis of the ventricular wall of the heart, which is a cause of sudden death. The systematic bacteriologic examination of fibrotic uteri removed by me have not yielded any evidence of micro-organisms.

This, however, is not surprising, for the organs of the human body possess in a high degree the power of recovery after being over-run by pathogenic micro-organisms; the tissue of the uterus is no exception to this, but in some instances the appearance of recovery is illusory. A study of the gross effects of septic infections, including gonorrhœa, on the Fallopian tubes shews that they permanently damage the tissues. It is often difficult to determine which microphyte is responsible for the mischief, because the natural resistance of the tissue and their defensive mechanism leads to the destruction of the micro-organisms. Moreover, comparison of the microscopic changes in fibrotic uteri with those seen in the thickened sclerosed tubes, now known to be the sequence of chronic sepsis, establishes their identity.

We have been too long content with the idea that the gonococcus mainly expends its violence on the Fallopian tubes, converting them into closed purulent sacs, and then by degrees the coccus loses its virulence and dies. In course of time, if these sacs are not removed by the surgeon, the fluid in the distended tubes becomes colourless and watery. Coincident with these changes the ampullary portion of the distended tube becomes thin and transparent, often so thin that it bursts, then the isthmial segment of the tube will be found as a thickened fibrous cord, traversed by a narrow canal. A remarkable feature in these changes is their chronicity, for it requires fifteen or twenty years for a gonorrhœal infection to run its course to the complete destruction of

the internal genital organs ; acute gonorrhœa in women is most common between the fifteenth and the thirtieth year. During the same period acute pyosalpinx is common, but declines in frequency after that date, but the thin-walled hydrosalpinx becomes common after the thirty-fifth year, and is occasionally found after the fiftieth year. The sclerosed uterus is rare before the thirty-fifth year of life, but it increases in frequency up to fifty. This chronologic review supports the view I have often expressed that hydrosalpinx is a late stage of pyosalpinx and the sclerosed, or fibrotic uterus is the ultimate result of a septic infection. For these reasons I gave the name fibrosis uteri to the condition ; it expresses its morbid anatomy without implying anything positive concerning its cause, but I have long held the opinion that the gonococcus is the most active agent in its initiation. The pathologic results of gonorrhœic infection of the uterine tubes are well-known, and it is clear to my mind that chronic fibrosis of the uterus must be added to the list of sequences which belong to this disease, which provokes so much personal suffering and domestic unhappiness. Tubes distended with sterile serum, sometimes with pus, are very often the legacy of a septic infection of the uterus supervening on abortion.

On microscopic examination the changes found in the uterine tissues consist in the replacement of the muscle fibres by fibrous tissue. The thickness of the arterial walls is due to an increase in their outer and middle coats. The arterial changes are similar to those

presented by the uterine arteries several years after the menopause. The essential anatomical feature of the disease is the replacement of the unstriped muscle fibres of the uterus with dense tough fibrous tissue ; the change involves the endometrium and the branches as well as the trunk of the uterine artery. The tissue changes in fibrotic uteri are identical with those occurring in the uterus in old age, but with this difference : The **changes due to senility diminish the size of the uterus, whereas in the disease we are considering the uterus is always enlarged, sometimes to twice its normal size.**

The fibrotic changes are in all probability the end-results of infection with the gonococcus, streptococcus, or colon bacillus, acquired in early life, sometimes the sequel of a pregnancy. The change in the uterus is unassociated with chronic renal disease or general arterio-sclerosis.

The chief symptoms of fibrosis uteri are uncontrollable menorrhagia and profound anæmia associated with enlargement of the uterus in parous women between thirty-five and forty-five. The menstrual period lasts ten, twelve, or even sixteen days. In severe cases the patients are scarcely free from a sanguineous loss. The uterus is often large enough to reach above the symphysis. Occasionally it is retroflexed and fixed by adhesions to the pelvic floor. Sometimes the ovaries and tubes are adherent to the broad ligaments. The cervix is often intensely hard.

There are three conditions in which the clinical signs simulate fibrosis uteri :—A small submucous fibroid,

diffuse adenomyoma of the uterus, and cancer of the endometrium, or of the tubal mucous membrane. The profound anæmia and the abundant loss of blood have led gynæcologists to remove the uterus under the impression that it was cancerous (Barbour).

Uncontrollable menorrhagia, which is the conspicuous clinical feature of fibrosis uteri, was occasionally treated by the removal of the ovaries when surgeons were unfamiliar with the pathological conditions underlying it. In the second example which came under my care the patient was seen in consultation with several obstetric physicians, who strongly objected to my proposal of removing the uterus, maintaining excision of the ovaries to be the proper measure ; my contention that the ovaries were of more value to a woman than her uterus excited derision. In deference to their opinion I removed the ovaries, but the loss of blood remained unabated until two years later, when I removed the uterus by the vaginal route, and at this date (1912) some gynæcologists do not know that a chronically infected uterus often bleeds freely and irregularly in spite of the complete removal of both tubes and ovaries.

When the uterus is moderately enlarged and the vagina capacious, vaginal hysterectomy is a safe and easy operation, otherwise abdominal hysterectomy is preferable. One ovary should be left if it be healthy, but if the woman is over forty it is wise to remove both ovaries. It is of no moment whether total or subtotal hysterectomy is performed, but when the subtotal method is adopted care must be taken to sever the neck

of the uterus well below the internal os so as to remove the whole of the menstrual area ; this includes all that portion of the endometrium which bleeds during menstruation.

In order to indicate the importance of ablating the whole of the menstrual area, reference may be made to two patients which came under my observation, in which surgeons had removed the uterus above the level of the internal os. After the operation each patient had severe recurrent hæmorrhages from the cervical stump that a year later it was necessary to remove it. In spite of such experience, an operation, egregiously named Utriculoplasty, has been advocated. This method consists in the excision of a wedge-shape piece from the body of the uterus, having its base at the fundus and its apex at the internal os. The V-shaped gap left after the removal of the wedge of tissue is closed by the approximation of the cut edges of the uterine wall by mattress-sutures ; a continuous suture carried along the cut edges makes the union more complete and controls the oozing of blood. The principle of this operation is to reduce the endometrium with the object of limiting the area of the tissue concerned in menstruation.

Dührssen (1898), Kelly (1908), Bonney, and Stark have reported satisfactory consequences from this operation.

In several instances in which the uterus has been maimed by the operation of utriculoplasty the bleeding has recurred so severely that it has been necessary to remove the remnant of the organ.

A more serious cause for the condemnation of this operation is the danger of overlooking a small focus of cancer in the endometrium. The persistent bleeding and profound anæmia associated with fibrosis uteri has induced surgeons to perform hysterectomy under the impression that the patients had cancer of the body of the uterus. It has also happened that utriculoplasty has been performed on a patient supposed to be suffering from uterine fibrosis, but the symptoms quickly returned and the uterus was extirpated; to the surgeon's surprise the corporeal endometrium contained an extensive deposit of cancer.

In a case reported by Bonney, the woman had two pregnancies subsequent to utriculoplasty. This is of interest as shewing that the patient did not suffer from typical uterine fibrosis, for when this disease is sufficiently pronounced to require operative treatment, the patient is incapable of conceiving.

On the whole, utriculoplasty is regarded by many as a sentimental operation, and if a woman's symptoms are sufficiently severe to justify operative treatment, hysterectomy is the safer and more satisfactory operation.

BARBOUR, F.—Climacteric Hæmorrhage due to Sclerosis of the Uterine Vessels. *Trans. Ed. Obstet. Soc.*, 1904-5, xxx., 71.

BLAND-SUTTON, J.—Hysterectomy as a Conservative Operation. *Brit. Med. Journ.*, 1899, i., 839.

BONNEY, V.—Six Cases of Utriculoplasty for Uterine Hæmorrhage, one of which was followed by pregnancy and labour. *Proc. Roy. Soc. Med.*, 1911, Vol. iv., *Obstet. Sect.* 270.

FINDLEY, P.—Arterio-Sclerosis of the Uterus as a cause factor in Uterine Hæmorrhage. *Trans. Am. Gynæcol. Soc.*, 1905, xxx., 399.

GARDNER, W., and GOODALL, J. R.—Chronic Metritis and Arterio-Sclerotic Uterus. *Brit. Med. Journ.*, 1906, ii., 1176.

STARK, J. W.—Uterine Fibrosis and allied conditions with special reference to treatment. *Glasgow Medical Journ.*, 1912, lxviii., 212.

CHAPTER X.

Adenomyoma of the Uterus.

Adenomyoma of the uterus is a morbid condition of the endometrium by no means rare; although pathologically distinct from fibroids, it must be considered in connection with these tumours, for the changes it produces in the uterine tissues are often indistinguishable without the aid of a microscope from those presented by some varieties of sessile fibroids. Moreover, the two diseases are often present in the same uterus. A submucous fibroid is an overgrowth of the unstriped muscle fibre mixed with the connective tissue of the endometrium, and free from epithelium. Adenomyoma of the uterus is the product of epithelial overgrowth with a responsive increase of the connective tissue in which the glands are implanted. This overgrowth is probably due to the action of micro-organisms, and this brings it into relationship with the disease discussed in the preceding chapter under the name of Fibrosis uteri, a condition due to the overgrowth of fibrous tissue, an end-result of chronic septic infection.

The detection and isolation of adenomyoma of the uterus as a condition distinct from "fibroids" is a matter of some interest. In 1896, Prof. Von Recklinghausen described the leading pathological features of the disease. Cullen reported some cases in the same year, and drew attention to its clinical importance. Little attention was given to it in Great Britain, although examples of the disease were observed and carefully recorded. One of the reasons, and perhaps the chief, which militated against the recognition of adenomyoma is the necessity for a microscopic examination of the tissue. As this change in the endometrium is often associated with fibroids, and the symptoms caused by it are identical with those set up by submucous fibroids, the real nature of the trouble in the uterus is often overlooked. Nevertheless, the tissue changes in an adenomyomatous uterus are so characteristic that they cannot be mistaken, and the naked-eye features, though they cannot be relied on without the confirmation afforded by a microscopic examination, are often sufficiently marked to lead the surgeon to suspect the presence of this change in the endometrium. The change may involve the whole endometrium and produce uniform thickening of the walls of the uterus, and in this condition it is occasionally mistaken for cancer of the corporeal endometrium. When the disease is located to a particular area of the endometrium the appearances resemble very closely those associated with a submucous fibroid, but lacks encapsulation, the feature so characteristic of a fibroid.

In a typical example of adenomyoma the uterus is enlarged, and when the organ is bisected longitudinally the walls will be found thickened, sometimes to the extent of six centimetres, or more. This increase is due to the formation of new tissue between the outer wall of the uterus and the superficial stratum of the endometrium. There is no attempt at encapsulation, and the term, diffuse, usually applied to it is thoroughly justified. The cut surface of this adventitious tissue differs from that presented by common hard fibroids, for it never presents the vortex-like arrangement seen in them, but, when freshly cut, the surface has a pattern not unlike that of the fabric known as "watered silk." When the cut surface is critically examined it is sometimes possible to detect the new tissue, for there is a marked distinction between it and the true tissue of the uterus.

In many instances the adenomyomatous change is localised to a definite area of the endometrium, and in this way causes a prominence which may bulge on the mucous or on the serous surface of the uterus, and thus closely simulate a submucous or an interstitial fibroid. (Figs. 23 and 24). Occasionally small bodies project under the peritoneal coat of an adenomyomatous uterus, and resemble sessile and also stalked subserous fibroids; these are bud-like processes of glandular tissue. Pedunculated processes of this kind are more common in the immediate neighbourhood of the cornua of the uterus, the walls of the organ being thinner here than elsewhere, because hey are tunnelled by the Fallopian tubes.

The specimen represented in Fig. 24 is a good example of a localized deposit of adenomyomatous tissue resembling a subserous fibroid. In this instance the posterior surface of the uterus and the tumour adhered to the rectum. When the uterus was divided after removal we noticed that the tumour lacked a capsule ;

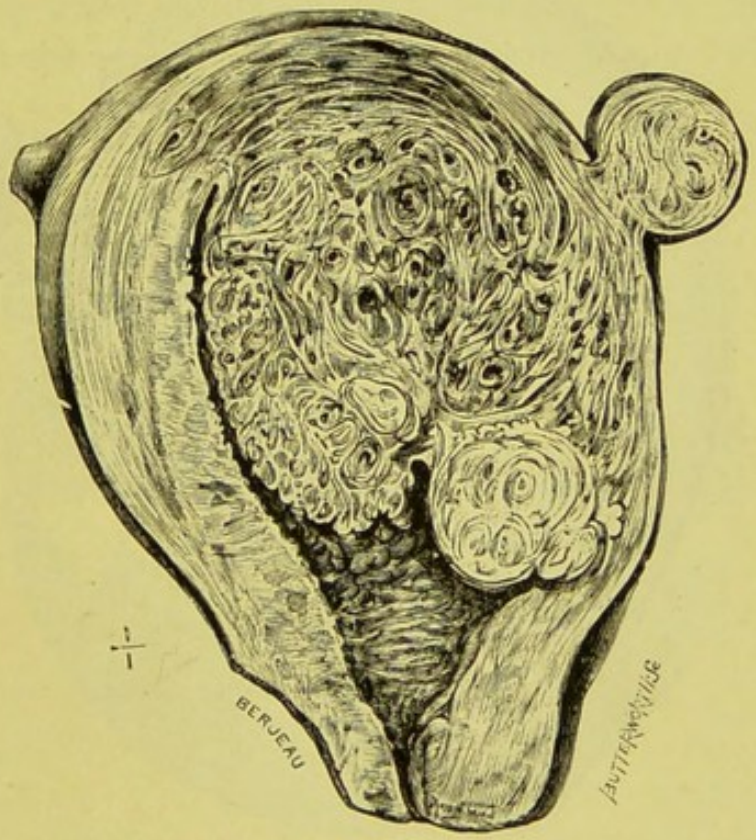

Fig. 23.—Uterus in section, showing a localised patch of adenomyoma in the posterior wall. From a spinster, aged 32. The gland spaces were cystic and filled with gelatinous material. (From the author's work on ' Tumours.')

on microscopic examination it proved to be a collection of adenomyomatous tissue. The glandular elements could be traced in successive sections through the uterine wall until it became continuous with the endometrium lining the fundus of the uterus.

The new tissue consists mainly of unstriped muscle fibre disposed in an irregular manner; the spaces between the bundles of muscle tissue are filled with the peculiar stroma of the uterine mucosa, containing gland tubules lined with columnar epithelium, of the same

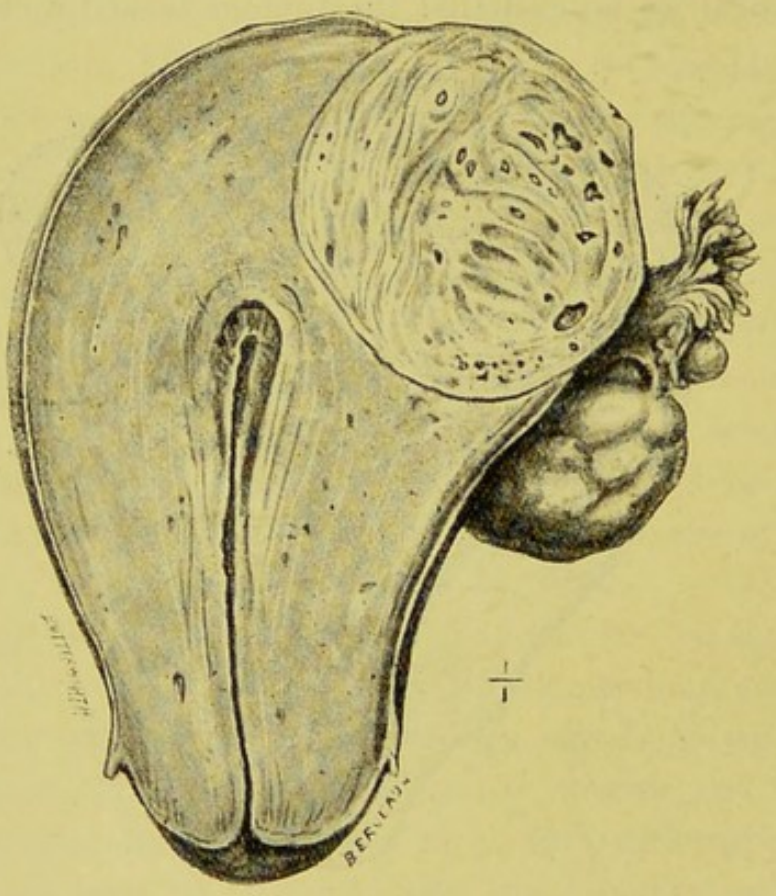

Fig. 24.—Uterus in section shewing a localized patch of adenomyoma resembling a subserous fibroid. From a primipara aged 35.

type as the normal tubular glands of the endometrium. (Fig. 25). The glandular elements are irregularly distributed in the adventitious tissue, and can be detected up to the limits of the thin muscular stratum underlying the peritoneal coat of the uterus. The

amount of the glandular element varies widely in different specimens. In some instances the gland spaces become dilated and form cysts, and these are occasionally large enough to be obvious to the naked-eye on the cut surface of the mass.

A wide study of adenomyomatous uteri shews that there is great variation in the proportions of the two tissues concerned in the pathological formation, namely,

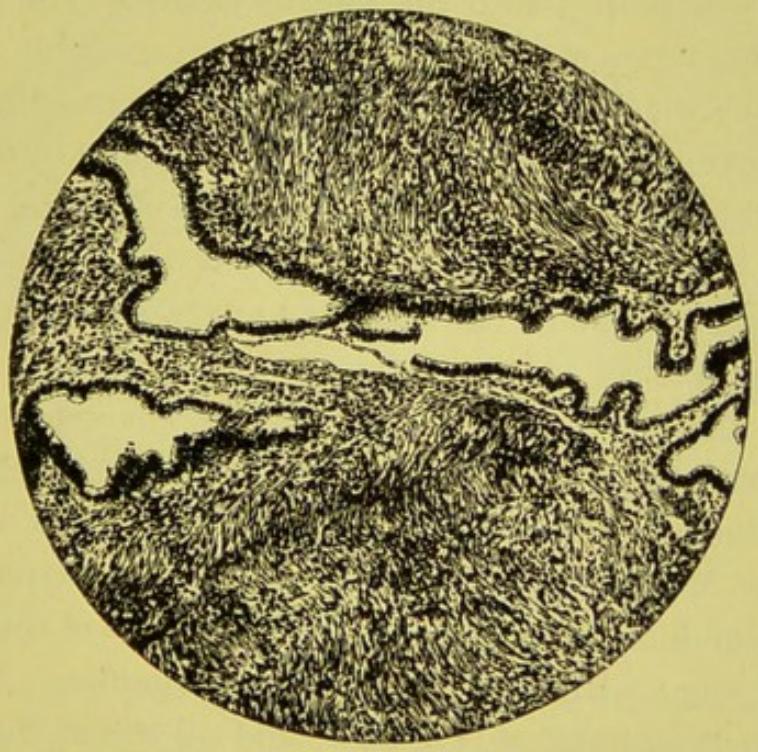

Fig. 25.—Microscopical appearances of diffuse adenomyoma of the uterus. x 60. (After Frank E. Taylor).

the glandular element and the myomatous. Judging from my own observations, when the myomatous element is in excess the uterus wi l be moderately enlarged and hard, sometimes very hard. Such a uterus will require to be examined thoroughly and sections made through its whole thickness in order to

detect isolated glandular tracts. In some hard specimens where the uterus is scarcely enlarged the gland islets sometimes lack the usual stroma. When the glandular elements are abundant, the uterus is much larger than normal and its fundus may rise high in the hypogastrium. Such a uterus may measure 16 to 20 inches in circumference. In some specimens the glandular tissue may be so predominant that polypoid processes project into the uterine cavity. The naked-eye characters of such an endometrium resemble cancer, and the illusion is sometimes enhanced when the parts are examined microscopically, for the tubular glands in the diseased tracts are occasionally lined with a double row of epithelium. Some of these have been erroneously described as adeno-carcinomas, but the condition is not malignant.

In the early investigation of this adenomyomatous disease of the endometrium it was thought that the glandular elements were mainly derived from vestiges of the Müllerian and Wolffian ducts; the frequency of the glandular formations at the tubal angle of the uterus gave some slender support to this opinion. No one seriously entertains this view, and all recent histologic inquiries indicate that the glandular tracts are derived from the uterine mucosa. When isolated sections of the adenomyomatous tissue are examined the glandular areas appear as islets, but when a consecutive series of sections is examined the various tracts will be found to run into each other, and if the investigation is conducted on a sufficiently large tract of tissue it is possible

to follow them up until they become continuous with the normal endometrium. Since the disease has become more widely recognised attention has been directed to the frequency with which infective disease of the Fallopian tubes are associated with adenomyomatous disease. Chronic tubal disease is an occasional complication of submucous fibroids, but chronic pyosalpinx and

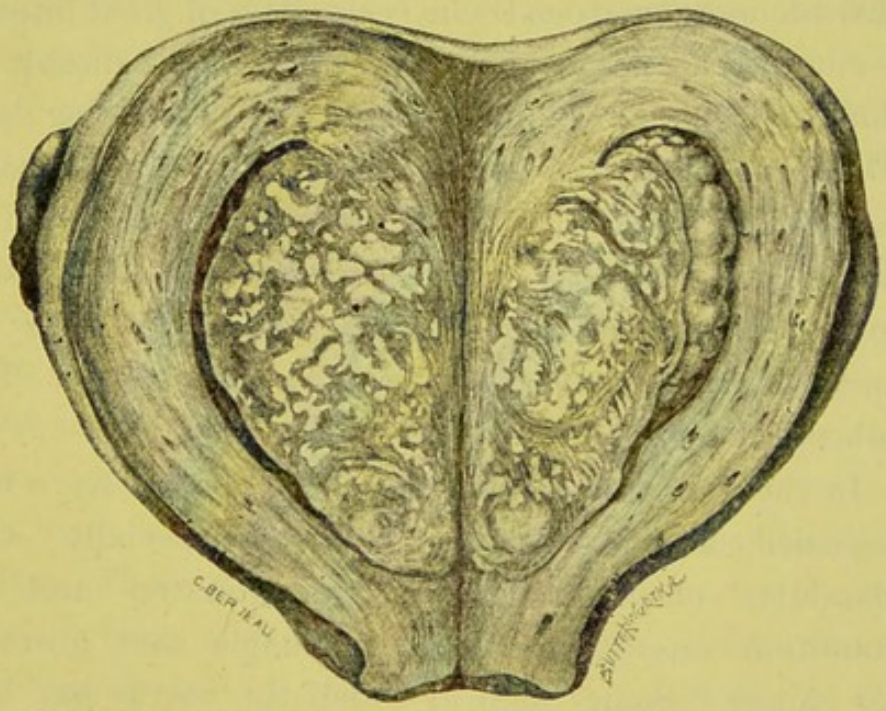

Fig. 26.—Uterus laid open by a vertical incision; the endometrium on the anterior wall is occupied by an unencapsuled mass of tuberculous adenomyomatous tissue. From a spinster aged 46. She was in good health 6 years after the operation.

hydrosalpinx are often found associated with adenomyomatous disease of the uterus, and evidence of chronic infection is often obvious on the peritoneal surface of uteri so affected. Indeed, evidence is accumulating that the tissue-change which characterizes this disease is the result of microbic infection. (Fig. 26),

Cases have been reported in which tuberculous foci occurred in the midst of typical adenomyomatous tissue (Archambault and Pearce, Grünbaum, and by myself), and Lockyer has described an adenomyomatous uterus removed from a spinster of forty-eight years, in which both tubes were tuberculous, and I have had a similar experience. The detection of the tubercle bacillus in this adenomyomatous tissue is a matter of great interest, for it indicates that some examples of this disease are due to tuberculous infection of the descending type. The focus of the disease being in the intestine the bacilli infect the peritoneal fluid and are carried into the tubes, finally reaching the uterine cavity. In the lesions found in the adenomyomatous uteri, giant cells and epithelioid systems have been detected as well as tubercle bacilli.

In the past, many examples of this disease have been regarded as fibroids and others, especially when glandular elements largely predominated and the condition caused excessive menorrhagia, were mistaken for cancer. Some cases in which the uterus has been removed for disease, assumed to be cancer, and there has been no recurrence, the presumption is fair that the disease was adenomyoma.

Like cancer, this disease lacks specific symptoms; the leading clinical features may be summarized thus :— It is most frequent between the thirtieth and fiftieth years, and has been observed as late as sixty. The adenomyomatous change occurs in nulliparous spinsters and in barren married women as well as in those who are

fertile ; one of my patients had borne fourteen children.

The symptoms of which the patients complain are profuse menorrhagia, and in severe cases sanguineous fluid may flow from the vagina, sometimes for five or six weeks without intermission. Pain at the menstrual period is fairly common.

On physical examination the uterus is found to be bigger than normal, and in some cases the enlarged fundus may rise high in the hypogastrium. The contour of the uterus may be quite smooth, but in many instances it is irregular. This unevenness may be due to the localisation of the adenomyomatous tissue to one wall of the uterus, or the disease may be complicated by the presence of subserous or interstitial fibroids.

It will be seen that these signs and symptoms are those which commonly accompany a submucous uterine fibroid, and it is under this impression that operative treatment is most commonly recommended and undertaken. These are also the signs furnished by fibrotic uteri. When adenomyomatous changes in the uterus are complicated by chronic bilateral infections of the Fallopian tubes the nature of the affection is very liable to be overlooked, especially when the uterus is only moderately enlarged. It has been mentioned already that a shrewd and experienced observer may suspect adenomyomatous disease before operation ; even then the use of the microscope is indispensable for its identification.

The importance of appreciating the unencapsuled character of the lesions in this disease is sometimes

brought to the surgeon's notice, when he dilates a uterus with the object of removing a submucous fibroid, and vainly attempts to drag out a mass of adenomyomatous tissue.

The only effectual mode of dealing with this disease is removal of the uterus, either by the vagina, or preferably by the abdominal route. Subtotal hysterectomy with conservation of an ovary gives admirable results, immediate and remote. Even in those cases in which the adenomyomatous mass was complicated with tubercle the patients made excellent recoveries, and the condition of these women many months after operation is stated in the reports to have been excellent. It is also worthy of note that no instance is recorded in which hysterectomy has been performed for this disease and the patient has again come under observation with recurrence.

In order to show the uselessness of drugs in this condition, I will mention the case of a patient who suffered from profuse menorrhagia. An obstetrician of repute, thinking she had a submucous fibroid, recommended her to take thirty drops of the liquid extract of ergot three times each day. She continued regularly to swallow this stuff for fifteen years. The menorrhagia became so profuse that at the end of this time I was asked to remove the uterus. It was adenomyomatous. The prolonged use of ergot had caused the tip of her nose to become blue and dry, indeed, it resembled the nose of a mummy.

CHAPTER XI.

Fibroids in Relation to Pregnancy.

It is beyond dispute that fibroids arise in the uterus during menstrual life. In Great Britain this period has an average of thirty years, from the fifteenth to the forty-fifth years. There are few reliable observations in which fibroids have been found in the uterus before the twentieth year of life. Many examples have been observed between the twentieth and the twenty-fifth years. Between twenty-five and thirty-five fibroids are common, but they are observed most frequently in women between the thirty-fifth and forty-fifth years. The interval between the twenty-fifth and thirty-fifth year is the great child-bearing period. In relation to pregnancy and fibroids the menstrual epoch of a woman's life may be divided into three periods :—

(1) From fifteen to twenty-five. In this period if the environment be favourable she is infinitely more liable to conceive than to grow fibroids.

(2) From twenty-five to thirty-five her chances of pregnancy are as great as in the preceding period, but her liability to grow fibroids is increased.

(3) From thirty-five to forty-five the liability for conception diminishes, but for fibroids it is greatly increased.

It is obvious from a consideration of the above facts, that when pregnancy and fibroids co-exist the subjects of this combination should be women past thirty. This is true and many of them have either married late in life, or if they married early, have remained for many years barren. There is another feature worth consideration. I have often performed hysterectomy for fibroids on patients who never suspected the existence of a tumour until the occurrence of a miscarriage; since then good health had been denied them.

It is admitted by those who have devoted attention to this matter that submucous and intramural fibroids are unfavourable to conception. A fibroid of either variety, or one in the neck of the uterus, by no means prevents conception, but this combination is often very dangerous to the mother as well as to the child. A large subserous fibroid does not hinder conception, but it is occasionally a serious complication of pregnancy and may hinder, or completely obstruct delivery, or cause trouble during the puerperium. Pregnancy and fibroids are inimical to each other; thus, when pregnancy and fibroids co-exist the association is doubly harmful, for the alterations in the physiological conditions of the uterus induce pathologic changes in the fibroids, and in many instances the fibroids exert hindrances of an obstructive character on the uterus. Some of these occur quite early in the course of pregnancy. When a uterus becomes gravid it slowly enlarges, and emerging from the pelvis into the hypogastrium ascends as the months go by until the fundus reaches the epigastrium.

Attention has already been drawn to the condition known as impaction, and some of the difficulties which happen were described on page 32. When a fibroid grows in the anterior and another in the posterior wall of the uterus, it must be obvious that if such a uterus became gravid the signs of impaction would be aggravated. Here are the details of an actual case :—

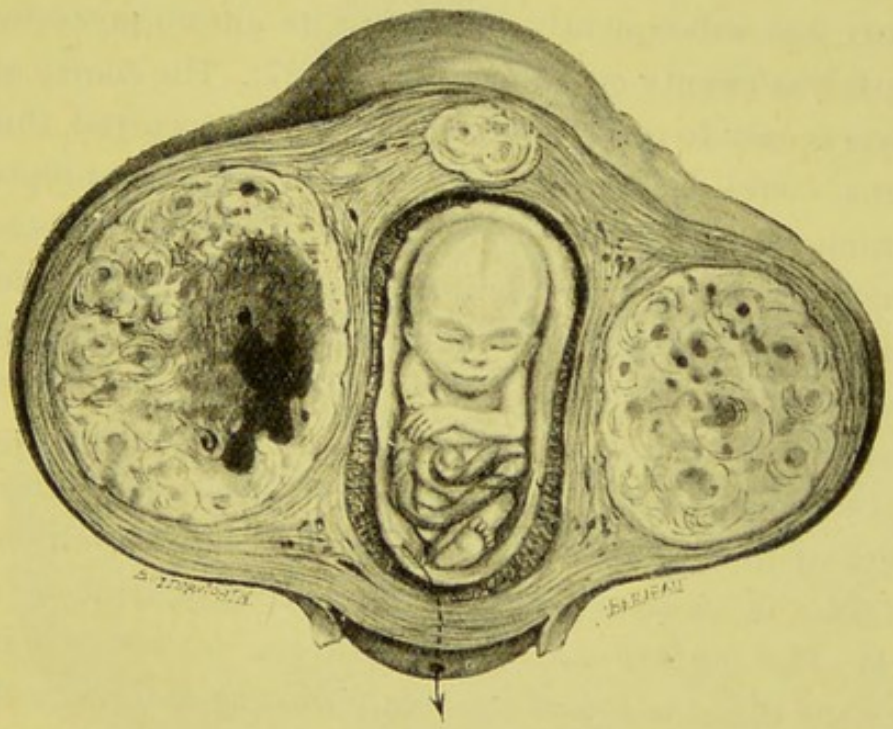

Fig. 27.— Gravid uterus with a fibroid in the anterior and one in the posterior wall : the latter, softened by red degeneration.

A woman, aged thirty, who had not menstruated for three months was suddenly seized with severe pain and retention of urine. The medical attendant found a mass in the pelvis which he regarded as a retroverted gravid uterus ; under an anæsthetic he succeeded in pushing the mass out of the pelvis, but a lump appeared

in each iliac fossa. It was clear that a fibroid of the uterus or an ovarian tumour was complicating the pregnancy. Operative interference was clearly indicated, and when the parts were exposed in the course of the operation we found a fibroid growing from the posterior wall of the uterus, lying in the right iliac fossa, and a smaller tumour in the anterior wall occupied the left iliac fossa. Hysterectomy was performed. The uterus was subsequently bisected: its antero-posterior length was twenty centimetres. (Fig. 27). The course of events is easy to read:—Before conception occurred, this uterus could be barely accommodated in its proper position in the pelvis, and as it increased in size coincidently with the progress of the pregnancy, the tumour on its posterior wall prevented the uterus ascending into the hypogastrium by becoming impacted in the hollow of the sacrum. When the impaction was relieved the tumours so increased the antero-posterior length of the uterus that it could not occupy its normal position, it therefore rotated through a quarter of a circle; the big tumour on the posterior wall rested in the right iliac fossa, and the tumour in the anterior wall in the left fossa, a condition of things totally unfavourable to the successful continuance of the pregnancy.

Impactions of this kind occur when a sessile subserous tumour the size of an orange grows from the posterior wall. Even small subserous tumours on the posterior wall of the uterus may, by becoming hitched under the sacral promontory, prevent the uterus rising out of the pelvis, especially near the time of quickening, whilst a

large stalked tumour, or even a sessile tumour weighing several pounds growing from the fundus, will offer no impediment to the ascent of the uterus during pregnancy or its descent after delivery, although it may cause difficulty in other ways. The question at once suggests itself, what would happen to an impacted gravid

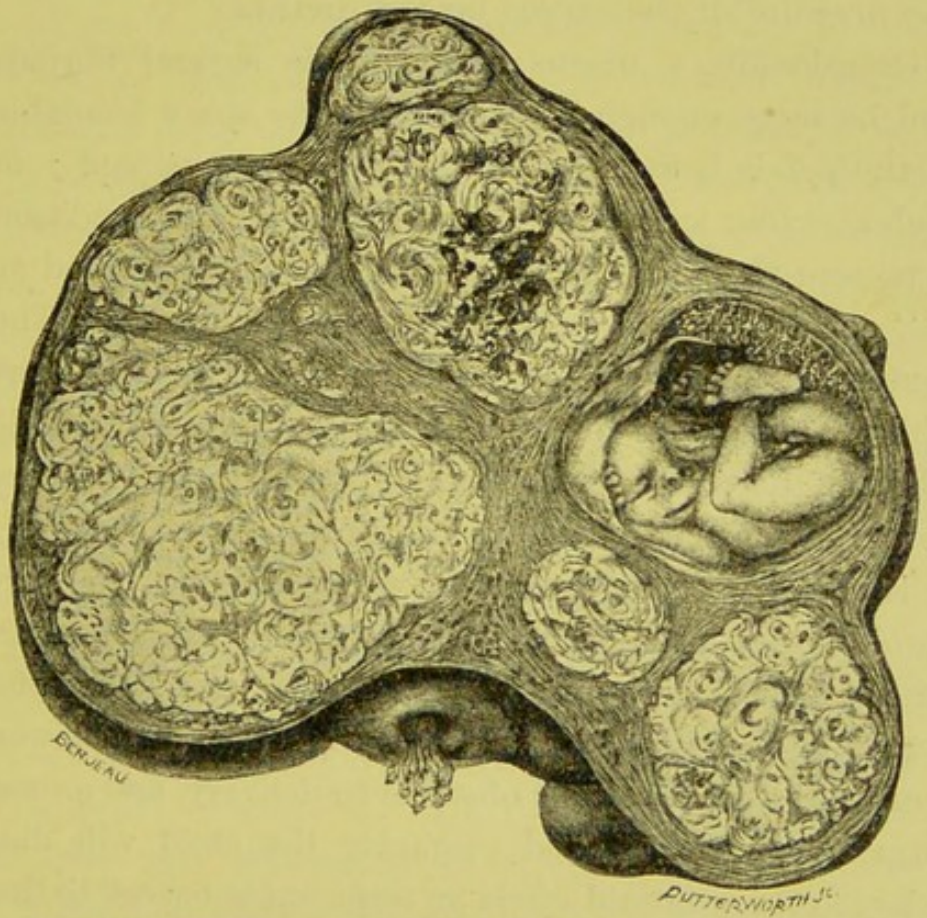

Fig. 28.—A uterus distorted with fibroids; it is shewn in section. The uterine cavity contains a fœtus of four months' development. (Removed from a woman aged 42 years).

uterus containing fibroids if surgical relief were not available? The answer is not difficult, miscarriage happens, and the patient recovers, but she runs great

risk from hæmorrhage, and also the chances of sepsis, especially if the uterus contains a submucous, or an intramural fibroid, for such tumours during pregnancy are especially prone to necrosis and red degeneration. (See page 117). Fibroids in this condition are very liable to become septic. Another inconvenience connected with impaction is retention of urine due to the pressure of the uterus on the urethra.

Occasionally a uterus may contain several fibroids and be large enough to occupy all the space available in the pelvis before the patient becomes pregnant; in such an event symptoms occur early. Such a condition is presented in Fig. 28; the uterus may be described as a "constellation" or a "pleiad" of fibroids. The contemplation of such a specimen makes it clear that whilst those who practise midwifery cannot decide whether fibroids cause sterility or sterility induces fibroids, women with fibroids in the uterus often conceive. It is also true that pregnancy when complicated with fibroids often goes successfully to term. At the same time a fibroid in the neck of the uterus, or a subserous fibroid of moderate dimensions projecting in its lower zone, will offer a serious obstacle to delivery, and unless surgical aid be afforded promptly the child will die. A large cervix-fibroid offers an impassable barrier to the transit of the child. (See page 57). Sometimes it is expelled during labour. Bennett attended a woman who had been ten hours in labour (her eighth confinement), when a fibroid was forcibly expelled from the vagina and fell on the floor. It was pyriform and

measured $5\frac{1}{2}$ by 4 by $2\frac{1}{2}$ inches. The fœtus was still-born; the mother recovered.

When pregnancy is complicated with fibroids it is the usual practice to keep the patient under observation. If severe symptoms arise it is occasionally necessary to interfere surgically at any period of the pregnancy, but it often happens that with care it can be allowed to continue to term, and if the tumour is in a situation where it offers an insuperable obstruction to labour then the child can be delivered by Caesarean section. If the tumour is single and favourable for myomectomy this course may be adopted, otherwise the uterus should be removed. When surgical intervention becomes necessary in the early stages of the pregnancy the same alternatives are available, for an impacted pedunculated fibroid may be removed, or a sessible tumour enucleated from its walls without disturbing the pregnancy. A large number of myomectomies have been reported since I drew attention, in 1901, to the tolerance of the uterus to such procedures, and a more extensive experience of myomectomy during pregnancy shews that in more than half the patients this operation is followed by abortion. The mortality of myomectomy is higher than subtotal hysterectomy for such conditions.

It happens that a woman unlucky enough to conceive with a large fibroid in her uterus may be so far fortunate that the pregnancy goes to term and she becomes the mother of a healthy baby, but her risks are by no means ended, for a submucous fibroid may become extruded, degenerate, or septic, and anyone who cares to follow

up the subject can find in periodical obstetric literature many sad cases, for a septic fibroid in a puerperal woman entails a long illness and often a fatal ending.

There is one matter connected with fibroids and pregnancy which merits careful consideration. If a single woman with fibroids in her uterus indulges in sexual intercourse she runs the same chance as a married woman in the same circumstances of becoming pregnant. When pregnancy and fibroids co-exist in a married woman and cause pain or pelvic disturbance she seeks medical aid when she suspects herself to be pregnant, but a spinster in similar circumstances, although she seeks aid on account of pain, pelvic disturbance or for a swelling in the abdomen, often carefully conceals the fact that her menstruation has ceased, and if deliberately questioned she will wilfully mislead in this important matter. Moreover, she will further lead the doctor astray by stating that the tumour has greatly increased of late. In the case of an early pregnancy in a uterus containing a large fibroid, the tumour will so predominate as to obscure the softer uterine fundus, and it is astonishing how often pregnancy in these circumstances is overlooked until the uterus has been removed. Pregnancy is also likely to be missed when it occurs in a woman known to have fibroids in her uterus, and who has lived for a long time in barren wedlock.

An examination of the breasts often yields valuable evidence, in spite of the fact that mucoid fluid can sometimes be squeezed from the nipples, when the uterus of

a young woman contains a soft submucous fibroid the size of a cricket ball.

In addition to the mechanical obstruction which fibroids often offer to the progress of pregnancy, there is a peculiar change induced in fibroids by pregnancy known as **red degeneration,** which demands careful consideration.

When the walls of the uterus are occupied by fibroids and pregnancy ensues these tumours, depending on the circulation of the uterus for nutrition, are often influenced by the altered conditions. The change wrought in them by pregnancy have been described by many writers as consisting in the softening and flattening out of interstitial fibroids ; also that the muscle tissue of fibroids multiplies with the enlargement of the uterus coincident with pregnancy. This supposed active growth of fibroids in the walls of a gravid uterus appeared to receive support from the fact, noted by many observers, that fibroids in a pregnant uterus often become red, or flesh coloured, and this change of colour was attributed to an increase of the muscular tissue of the tumour, or to its increased vascularity consequent on the pregnancy. Several surgeons, myself among them, have given some attention to this alteration in the colour and texture of uterine fibroids and realized that it is due to degenerative change.

The usual colour of a uterine fibroid is pale yellow (very hard fibroids are white) ; in degenerate and necrotic fibroids the colour deepens. In the course of pregnancy a fibroid often becomes deep red, sometimes

the colour is like that of fresh beef-steak. In the early stages the colour appears in streaks, but as the pregnancy advances the tissue throughout the tumour is reddened and softened, and occasionally becomes diffluent, the fibroid being converted into a cyst filled with chocolate coloured fluid, the cyst-wall being the original capsule of the tumour. All the topographical varieties of fibroids are liable to red-degeneration, but interstitial and submucous tissues are those most affected. A gravid uterus may contain many fibroids and none changes, or it may contain two fibroids, and one of them becomes red and quickly liquefies. Cervix-fibroids are not exempt from this change. The softening of the tissues composing a fibroid sometimes takes place with great rapidity and reduces even a hard fibroid to the consistence of soft-soap. A microscopic examination of the reddened tissue shews that the colour is due to the diffusion of blood pigment through the necrosed tissues. The rapidity with which these changes occur in fibroids induced me to have a large number of them examined for micro-organisms. In one of my own specimens, Somerville Hastings succeeded in obtaining in pure culture Staphylococcus pyogenes aureus. Lorrain-Smith has found staphylococcus in one specimen and diplococcus in another. My experience convinces me that microbic infection of red fibroids is a sequence and not a cause of the change, and micro-organisms are rarely found in red fibroids. Murray ascribes the red colouration to the hæmolytic action of lipoid bodies.

Red degeneration occurs occasionally in uterine fibroids in unimpregnated as well as in gravid uteri, but it is true that the change is more frequent, more intensive and more extensive when associated with pregnancy.

Other important features associated with degenerative fibroids complicating pregnancy are pain and tenderness. I appreciated this in the first examples of the condition which came under my notice, and have persistently called attention to its significance. The remarkable feature of the pain is the suddenness of its onset, for it resembles the pain experienced by patients when an ovarian tumour undergoes axial rotation and twists its pedicle ; or the pain and shock produced by the bursting, or abortion, of a gravid Fallopian tube. A study of reported cases shews that red degeneration causes symptoms which mimic those associated with serious abdominal lesions so closely as to deceive obstetricians and surgeons. These things shew that red degeneration is of interest outside the pathological laboratory ; it is of clinical importance to remember that fibroids undergoing this change are often painful and extremely tender, the tenderness is a valuable diagnostic sign. When the signs are present in a mild degree they generally subside if the patient be kept at rest in bed ; it is only the very severe cases which call for surgical treatment.

It is now established that pregnancy is a powerful exciting cause of red degeneration (necrosis) in fibroids and it often arises early in the pregnancy. When pregnancy is complicated with fibroids and one of the

tumours becomes enlarged and tender, the occurrence of red degeneration may be suspected. Fever is not a common symptom, but it occurs. When a pregnant woman complains of acute pelvic pain and the presence of a uterine fibroid is unsuspected, then grave errors of diagnosis happen and occasionally unnecessary operations are performed.

My knowledge of the red change in fibroids is founded on a careful study of forty specimens, and of these twenty-six were associated with pregnancy. It is worth mention that so far I have not seen the least evidence of red degeneration in an ovarian fibroid nor the report of such a case. I have removed on four occasions an ovarian fibroid incarcerated by a gravid uterus, but none shewed any signs of the red change, and an ovarian fibroid, complicating pregnancy, has been found with its pedicle twisted.

No satisfactory cause of the red degeneration of fibroids has been found. The presence of micro-organisms in the necrosed tissue is in all probability exceptional; the thrombosis and infarction theories require more proof. The chief facts established in regard to this change is its proneness to attack fibroids when the uterus becomes gravid. Thus pregnancy is inimical to fibroids, and fibroids so changed seriously menace pregnancy, often entail the premature expulsion of the fœtus and occasionally destroy the life of the mother.

Practitioners of midwifery formerly believed that when a uterus beset with fibroids becomes gravid, the

tumours enlarge in consonance with the physiologic increase of its normal muscle tissue. That some fibroids enlarge during pregnancy is beyond doubt, but the enlargement is the result of alterations in the circulation of the tumours, leading to œdema and to hæmolysis of the blood in them. This is another illusion swept from obstetric art by careful microscopic inquiry. Among other unsupported opinions formerly taught by men of experience may be mentioned the belief that fibroids occasionally atrophied and disappeared after pregnancy, the muscular tissue of the fibroid undergoing involution like the tissue in the uterine walls. A study of the effects of red degeneration offers an explanation of this phenomenon as exemplified in the following observation :—

A woman, aged thirty-six, gave birth to a child in 1896. Two years later a fibroid grew in the uterus so that this organ could be felt in the hypogastrium about the size of a turkey's egg. In 1901 she gave birth to another child at full term. A few days after delivery the fibroid became tender, irregular losses of blood occurred and shreds of soft red tissue were discharged from the uterus ; these the medical attendant regarded as " retained secundines." I removed the uterus and found a degenerate submucous fibroid occupying the cavity of the uterus ; its capsule had burst and the soft dark red tissue was being discharged in shreds. A bacteriologic examination of the solid peripheric portion of the tumour was made, with negative results. The patient recovered.

BENNETT, C. G.—Spontaneous expulsion of fibroid polypus during labour. *Brit. Med. Journ.*, 1912, ii., 1470.

BLAND-SUTTON, J.—The Inimicality of Pregnancy and Uterine Fibroids. *Essays on Hysterectomy*, 1905, 76.

BLAND-SUTTON, J.—Red Degeneration of Uterine Fibroids Complicating Pregnancy. *Brit. Med. Journ.*, 1909, i., 1471.

FAIRBAIRN, J. S.—A Contribution to the Study of one of the Varieties of Necrotic Changes in Fibro-myomata of Uterus. *Journ. Obstet. and Gyn. of the Brit. Empire*, 1903, iv., 119.

MURRAY, H. L.—The Hæmolytic Lipoids of Degenerating Fibroids, with special reference to Red Degeneration. *Journ. Obstet. and Gyn. Brit. Empire*, 1910, xvii., 534.

SMITH, J. L., and SHAW, W. F.—On the Pathology of the Red Degeneration of Fibroids. *Lancet*, 1909, i., 242

CHAPTER XII.

The Clinical Features of Uterine Fibroids.

Uterine fibroids, the commonest tumours to which women are liable, rarely attract attention before the twentieth year. Unknown before puberty, extremely rare before the twentieth year, more frequent in the third decade, they attain the maximum degree of frequency between the thirtieth and fiftieth years. I have collected many lists of women, with their ages, who have had fibroids removed and the average age distribution comes out in this way:—Among one hundred cases, 85 per cent. come under observation between the thirtieth and the fiftieth years; 10 per cent. above fifty, and 5 per cent. between the twentieth and thirtieth years. In a very large proportion of patients the earliest indication of a fibroid is excessive menstruation, and there may be bleeding between the menstrual periods; many seek advice because they notice a tumour in the belly, and others do not know they possess a fibroid until it causes retention of urine; this leads to its discovery. Some are discovered when a patient is pregnant and the fibroid becomes painful; in others it remains undetected until the woman is in labour. In rare instances a fibroid extruded after the

delivery of the fœtus has been mistaken for the head of a twin, and it is rarer for a cervical fibroid to be expelled before the fœtus.

The small submucous fibroids which cause severe bleeding, but do not enlarge the uterine greatly, can only be detected with certainty by dilating the uterus artificially. The simplest cases are those in which the patient seeks advice when the tumour is hanging out of the uterus.

When a fibroid is so large as to rise out of the pelvis, it usually occupies the hypogastric region ; if pedunculated it may be sufficiently mobile to lie in the iliac region and resemble an ovarian cyst. When the uterus is enlarged with fibroids, its surface may be smooth or tuberous. On auscultation, if the tumour be vascular, a venous hum, or souffle, is audible. This hum, audible in some fibroids a few days before menstruation, temporarily disappears with the flow.

Many fibroids remain hidden in the pelvis until they are detected on vaginal examination ; many give no sign of their presence until they become big enough to interfere with the pelvic viscera, or become complicated with changes in other organs, such as an ovarian cyst ; a distended Fallopian tube, pregnancy, tubal pregnancy, or cancer of the uterus, which lead to an examination of the pelvis. Tumours of the internal genital organs of women are extremely common during the child-bearing period, and as fibroids often simulate a uterus enlarged by pregnancy, it is useful to study all the phases of this condition as a preliminary to the accurate diagnosis of

uterine fibroids. This subject is discussed in a separate chapter on account of its importance. There are some general points in the differential diagnosis of fibroids worth remembering. For example :—When a woman has a tumour, suspected to be a fibroid, it is possible that she may have conceived and the enlargement of the uterus is due to the progress of the pregnancy. On the other hand, the diagnosis may be erroneous and the suspected fibroid is an ovarian tumour ; this is a very common error. Ovarian tumours and fibroids often co-exist, and a huge cystic subserous fibroid is indistinguishable clinically from a cystic ovarian tumour. It is difficult to distinguish between an ovarian fibroid and a uterine fibroid. An ovarian fibroid is intensely hard and feels harder than an uncalcified uterine fibroid. The intense hardness of an ovarian fibroid enabled me to suspect its nature before removal on one occasion. A large hydrosalpinx, or a pyosalpinx, complicates, and sometimes simulates, an impacted uterine fibroid. No one realized, until surgeons began to relieve women suffering from uterine fibroids, how frequently errors were committed in diagnosis, even by men of great experience ; some illustrations may be instructive.

The recognition of an uncomplicated uterine fibroid is usually regarded as a simple clinical exercise, but the conditions with which they have been confounded are many. If mistakes in diagnosis arise when the tumours are single, the chances of error are greater when two or more morbid conditions, co-exist, especially if they happen to be associated with a normal or an

abnormal pregnancy. Formerly, it was a matter of great importance to distinguish between an ovarian tumour and a uterine fibroid, because, thirty years ago, the removal of a uterine tumour was a very dangerous proceeding, even with the most careful antiseptic precautions. In those days it often happened that a surgeon opened the abdomen for the purpose of removing a tumour which he believed ovarian, but when exposed to view it proved to be a uterine fibroid. In these circumstances it was the usual practice to close the abdominal incision and leave the tumour; in my early days as a surgeon, I performed hysterectomy for fibroids on many patients who, several years previously had been submitted to disappointing treatment of this kind. Sometimes, a surgeon on opening the abdomen would come upon a tumour and not being able to clearly recognise the organ from which it grew, would nevertheless persist in its removal. I have on two occasions examined a tumour which had been removed in this blind way and been able in each instance to satisfy the surgeons who removed it, that the suspected tumour was the body of the uterus containing a large soft submucous fibroid. Occasionally, surgeons were so extremely careful when selecting cases for ovariotomy not to mistake a fibroid for an ovarian tumour that they often refrained from operating. This extreme caution had its bad side, for women with ovarian dermoids were allowed to retain them until they formed adhesions, or communicated with hollow viscera, such as the bladder, rectum, colon, or ileum. It was formerly taught that

ovarian cysts should be removed promptly as they inevitably destroyed life, but fibroids grow slowly, and can be tolerated with impunity. Ovarian cysts sometimes grow slowly. In 1894 a tumour, the size of a coconut, was detected in a woman, aged 35 years; believing it to be a fibroid she was warned by some physicians to refrain from operation as the tumour would disappear at the menopause. For 18 years this tumour remained quiescent, but in 1912 it began to grow, and became as big as the patient's head I removed the tumour; it was an ovarian cyst with jelly-like contents. The patient, at the time of the operation, was 52, and menstruated regularly. Fortunately, it is no longer a matter of necessity to decide between ovarian and uterine tumours, for the same treatment is meted out to both, but surgeons should delight in accurate diagnosis, and, like expert riflemen, prefer to hit the bull's eye rather than be content with a magpie.

Although there is no longer any need to attempt refinement of diagnosis between ovarian and uterine tumours, there are many complicated conditions which call for diagnostic skill. The four following examples illustrate this :—

A woman under my care had a tumour in the pelvis which furnished the physical signs of an ovarian cyst the size of an orange. When exposed through an abdominal incision it resembled a pedunculated subserous fibroid, and was of the same colour as the uterus. My surprise was great, when, after completing the operation and incising the tumour, it proved to be an

echinococcus colony in the mesosalpinx. A similar case has been reported by Altormyan, of Aleppo; the colony in his specimen formed a mobile tumour, as big as the patient's head, attached to the uterus.

Giles reported a case in which the colony grew in the wall of the uterus at the fundus and reproduced exactly

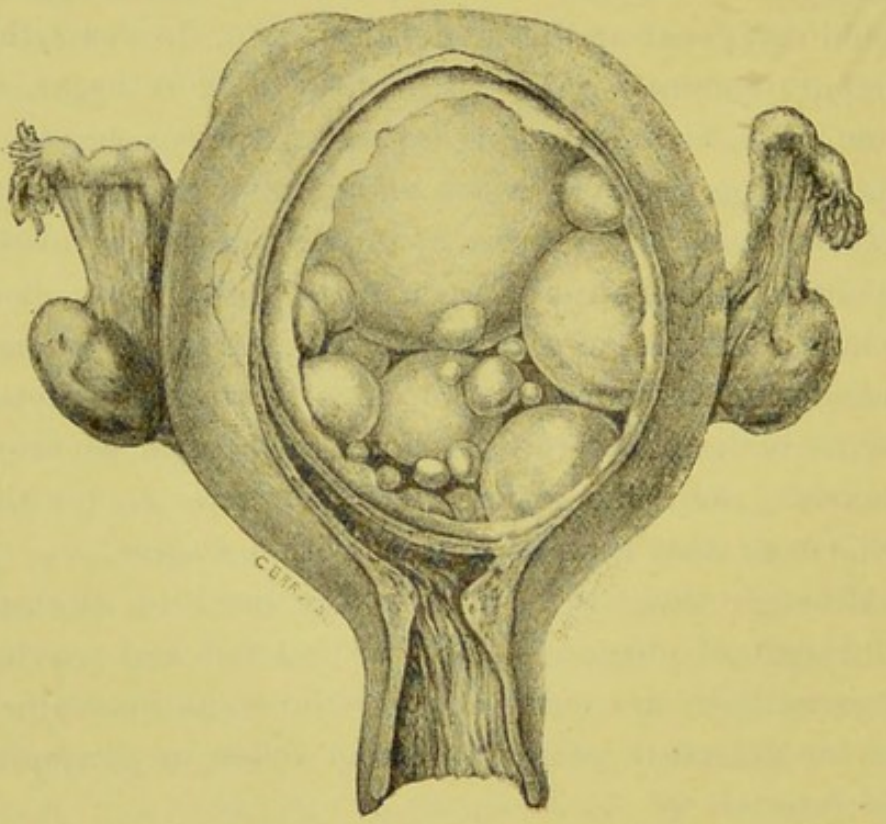

Fig. 29.—A uterus removed under the impression that it contained a submucous fibroid. The supposed fibroid proved to be an echinococcus colony. (After A. E. Giles).

the clinical conditions of a large submucous fibroid, and the uterus was removed under this impression. (Fig. 29).

Reference should be made to a woman who came under Blacker's care in labour, delivery being obstructed

by a tumour, which was regarded as a calcified fibroid. Hysterectomy was performed by the clamp method and the tumour allowed to remain; a few days later echinococcus vesicles appeared by the side of the pedicle and led to the discovery of the nature of the obstructing tumour.

It is rare for abnormalities of the kidney to complicate the diagnosis of fibroids, but a subserous fibroid with a long stalk has been mistaken for a movable kidney, and I have been present on two occasions when an operation performed on a tumour supposed to be renal in origin proved to be a pedunculated fibroid. McCaw reported an instance in which a woman in the fifth month of pregnancy complained of severe pain in her belly; this led to the detection of a lump in the left lumbar region. The case was seen by a gynæcologist and a surgeon in consultation, each of them a man of experience. The tumour was considered to be renal in origin. Cœliotomy was performed, and the tumour proved to be a sessile subserous fibroid weighing four pounds. It was successfully removed and the pregnancy continued undisturbed and ended successfully.

This may be a suitable place to state that a kidney in the hollow of the sacrum simulates a pelvic tumour, and several cases have been recorded in which a pelvic kidney has been removed under the impression that it was a tumour. On one occasion it proved to be the only kidney the patient possessed. **Three specimens of pelvic kidney under my own observation were associated with unicorn uteri.**

The most unexpected organ to find in the pelvis is the spleen, and some strange experiences in connection with it have been recorded. Sir Spencer Wells performed cœliotomy on a woman expecting to find a fibroid. In the course of the operation a large purple mass was exposed ; on manipulating it, his hand suddenly broke into a large soft bleeding organ, which proved to be a large spleen lying in contact with the uterus. Varneck had a stranger experience, for he operated on a young woman and succeeded in removing piecemeal something which he regarded as a firmly adherent fibroid. Some fragments removed in the course of the operation were examined in the laboratory, and the supposed fibroid was discovered to be a spleen.

It has fallen to my lot to remove on several occasions enlarged spleens which have wandered into the pelvis and come in contact with the uterus. On one occasion a woman was brought to me with a tumour which was considered by her medical attendant to be a pedunculated subserous fibroid. The suspected tumour had a spleen-like shape, a notched border, and could be made to float in a suspicious way on the intestines when the patient lay on her back ; moreover, in this position the suspected tumour, which could be easily felt through the vagina, seemed as if it were tugged upwards when the patient breathed deeply. These signs induced me to venture on the diagnosis that the lump was not a fibroid but a wandering spleen. In due course an operation was performed, and the diagnosis proved to be correct and she made a good recovery. A wandering

spleen is an occasional source of perplexity and doubt in diagnosis, and of late years some interesting observations have been published concerning them.

It is certain that in the past women often endured unnecessary suffering from the blind belief of surgeons that uterine fibroids were tumours capable of easy recognition.

NOTE.—*For references see page* 140.

CHAPTER XIII.

The Differential Diagnosis of Fibroids and Pregnancy.

Under ordinary conditions the diagnostic signs of normal pregnancy are clear, distinct and easily appreciated. This is true also of the physical signs presented by the uterus when enlarged by fibroids. Occasionally a submucous fibroid presents clinical features which closely simulate a gravid uterus. On the other hand, a pregnancy, in its early stages, will furnish signs so similar to those presented by a soft quickly growing submucous fibroid that a careless observer is easily baffled; the diagnosis may be difficult even for one who possesses caution and experience. It occasionally happens that a surgeon opens the abdomen with the intention of performing hysterectomy for a swelling which he believes to be a fibroid, but on exposing the uterus finds difficulty in deciding whether the organ is gravid or contains a soft submucous fibroid.

The signs of early pregnancy on which reliance is placed are these:—Suppression of menstruation, morning sickness, fulness and tenderness of the breasts, pigmentation of the mammary areola, and mucoid secretion can be squeezed from the nipples. When the uterus is large enough to rise out of the pelvis into the hypogastrium it can be felt as a tumour, smooth and

rounded, which hardens and softens under firm continued pressure of the palm. The softness of the cervix is also a valuable sign. The change in the consistency of that part of the uterus just above the cervix and below the expanded segment of the uterus is the chief feature of Hégar's sign. When this sign is well marked, the enlarged fundus is sometimes mistaken for a gravid Fallopian tube.

After the mid-period of pregnancy there is rarely difficulty, the signs known as ballottement, spontaneous movements of the fœtus, and the sounds of the fœtal heart and the uterine souffle lend their aid.

These signs are as easy to learn as the ten commandments, but it is not always easy to apply them ; one or more may be masked by morbid conditions of the fœtus and some are simulated by abnormalities of the uterus. Not only does normal pregnancy often give rise to diagnostic doubts and difficulties, but these are accentuated when the pregnancy is abnormal, for example, such conditions as tubal pregnancy ; a retroverted gravid uterus ; molar pregnancy, or pregnancy in the rudimentary horn of a unicorn uterus. It is true that in order to be proficient in the diagnosis of pelvic tumours a practical acquaintance with the vagaries of pregnancy is absolutely essential, even then difficulties in differential diagnosis, due to this cause, will frequently beset the surgeon who devotes himself to abdominal operation.

In this chapter some of the difficulties will be discussed and illustrated by examples. Some of the cases which

give rise to difficulty are those in which women have motives for concealing the pregnancy and strenuously deny its possibility. In such cases too much reliance on the patient's statement leads the surgeon astray, for he will be misled by the supposed absence of the most reliable of all the signs of early pregnancy—suppression of menstruation.

When the uterus is enlarged by a submucous fibroid as big as a cricket ball, and the patient is between twenty-five and thirty, it closely resembles the uterus of a primagravida at the second and third month of pregnancy. For example: A spinster, between twenty and thirty-five complains of pelvic pain, and on examination a globular body is felt which closely resembles an ovarian cyst or a soft fibroid; the neck of the uterus retains its virgin shape and hardness, and a deep sulcus can be made out by the finger between it and the globular body. She asserts that her menstruation is normal. Such a condition has often been the source of an erroneous diagnosis and an ill-starred operation. Here is another clinical picture: A healthy lady's-maid, aged thirty-three, engaged to be married, complains of abdominal pain and a swelling in the hypogastrium; she asserts that menstruation is normal. The breasts are free from fluid. On examination a tumour of smooth contour and occupying the middle line rises well out of the pelvis; the cervix uteri is firm, and a sulcus can be easily felt between the uterus and tumour. Anxious to be free of the tumour before getting married an operation is undertaken. On

exposing the uterus through the abdominal incision it is big, rounded and soft like a uterus three months gravid. Unable to determine whether the enlargement was caused by a soft quickly growing fibroid, or to pregnancy, the uterus was returned into the abdomen and the incision sutured. The patient left the hospital and completed her convalescence in the country. Three months later she returned, and as the physical signs were unaltered she was re-admitted and hysterectomy performed. The tumour in the uterus was a very soft fibroid.

This is not an isolated case, for Dr. E. H. Tweedy had three difficulties of this kind in Rotunda Hospital, Dublin, in the space of four weeks. The first occurred in a nulliparous married woman, aged thirty-eight. She was submitted to cœliotomy for the removal of a uterine fibroid. On opening the abdomen " all present were startled to discover that the uterus closely resembled that of pregnancy. Not without the greatest hesitation was it decided to make a small exploratory incision and thus decide the matter. An interstitial myoma fortunately came into view."

The second case was a multiparous woman, aged twenty-six, with an enlarged uterus which furnished the signs of an interstitial myoma. When the uterus was exposed in the course of an operation it proved to be gravid.

The third patient, a primipara, aged thirty-one, had an interstitial fibroid; when the abdomen was opened the tumour so resembled a gravid uterus that the

operation was discontinued. "At the expiration of a month it became obvious that the case was not one of pregnancy, and a fibroid uterus was successfully removed per vaginam."

This experience is of interest as occurring in the practice of the Master of the Rotunda, a position affording exceptional opportunities for a physician to make himself practically acquainted with the physical alterations of the uterus when exercising its functions.

A submucous fibroid, as big as a fœtal head, growing rapidly in a spinster about thirty years of age, and whose breasts furnish a secretion on pressure, will make a surgeon very cautious in giving a definite opinion for or against pregnancy.

A woman, aged 38, had been married 15 years. She had fibroids in her uterus, but ceased to menstruate and suffered from morning sickness. The breasts enlarged and the uterus increased in size. Hall, who reported the case, came to the conclusion that the uterus, in addition to containing fibroids, had become pregnant. He removed the uterus, and in the course of the operation was satisfied that it was gravid. After the operation he bisected the uterus and to his great surprise found a soft submucous fibroid, but no pregnancy.

Perhaps the greatest clinical puzzles are such things as molar pregnancies with irregular losses of blood; hydatidiform moles with uterine contractions and irregular losses of blood; and retroversion of the gravid uterus.

Occasionally some of these considerations are urgent and require prompt treatment, but on the whole it is well to remember in doubtful cases that **waiting and watching** is an admirable means of clearing up many doubts in connection with pregnancy. In cases of doubt an examination under an anæsthetic often enables a diagnosis to be made, but there is a form of soft submucous fibroid which arises between the twenty-fifth and thirty-fifth years, which causes the uterus to enlarge so like a normal pregnancy of about the third month, that such a uterus has been excised and placed on the laboratory table and the pathologist has been unable to determine without opening it whether the organ contained a fœtus or a fibroid.

Olshausen had a remarkable experience : he performed hysterectomy on a woman, aged thirty-eight, who was known to be pregnant, and had a large tumour in the pelvis (believed to be a cystic fibroid), and as it would effectually obstruct delivery the operation became a necessity. When the uterus was opened after removal the supposed fibroid proved to be a sacro-coccygeal tumour growing on the fœtus.

Fibroids and tubal pregnancy sometimes co-exist, and when the fibroid is big the combination causes unusual difficulty in diagnosis. It may be mentioned incidentally that fibroids do not arise in the tissues of the Fallopian tubes. The rarity with which tubal pregnancy occurs in association with uterine fibroids is, in a measure, indicated by the scanty literature relating to it. The infrequency of the combination may be

explained on the ground that the period of life (20-35), when tubal pregnancy occurs most frequently, represents a comparatively quiet time for uterine fibroids. Although the two conditions rarely co-exist, it is necessary for those surgeons who are ambitious to make a correct diagnosis before an operation, to study this matter with some care, because it is an axiom in clinical diagnosis that pathologic conditions of the tubes more closely simulate tumours of the uterus than cysts of the ovaries. That tubal pregnancy should simulate the clinical signs of a uterine fibroid is in a measure due to the hæmorrhage which is a clinical feature associated with some conditions of tubal pregnancy. Here is an example: A woman aged thirty-eight, complained of profuse menorrhagia; the history and the physical signs indicated the existence of a submucous fibroid. The patient was anæsthetised and the cervical canal dilated; a large rounded mass like a sessile submucous fibroid could be felt embedded in the posterior wall of the uterus and projecting into its cavity; it appeared too big to admit of enucleation. Hysterectomy was recommended. The patient decided to wait before consenting to such a serious measure. However, during the succeeding three months the bleeding continued to be so profuse that she submitted to operation; the supposed fibroid proved to be a gravid tube containing a mole as big as a turkey's egg. In this instance the bleeding from the uterus, supposed to be caused by a fibroid, was due to blood effused into the tubal gestation-sac escaping through the tube into the uterine cavity.

I have seen several similar cases since, but none which so closely simulated the signs and symptoms of a submucous fibroid.

A number of records may be gathered from periodical literature where men of experience like Thomas Keith, Angus Macdonald, and Duncan, among others, have performed cœliotomy for the purpose of removing a fibroid, and have found a sequestered extra-uterine fœtus instead. In some of the cases the swelling has been removed and the operation completed under the impression that the tumour was a fibroid, but a subsequent examination of the excised mass has disclosed a mumified fœtus. In two cases known to me the fœtus was enclosed in the rudimentary horn of a unicorn uterus.

A remarkable example of the diagnostic difficulties due to the concurrence of fibroids and tubal pregnancy has been recorded with care and in great detail by Cullingworth. Briefly the chief features may be set forth in this way: A woman, aged 33, sought relief for pelvic trouble, the physical signs of which so resembled those produced by retroversion of a gravid uterus that a deliberate but unsuccessful attempt was made to reduce the supposed displacement. Twenty-five days later another but equally ineffectual effort was attempted. Misgivings then arose in regard to the diagnosis; sixteen days afterwards cœliotomy was performed and a large fibro-myomatous uterus and a Fallopian tube containing a fœtus four and a half inches long were removed It is gratifying to add that this

long-suffering woman made an excellent recovery from the operation.

A critical study of errors committed in the differential diagnosis of uterine fibroids and pregnancy shews that the majority are committed before the beating of the fœtal heart is audible.

BLACKER, G.—*Clinical Journal*, 1908, xxxi., 309.

BLAND-SUTTON, J.—Remarks on Wandering Spleens. *Trans. Med. Soc. London*, 1897, xx., 95.

CULLINGWORTH, C. J.—Early Ectopic Gestation complicated by Fibro-myomata of the Uterus. *Trans. Obstet. Soc.*, xl., 285.

HALL, R. B.—Fibroid Tumour of the Uterus simulating Pregnancy. *Trans. Amer. Ass. of Obstet. and Gyn.*, 1908, xxi., 427.

TAYLOR, F. E.—The Pelvic Spleen. *Clinical Journal*, 1905, xxv., 299.

TWEEDY, E. H.—Reports of the Rotunda Hospital, 1909, p. 30. See also HORNE, H. J., *Lancet*, 1913, i., 101.

CHAPTER XIV.

The Treatment of Uterine Fibroids.

All attempts to cure uterine fibroids by medical and electrical methods have been conspicuous failures, so that women encumbered with, or whose lives are imperilled by these tumours, seek the aid of surgery. Fortunately they do not seek in vain. The methods of removing uterine fibroids depend on their position and size. The removal of a pedunculated submucous fibroid, as big as a tennis ball, extruded into the vagina and connected with the interior of the uterus by a narrow stalk is one of the simplest procedures in surgery. The enucleation of such a tumour sessile in the fundus of the uterus of a nulliparous spinster of forty years is a difficult proceeding and in pre-antiseptic days was followed by a high death rate. When a fibroid is too big to be extracted, especially if it be septic, the uterus is extirpated with it. These three procedures are known respectively as: Vaginal myomectomy; Vaginal enucleation, and Vaginal hysterectomy.

Fibroids too large to permit of removal through the vagina, or growing in situations which render them inaccessible through this canal, are reached through an incision in the abdominal wall. By this method it is possible to remove a pedunculated subserous fibroid

and conserve the uterus ; or enucleate a sessile subserous, or an interstitial fibroid from the uterine tissues. These methods are known as abdominal myomectomy and abdominal enucleation respectively. Sometimes a big submucous fibroid can be enucleated by incising the uterine wall and opening the uterine cavity. This is known as hysterotomy. The removal of large fibroids usually entails the sacrifice of the uterus also. This operation is known as hysterectomy. When the conditions are favourable the body of the uterus and half its neck is removed. When the neck of the uterus is unhealthy, or in a condition likely to prejudice the health of the patient, it is removed also. Thus the operations required for the treatment of uterine fibroids form two groups : Abdominal and Vaginal. It will be convenient to describe the abdominal methods first.

Abdominal Hysterectomy.

It cannot be too strongly stated in regard to this operation that **rigid asepsis and perfect hæmostasis** are essential for success, and that the best way of learning how to fulfil these requirements is to watch, or better, assist an experienced surgeon in the performance of such operations ; as hysterectomy for fibroids is performed very frequently in all large hospitals, no practitioner should venture to undertake such a serious operation without some preliminary training in this particular line of surgery.

Preparation of the Patient.—It is usual to keep the patient in bed for two or three days ; during this time the bowels are freely evacuated, the urine examined

and the general condition of the patient ascertained. Twelve hours before the operation the patient should have a warm bath unless she is too ill to permit it; then the lower abdomen, pubes and pudenda are shaved and well washed with soap and warm water. The vagina is douched with a solution of perchloride of mercury 1 in 5,000. An hour before the operation the anterior surface of the abdomen is thoroughly painted with tincture of iodine. Nervous patients are relieved of anxiety by an hypodermic injection consisting of Tartrate of Morphia Gr. $\frac{1}{4}$ Atropine Gr. 1/60: administered an hour before the operation No food or drink is given within six hours of the operation, but it is good practice with women weakened and anæmic from exhausting hæmorrhages to inject half a pint of normal saline solution into the rectum an hour before the operation. The bladder is emptied by means of a glass catheter immediately before the patient enters the operation-room; she should wear sterilized linen clothes for the operation.

Instruments.—These are constructed of metal throughout in order that they may be thoroughly sterilized by boiling. The following are necessary:—Scalpel, 12 hæmostatic forceps, 2 dissecting forceps, two fenestrated forceps which are useful as sponge-holders, a volsella, six curved needles of various thickness, scissors, rubber gloves and a glass catheter which will serve as a bladder sound if required. During the operation the instruments are immersed in warm sterilized water after they have been boiled for ten minutes.

Suture Material.—The most useful material for this purpose is plaited silk thread. I have used it exclusively for twelve years: it can be obtained of any thickness and is easily sterilized by boiling without impairing its strength. The two most useful sizes are No. 2 and 4. The thread is wound on a glass, or metal spool, and boiled for an hour immediately before use. Silk thread remaining on a spool may be reboiled twice or thrice without impairing its strength. Many surgeons hold catgut in high esteem.

Gloves.—It is unnecessary to advocate the use of rubber gloves: it is admitted that their employment reduces the mortality of the operation and abolishes unpleasant sequelæ. All who take part in an operation, surgeons, assistants, and nurses should wear sterilized rubber gloves and understand that it is as necessary to thoroughly disinfect the hands before donning the gloves as if no gloves are worn.

Dabs.—Six dabs made of Gamgee tissue are excellent substitutes for marine sponges. They are cheap, can be cut to any size to meet the needs of a particular case. They are sterilized by heat, or if by hot water, they should be boiled for one hour. During the operation they are washed out in warm sterilized water. I always employ six dabs: never allow one to be cut: count them before the operation; recount them before suturing the incision and make a third count before the patient leaves the operation-room, and then they are cast on the fire.

Dry gauze and dabs are harsh and irritating to the peritoneum and a cause of adhesions.

The Table.—Trendelenburg's position is essential for the proper performance of hysterectomy. There are many varieties of table designed for placing and retaining the patient in this position. When the patient is arranged for the operation it is the surgeon's duty to ascertain that the arms lie parallel with the trunk and not resting on the hard edges of the table. Post-operative paralyses of the upper limbs are troublesome and unpleasant sequelæ for patients and surgeons.

Anæsthesia.—The majority of surgeons employ general anæsthesia for pelvic operations. The most comfortable method is to induce unconsciousness with nitrous oxide gas and maintain the anæsthesia with ether, chloroform or a mixture of these according to the requirements of the case. Occasionally the general condition of a woman requiring hysterectomy will not permit the administration of ether or chloroform. Hysterectomy can be performed with the aid of an intra-dural injection of a solution of novocain. It is an objection to this method in pelvic operations, especially abdominal hysterectomy, that it is not advisable to place the patient in the Trendelenburg position as it allows the solution in the dural space to gravitate to the cervical and bulbar regions.

CHAPTER XV.

Abdominal Hysterectomy for Fibroids

Hysterectomy as a name for the operation of removal of the uterus was proposed in 1879, by Tillaux, in a communication to the Academy of Medicine, Paris. When extirpation of the uterus is required for fibroids it is generally performed by the abdominal route ; when the tumours are large this is the only available method. In the case of fibroids it is not always necessary to remove the neck of the uterus. The operation in which the body of the uterus and the supra-vaginal portion of the cervix are removed is known as subtotal hysterectomy. When the neck of the uterus is extirpated also, the operation becomes a total hysterectomy or panhysterectomy. This chapter will be concerned with these two operations.

Subtotal Hysterectomy.

In this operation the body of the uterus and the supra-vaginal portion of its neck is removed through an abdominal incision.

When the patient is thoroughly anæsthetised and the operation area isolated with sterilized towels the

abdomen is opened by a median subumbilical incision. When the tumour is large the incision will require to be extended above the navel, sometimes as high as the xyphoid cartilage. The surgeon should never allow himself to be embarrassed by a small incision. As soon as the peritoneum is incised the surgeon introduces his hand and carefully ascertains the condition of things in the pelvis, the presence or otherwise of adhesions, the relation of the fibroid to the uterus, its mobility, or degree of impaction, and the condition of the ovaries and tubes. The uterus is then carefully lifted through the incision with the aid of a volsella; the intestines and omentum are isolated from the pelvis and protected with a large warm dab. In fat patients with moderate enlargement of the uterus access to the pelvis is sometimes difficult, in such cases it is convenient and safe to withdraw the intestines and wrap them in a warm cloth until the intra-pelvic part of the operation is completed. In a simple case with a freely movable uterus the following steps are easily accomplished:—The broad ligaments are seized with hæmostatic forceps near the brim of the pelvis, if the surgeon intends to remove the ovaries and tubes with the uterus, but if he wishes to leave them the broad ligaments are seized near the uterine cornua. It is also an advantage to seize with forceps the round ligament at this stage in order to control bleeding from the artery it contains and prevent the cut ligament retracting into the inguinal canal. The broad ligament on each side of the uterus is divided with scissors and this renders the organ mobile and easy

to manipulate. In some cases the uterus is so thoroughly impacted in the pelvis that it cannot be extracted until the broad ligaments have been divided. As soon as this is accomplished each uterine artery is exposed in turn and nipped with forceps. A peritoneal flap is then fashioned on the front of the uterus, care being taken not to cut the bladder ; as a rule, the upper limit of this viscus is easily seen ; if there be any doubt about its limits a glass catheter introduced into the bladder is a reliable guide. A similar flap is fashioned on the posterior wall, but the surgeon must not cut too low or he will injure the rectum, and if there has been pelvic peritonitis the rectum sometimes adheres firmly to the back of the uterus. As soon as the flaps are cut, the uterus is detached by dividing its neck well below the level at which it joins the body of the uterus. If the forceps have been properly applied to the uterine arteries, the amputation of the uterus is almost a bloodless proceeding. Often a small vessel here and there in the flap, or in the stump, requires pinching.

The principles involved in this part of the operation may be explained by reference to the diagram (Fig. 30). The arteries supplying the uterus follow four routes :— Two of these are followed by the ovarian arteries when they traverse the broad ligaments to reach the cornua of the uterus, and anastomose with the terminations of the uterine arteries ; the latter come into relation with the uterus near the junction of the body and cervix, and ascend the sides of the uterus to the cornua. No large vessels exist on the anterior or posterior surface of the

uterus. A twig derived from the deep epigastric artery accompanies the round ligament to the uterus. It is clear from this arrangement that when forceps are properly applied to the ovarian and the uterine arteries the blood supply of the uterus is under absolute control. However, the simplicity of this arrangement is often disturbed by tumours distorting the uterus and by enormous development of veins in the broad ligaments (Chapter XXII.), but if the surgeon keeps the normal

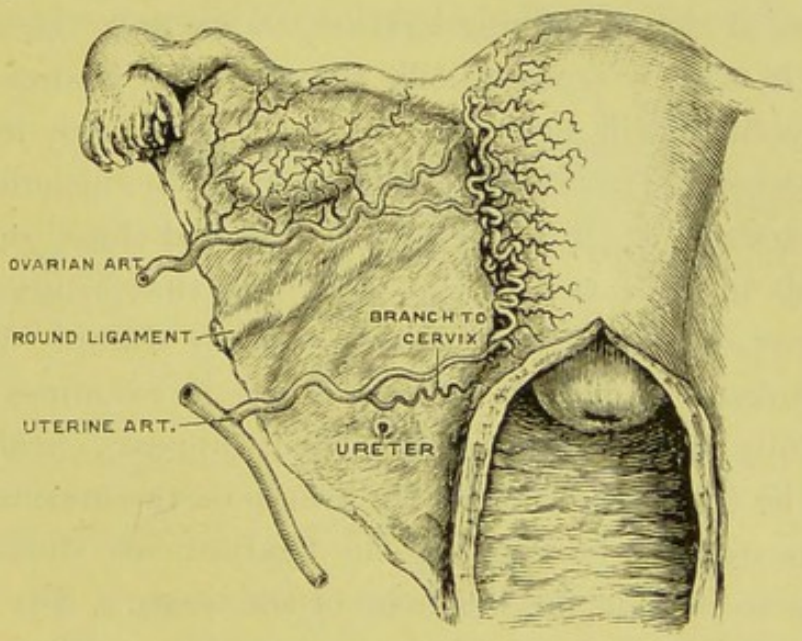

Fig. 30.—The uterus seen from behind. The diagram shews relations of the uterine and ovarian arteries to each other and to the uterus.

arrangement of the vessels well in mind, he will rarely have difficulty in dealing with abnormalities. It is necessary to r member that the ureter lies near the middle of the cervix uteri and is crossed by the uterine artery in this situation. As soon as the bleeding vessels are controlled with forceps the stump is examined in order to ascertain if it be free from cancer or polypi.

When the condition of the stump is in the least degree suspicious the cervix should be extirpated. (This converts the operation into a total hysterectomy, and the methods of dealing with the cut margin of the vagina are described on p. 154).

If the cervical stump is satisfactory the surgeon now proceeds to tie the vessels. As a rule the ovarian pedicles are transfixed and tied in a mass ligature as in ovariotomy. It is a good plan, after tying the two halves of the transfixing ligature, to encircle the whole pedicle with a separate silk thread: this insures that the pedicle will not bleed at the spot where it was transfixed. The round ligament may be included in the ligature when the pedicle is long and thin; or, the vessels may be tied in the same way that arteries are secured on the face of an amputation stump. When the surgeon intends to leave an ovary, he examines both carefully and selects that which appears healthy; then he transfixes and ties the stump on the uterine side of the ovary. In applying the ligature care should be taken to include the ligament of the ovary; it is very liable to slip out of the encircling loop. When the round ligament cannot be conveniently included in this ligature, it is secured separately. **When the endometrium is septic or cancerous both ovaries and tubes should be removed.** The conditions which guide the surgeon in deciding the fate of the ovaries in the course of hysterectomy are discussed in Chapter XXV.

As a rule, the cervical canal is free from micro-organisms, but they are present with sufficient frequency

to make an application of tincture of iodine to the cervical endometrium and the cut surface of the stump, a judicious act before applying ligatures and sutures to the stump. (See p. 88).

The uterine arteries are tied with thin silk ; these vessels as they run up the sides of the uterus are accompanied by veins so there is a vascular bundle at the point where the cervix is divided. If after the uterine arteries are ligatured there is oozing from these veins, it is easily controlled by a mattress suture. (Fig. 31).

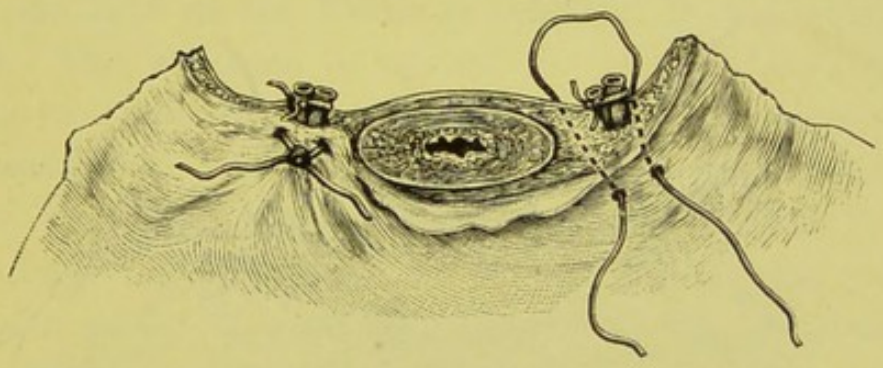

Fig. 31.—The method of applying the mattress suture in order to secure the uterine artery and bring the peritoneal flaps into apposition over the cervical stump.

The silk is passed through the anterior and posterior flap in such a way that when it is tied, the flaps are brought into apposition, and at the same time the loop of silk embraces the blood vessel and controls oozing in the tissues of the vascular zone in which the artery runs. The needle may be passed through the flaps either from before backwards or in the reverse order, but care must be taken to avoid pricking the bladder, or suturing it to the stump. As soon as the oozing is controlled the free edges of the flap are approximated

by a continuous suture of thin silk, or a few interrupted sutures (Fig. 32); gaps in the flaps formed by the broad ligaments are similarly secured. In suturing the flaps, needles with sharp edges are liable to cut the uterine arteries near the ligature and the bleeding will delay the operation. A knowledge of the liability to the accident should be sufficient to prevent its occurrence.

When this operation is properly performed there is no projecting stump on the floor of the pelvis; the

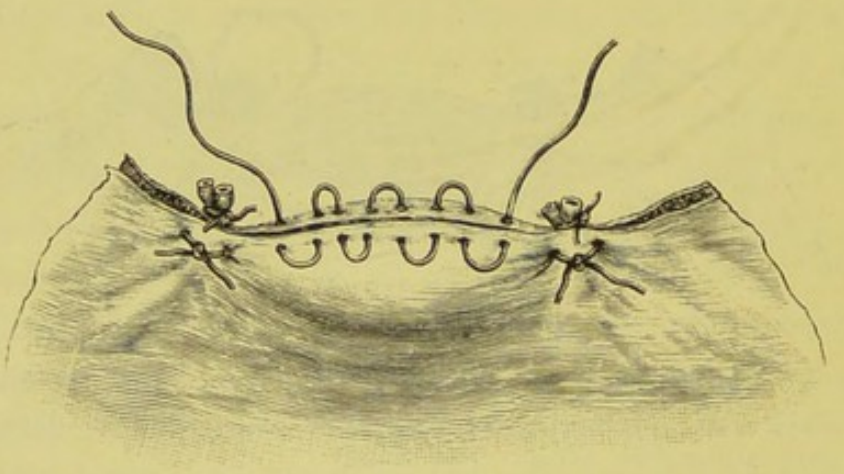

Fig. 32.—A diagram shewing the method of suturing the peritoneum over the cervical stump after subtotal hysterectomy.

sutured edges of the peritoneum merely appear as a thin line below the base of the bladder. The pelvis is now carefully cleared of blood and clot, the condition of the abdominal organs noted, especially the vermiform appendix, and this, if obviously diseased, should be removed. The dabs and instruments are counted, and the abdominal incision sutured in the manner recommended in Chapter XXIII.

It happens occasionally after subtotal hysterectomy that blood escapes freely from the cervical stump. This comes from the cut surface of the cervix. In some operations the cervical tissues bleed more freely than usual; in such a case it is useful, before the patient leaves the operating table, to apply a volsella to the cervix in such a way as to compress its anterior and posterior surfaces for 36 or 48 hours.

Total Hysterectomy.

This differs from the subtotal operation in the fact that the neck of the uterus is removed as well as its body. The abdomen is opened as in the preceding operation and the uterus withdrawn, the arteries controlled with forceps and the broad ligaments divided as in subtotal hystercetomy. Unless the uterus be very big it is easily drawn out of the abdomen and the bladder peeled from the cervix. The surgeon then feels for the vaginal end of the cervix and opens the vagina with the scalpel and detaches the neck of the uterus, taking care to avoid wounding the bladder, ureters or the rectum. As soon as the uterus is detached the cut margin of the vagina is seized with forceps to prevent its retraction. In some instances the body of the uterus may be removed as in the subtotal operation, and its neck exsected separately. Occasionally the surgeon begins with the intention of performing a subtotal operation, but finding the cervix unhealthy or cancerous removes it. As soon as the uterus is removed and all bleeding vessels controlled and the ovarian stumps secured, the surgeon proceeds

to deal with the vaginal opening. This requires careful attention, for in the subtotal operation the vessels concerned in the stump are the uterine arteries, but when the neck of the uterine is excised the territory of the vaginal arteries is invaded and a number of small branches require ligatures. The parts which require most attention are the lateral angles in the immediate neighbourhood of the uterine arteries. These arteries may be ligatured separately and then the flaps at each angle brought together by mattress sutures; oozing vessels on the cut edge of the vagina may be tied separately, or they can be controlled by a continuous suture. Experience teaches that sutures and ligatures applied to the cut edge of the vagina are apt to be infected and act as setons whereby a discharge is produced which annoys the patient. To remedy this, instead of applying a number of ligatures, I tie the uterine arteries securely and then introduce two pairs of fenestrated forceps through the vagina and catch the bleeding edges of the vagina. These forceps remain for two days and act as drains; by this means subsequent trouble with the ligatures is avoided; patients complain but little of the forceps. After the forceps are in position the edges of the peritoneal flaps are sewn together at the lateral angles; the opening left by the removal of the neck of the uterus is allowed to remain open. After removing all fluid and clot, the abdominal viscera are inspected, the intestines and omentum adjusted, and the abdominal incision closed as described in Chapter XXIII.

An uncomplicated total hysterectomy cannot be described as a difficult operation when performed by a surgeon accustomed to abdominal operations, but occasionally when fibroids adhere to colon, small intestine and rectum, or are complicated by an adherent dermoid, bilateral pyosalpinx, cancer of the rectum and the like then the resources of the surgeon may be severely taxed.

Total Hysterectomy with preliminary ligature of the Internal Iliac Arteries. With the hope of abolishing the trouble caused by the ligatures applied to the cut edges of the vagina in total hysterectomy performed for fibroids, fibrosis uteri, and cancer, I have modified the operation by applying a ligature to each internal iliac artery. This is easily carried out, after the abdomen is opened, by carefully incising the peritoneum where it lies over the brim of the pelvis at the sacro-iliac synchrondrosis. On the right side, care must be taken not to injure the ureter which lies in close relationship to the artery. On the left side, in addition to the ureter, the rectum complicates the proceeding. It is necessary to incise the meso-rectum and turn the bowel outwards. When there has been much inflammatory trouble in the pelvis the peritoneum lining it is often thick and œdematous. Under such conditions additional care is necessary in exposing the internal iliac arteries, as the ureters are then not so easily recognised, and, therefore, run a greater risk of being cut during the exposure of the artery.

After the internal iliacs are tied, the uterus is completely extirpated; sometimes there is no bleeding from the uterine arteries when they are cut in the course of the operation; in others a thin jet of blood escapes. In either case they should be ligatured.

With every precaution, aseptic or antiseptic, it is impossible to keep the ligatures applied to the cut edge of the vagina aseptic, and a few months later some of them will be acting as setons and others will be extruded into the vagina.

Drainage. When the removal of a uterus has been complicated by adherent tumours, or cystic ovaries, or distended and inflamed tubes, raw oozing surfaces exist in the pelvis; in these circumstances it is a wise precaution to drain; this is especially necessary in cases where a fibroid is complicated with cancer of the cervix. Cancer in this situation is always colonized with micro-organisms. (See Chapter VIII.). After trying many methods I find the following satisfactory:— A rubber tube reaching to the bottom of the pelvis and emerging at the lower angle of the abdominal incision. It is rarely required more than forty-eight hours. Some surgeons are opposed to drainage. It has been compared to defending oneself against the sparks of Vulcan with an umbrella. Drainage judiciously employed is useful, and a tube inserted in the manner described acts better than one introduced through the vagina, and it is more easily managed: if retained too long the scar may be weak at the site of the drain track, and is more liable to yield.

CHAPTER XVI.

Operations for Large Cervix-Fibroids and Fibroids of the Broad Ligament.

The operative treatment of this variety of fibroids needs separate consideration because these tumours do not lend themselves to any routine method. Cervical fibroids of moderate size can be easily enucleated by the vaginal route, large examples demand hysterectomy. Of all the varieties of fibroids none can cause so much difficulty in an operation as the cervix-fibroid, and, as a rule, it begins at the outset of the operation for, on opening the abdomen, the surgeon finds the pelvis filled with an ovoid tumour with the uterus perched on its summit like the lantern on the dome of a cathedral.

When the uterus, with the tumour in its neck is not large enough to fit the pelvis tightly and can be drawn up, the operation can be easily and expeditiously performed. A tumour may be so firmly impacted that it cannot be drawn up; in such conditions the broad ligament should be divided on each side: this often facilitates the elevation of the parts, and permits access to the uterine arteries which lie on the outer wall of the expanded cervix. (The bladder is a source of difficulty in dealing with these tumours for it is often pushed out of the pelvis and its walls are sometimes very thick).

In performing subtotal hysterectomy, the surgeon cuts through the thick cervix below the tumour, but in removing a central cervical fibroid he incises what appears to be the capsule of the tumour but it is in fact the expanded cervix, and in this part of the operation he divides the uterine arteries. The cut edges of the expanded sac usually bleed freely. After the tumour is enucleated the cup-shaped sac quickly shrinks; the vessels in its walls are ligatured and the edges of the expanded cervix approximated with sutures and the ovarian pedicles secured in the usual way. As soon as the tumour is removed the bladder retracts into the pelvis and assumes its normal position.

Occasionally a central cervix-fibroid is so tightly impacted in the pelvis that even after the broad ligaments have been divided it cannot be raised out of the pelvis. In such a case it is a good plan to split the cervix longitudinally taking care not to incise the bladder, then after incising the capsule, the tumour, as a rule, enucleates easily. The enucleation of a large impacted fibroid requires to be conducted without undue display of force, or so much shock will be caused as will place the patient's life in peril. After the tumour has been enucleated the expanded cervix quickly contracts and the operation is completed on the lines of a subtotal hysterectomy. Experience teaches that, as a rule, it is easier and safer to remove the body of the uterus and enucleate a cervix fibroid than to remove the uterus, cervix and fibroid as one mass.

In some of my early operations for cervix-fibroids I was anxious to save the uterus; after enucleating the tumour and tying the cut blood vessels, the edges of the incision in the expanded cervix were sewn together. In two instances I split the uterus in two lateral halves, and after shelling the fibroid out of the expanded cervix, sutured the two halves of the uterus together. These cases recovered, but on the whole the removal of the uterus with conservation of an ovary is a safer and more satisfactory proceeding. There are, of course, conditions where the surgeon feels justified in making great efforts to save the uterus even at an increased risk to the patient's life. Here, as in so many other surgical procedures, the surgeon has to exercise judgment and discretion.

When a fibroid grows from the posterior aspect of the cervix immediately beneath the peritoneum it affects the cervix very differently to one growing within it, for the neck of the uterus is stretched, but not distended by the tumour. In such a condition, after dividing the broad ligaments and obtaining access to the pelvis it is a good plan to split the capsule covering the tumour posteriorly, and then enucleate the fibroid: this accomplished, the operation reduces itself to a subtotal hysterectomy, but there is this difference, the surgeon will, when the tumour is big, find a pouch formed by the portion of the capsule which covered the lower pole of the fibroid: this pouch extends lower than the point at which the cervix is divided, and the vaginal stump of the cervix lies in the anterior wall of the pouch.

Before suturing the stump, it is good practice to split this portion of the cervix longitudinally with scissors in order that blood and serum from the pouch may freely escape into the vagina.

In some examples of cervix-fibroids, after removing the uterus and making the blood vessels secure, instead of stitching the edges of the expanded cervix together, it is only necessary to sew the peritoneum over the cut edges.

Fibroids growing from the anterior aspect of the cervix either bulge into the vagina or rise into the hypogastrium. The former can be safely enucleated by the vagina ; those which grow into the hypogastrium sometimes strip the peritoneum from the anterior abdominal wall for two or three inches, or more. In one instance, I removed a tumour of this sort through a median subumbilical incision without opening the peritoneum. The fibroid was described in the notes by the house surgeon, "as big as a football."

Operations for the Removal of Fibroids from the Broad Ligament.

Fibroids of large size unconnected with the uterus and growing between the layers of the broad ligament are often troublesome tumours to remove. On opening the abdomen, the surgeon recognises the nature of the tumour-mass when he finds that the uterus is not incorporated with it, and the tumour itself covered with a thin loose transparent veil of peritoneum. On incising the peritoneal covering, the fibroid is easily enucleated,

and, as a rule, there is free bleeding from the large veins in its capsule, especially in the vicinity of the bladder. The process of enucleation should be conducted carefully for the ureters lie below the tumours, and in this operation are easily injured. The bladder is spread out over the surface of a broad ligament fibroid and runs great risk of being cut. When the tumour is very large

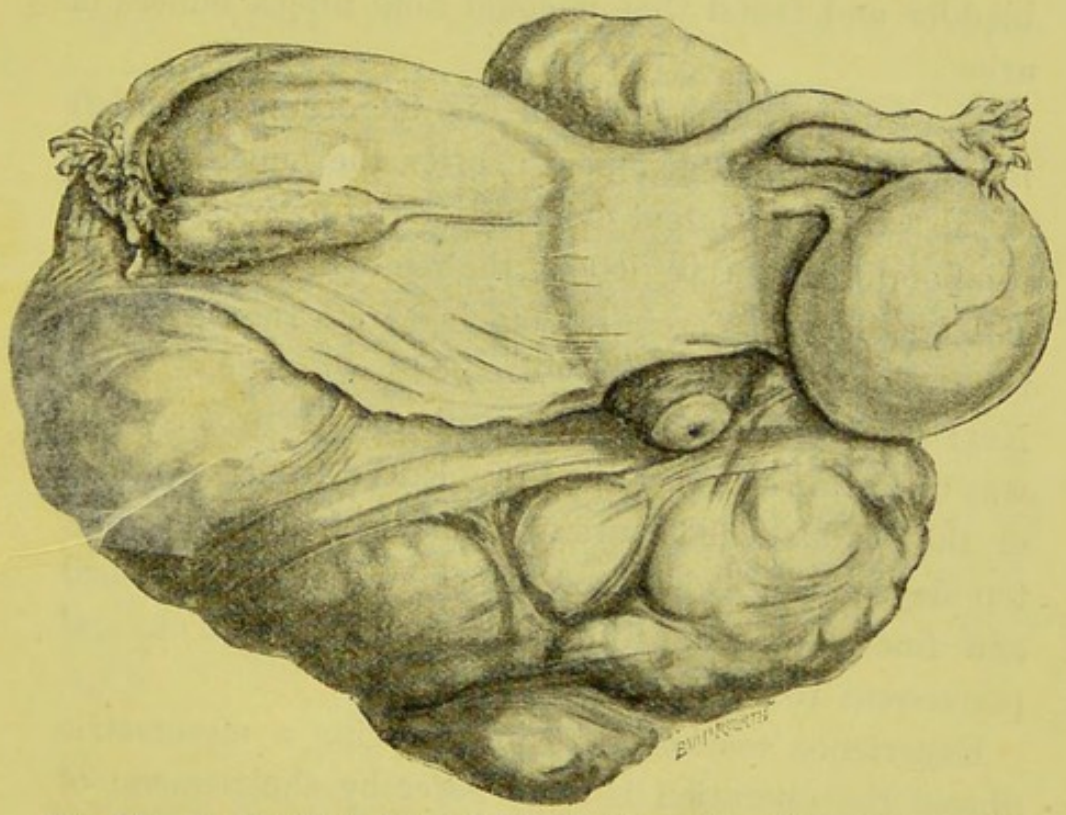

Fig. 33.—A fibroid of the left broad ligament. The uterus rests upon but is not involved in the tumour. A process of the fibroid bulges between the ovary and the tube. The right ovary is cystic. From a married woman, aged 52. (Museum R. College of Surgeons, England).

and has interfered with the bladder so as to cause chronic retention of urine, the vesical walls, as a result of repeated distention, become thin and resemble peritoneum: in such conditions a large portion of the

bladder is sometimes accidentally cut away with the tumour. On one occasion, in such a case, I cut off the upper third of the bladder, but recognising my fault, carefully joined the divided edges of the bladder with very fine silk sutures and drained it with a self-retaining catheter for ten days. The woman recovered. Three years later I was able to investigate the capacity of the bladder and found that it could hold fifteen ounces of urine.

The tumour represented in Fig. 33 occupied the left half of the broad ligament; after the enucleation, I could see the terminal 4 inches of the ureter lying on the floor of the cavity left by the removal of the fibroid. The bladder was carefully detached from the surface of the tumour, and the cavity drained with a rubber tube. Next day the dressings were soaked with urine and it was uncertain whether the urine leaked from the ureter or the bladder. The drain tube remained in position ten days; the leakage of urine gradually diminished and finally ceased. The patient made a quick and permanent recovery

Experience teaches that in removing a mesometric fibroid the operation is made safer by the removal of the uterus. In many cases the surgeon has no choice, but occasionally he is tempted to leave the uterus, but it is an unwise step which leads to troublesome bleeding. Removal of the uterus enables the surgeon to make hæmostasis more complete.

The two chief causes of the high mortality of operations performed for the removal of broad ligament

fibroids are injury to the ureter, and uncontrollable venous bleeding. **The bladder and ureters are more often injured in the removal of mesometric fibroids than in any other pelvic operation.** It is fortunate that such tumours are uncommon.

Hysterectomy when the Uterus is Double.—Fibroids arise in malformed uteri as well as in those of normal shape. When the body of the uterus is double

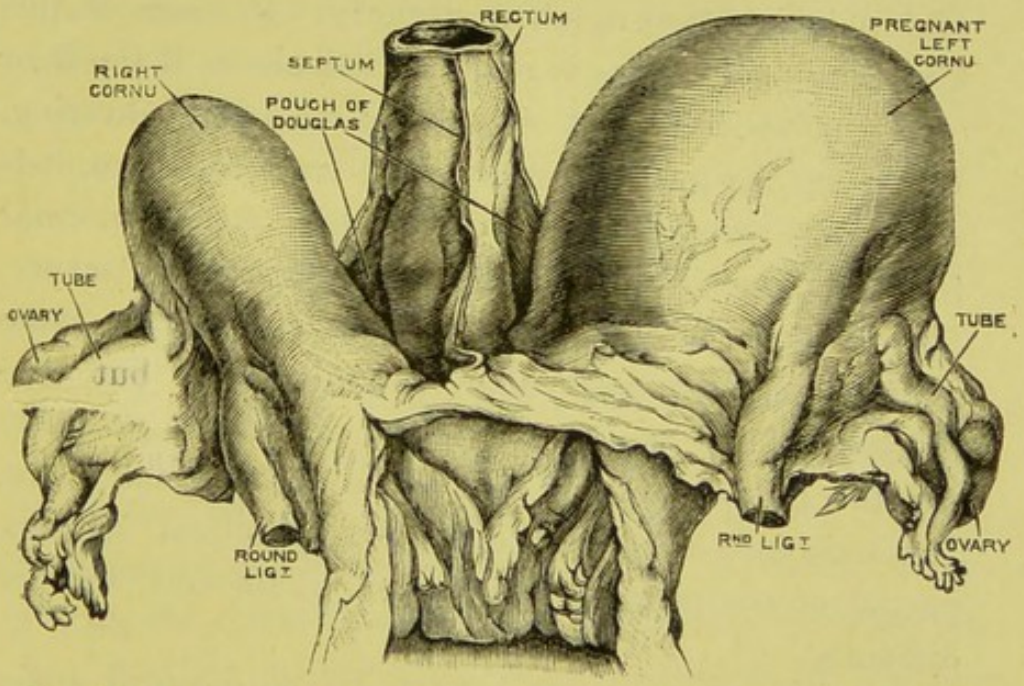

Fig. 34.—A bicornate uterus shortly after delivery at term. The drawing shows the position of the ligamentum vesico-rectale.

(bicornate) and the surgeon stumbles upon it in the course of a pelvic operation, he may be puzzled if he is not familiar with the anatomical conditions associated with this abnormality, for the rectum lies in the middle line of the pelvis and a median vertical fold of peritoneum, the **ligamentum vesico-rectale**, passes from its anterior surface through the gap between the uterine

cornua and becomes continuous with the peritoneum covering the posterior aspect of the bladder. (Fig. 34). The portion of this peritoneal fold which lies between the rectum and the neck of the uterus divides the recto-vaginal fossa into a right and a left half.

This median fold requires careful treatment or the surgeon will accidentally open the bladder if he divides the fold too far forwards, or injure the rectum when the fold is incised too much posteriorly. In cases of this kind when the uterus is removed it looks as if the floor of the pelvis had been stripped of its serous covering. In closing the peritoneum over the cervical stump, it is sometimes necessary to bring the edges of the abnormal fold into apposition vertically with a continuous suture.

Experience teaches that bicornate uteri cause more difficulty in diagnosis than in technique, but the presence of the vesico-rectal ligament would probably bar the removal of the uterus by the vaginal route. The existence also of a median longitudinal septum, partial or complete, in the vagina would add another difficulty.

The ligamentum vesico-rectale has an interest apart from questions relating to technique, for it very probably stands in some embryological relationship to, and may be responsible for the production of a bicornate uterus.

Cancer of the Breast and Fibroids.

I have seen women who wished to be relieved of a large uterine fibroid and who had at the same time cancer of the breast. In 1905, a schoolmistress, aged

54, had a very large fibroid which she desired to have removed because it interfered with her work on account of its size. At the same time she drew my attention to a cancerous lump in her breast. After careful consideration I removed the uterus by the subtotal method and both ovaries; after closing the abdomen the cancerous breast was freely excised with the axillary lymph nodes. The patient recovered easily from the double operation and died from recurrence and internal dissemination in 1910.

In 1911, I performed the combined operation of hysterectomy for fibroids and cancer of the breast on two patients. Both recovered from the operation. Nothing untoward has been reported concerning their subsequent history.

Sarcoma of the Tibia and Fibroids.

In 1909, a married lady, aged 37, suffered severely from menorrhagia and pain caused by a fibroid. These troubles made her anxious to have the uterus removed. During the consultation she casually drew my attention to a swelling on her tibia which presented the clinical signs of a periosteal sarcoma. To make the diagnosis certain, a fragment of the tibial tumour was removed and examined microscopically. It proved to be a spindle celled sarcoma and the leg was amputated through the knee joint.

After the patient recovered from the operation the menorrhagia caused so much trouble that she requested me to remove the uterus. Hysterectomy was per-

formed in November, 1911. The patient was reported to be in good health, December, 1912.

Carcinoma of the Colon and Fibroids.

On several occasions in the course of removing the uterus for fibroids I have accidentally discovered a cancerous growth in the colon, sigmoid flexure or the rectum, and have excised the growth from the bowel in addition to removing the uterus.

BLAND-SUTTON, J.—A Topographical and Clinical Study of Fibroids of the Neck of the Uterus. *Lancet*, 1904, i., 931.

DORAN, A.—Fibroid of the Broad Ligament weighing forty-four pounds and a half pound, removed by enucleation. Recovery. With table and analysis of 39 cases. *Trans. Obstet. Soc., Lond.* (1899), 1900, xli., 173.

CHAPTER XVII.

Abdominal Myomectomy.

Under this term it will be convenient to include operations for the removal, through an abdominal incision, of pedunculated subserous fibroids, sessile and interstitial fibroids of the uterus.

This operation has been advocated and practised by many surgeons, including Spencer Wells (1863), Martin (1880), and Schrœder (1893), who were imbued with conservative ideals in regard to the uterus. The operation was attended with a high mortality, but the improvements in the methods of performing hysterectomy have limited very materially the scope of abdominal myomectomy.

Abdominal Myomectomy. This signifies the removal of one, or more, pedunculated subserous fibroids through an incision in the abdominal wall, conserving the uterus tubes and ovaries.

Abdominal Enucleation. In this operation a sessile fibroid is shelled out of its capsule; the uterus tubes and ovaries being conserved.

Hysterotomy. This term is applied to an operation in which a submucous fibroid is removed through an incision in the wall of the uterus which opens the uterine cavity.

The preliminary steps of all these operations are the same as for hysterectomy, and the Trendelenburg position is of great advantage.

After opening the abdomen and protecting the intestines with a dab, the surgeon carefully inspects the conditions of the organs in the pelvis. When the fibroid possesses a thin slender pedicle, he transfixes the stalk with a needle armed with a double thread of silk and ties it securely. When the pedicle is short and broad it is a good plan to incise the capsule, enucleate the tumour, and then bring the flaps firmly together with silk threads. After cutting away the redundant portions of the capsule the edges are closely united with a continuous suture of thin silk.

When a fibroid is embedded in the wall of the uterus, the tumour is exposed by cutting through its capsule and then pulled out with a volsella. As a rule, it comes out quite easily and the walls of the empty capsule bleed freely. Bleeding vessels are secured with forceps, then tied, and mattress sutures are inserted in such a way as to bring the walls of the capsule into firm apposition. The number of sutures varies with the size of the fibroid. In some instances a uterus contains six or even ten fibroids and all of them may be enucleated at one operation. Sometimes the oozing from the bed of the fibroid is difficult to control and the surgeon is driven to remove the uterus. This is a common sequel to myomectomy.

In removing a submucous fibroid, the surgeon opens the uterine cavity, and after extracting the tumour he

closes the incision in the uterine wall as after a Cæsarean section.

In all these operations the great difficulty is to obtain a perfect hæmostasis, and it is this which makes the risks of myomectomy so much greater than hysterectomy.

All writers admit that the ideal method of dealing with fibroids is to remove them and conserve the uterus, tubes and ovaries, but in actual practice this operation can only be carried out in a small proportion of cases, probably in less than ten per cent.; moreover, the preservation of the uterus is not always an advantage to the patient, because in a woman during the child-bearing period of life, we cannot assure her after removing a fibroid by myomectomy or enucleation that other fibroids may not grow and become formidable tumours, for she probably has what I have called seedling or latent fibroids (see p. 33) in the walls of the uterus, and experience teaches that this is a real danger, for several patients, from whom I have enucleated fibroids by the abdominal and the vaginal route, have subsequently come again under my care with tumours so large and troublesome as to require a repetition of myomectomy, or they have submitted to hysterectomy. I have also on several occasions removed the uterus from women on account of large fibroids and from whom fibroids had been removed several years previously by other surgeons, and have published accounts of particular cases.

These are conditions in which myomectomy and enucleation are legitimate procedures :—

1. A young woman contemplating marriage ; or a married woman anxious for offspring.

Although I performed myomectomy often in my early operative experience, I only know of five patients who subsequently bore children.

2. Sessile subserous fibroids are very liable to undergo red degeneration in a pregnant uterus, and the pain accompanying this change often leads the surgeon to an erroneous diagnosis (see p. 117). When the abdomen is opened, the surgeon expects to find an ovarian tumour with a twisted pedicle, or a gravid tube which has burst, but finds a fibroid. In these circumstances he prefers to enucleate the tumour instead of removing the gravid uterus. In 1891, I was able to record a case in which I successfully enucleated a fibroid from the wall of a gravid uterus without interrupting the pregnancy, which went safely to term. This practice has also been successfully carried out by other surgeons, and is a further illustration of the tolerance of the uterus, when gravid, to physical insults.

3. Myomectomy is a safe undertaking in patients at, or after the menopause, where a stalked fibroid causes trouble by twisting its pedicle, or by shrinking sufficiently so that it can fall into the true pelvis and become impacted. Occasionally the pedicle of such a tumour entangles and strangles a loop of small intestine. It is, however, right to state that a woman, who has had a subserous fibroid removed by myomectomy, runs a

greater risk of intestinal obstruction from adhesion of intestine to the stump of the tumour than from entanglement of intestine by the fibroids before operation. (Chapter XX.).

All surgeons agree that abdominal myomectomy is attended with a greater mortality than hysterectomy. Olshausen in the years 1900-5 performed enucleation on 124 patients with 14 deaths. Eight of the women subsequently came under his notice with recrudescence of fibroids.

Christopher Martin has performed abdominal myomectomy seventy-three times with one death, but he does not refer to the number of recrudescences.

In twelve years I performed abdominal myomectomy and enucleation on ninety-five women. Of these, three died as the result of the operation. In 10 of the patients other fibroids grew in the uterus and hysterectomy became a necessity some years later; of these, 2 died from the operation. One patient from whom I removed a submucous fibroid by the abdominal route died 4 years later from cancer arising in the body of the uterus.

This is also worth mention; on ten occasions I have performed hysterectomy on women for troublesome menorrhagia associated with submucous fibroids who had had hysteropexy performed some years previously.

Since 1906, I have rarely performed abdominal myomectomy or enucleation; increasing experience has taught me that when a uterus contains a fibroid which justifies the opening of the abdomen it is almost

invariably a wiser and safer proceeding to remove the uterus with the tumour. Experience also teaches this stern lesson :—**After the enucleation of a fibroid in the procreative period of life a woman is more likely to grow another fibroid in her womb than to conceive successfully.**

MARTIN, C.—On the Dangers and Treatment of Myoma of the Uterus. *Lancet*, 1908, i., 1682.

OLSHAUSEN R.—In Veits *Handbuch der Gynakologie, Wiesbaden*, 1907, ii., 607.

CHAPTER XVIII.

Vaginal Myomectomy and Vaginal Hysterectomy.

Vaginal Myomectomy.—Under this heading the various operations for the removal of fibroids from the cervical canal and the cavity of the uterus will be described.

In these operations the patient is prepared as for hysterectomy and the instruments used are the same, with the addition of a Sim's speculum, Clover's crutch, and a set of uterine dilators.

The Steps of the Operation.—These vary according to the size, character and position of the fibroid. It will be convenient to describe the simplest condition, and then those which offer difficulty. In all these operations the patient is secured in the lithotomy position.

1. **A Pedunculated Fibroid Protruding from the Os Uteri.**—In such a case the surgeon ascertains the point at which the pedicle is connected with the uterus, and assures himself that the uterus is not partially inverted. A submucous fibroid protruding through the mouth of the womb often resembles a partially inverted uterus. The distinction is made in the following way :—

On careful bimanual examination, if the uterus be inverted, the fundus of the uterus will not be felt in its

usual position, and in thin patients a cup-shaped depression will be felt instead of the uterine body. In an inverted uterus the sound will pass less than the normal $2\frac{1}{2}$ inches, whereas, if a fibroid is present without inversion the sound will pass to a normal, or greater than normal distance. Neglect of these precautions has led to fatal results, because when the surgeon mistakes an inverted uterus for a fibroid and cuts it off, he not only opens up the peritoneal cavity, but the cut walls of the uterus bleed freely and patients have died after such an accident from the loss of blood. The danger is greatest when a fibroid growing from the fundus of the uterus inverts the organ and drags it into the vagina (Fig. 10).

A fibroid with a slender stalk is easily detached by being seized with forceps and twisted round and round until it comes off. This twisting torsions the pedicle and occludes the vessels in it. The surgeon examines the uterine cavity in order to ascertain if other polypi are present. The vagina is then douched and tamponed.

2. **A Sessile Fibroid Protruding at the Os Uteri.**—When such a tumour does not exceed the size of a golf ball it may be removed in the following manner :—

The cervical canal is dilated until it admits the finger ; this enables the surgeon to determine the size and position of the polypus. He divides the capsule of the tumour with a scalpel and with a raspatory shells the tumour out of its capsule. The fibroid is seized with a stout volsella and dragged out of its bed and withdrawn from the uterus. The uterine cavity is

swabbed out in order to remove blood and clot. When there is free bleeding the cavity may be plugged with a strip of sterilized gauze.

The chief danger in such an operation consists in seizing the tissue of the uterus instead of the tumour, and tearing it When too much violence has been exerted in dragging the fibroid from its capsule the wall of the uterus has been torn through. An undetected accident of this kind has led to fatal intrauterine bleeding, and when the endometrium has been septic, rapidly fatal peritonitis has followed. Accidents of this kind, as a rule, entail vaginal hysterectomy. In removing a fibroid from a uterus recently gravid greater care is necessary than with an unimpregnated uterus, for the walls of the organ are soft and easily torn or perforated. When the uterus has been torn in the course of surgical manipulations and bleeds freely it is, as a rule, wise to remove it.

3. **Sessile and Pedunculated Submucous Fibroids with an undilated cervical canal.**

In this operation the surgeon is unable to assure himself of the actual conditions until he dilates the cervical canal and explores the uterine canal with his finger. On detecting a fibroid he determines its size, seat and character. A small tumour is seized with forceps and extracted, as explained in the preceding sections. Occasionally the surgeon finds a fibroid which he can detach, but after detachment it is too big to be extracted from the uterus. The delivery of such tumours may be effected in a variety of ways. For

example, the fibroid may be seized with a volsella and dragged into the cervix, then with scalpel or scissors the surgeon cuts away portions to reduce its bulk. With care a fibroid as big as a cocoa-nut may be extracted piecemeal (morcellement of a fibroid).

The removal of a sessile submucous fibroid through a cervical canal with rigid walls is often a difficult matter. In some cases the operation is facilitated by dividing the walls of the canal on each side and, after extracting the fibroid, the cut edges are joined together with sutures.

In some cases the bladder may be turned off the neck of the uterus and the front wall of the cervix divided longitudinally. I have extracted fibroids from the uterine cavity in this manner on several occasions. The edges of the incision are joined with sutures.

A fibroid, of moderate dimensions, growing from the anterior wall of the neck of the uterus and protruding into the vagina is easily removed by peeling the bladder from the cervix then, after incising the capsule, the tumour is dragged from its bed. Free bleeding, occasionally difficult to control, follows this manœuvre ; it is useful to secure the vessels with long hæmostatic forceps and leave them in position forty-eight hours.

It is not an uncommon accident in the process of removing submucous fibroids to perforate the walls of the uterus by dilators, sounds, or forceps. When the interior of the uterus is clean a perforation may do no harm ; if it be septic, the patient will run great risks of peritonitis. When the hole in the uterus is big, fatal

intra-peritoneal bleeding may follow, or the hole will allow intestine to prolapse into it and cause intestinal obstruction. The safest course in accidents of this kind is to perform vaginal hysterectomy. In the hands of those who trust to luck after such accidents, the patient runs a risk of dying of hæmorrhage or septic peritonitis. In pre-antiseptic days the mortality after the operation styled "enucleation of uterine polypi" was very high. Forty years ago this method was advocated for the removal of sessile submucous fibroids, and it was carried out on the following plan:—After dilating the cervical canal, the surgeon deliberately split the capsule of the tumour with a knife and then separated it from the fibroid with a raspatory. The contractions of the uterus extruded the tumour from its capsule, and in the course of a few days the fibroid as a stinking slough could be extracted. The mortality of this method for removing submucous fibroids was very high. The patients often died from hæmorrhage, or from sepsis, or from a combination of hæmorrhage and sepsis.

In the days before hysterectomy became an established method of dealing with submucous fibroids, the persistent efforts sometimes made to forcibly drag a large fibroid out of the uterus, often left this organ so torn and maimed that the removal of the uterus would have been a merciful proceeding.

Vaginal Hysterectomy.

The removal of the uterus, with or without the ovaries, and the Fallopian tubes is an operation rarely performed

for fibroids. Occasionally, it is a very useful method especially when the uterus contains a small septic fibroid, or when pyometra is associated with a fibroid polypus. It happens from time to time that the surgeon dilates the cervical canal with the expectation of finding a sessile submucous fibroid, and finds instead that he has to deal with a fibrotic uterus. In some instances, the enlargement produced by the disease known as adenomyoma has been mistaken for a submucous fibroid, and the surgeon had endeavoured to remove the unencapsuled adventitious tissue, and finally ended by removing the uterus. Whenever an operation is arranged for what is intended to be a vaginal myomectomy the surgeon should be prepared to perform vaginal hysterectomy for, if he accidentally tears or perforates the uterus in the course of the operation, or fails to remove the tumour, or is assailed with uncontrollable bleeding, if he be prepared with the implements for the removal of the uterus, and has the courage to remove it, he has the means of emerging with credit from an awkward dilemma. Let me illustrate this from my own practice :—

The wife of a doctor had been duly delivered of her second child ; coincidently with the expulsion of the placenta a sessile submucous fibroid protruded at the widely opened mouth of the uterus : it disappeared within the uterine cavity as soon as the womb contracted, and during the protracted lying-in gave rise to troublesome bleeding. Seven weeks later I was asked to remove the fibroid. In due course, after dilating the

cervical canal a sessile fibroid, somewhat larger than a golf ball, was felt at the fundus of the uterus. Whilst dilating the cervical canal the largest dilator tore through the soft wall of the uterus at the base of the tumour. The slit was wide, the uterus soft and friable, After explaining the situation to the patient's husband I removed the uterus through the vagina with only the nurse to help me. The patient recovered.

Steps of the Operation.—When the vagina is capacious and the uterus small or only slightly larger than normal, this operation is simple. When the uterus is large and the vagina narrow, as in spinsters, at or past middle-life, it can only be described as a surgical struggle.

I have tried many methods of performing vaginal hysterectomy, nearly all are satisfactory, but they fall into two categories: Ligature methods, and clamp methods. For some years I have exclusively adopted clamps. **Success depends on the selection of suitable cases, not on the method.**

The patient properly prepared and suitably attired is placed in the lithotomy position and arranged so that the perineum faces a good light. It is a great advantage to use a table which can be tilted on the Trendelenburg principle. (Fig. 35). The surgeon, seated at a convenient level, introduces the beak of a Sim's speculum into the vagina and a sound into the bladder, in order that the assistant may keep the surgeon informed of the relation of the bladder to the uterus throughout the first stages of the operation

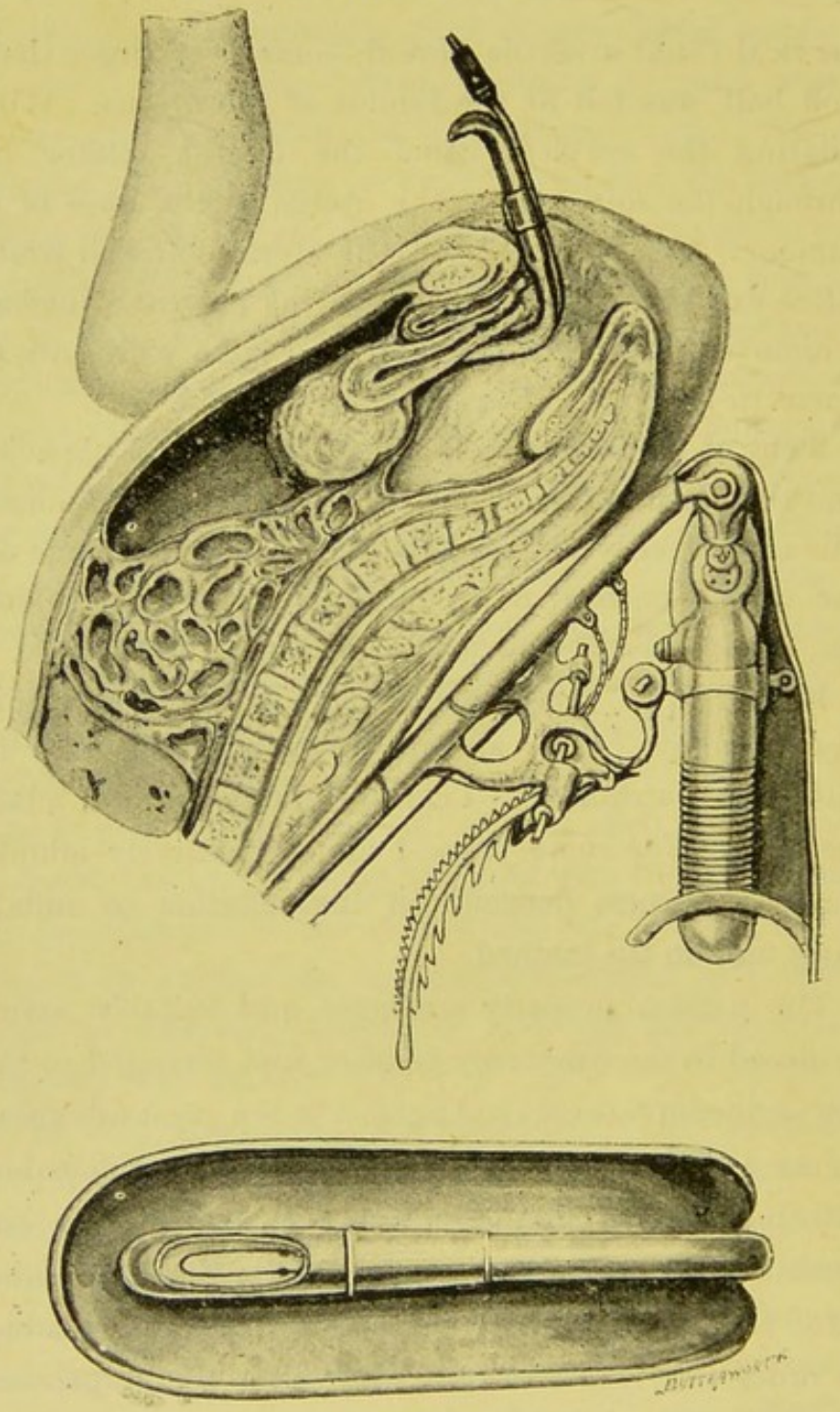

Fig. 35.—A patient arranged in the Trendelenburg position for vaginal hysterectomy, with Ott's electric speculum in use. (After Prof. Dm. de Ott).

The cervix is seized with a stout volsella and the mucous membrane on its anterior aspect is transversely divided with a scalpel at a point sufficiently low to avoid cutting the bladder; with the handle of the scalpel the bladder is carefully detached until the lowest limit of the utero-vesical pouch is reached and opened. Throughout this stage the surgeon constantly informs himself of the position of the bladder by manipulating the sound or catheter.

The incision in the mucous membrane is now carried round the cervix; the recto-vaginal pouch is opened more safely with scissors than with a scalpel. As soon as the recto-vesical pouch is opened it is useful to catch the cut edge of the mucous membrane with fenestrated forceps, as this controls the bleeding at that spot. Strong clamp forceps are now applied to the broad ligament on each side of the uterus, and if properly applied they secure the uterine arteries. The tissues between the uterus and the clamps are divided with scissors. The uterus can now be drawn down sufficiently to allow a clamp-forceps to be applied to the broad ligament at each angle of the uterus: these clamps secure the ovarian arteries. The tissues between the clamps and the uterus are divided and the uterus comes away. If all the tissues have been properly included in the clamp the wound should be free from blood. If any vessel has been missed by the clamps it can be secured separately. After the uterus has been removed the inspection of the pelvis is facilitated by the use of Prof. Ott's electric speculum. (Fig. 35). In this way

the field of operation within the pelvis is illuminated and any blood vessel which may be bleeding is easily seen and readily secured. A strip of gauze is introduced into the vagina to prevent the forceps pressing on the perineum. The clamps remain on for forty-eight hours at least. The use of clamps shortens the time occupied in the operation and avoids troublesome sequelæ due to the separation of ligatures.

It is most important to caution nurses never to give vaginal douches to women during the ten days following a vaginal hysterectomy. An indiscretion of this kind will lead to a fatal result from peritonitis, for the septic fluid in the vagina will be forced into the pelvic section of the abdomen.

The after-treatment and the sequelæ are the same as for abdominal hysterectomy, but the convalescence is shorter.

CHAPTER XIX.

Hysterectomy.

After-Treatment: Risks and Sequelæ.

Hysterectomy is attended by several risks, immediate and remote, which may spoil the best planned and most carefully executed operation. Some of these may be avoided by attention to the details of what is known as after-treatment.

The patient is returned to bed with gentleness and usually lies on her back, but many anæsthetists prefer to turn her on one or other side for an hour, until there is a fair return to consciousness; she then lies on her back and a pillow is placed under the knees. Hot-water bottles should not be placed in bed with the patient until she is completely conscious: they are rarely needed. The healing of blisters caused by hot-water is a slow process.

During the first twelve hours the patient complains of pain, thirst and vomiting. Thirst is, in a measure, relieved by the administration of ten ounces of normal saline solution by the rectum an hour after the patient returns to bed; the addition of a teaspoonful of glucose to the solution is useful, and in some cases relieves vomiting. The saline solution may be repeated in four hours. The patient may be allowed to wash her

mouth frequently with warm or cold water. If there be no vomiting she may swallow some water from time to time ; as a rule, it is better to abstain from swallowing anything for eighteen hours ; the best way to avoid post-anæsthetic vomiting is to keep the stomach empty.

There is always pain after hysterectomy, partly due to tension on the sutures and to colic. This, when severe, may be relieved by a quarter of a grain of morphine given hypodermically. The routine administration of morphia is injudicious and rarely necessary. Aspirin in 10 grain doses is very useful and not harmful.

At the end of twenty-four hours tea, barley-water or milk-and-water may be allowed in small quantities, and if retained the quantity may be increased. On the third day the rectum is cleared with an enema ; then the patient may take fish, chicken, etc., and is soon able to have convalescent diet.

When vomiting is troublesome it may be necessary to keep the patient on nutrient enemas for several days. When there is tympanites this is relieved by the insertion of a rectal tube every four hours ; when this fails a turpentine enema should be given.

After hysterectomy the patient should be encouraged to pass water naturally, but many are unable to urinate lying on the back ; in such the bladder is emptied by a glass catheter sterilized by boiling immediately before use. Before passing the catheter the nurse cleans the parts about the urethral orifice. Cleanliness and care with the catheter must be enforced : cystitis causes much misery. During the first week, the quantity of

urine passed is measured, and the amount recorded in the note book.

The temperature should be taken every four hours during the first week and recorded. The first record is usually subnormal; in twelve hours it rises to normal or beyond. During the first day it may rise to 100° without causing alarm; beyond this, if accompanied by a rapid pulse, an anxious face, distended belly and frequent vomiting it will cause anxiety. A temperature of 101° or 102° unaccompanied by other symptoms is not a cause for alarm, unless maintained.

The pulse is a valuable guide and often more trustworthy than the temperature. When steady and full, there is no need for alarm, but when its rate increases to 120 or 130 per minute, and is thin and thready, then there is danger even if the temperature be only slightly raised.

On the seventh or eight day the sutures may be removed; if the operation has been undertaken for a septic fibroid, two or three should be allowed to remain a few days longer. As a rule, the wound is soundly healed in fourteen days, and if the convalescence has been non-febrile the patient can now leave her bed. Women with a thin abdominal wall, and especially those who earn their living by hard work, should wear a well fitting abdominal belt for a year, even when the incision has been closed with buried sutures.

Post-Operative Complications.—Recovery after hysterectomy for fibroids may be hindered by many complications and completely marred by a few.

Women after operations for fibroids are liable to the risks and sequelæ common to all abdominal operations. Such risks as posture-paralysis affecting the arm, or the legs, if she has been placed in the Trendelenburg position, or in the lithotomy position with the assistance of Clover's crutch. These things are avoidable accidents. The anæsthetic may be responsible for post-operative bronchitis and pneumonia. Septic parotitis sometimes occurs after hysterectomy, but I have never had such a sequel in my own practice.

Intra-peritoneal bleeding from the slipping of a ligature from the ovarian or the uterine arteries is a serious risk, and the chance of its occurrence diminishes with experience. Post-operative hæmorrhage is much more frequent after total than after subtotal hysterectomy.

The risks of the wound bursting open may happen after hysterectomy if the sutures are removed too early, and especially if the wound becomes infected. This accident is more common in the practice of surgeons who use catgut for buried sutures and as it is a matter of importance, especially in relation to thrombosis, it is discussed at length in Chapter XXIII. Here it is sufficient to mention that this is a serious accident and occurs during violent coughing, or vomiting. There is great strain on the sutures during these acts, and when they do not cause the wound to gape, sutures are strained and knots loosened, conditions which ultimately lead to yielding scars. Sometimes, too, in the course of convalescence, vomiting or coughing

will cause muscle and fascia to gape and allow intestine or omentum to intrude into the wound. If the intestine be nipped the patient will suffer from intestinal obstruction, which in such circumstances has ended fatally.

Post-operative septic peritonitis due to infection during the operation is now exceedingly rare. Aseptic preparations are carefully carried out and surgeons are now so particular in what may be called the ritual of an operation that when a dab, gauze, or an instrument is left in the abdomen accidently, it does not, as in former days, cause septic and rapidly fatal peritonitis, but the sequestered article becomes encysted in the pelvis, or makes its way insidiously into the bowel or the bladder, to be discovered at a secondary operation and serve as a means for the surgeon to be mulcted in damages. The responsibility of the operator in these matters has been determined in an action-at-law. The size, variety and number of surgical implements, and sponges, or their substitutes, accidentally left in the abdomen after operations are beyond belief.

In the operation of total hysterectomy, the vagina is opened up and the gloves of the surgeon are liable to contamination, and as this accident has some relationship to post-operative thrombosis and embolism, especially in connection with buried sutures, it is considered in Chapters XXIII. and XXIV.

Tetanus, the dread complication of wounds, was formerly an occasional sequel to pelvic operations. Some cases which have been reported in the Twentieth

Century as post-operative complications of hysteropexy occurred in patients in whom the abdominal incision was sutured with catgut, and the tetanus bacillus has been found in the catgut remaining unused after the operation.

Intestinal complications occur during the performance of hysterectomy and afterwards: they are important enough for special consideration. This is also true of troubles caused to the bladder and ureters, and indirectly the kidneys, by uterine fibroids.

CHAPTER XX.

Intestinal Complications connected with Hysterectomy for Fibroids.

Intestinal complications connected with fibroids are not common, but they occur with sufficient frequency to demand the careful consideration of surgeons. Intestines, small and great, are liable to be injured in making the abdominal incision, and the transverse colon or its sigmoid flexure sometimes adheres to the surface of the uterus, or to a pedunculated fibroid. A coil of adherent intestine is sometimes torn in the process of separation from the tumour, and will require resection or an anastomotic operation to repair the injury. A fibroid burrowing between the layers of the broad ligament will, on the left side, strip the peritoneum from the rectum and on the right side use up the meso-colon sometimes to such an extent that the vermiform appendix lies on the crown of such a tumour; in this position it has been mistaken for an adhesion and divided, the surgeon being ignorant of the accident until it was revealed in the post-mortem room.

When a fibroid adheres to the floor of the pelvis, the adhesions should be carefully detached and the tumour elevated cautiously, for undetected holes in the rectum, as a rule, end fatally. The diagnosis of fibroids is

notoriously uncertain, and a massive cancer in the sigmoid flexure of the colon adherent to the fundus of the uterus occasionally resembles a fibroid so closely as to mislead the unwary. It is by no means uncommon for a surgeon in the course of a hysterectomy for fibroids to discover a cancerous tumour in the rectum; this has happened to me. On seven occasions after removing the uterus for fibroids I have resected six or more inches of a cancerous colon ; in each instance the double operation was well borne and ended successfully. In the course of removing a huge fibroid reaching to the ensiform cartilage, the tumour adhered to the duodenum, near its junction with the jejunum ; in separating the tumour from the gut a hole appeared in the duodenum. This adventitious opening was closed by a purse-string suture and the patient convalesced without incident. She was in good health six years later.

A rare cause of death after hysterectomy is perforating ulcer of the stomach. I have had such a case, it occurred a few days after the operation and the patient died. Rosthorn had a similar experience and Olshausen has seen four examples of this sequel.

The perforation of the ileum due to being crushed by a calcified fibroid in consequence of a fall is worth mention among intestinal complications (see p. 20).

Intestinal Obstruction.—It is difficult to estimate with any approach to accuracy the relative frequency of intestinal obstruction after operations on the uterus. The danger is real. The obstruction may be acute or chronic ; it occurs sometimes within thirty hours of

the operation, or may be delayed for months or years. The causes may be arranged under four headings :—

1. Adhesion of small intestine to the abdominal wound.
2. Adhesions to a stump, or raw surface in the pelvis.
3. Strangulation by a band, or a narrow piece of omentum.
4. Incarceration and strangulation of intestine in the sac of a scar hernia.

The most acute form of strangulation arises shortly after the operation or during convalescence. It may be due to an adhesion of a piece of intestine to the suture line of the abdominal incision ; if the sutures give way, or are loosened by straining efforts during vomiting, a knuckle of gut may be strangled in the wound between two sutures. A piece of intestine may adhere to the stump left after the removal of the ovary and tube, or to the line of suture left after amputation of the uterus in subtotal hysterectomy. In rare instances, small intestine has been included in a ligature applied to a pedicle.

From a careful consideration of this subject I have come to the conclusion that post-operative intestinal obstruction is more frequent after ovariotomy and myomectomy than after hysterectomy, because the stump or pedicle left after the removal of an ovarian tumour lies higher in the pelvis, and in closer relation to the ileum and jejunum, than the line of suture which results from a properly performed subtotal hysterectomy. This opinion receives support from the frequency with which intestinal obstruction occurs in

the practice of those surgeons who, in performing subtotal hysterectomy, leave a large piece of the neck of the uterus sticking up like a post on the floor of the pelvis, and it is usually the sigmoid flexure of the colon which adheres to the stump. No instance of post-operative intestinal obstruction has occurred in my practice after vaginal hysterectomy.

Post-operative intestinal obstruction is a serious condition ; it requires prompt recognition and equally prompt treatment. Obstruction to the small intestine occurs earlier and is more acute than in the large, and unless the surgeon acts quickly and decisively the patient dies. The only rational treatment consists in re-opening the abdomen, finding the obstructed coil of bowel and setting it free. The precise methods to be adopted after the obstruction has been found depends on the part of the intestine affected, the condition of the bowel and the state of the patient. When the gut is damaged and requires such measures as resection, or ileo-colostomy, indeed anything which will require the patient to remain under an anæsthetic for a long time, it is preferable to adopt some simple method of relieving the obstruction, like colostomy, and when the acute signs have subsided, to complete the relief deliberately on a suitable occasion.

BLAND-SUTTON, J.—On Perforation of the Stomach and Small Intestine as a sequel to Ovariotomy and Hysterectomy. *Journ. of Obstet. and Gyn. of the Brit. Emp.*, 1909, xv., 197.

CHAPTER XXI.

The Bladder and Ureters in Relation to Uterine Fibroids.

The intimate relationship of the uterus and the bladder occasionally leads to complications of great clinical importance which it is necessary for the surgeon to appreciate: a lack of familiarity with them will lead him into awkward errors of diagnosis and the commission of some accidents when performing pelvic operations.

Fibroids often grow so slowly and insidiously that their existence is unsuspected until they have appropriated all the available space in the pelvis, then, by pressing on the urethra they cause retention of urine.

There are two methods by which uterine fibroids interfere with the bladder and hinder urination. When a fibroid fits the true pelvis so tightly that the tumour cannot rise upwards into the hypogastrium it is said to be incarcerated or impacted, and pressing on the urethra it hinders the voiding of urine. (Fig. 36). The simplest form occurs with a submucous fibroid and the signs are the counterpart of those produced by a retroverted gravid uterus, for the slowly enlarging fundus, having filled up the hollow of the sacrum, prevented from rising out of the pelvis by the promontory of the sacrum, elongates and constricts the urethra, producing retention of the urine and distension of the bladder.

The most insidious kind of impaction happens with cervix-fibroids. In describing them it was mentioned that when one of these tumours attains a transverse diameter of ten centimetres (4 in.) it has, as a rule, used up the pelvic space, and, pressing on the urethra,

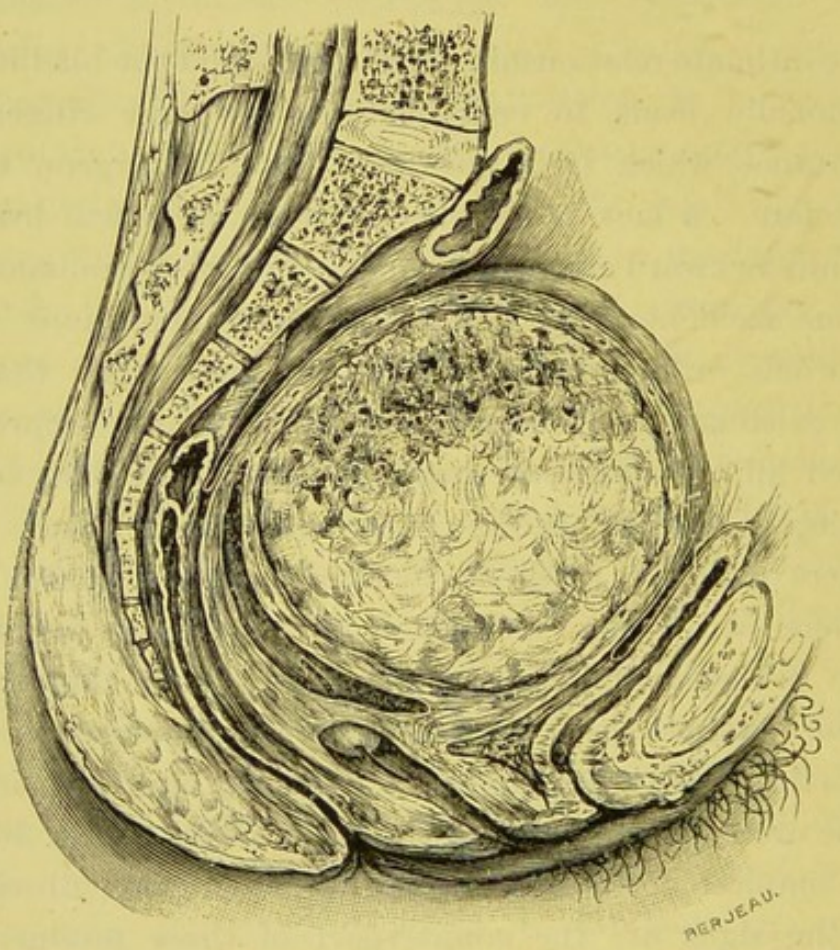

Fig. 36.—Frozen section of a pelvis in which the uterus containing a large fibroid is impacted under the promontory of the sacrum.

hinders the voiding of urine and leads to retention of urine. This is a well-known condition and a clinical formula may be expressed in regard to it in the following terms :—

When a woman, between thirty-five and forty-five years of age, seeks relief because she suffers from retention of urine for a few days prior to each menstrual period, it is almost certain she has a fibroid in her uterus. The occurrence of this difficulty shortly before each menstruation is due to the turgescence of the tumour; this congestion in some fibroids is such that a murmur (or hum) is audible on auscultation. With the issue of blood, the tumour shrinks and the murmur disappears until immediately before the advent of the next menstrual period.

The frequent recurrence of retention leads to changes in the tissues of the bladder, for its walls thicken, and its capacity increases; when such a bladder is distended it rises high in the abdomen and resembles a large cystic tumour. Cases have been reported in which the urinary bladder, as the result of chronic retention, has held six or more pints of urine. The toleration of the bladder under these conditions is very remarkable, and it is difficult to understand why it does not burst. If the urine becomes septic the vesical mucous membrane is liable to slough with serious consequences to the patient.

Chronic retention of urine due to pressure of a fibroid leads to dilatation of the ureters, sacculation of the kidneys and permanent damage to their secreting tissues. The evil effects of the pressure of a fibroid on the urethra were well shewn in a case I had an opportunity of examining:—A woman forty-five years of age had a submucous fibroid which caused retention;

the urine became septic, and a large phosphatic calculus formed in the bladder. This stone was crushed by an able surgeon and the fragments removed by an evacuator. She died a few days later. The bladder was much enlarged and its wall thickened ; the ureters were dilated, the orifice of each was so big as to admit my index finger. The kidneys were loculated cysts with very little cortical substance, and in the pelvis of each kidney there were fragments of the calculus. The post-mortem examination shewed that after the stone was broken up in the bladder with the lithotrite, the stream of water from the evacuator forced the smaller fragments from the bladder up the ureters to the pelves of the kidneys. Such a sequence is very unusual. Severe cystitis sometimes follows retention due to the use of a dirty catheter, and it sometimes remains a troublesome complication after the fibroid which caused the disturbance has been removed.

When the bladder is moderately distended it rises slightly above the pubes and there is dulness on percussion in the hypogastrium, but there is, as a rule, no indication of swelling on inspection. When the bladder is overfull the hypogastrium is occupied by a pyriform swelling which may extend as high as the navel. It is surprising that in this condition the bladder has been often mistaken for a tumour and the abdomen has been opened in this belief. It should be a golden rule with a surgeon never to express an opinion concerning the nature of a median cystic swelling in the lower abdomen without having the bladder previously

emptied with a catheter, and, in doubtful cases, he should pass the catheter himself, for when the urethra is obstructed by a cervix-fibroid there is often difficulty in passing a catheter, and the nurse may imagine that she has succeeded in doing this and mislead the surgeon, then he proceeds to open the abdomen and to his dismay finds that he has inadvertently opened the urinary bladder.

Observations in the operating-room teach us that an overfull bladder is occasionally opened by surgeons when incising the abdominal wall, but I am sure the major number of such accidents happen when a chronically distended bladder contains a moderate quantity of urine. The frequent recurrence of retention leads to the displacement of the peritoneum from the lower part of the abdominal wall, then the fundus of the bladder lies above the pubes and in contact with the abdominal wall uncovered by peritoneum. When the surgeon has acquired some experience in pelvic operations he soon learns to recognise this condition, for, after incising the fascia in the middle line, instead of coming to the peritoneum he finds himself involved with tissue which easily bleeds ; this makes him alert to the abnormal condition. In such a case it is best to open the peritoneum near the umbilicus and ascertain the position of the bladder. When the bladder is accidentally opened the incision should be closed with sutures of fine silk. The bladder is more often injured in the process of separating it from adhesions to the uterus, and especially when being detached from the

neck of the uterus in the course of total hysterectomy. Serious accidents to the bladder happen when it is spread over the front of those large tumours known as broad ligament fibroids (see p. 161).

The bladder is sometimes injured in suturing the flaps of the cervical stump in the course of a subtotal hysterectomy, or in stitching the vaginal wall in total hysterectomy. This accident may cause the patient much discomfort, for the sutures will work their way into the bladder and cause great vesical irritation. Sutures within the bladder serve as nuclei for phosphatic concretions. Whenever patients who have had hysterectomy performed complain of frequent and painful micturition, and these troubles persist, a cystoscopic hunt should be made for ligature loops.

In the course of vaginal hysterectomy the surgeon sometimes wounds the bladder in reflecting it from the neck of the uterus. When the surgeon realizes that he has wounded the bladder (this by no means always happens) he is tempted to close the opening with sutures. This proceeding is unnecessary, for a small opening will close spontaneously, whereas sutures in such circumstances become septic, find their way into the bladder and become the nucleus of a phosphatic concretion. In order to shew how troublesome ligatures may be when they ulcerate into the bladder the following case will serve :—

A woman had her uterus removed for fibroids in Australia, and after the operation suffered from frequent urination. She came to England with her urine

fœtid and purulent; often it contained calculous material. On dilating the urethra the upper end of the cervical stump was found within the bladder, bristling with silk ligatures arborescent with phosphatic deposit. The silk loops were removed, the urine soon became acid in spite of the anomalous position of the cervical stump. In this instance it was clear that the stump of the uterus became septic, the abscess which formed in connection with it burst into, and infected the bladder; the stump slowly ulcerated through the wall of the bladder and projected into its cavity.

Injuries to the **Ureters** are liable to happen in all forms of hysterectomy, but the majority occur when the neck of the uterus is removed.

The injuries to which the ureters are exposed in the course of removing the uterus are the following :—

1. One or both ureters are sometimes included in the ligatures applied to the uterine arteries.

2. One or both ureters have been cut or completely divided in removing the uterus.

3. A piece of the ureter (as much as 7 centimetres) has been exsected.

4. A ureter has been transfixed by a needle and thread when suturing the layers of the broad ligament.

5. A tumour arising from the lower part of the pelvis, between the layers of the broad ligament, will sometimes carry the ureter over its crown like a strap. In this position it may be mistaken for an adhesion.

6. In vaginal hysterectomy the ureters have been accidentally clamped.

When a ureter has been injured during the performance of subtotal hysterectomy, and the accident has not been noticed at the time of the operation, the urine leaks into the connective tissue of the broad ligament and the extravasation may extend to the loin. When the urine leaks into the pelvis it will, in a few days, escape through the abdominal wound. In cases where the neck of the uterus has been removed, as in total or in vaginal hysterectomy, and the ureters have been injured, the leakage of urine through the vagina soon apprises the surgeon of the accident. When both ureters have been tied, or clamped accidentally, anuria is the immediate consequence.

When a ureter is injured in the course of an operation it is important that the surgeon should recognise the accident, as this enables him to deal with it at once.

The primary treatment for a ureter injured in the course of a pelvic operation depends in a large measure on the ability, judgment and experience of the surgeon, as well as on the extent of the injury.

1. When a ureter is partially divided the opening may be closed with sutures of fine silk.

2. When the duct is completely divided the cut ends may be invaginated, the upper into the lower.

3. If a piece measuring five centimetres, or more, has been exsected, two courses are open. (a) A ligature may be applied to the upper end with the prospect of causing atrophy of the kidney. (b) The kidney may be removed if its companion is healthy; otherwise the proximal end of the ureter should be secured in the

wound, or be brought out through a stab wound in the loin.

4. When the cut ends of a ureter cannot be safely joined, the proximal end should be engrafted into the bladder. Many cases have been successful, but there is reason to believe that when the ureter has been engrafted into the bladder its walls become sclerosed by chronic ureteritis and the lumen narrowed and obliterated.

The sclerotic obliteration of a ureter engrafted into the bladder is a slow process and it does not happen in every case. For example, Lockyer, in removing a fibroid which burrowed between the layers of the broad ligament wounded the bladder and divided the right ureter ; he sutured the hole in the bladder and removed the right kidney. During the twenty-four hours following the operation there was anuria. On re-opening the abdomen and finding that the left ureter had been divided he engrafted its proximal end into the bladder, through the wound which had been already sutured. Convalescence was disturbed by a urinary fistula, but the woman recovered and reported herself in good health three years later.

When a ureter has been injured in the performance of total hysterectomy and is unnoticed, urine escapes by the vagina, and at first there is doubt whether the leak is due to an injury to the bladder or to a ureter. In such conditions the quantity of urine voided through the urethra is compared with that which escapes through the vagina. If the quantities be equal, the

leak is in the ureter; the surgeon has to decide which ureter has been injured, but he need be in no hurry to determine this, for a fistula due to partial injury of a ureter sometimes closes; if it persist for more than three months it will not heal spontaneously.

In order to ascertain which ureter is injured the surgeon avails himself of the cystoscope. This instrument will not only enable him to determine the point, but he can sometimes learn whether a ureter is completely divided.

Jonas related the details of a case in which he performed total hysterectomy for fibroids and on the tenth day the nurse reported the escape of urine from the vagina. The urine voided from the bladder measured on the average fifty ounces, but it now fell to twenty-five ounces. On cystoscopic examination urine could be seen issuing from the right ureteric orifice; at first the left orifice could not be seen, but on careful watching a movement was detected similar to the contraction of a ureter discharging urine, but no fluid came from the opening. This aimless movement of the ureter, known as "empty contraction," indicates that there is not complete interruption of the ureter. Such cases should have an opportunity of healing spontaneously. This happened to Jonas's patient.

When a ureteric fistula refuses to heal and the surgeon decides to remove the kidney, he not only satisfies himself cystoscopically to which kidney the cut ureter belongs, but he will be wise on exposing the kidney to inject a coloured fluid, such as methylene blue, into

the pelvis of the kidney and then ascertain if it escapes by the leak before removing the organ. The danger of removing the kidney belonging to the undamaged ureter is real; Morris reported a case in which this happened: A woman had total hysterectomy performed for a cervical fibroid by a gynæcologist; in the course of the convalescence a ureteral fistula was recognised, and as this failed to close spontaneously a surgical colleague performed nephrectomy, and next day found to his chagrin that he had removed the kidney belonging to the uninjured ureter. Serious accidents of this kind are less likely to happen now, because the surgeon can avail himself of the cystoscope and ureteral catheter; with these instruments it is possible, not only to decide with certainty which ureter in injured, but also to determine the position and extent of the damage.

I was present at a hysterectomy when a gynæcologist cut three inches out of a ureter, mistaking the duct for an adhesion. He overcame the difficulty by firmly tying the proximal end of the cut ureter with a silk thread. The patient, a middle-aged woman, recovered without an untoward sign and remained well. This led me to take an interest in this method of dealing with a cut ureter, and in 1909 I expressed the opinion that "**it is possible and probable that a ureter has been ligatured in the course of an operation, and the patient has recovered, without anyone having a suspicion that such an accident has happened.**" Dr. J. D. Barney has collected and analysed the reports of sixty-two cases of injury to the ureter. Of these

sixteen were bilateral and forty-six unilateral. The majority of the accidents occurred in the course of hysterectomy. He finds that sudden occlusion of a ureter by ligature often produces no symptoms ; sometimes it is followed by pain and tenderness in the kidney, which subsides spontaneously. In some instances the accident is followed by hydronephrosis, and he reiterates the opinion expressed above that there is a strong probability that a ureter is often unconsciously ligatured.

A ureteral fistula is a serious matter for the patient. Blacker has had three of these accidents after total hysterectomy. In one the kidney was removed on account of septic changes. The second had an attack of anuria lasting twenty-four hours ; it passed off, she recovered, and the fistula healed. The third died eight weeks after hysterectomy with symptoms of pyæmia ; a small abscess had formed near the site of the fistula.

When a fistula of the ureter has healed spontaneously, the risks are by no means at an end, for the patient is liable to attacks of anuria, pyelitis, and pyæmia.

BARNEY, J. D.—The effects of Ureteral Ligation ; experimental and clinical. *Surgery, Gynæcology and Obstetrics*, 1912, xv., 290.

JONAS, E.—Temporary Uretero-Vaginal Fistula after Panhysterectomy for Fibroid of the Uterus. *Amer. Journ. of Obstetrics*, 1907, lvi., 731.

MORRIS, H.—The Surgery of the Kidney. *Brit. Med. Journ.*, 1891, i., 878.

CHAPTER XXII.

Thrombosis and Embolism in Relation to Septic Infection of the Uterus.

Thrombosis and embolism are common sequences of septic infection of the uterus. In order to consider them adequately it will be useful to review the blood supply of the uterus, which is somewhat peculiar, not only in the disposition of the main vessels and the way in which these vessels adapt themselves to the variations of size to which the uterus is liable, but also in connection with some of its morbid conditions.

The main blood supply of the uterus comes from the internal iliac arteries, each of which furnishes a uterine artery. This vessel lies in a connective tissue tract at the side of the uterus between the layers of the broad ligament. Each uterine artery reaches the uterus at the junction of the body and neck of the organ, and ascends to the fundus ; at the cornu of the uterus the artery inosculates freely with the corresponding ovarian artery from the aorta. As they course up the sides of the uterus, the uterine arteries give branches freely to the back and front of the organ which anastomose in the uterine tissues.

In the virgin uterus the uterine arteries are straight ; during pregnancy they increase rapidly in size in

correspondence with the enlargement of the uterus, and when this organ shrinks after delivery the arteries do not return to the virgin condition, they remain enlarged and lengthened, lying in serpentine folds. Repeated pregnancies produce a permanent increase in length, degree of folding, and thickness of these arteries. After the menopause the uterine arteries in multiparous women are like cords traversed by a narrow canal. This increase in thickness depends on an overgrowth of the outer coat of the arteries. This change is similar to that which occurs in the hypogastric artery after birth.

I have made many examinations of the uterine arteries of women between the fiftieth and eightieth years of life, and have never found evidence of arteritis, atheroma, or calcification in them. This is somewhat surprising in view of the frequency with which calcification occurs in fibroids.

The veins of the uterus exhibit even greater changes than the arteries. The uterine veins open into the iliac veins, whilst those which accompany the ovarian arteries open on the right side into the inferior vena cava, and on the left side into the renal vein. The uterine and ovarian veins in the pelvis are in the most intimate union between the layers of the broad ligament, where they form a venous plexus in association with the lymphatics belonging to each set of veins.

During pregnancy these veins enlarge enormously, many of them are wide enough to admit a finger. This enlargement is not confined to the veins between the

layers of the broad ligament, but often involves the ovarian veins in their extra-pelvic course. It is not rare to find lymphatics in the broad ligaments as big as goose quills.

The discovery of the part played by pathogenic micro-organisms in the production of septic diseases, especially the group formerly so dreaded by surgeons—pyæmia—has taught men that thrombosis is due to the action of micro-organisms or their toxins, and that the veins and the lymphatics are the channels through which the blood is colonized with pathogenic micro-organisms.

When the enormous size of the veins in the broad ligament during pregnancy, or when the uterus contains a large submucous fibroid, is appreciated it is easy to understand that they may become huge reservoirs of clot as a sequel to septic infection of the uterus. The clot contained in these vessels may extend into the iliac vessels, or into the ovarian veins, and I have seen both sets of vessels filled with a soft clot which extended into the vena cava and its conical termination projected into the cavity of the right auricle.

A study of the pathological conditions underlying septic infections of the uterus shews that the fate of the patient is largely determined by the virulence of the micro-organisms, and the extent to which the blood is colonized by them. We know that the leucocytes can, and often do, successfully resist these invasions. Apart from this, patients run great risks from the transport of clots to the pulmonary artery, causing death, some-

times in a few minutes. Small septic emboli arrested in branches of the pulmonary artery set up septic pneumonia; this often entails a serious illness and sometimes ends in death.

The high death-rate of sepsis arising in the uterus has induced some surgeons to remove such septic uteri by the abdominal route. This method has proved unsatisfactory; a study of the pathological conditions underlying septic changes in the uterus, and the modes by which metastatic bacteriæmia arises, indicates the futility of such a proceeding, for it is useless to remove the uterus when the veins in the broad ligament are full of septic clot.

Attempts have been made to hinder the entrance of micro-organisms into the circulation by ligation of the ovarian veins or the iliac veins. The surgeon here is confronted with a great difficulty, for he has no means of deciding beforehand whether the infective material finds its way into the circulation by the iliac or the ovarian veins.

Trendelenburg (1901) shewed that success could be obtained in chronic cases, even when the infecting agent was a streptococcus, and some brilliant successes have been recorded by Michels, Bumm, Cuff, Lendon, and other surgeons.

Experience teaches that acute cases are unsuitable. Success can only be hoped for in chronic cases where the thrombosis is limited. This matter does concern us very closely in relation to fibroids. From the bacteriological standpoint the condition of the uterus

when it contains a septic submucous fibroid is the counterpart of a septic puerperal uterus, and it is a very dangerous proceeding to remove it by the abdominal route when the sepsis depends on the staphylococcus, but it is almost surely fatal when the streptococcus is present.

The ovarian veins sometimes become thrombosed as a consequence of sepsis following hysterectomy. An instructive example of this has been recorded by T. G. Stevens :—A woman died eleven days after a subtotal hysterectomy for fibroids. He found the right ovarian vein thrombosed from the point where it was ligatured in the pelvis to its entrance into the vena cava ; " the vein could have been easily dissected out, and possibly the fatal result might have been averted." Stevens isolated the bacillus pyocyaneus from the clot in the vein and produced it in culture. In some instances the thrombosed ovarian veins can be felt as hard cords when the abdominal walls are thin.

Methods of Ligaturing the Ovarian Veins.—The ovarian vein can be readily exposed through an incision in the anterior abdominal wall running from the tip of the eleventh rib to the spine of the pubes parallel with Poupart's ligament ; the muscles are divided and the peritoneum is exposed, but not opened, and gently reflected until the ovarian vein is reached ; the vein is then carefully separated from the ureter. About two centimetres below its junction with the vena cava or the renal vein, as the case may be, it is securely ligatured and divided. The lower section of the vein is isolated

towards the pelvis and securely ligatured; the intermediate section is then cut away. The margins of the wound, including the cut edges of the muscles, are united with interrupted sutures, and the space may be drained with gauze or rubber tubing. When the operation is conducted in this way it is extra-peritoneal. In some instances the thrombosed ovarian veins have been successfully tied through a median abdominal incision. In other instances the surgeons have contented themselves by tying the vein and then splitting it up and turning out the clot. The extra-peritoneal operation is not difficult when the parietal tissues are stretched and the connective tissue softened by pregnancy.

The operation presents no technical difficulties, but the selection of the proper cases demands judgment as well as experience.

BUMM, E.—"Zur Operativen Behandlung der Puerperalen Pyämie." *Berliner Klin. Wochensch.*, 1905, xlii., 829.

CUFF, A.—A contribution to the Operative Treatment of Puerperal Pyæmia. *Journ. of Obstet. and Gyn. of the Brit. Empire*, 1906, ix., 317.

LENDON, A. A.—Puerperal Infection, Thrombosis, Ligature of the Right Ovarian Vein; Recovery. *Australasian Med. Gaz.* 1907, xxvi., 120.

MICHELS, E.—The Surgical Treatment of Puerperal Pyæmia. *Lancet*, 1903, i., 1025.

STEVENS, T. G.—The Bacteriological Examination of a Thrombosed Ovarian Vein (following Hysterectomy). *Trans. Path. Soc., Lond.*, li., 50.

TRENDELENBURG, F.—Ueber die chirurgische Behandlung der puerperalen Pyämie. *Münchener Med. Wochenschr.*, 1907, xxxiv., 1302.

CHAPTER XXIII

The Methods of Suturing the Abdominal Incision in Relation to Thrombosis and Scar-Hernia.

An incision made in the abdominal wall for the purpose of removing a pelvic tumour will heal soundly in seven days if the edges of the incision be kept in contact by sterile sutures and micro-organisms be excluded. To-day the union of such a wound occurs, as a rule, so uninterruptedly, so uniformly and painlessly that men cease to wonder at it, and few are tempted to consider the impossibility of such operations if the edges of the incision did not unite. Before surgeons knew the cause of suppuration in wounds, incisions made in the abdomen often failed to unite, or the union was so feeble that the edges easily parted and allowed the viscera to protrude. To-day the surgeon is not content with a method which simply allows the wound to heal quickly, but he desires to obtain an unyielding scar; for a scar-hernia will often cause a patient more inconvenience and trouble than the tumour for which the operation was needed. It is for this reason that a great amount of ingenuity has been expended by surgeons with the object of finding a method of closing the abdominal wound which will furnish a firm scar. This, is in a measure presumptuous, for nature in the operation

of uniting the lateral halves of the belly-wall in a median cicatrix, the linea alba, cannot always secure an unyielding scar.

There are more than fifty methods in vogue for closing a median subumbilical incision and the following materials have been vaunted for sutures:—Silk, silkworm-gut, catgut, linen thread, and horse-hair; silver, iron, aluminium, platinum, and gold in the form of wire. The multiplicity of methods and the variety of suture-material is proof that none is entirely satisfactory. The first requisite for obtaining a good scar is perfect asepsis, and there is, in spite of the manifold methods employed, a tendency with many surgeons to return to simple methods; that which gives me the best result will now be described, and the reasons for adopting it.

The peritoneum, sheath of the rectus and the edge of the rectus muscle, skin and fascia are carefully approximated by interrupted sutures of silk (size No. 4), sterilized by being boiled for an hour and inserted with the hands covered with sterilized rubber gloves. This is known as the through-and-through method of suture; the distance between each suture is rather less than two centimetres. Before the silks are tied, interrupted sutures of silk (No. 2) are used to bring the fascia together; these are introduced at intervals of three centimetres, or less when the abdominal walls are very thin. When the main sutures are tied the skin edges are carefully approximated by a continuous suture of thin silk.

A wound sutured in this way heals quickly and soundly. Some of the sutures are removed on the eighth and the remainder on the tenth day.

Post-Operative Thrombosis.—It may seem strange to consider this unpleasant and troublesome condition in a chapter devoted to the suture of the abdominal incision, but I shall endeavour to show that this sequel to hysterectomy is often due to infection from the abdominal wound, and it is commonly associated with the employment of buried sutures.

A perusal of surgical and gynaecological periodical literature of all countries contains frequent references to thrombosis of the saphena, femoral and iliac veins as a sequel to pelvic operations. It is usually noticed about the twelfth day, and its occurrence is intimated by fever, pain in the thigh and leg, quickened pulse and gradually increasing œdema of the leg. When the signs and history of cases of post-operative thrombosis are carefully considered they can be arranged in two groups: in one the saphena vein is involved, in another the femoral and iliac veins.

The simplest conditions are those in which thrombosis is limited to the saphena vein. The patient complains of pain in the groin and along the front of the thigh; often the pain and tenderness are confined to the calf. The tenderness is mainly in the skin overlying the thrombosed vein. When the thrombosis is confined to the saphena vein, the acute symptoms subside in ten or fourteen days. As a rule, it affects one limb, but when

both become involved, the occurrence is usually consecutive.

In many instances the thrombosis attacks the femoral and external iliac veins, and I have come to the conclusion that thrombosis of these veins occurring as a sequel of abdominal hysterectomy is often due to infection of the abdominal incision, and the channels of infection are the epigastric veins, superficial and deep, and the collateral lymphatics.

Femoral thrombosis and fatal pulmonary embolism are recognized sequels of hysteropexy. In this operation if the retaining sutures are passed too deeply into the uterine wall they traverse the endometrium, and if it be septic the silk thread will be infected and cause trouble. A study of the facts led me to believe that the factors which produce the changes in the abdominal wound ending in thrombosis of the femoral, external iliac, or femoral veins are buried sutures. I made a series of trials in which a number of median abdominal incisions were closed with buried silk sutures, also a series of cases in which through-and-through sutures were employed. However carefully the silk is prepared and the sutures inserted with hands covered with sterilized rubber gloves, now and then a buried suture will give trouble. Even when the sutures appear to settle down without disturbance they often cause trifling rises of temperature.

Surgeons who habitually employ catgut for buried sutures admit that the absorption of the catgut is accompanied by fever, but there is a serious objection

to this use of catgut. During the period of its absorption, the union between the apposed surfaces of the incision become softened, and any undue exertion on the part of the patient, such as coughing or straining, will cause them to separate and permit protusion of the intestine. This is a serious matter, for Madelung, in a valuable contribution, has shown that a large proportion of the patients in whom this accident happens die in consequence. He also points out that this serious post-operation calamity occurs most frequently in the practice of those surgeons who use catgut sutures for bringing together the middle layer of the abdominal incision.

In 1902, Clark, of Philadelphia, published some observations on post-operative femoral thrombo-phlebitis, especially as a sequel to cœliotomy. He believes that it has its origin as a primary thrombosis of the deep epigastric veins due to injury of the edges of the incision by metal retractors. The thrombosis is slowly propagated along the vessel to the external iliac vein, and by retrogressive thrombosis to the femoral vein. Just as the proof of the paper left his hand a very convincing case came under his observation :—

A woman aged thirty-two years had hysteropexy performed for retroflexion of the uterus. The vermiform appendix was removed at the same operation. Thirteen days later there was well marked femoral thrombosis. Two months later the patient's condition being unsatisfactory the abdomen was re-opened ; the right ovary and tube, being inflamed, were removed.

In the course of the operation the right epigastric veins were found to be varicose and thrombosed. They were "like dense cords as large as goose-quills." The right epigastric vein was obstructed at its entrance into the external iliac vein.

The deep epigastric veins are in intimate relation with the wound area when the abdomen is opened by a median subumbilical incision, whether the cut be made in the linea alba, or, to one side of the middle line in the belly of the rectus muscle. The branches of the vein collect the blood from the subcutaneous, as well as the subserous tissue in the parts adjacent to the linea alba. (Fig. 37).

It will be obvious to anyone who reads the chapter relating to the Flora of the Uterus that the surgeon's fingers must in some cases, at least, be contaminated with pathogenic organisms in the course of removing the uterus. Although it is true that a large proportion of uteri removed for fibroids are free from micro-organisms, these mischievous things are present in a sufficient proportion of cases to account for the frequent occurrence of post-operative thrombosis.

The excessive frequency with which thrombosis occurs as a sequel of abdominal hysterectomy performed for cancer as compared with fibroids is another fact worth bearing in mind, for, as has been pointed out, cancer in the neck of the uterus often teems with streptococci, and these are notorious agents in causing thrombosis. When these things are carefully considered and then compared with the comparative

infrequency of thrombosis after vaginal operations, the evidence is strong that the excessive frequency of pulmonary embolism after abdominal hysterectomy

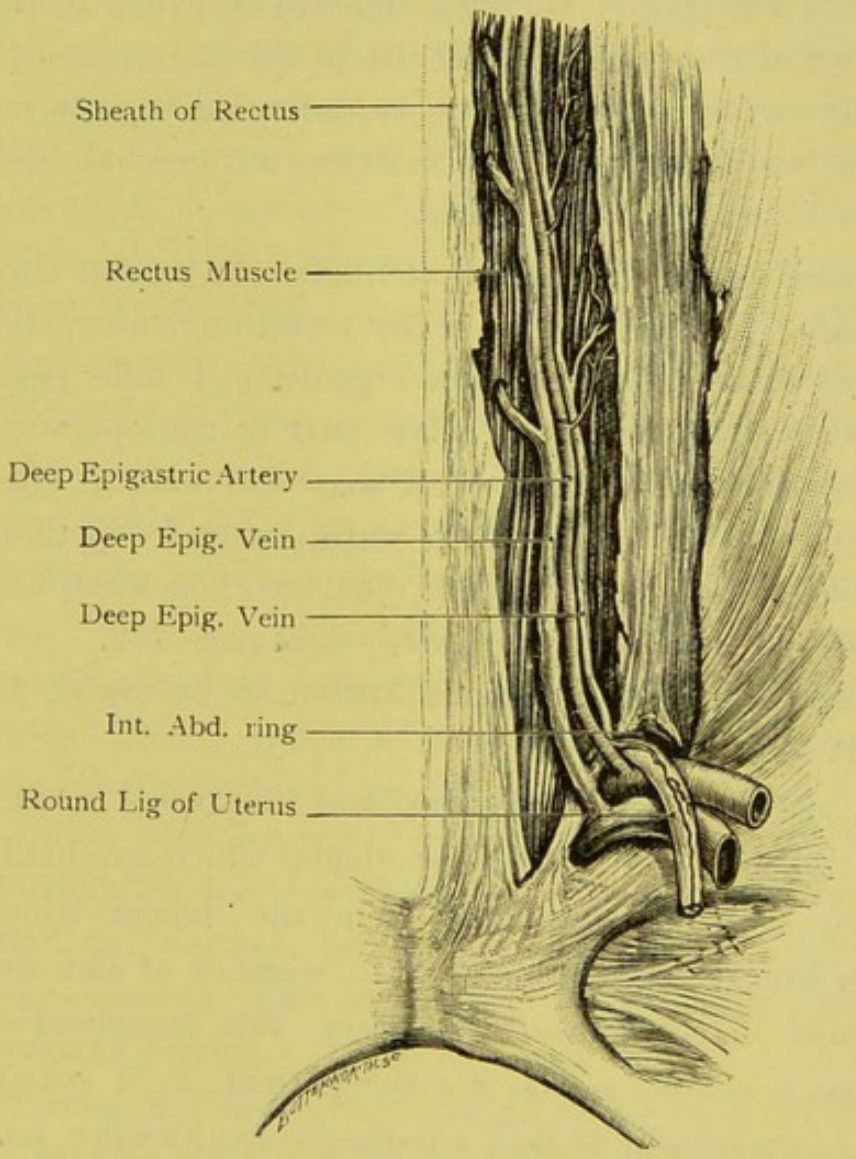

Fig. 37.—Posterior view of the rectus abdominis muscle below the level of the umbilicus. The origin of the deep epigastric artery and the termination of the vein is shown.

is in a measure due to buried sutures becoming infected from the contaminated fingers of the surgeon. Further

evidence in support of this opinion is given in Chapter XXIV.

The trifling modification in technique described on p. 151, consisting in applying tincture of iodine to the remnant of the cervical canal left in the stump, and to the cut surface of the stump, before tying the uterine arteries and introducing the mattress sutures has been followed by good consequences.

Having satisfied myself that fingers do become contaminated in the course of hysterectomy when the cervical canal contains micro-organisms, I take great care after completing the pelvic part of the operation to wash the gloves with warm soap and water; after rinsing them thoroughly with warm water I dip them in a solution of perchloride of mercury (1 in 5000) and then insert the sutures, as described on page 212.

In operating for conditions known to be septic, no sutures should be buried.

The occlusion of the femoral and iliac veins by clot leads to solid œdema of the thigh, which gradually extends to the leg. Apart from the danger which ensues from the detachment of a fragment of clot and its arrest in the pulmonary artery, this complication is often a serious matter for the patient, as it entails a long confinement to bed, a tedious convalescence, and the œdema will persist for many months, and occasionally impairs the circulation in the limb for several years, in spite of topical applications, careful bandaging, and judicious massage.

The œdema of the leg is usually attributed to obstruction of the femoral and iliac veins by clot, but the condition is not so simple, there is in addition lymphangitis. This associated plugging of the lymphatics has probably a greater effect in producing the swelling of the leg than the obstruction caused by the intravenous clot. It is a fact, well known to surgeons, that in operations on the armpit, the axillary vein is sometimes injured and requires an encircling ligature; no œdema of the arm follows, but when the lymphatics are blocked as a result of perlymphangitis by an extension of cancer from the breast, a brawny œdema of the upper limb ensues. This is true in relation to the lower limb. The femoral vein is sometimes wounded during the removal of enlarged lymph nodes from the groin; the surgeon, without hesitation, applies an encircling ligature to the femoral vein above and below the hole in its wall. No œdema follows. Again it is a frequent matter of comment, that the accident which so often has a tragic ending—the lodgment of an embolism in the pulmonary artery—occurs in patients when there has been no evidence of thrombosis, yet after death when the iliac veins are examined large thrombi are found therein.

During the time I was occupied in studying the effects of buried sutures in producing thrombosis, I buried no sutures in an abdominal incision for two years, except in one instance. During that period I had no post-operative thrombosis, and only one case of pulmonary embolism, and that happened to the patient

in whom I used buried sutures. She was a midwife on whom I performed hysterectomy for a big submucous fibroid ; and as she was a stout woman and led an active life, extra care was taken to secure a sound abdominal scar. She was making apparently an uneventful recovery until the eighth day ; then her temperature rose without any warning to 103° Fahr. On examination, some hardness could be felt in the lower portion of the wound. There was no œdema and no tenderness in the groin, and no evidence of pulmonary complications. I warned my house surgeon that in all probability she had thrombosis of the deep veins, and there was impending danger of a pulmonary embolism. She died suddenly a few hours later, and an embolus was found at the post-mortem examination firmly plugging the pulmonary artery.

In addition to imperfect union of wounds caused by suppuration, such conditions as chronic cough, flatulence and obesity cause scars to yield. The lower part of the scar is more likely to yield than the upper.

Hernial scars may be excised and the edges of the opening joined with sutures. When the whole scar yields in very thin feeble patients, and in very stout women a belt will give more satisfactory results than an operation, for in poor hospital patients who work hard the scar will yield again. Scar hernias are more common among the poor and ill-nourished than among the rich. There is a form of post-operative hernia in which the median scar remains firm and strong, but the rectus muscle on each side of it atrophies and allows the

abdominal wall to bulge and form a biloculated sac; operative measures for this condition are useless. In some yielding scars the sac forms a series of irregular pouches sometimes so numerous as to recall the sacs in the reticulum of a camel's stomach. This condition occurs usually in stout women, and is probably due to the sutures used in closing the incision being placed too far apart. A yielding scar is a great nuisance to the patient and to the surgeon; it is a reflection on the art of surgery that no method of suturing the abdominal wound is known which will with certainty produce a firm unyielding cicatrix. It is also true that injudicious efforts to obtain a firm scar often entail a long convalescence and risk to life.

BLAND-SUTTON, J.—Hunterian Lecture on Thrombosis and Embolism after Operations on the Female Pelvic Organs. *Lancet*, 1909, i., 147.

CLARK, J. G.—Etiology of Post-operative Femoral Thrombophlebitis. *University of Pennsylvania Med. Bull.*, 1902, xv., 154.

MADELUNG, O.—Ueber den Post-operativen Vorfall von Baucheingeweiden. *Verhandlung d. Deutschen gesellschaft f. Chir.*, Berlin, 1905, xxxiv., 168.

CHAPTER XXIV.

Embolism of the Pulmonary Artery after Hysterectomy.

Embolism of the pulmonary artery occurs very frequently as a sequel of abdominal hysterectomy but it rarely happens after vaginal hysterectomy. Klein collected the statistics of the Bettina-Stiftung (Vienna) and found nine fatal cases of pulmonary embolism in 1,720 abdominal sections. During the same period there was no instance of fatal embolism among 1,992 vaginal operations.

Although pulmonary embolism is common after abdominal hysterectomy, it is difficult to obtain reliable statistics because surgeons are reluctant to publish their experiences of this tragic sequel to an operation. There is sufficient evidence available to give some notion of the relative frequency of pulmonary embolism after hysterectomy for fibroids, and the following facts not only help in this direction, but shew an extraordinary variation in the practice of different surgeons. For example :—Baldy found that among 366 operations for fibroids in the Gynecean Hospital, Philadelphia, there were thirteen sudden deaths attributed to embolism. In the Middlesex Hospital in the years 1896-1906, both years inclusive, there were 212 abdominal hysterectomies for fibroids ; three patients died from pulmonary

embolism. At the New Hospital for Women, London, during 1901-1910, hysterectomy was performed for fibroids 189 times; two patients died from pulmonary embolism. (Lepper). In the practice of individual surgeons the results differ widely. Lyle, among eight subtotal hysterectomies for fibroids lost one patient from pulmonary embolism; Spencer lost 2 patients from this cause out of 85 total hysterectomies, and Olshausen 5 out of 366. Among 1,500 abdominal operations for fibroids I have lost 3 patients from pulmonary embolism, and in one of these women the fibroid was complicated with cancer of the corporeal endometrium.

A broad study of the statistics indicates that in the practice of some surgeons, fatal pulmonary embolism occurs in at least 1 per cent. of the patients who have abdominal hysterectomy performed for fibroids. This tragic mode of death is more frequent after total than after subtotal hysterectomy; it is a recognised sequel of hysteropexy, and the risks of its occurrence after abdominal hysterectomy for cancer is higher than for any other pelvic operation.

In considering embolism of the pulmonary artery in relation to hysterectomy, it is necessary to point out that the pelvis contains two potential reservoirs of clot—the iliac and the ovarian veins; as a rule, the iliac veins are the common source of the fatal clot.

Before describing the mechanical occlusion of the pulmonary artery by an embolus, there are a few points worth consideration. This vessel has the structure of

an artery, but conveys venous blood to the lungs; it has a greater diameter than any other artery, for the cross measurement above the sinuses of Valsalva is given by anatomists as 28 mm., so that a large clot is required to effectually plug it. An embolus large enough for this purpose comes, as a rule, from the

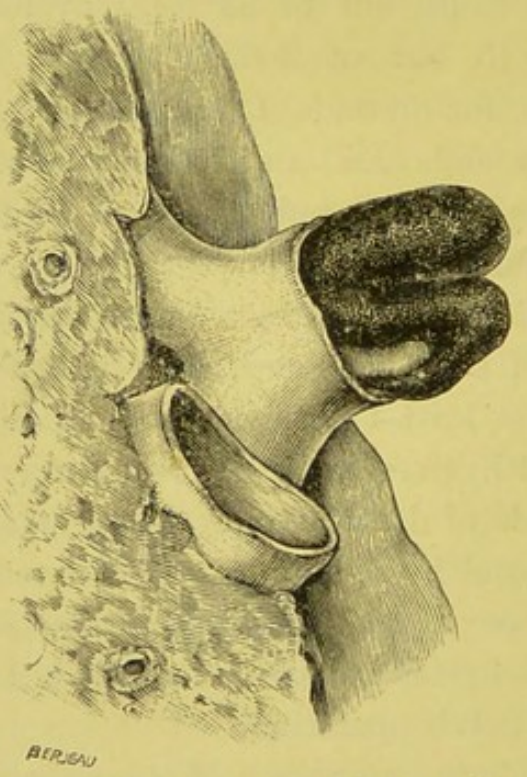

Fig. 38.—The pulmonary artery blocked by an elongated embolus doubled on itself. (After Thoma.)

inferior vena cava, or from a thrombus in the right auricular cavity, or from the iliac veins.

Often the pulmonary artery is found, at a post-mortem examination, completely blocked by an embolus, yet a careful examination of the venous system fails to reveal the source of the migratory clot. In these

instances probably the whole of a clot formed in a vein of moderate size slips from its surroundings, and although an elongated thrombus may be too narrow to block the pulmonary artery, it may be doubled up by the blood stream and form an effective plug. (Fig. 38). An embolus too small to occlude the pulmonary artery sometimes lodges on the ridge separating the right from the left branch; such a clot may act as an autochthonous thrombus and induce the propagation of additional clot which will fatally occlude the main trunk of the artery.

Pulmonary embolism may occur as a sequel of hysterectomy at any time from the hour of the operation onward to the thirtieth day. The majority of cases happen about the twelfth day; the detachment and transit of the clot is usually preceded by movement such as getting out of bed, sitting up in bed, but more particularly straining at stool. In one remarkable case, a woman complained of sciatic pain seventeen days after vaginal hysterectomy. To relieve this the surgeon flexed the patient's thigh on her abdomen and suddenly extended it. This dislodged a clot and the woman was seized with signs of pulmonary embolism and died in forty-seven minutes. At the post-mortem examination, the pulmonary artery was found to be occluded and the left ovarian vein thrombosed. (Byrom Robinson).

The most constant symptoms of pulmonary embolism are sudden, urgent dyspnœa, great pain in the chest, accompanied by agony and fear of death. "Parti-

cularly striking is the contrast between the violence of the dyspnœa and the freedom with which the air enters the lungs, and in the absence of pulmonary physical signs " (Welch). As a rule, the face is blue and covered with cold sweat. Death may follow in a few minutes or it may be delayed several hours. The patient remains conscious, but suffers severe mental distress. On one occasion I saw a woman within ten minutes of the lodgment of an embolus in the pulmonary artery; she was livid and unconscious, and although she had ceased to breathe, her heart continued to beat regularly and forcibly for five minutes after my arrival, then stopped suddenly. A patient convalescent after hysterectomy, performed for fibroids, may be dressing to leave the hospital and fall dying across the bed, or on the floor of the ward, or in the courtyard of the hospital. Periodical surgical literature contains many instances of these dramatic forms of sudden death due to post-operative pulmonary embolism.

Occasionally a patient may rally after the most urgent symptoms; then, later an extending thrombus, or a fresh embolus will cause death. Recovery may occur even in very desperate cases. It is not uncommon for women recovering from hysterectomy to be seized with a sudden pain in the side of the chest severe enough to fill them with alarm: in a few hours the temperature rises perhaps to 102° or 103° Fahr., and there may be some bloodstained sputum ejected. The physical signs indicate a patch of pleurisy or pneumonia. Attacks of this kind are not fatal, but they occasionally delay

convalescence; they are due to the arrest of small emboli in the lungs. In some cases a patient recovering from hysterectomy will exhibit signs which indicate that she has had a shower or a succession of small pulmonary emboli. This is a matter hard to prove, because the patients almost invariably recover. Beattie and Hall described a case in which a man with a thrombosed vein in his leg had repeated attacks of pulmonary infarction. When he died multiple aneurysms filled with organised thrombus were found in his lungs. No micro-organisms were found in the clot.

The Operative Treatment of Pulmonary Embolism.—The fact that the lodgment of a large embolus in the pulmonary artery does not always terminate life in a few minutes led Trendelenberg to attempt its extraction by operation. After careful consideration of the matter he carried out the following operation:

A woman, aged sixty-three years, was seized with the signs of pulmonary embolism. Trendelenberg raised an osteoplastic flap on the left side of the thorax, exposed the conus arteriosus, and intended to withdraw the clot through a slit in its walls by means of a specially constructed pump. The patient died from excessive bleeding before the clot could be extracted. The operation was hindered by an adherent pericardium.

He has carried out this operation on a man aged forty-five years. This patient was tabetic and sustained a spontaneous fracture of the femur. One month later he was seized with urgent dyspnœa and signs clearly

indicating the lodgment of an embolus in the pulmonary artery. Trendelenberg exposed the heart, opened the pulmonary artery, and by means of polypus forceps succeeded in withdrawing 34 cm. of clot. The incision in the artery was carefully closed with sutures. The man improved considerably as the result of the operation, but died thirty-seven hours later. At the post-mortem examination the left and right branches of the pulmonary artery contained an embolus.

Probably no amount of care will absolutely abolish the liability of patients to pulmonary embolism after pelvic and abdominal operations, but the thrombosis, which is not only a serious complication in itself, but the forerunner of the graver embolism, is often due to inefficiency in the means taken to procure asepsis. It is a misnomer to speak of the "uncontrollable embolus," but it behoves surgeons to give the most painstaking care to the preparation of ligature material, and to guard their hands, after thorough washing, with sterilized rubber gloves when performing pelvic operations. (See page 218).

To my mind, the greatest step in the advance of asepsis in operative surgery is the appreciation of this fact;—The skin of the surgeon's hand is one of the chief infecting agencies which patients risk when they submit to a surgical operation. It is a fact that soap and water aided by antiseptics are incompetent to render the skin of the hands free from pathogenic micro-organisms. **The chief cause of post-operative thrombosis and embolism is sepsis.**

The bacteriology of the clot is important in relation to this matter. The micro-organism commonly found in thrombi and emboli is the streptococcus; it is sometimes mixed with the staphylococcus, and the colon bacillus, but not the gonococcus. Extensive pelvic operations are often performed for damage caused to the uterus and the Fallopian tubes by the gonococcus, sometimes in the acute, but more often in the chronic stage of the disease. I have never seen a case of pulmonary embolism as a sequel to an operation on the uterus or tubes when the lesion was the consequence of gonorrheal infection. This seems to shew that the gonococcus causes great irritation of the tissues and produces adhesions freely, but does not coagulate blood.

BEATTIE, J. M. and HALL, A. J.—Multiple Embolic Aneurysms of Pulmonary Arteries following Thrombosis of the Veins of the Leg. *Proc. Roy. Soc. of Med.*, 1911, v. (*Path. Sect.*)., 147.

BLAND-SUTTON, J.—The Exotic Flora of the Uterus in relation to Fibroids and Cancer. *Brit. Med. Journ.*, 1913, i., 205.

HASTINGS, S.—A Preliminary Note on Pulmonary Embolism in Surgical Cases. *Archives of the Middlesex Hospital*, 1907, xi., 78.

KLEIN, V.—Ueber Post-operative Thrombosen und Embolie. *Zentralbl. f. Gyn.*, 1911, xxxv., 1570.

LEPPER, E. H.—Thrombosis following Laparotomies for Carcinoma. *Arch. Middlesex Hospital.* Eleventh Report from the Cancer Laboratories, 1912, p. 212.

LYLE, R. P. R.—A Series of Fifty Consecutive Abdominal Sections. *Brit. Gynaec. Journ.*, 1906-7, xxii., 120.

MALLET, G. H.—Some unusual causes of Death following Abdominal Operations. *Amer. Journ. of Obstet.*, 1905, li., 515.

OLSHAUSEN, R.—Veit's *Handbuch der Gynäkologie*, 1907, 2nd edit., Bd. i., 715.

ROBINSON, B.—Sudden Death, especially from Embolism following Surgical Intervention. *Medical Roccord, New York*, 1905, lxvii., 47.

SPENCER, H. R.—Discussion at British Association Meeting at Exeter on "Uterine Fibroids," &c. *Brit. Med. Journ.*, 1907, ii., 452.

TRENDELENBURG, F.—Zur Herzchirurgie. *Zentralbl. für Chir. Leipzig*, 1907, v., xxxiv., 1302.

CHAPTER XXV.

The Relative Value of Subtotal and Total Hysterectomy and the Fate and Value of Belated Ovaries.

During the latter half of the Nineteenth Century, surgeons were keenly endeavouring to find a safe method by which they could remove the uterus when it contained fibroids. The great success which followed the introduction of the short ligature in ovariotomy induced several surgeons to apply the same principle to the cervical stump when removing the uterus for fibroids; the result was dismal failure Matters improved somewhat after Koeberle introduced the *serre-noeud* and this continued the safest method until 1892. In the meantime antisepsis had begun to take effect in pelvic surgery, and attempts were made by Bardenheuer (1881), Polk, and other surgeons to avoid the dangerous difficulties connected with the treatment of the stump, by removing the cervix as well as the uterus (total hysterectomy) and some attained an encouraging measure of success. Nevertheless, other surgeons (Goffe, Milton, Heywood Smith, and Stimson) felt that the enucleation of the cervix was not always

necessary, and sought to find a way of avoiding it. The credit of solving the difficulty fell to Baer, of Philadelphia (1892), for he showed that it is dangerous to constrict the neck of the uterus with ligatures; it is only necessary to secure the arteries.

Baer's method of supra-vaginal hysterectomy, or, as it is now commonly termed, the subtotal operation, soon supplanted the total method of Bardenheuer. The publication of Baer's paper had great consequences; it came at a time when the attention of surgeons was centred on improvements in hysterectomy.

The method was promptly tested and adopted in London, and this improvement in technique revolutionized the surgical treatment of uterine fibroids in a few years. How great these changes are may be gathered from the following lists :—

In the year 1896 the results of abdominal hysterectomy for fibroids in eight hospitals in London were as follows :—

St. Bartholomew's ...	7	with	3	deaths.
St. George's	1	,,	0	,,
St. Thomas's	5	,,	2	,,
Middlesex	6	,,	1	,,
University College ...	3	,,	0	,,
Soho (for Women) ...	1	,,	0	,,
Samaritan	17	,,	4	,,
Chelsea (for Women) ...	9	,,	1	,,
	49		11	

Ten years later, that is, in 1906, the returns from the same sources, and the New Hospital for Women, are :—

St. Bartholomew's ...	26	with	4 deaths.
St. George's	8	,,	0 ,,
St. Thomas's	40	,,	2 ,,
Middlesex	50	,,	0 ,,
University College ...	21	,,	1 ,,
Soho (for Women) ...	60	,,	1 ,,
Samaritan (for Women)	37	,,	2 ,,
Chelsea (for Women) ...	80	,,	1 ,,
New for Women ...	26	,,	0 ,,
	348		11

During the years 1906 and 1907, at the Middlesex Hospital and the Chelsea Hospital for Women I performed abdominal hysterectomy for fibroids on 101 patients and they all recovered : the series continued unbroken until I had performed 135 of these operations without a death.

My predilection for subtotal hysterectomy may be gathered from the following statement :—Mr. C. H. S. Webb, Surgical Registrar to the Middlesex Hospital, has examined my case-records. He finds that among the last 109 abdominal operations I have performed in that institution, 103 were subtotal and 5 total hysterectomies. There was one abdominal myomectomy. All these patients recovered. (March 1st, 1913).

Subtotal hysterectomy is a safe method for removing the uterus when pregnancy and fibroids co-exist, for

this combination is sometimes so dangerous to the life of the mother as to render an operation necessary.

In 1901, I collected and published a dozen cases in which subtotal hysterectomy had been performed for this combination. Since that date a large number of cases have been reported, and as this experience is crystalized in practice it is unnecessary to adduce further evidence in its favour. I have performed subtotal hysterectomy with success for big fibroids complicated with tubal pregnancy.

Hysterectomy is sometimes required when labour is obstructed by a fibroid. In this event some surgeons prefer the total, and others the subtotal method. When hysterectomy is performed during labour, the cervix is so thin and expanded that it is difficult in the course of the operation to determine the junction of the cervix with the vagina.

In 1901, I collected some records relating to labour obstructed by uterine fibroids; most of them revealed a grim history of tragedy and woe. A broad survey enabled me to form the opinion that ovarian tumours have caused great trouble to parturient women, but fibroids have been more lethal as they frequently become septic during the lying-in. The whole subject is an instructive and impressive illustration of the baneful effects which environment often imposes on so-called innocent tumours. The subjoined table indicates that surgical interference when labour is obstructed by fibroids is more merciful to the mother than to her offspring.

Cases of Hysterectomy Performed on Patients in Labour in which the Obstruction was due to Fibroids.

Operator.	Result to Mother.	Fate of Child.	Nature of Operation.	Reference.
Spencer ..	R.	L.	Cæsarean Section, Subtotal Hyst.	*Trans. Obstet. Soc.*, xxxviii., 389.
Bland-Sutton*	R.	D.	Total Hyst. (See Fig. 20).	*Trans. Obstet. Soc.*, xlvi., 238.
Morison ..	R.	D.	Cæsarean Section, Total Hyst.	*Northumberland and Durham Med. Journ.*, 1904
Acland ..	R.	?	Cæsarean Section, Subtotal Hyst.	*Lancet*, 1904, ii., 948.
Spencer ..	R.	L.	Cæsarean Section, Total Hyst.	*Trans. Obstet.* 1906, xlviii., 240.
Spencer ..	R.	D.	Cæsarean Section, Total Hyst.	*Trans. Obstet. Soc.*, 1908.
Bland-Sutton	R.	L.	Cæsarean Section, Total Hyst.	1912 unpublished

* This is the first recorded case of total hysterectomy during labour. Operation, May 9th, 1904.

Hysterectomy has been performed successfully on patients over seventy years of age. My experience of the subtotal operation in patients after the menopause proves it to be even safer than during menstrual life. The atrophy of the cervix after the fiftieth year of life leads to the formation of a thin, and almost bloodless, stump that gives no trouble during the operation or afterwards.

TABLE OF CASES IN WHICH HYSTERECTOMY WAS PERFORMED ON WOMEN OF 70 YEARS AND UPWARDS.

Reporter.	Age.	Nature of Operation.	Result	Reference.
Bland-Sutton ..	73	Subtotal for Fibroid 28 lb.	R.	*Trans. Obstet. Soc.* 1900, xli., 300.
Bland-Sutton ..	70	Subtotal for Fibroid	R.	*Middlesex Hosp.*, 1910.
Stewart McKay	70	Subtotal for Fibroid 19 lb.	R.	*Australian Med. Gaz.*, 1907, 14.
Bland-Sutton ..	83	Vaginal Hyst. for Villous Disease.	R.	*Trans. Obstet. Soc.*, 1906, xlix. 46.
Malcolm ..	74	Total for Fibroids	R.	*Brit. Med. Journ.*, 1907, ii., 1571.

The Fate and Value of the Ovaries after Removal of the Uterus.

The only improvement of any importance made in Baer's operation concerns the ovaries. These Baer removed with the tubes, but in 1897 I advocated at the Obstetrical Society, London, that they were of great value to the patient, and pointed out that their conservation, when healthy, spared the patient the annoyance of that curious vasomotor phenomenon known to women as "flushing," which is the only obtrusive sign of the menopause.

It is now admitted by those surgeons in London who have had much experience in hysterectomy for fibroids, that the immediate results of preserving at least one healthy ovary in this operation are admirable,

especially to women under forty years of age, for the retention of an ovary is of striking value "in warding off the severity of an artificial menopause" (Crewdson Thomas).

The conservation of a healthy ovary in the course of hysterectomy for fibroids is important on three points:

1. To secure the patient freedom from "flushings."
2. If she be married, her marital relations.
3. If single, her nubility.

In regard to marital relations in women with a belated ovary nothing trustworthy is forthcoming, but I believe the retention of an ovary is an additional factor in promoting domestic bliss. The question of nubility is interesting. I am able to state that spinsters who have had subtotal hysterectomy performed with conservation of one ovary have subsequently married and lived happily with their husbands; and I am of opinion that the preservation of the vaginal segment of the neck of the uterus is an important factor, as it leaves the vagina intact, and though such women are sterile they are certainly nubile. Without over-stating the case it may be said that a belated ovary is a very precious possession to a woman under forty years of age, whether she be married or single. Some experienced observers maintain that an ovary is valuable to any woman who menstruates, even at the age of fifty years, the persistence of menstruation being an indication that the gland is functional.

Although I have left one or both ovaries in the performance of abdominal hysterectomy on several

hundred women, in only two instances have I found anything detrimental in the practice. In these two patients it was necessary to remove an ovary subsequently. Since 1906 I have modified the method and leave only one ovary, even when both are healthy ; the consequences have been very satisfactory. The good effects of leaving a healthy ovary are probably only temporary, for the belated organ atrophies and the patient exhibits the symptoms of the menopause, but they are not so violent as in the sudden change caused by the removal of two healthy ovaries. The rate of atrophy of the ovarian tissue in a belated ovary depends on the age of the patient. In 1898, I performed subtotal hysterectomy on a woman aged thirty-one, conserving the right ovary. Nine years later (1907) I operated again for intestinal obstruction and found this ovary healthy and functional, for a ripe corpus luteum was visible on its surface. Even a portion of an ovary, if it contains follicles, will maintain menstruation.

In regard to the fate of belated ovaries, the present condition of our knowledge may be stated thus :—

In a woman under the fortieth year of life a belated ovary remains active and discharges ova. An ovary belated after the fortieth year of life atrophies, and menopause symptoms will often ensue in the course of a few months after the operation. The retention of an ovary minimises the menopause disturbances, and they are never so acute and prominent under these conditions as they are when the menopause is induced by the sudden and complete removal of all ovarian tissue.

Experimental evidence obtained from rabbits proves that the removal of the whole uterus has no deterrent effect on ovulation, and it does not prevent the occur-

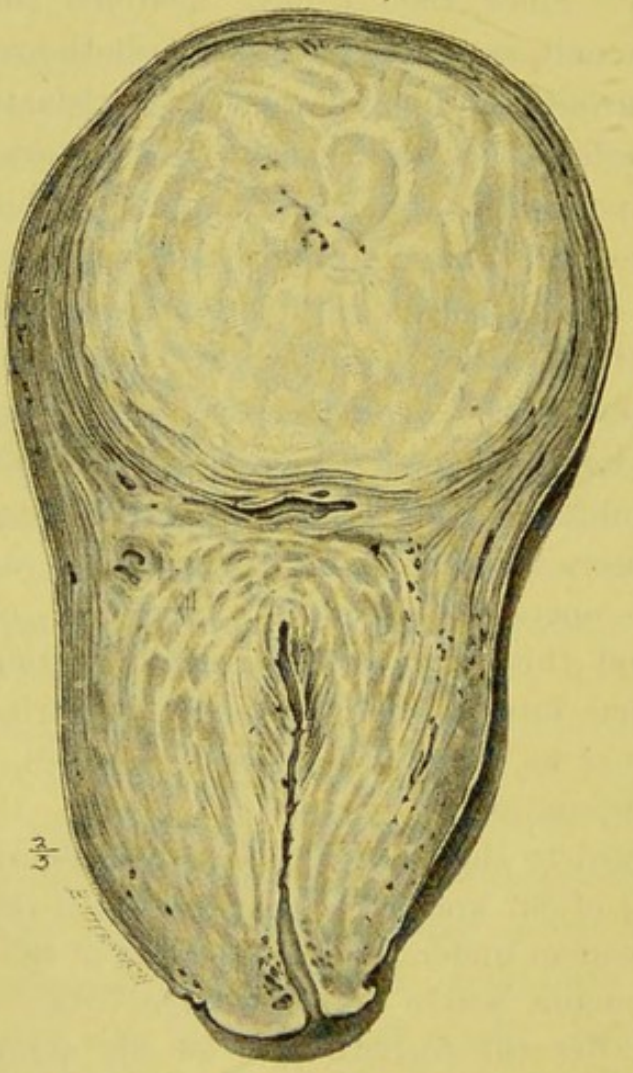

Fig. 39.—Uterus in sagittal section. A globular intramural fibroid grows from the fundus. Removed from a nulliparous woman, aged 45, in whom it became frequently impacted and caused retention of urine.

rence of œstrus and ovulation at periodical recurring intervals. (Bond).

There is no necessity to appeal to experiments on animals in this matter, as clinical observations on women are most eloquent in proclaiming the great value of a conserved ovary when the uterus is removed on account of troublesome and dangerous fibroids.

In reference to the value of ovarian tissue after hysterectomy for fibroids, attention should be drawn to a modification of this operation known as the Abel-Zweifel method, by which a small segment of the menstrual area of the uterus is left as well as one or both ovaries; this permits menstruation to continue in a subdued form. Doran has particularly studied this method, and practised it, but I cannot express any opinion as to its value, never having had the courage to perform it.

A large, solitary intramural fibroid at the fundus of the uterus sometimes leads to a curious error in the course of hysterectomy. Such a fibroid (Fig. 39) is usually globular; when it has a diameter of six inches or more it will fill the pelvis and push the uterus downwards in a way that hinders the surgeon reaching the cervix, and he is sometimes astonished to find (on examining the parts after completing the operation) that he has amputated the uterus through the middle of its body instead of dividing the neck. I have seen this happen on several occasions. Patients under 45 years of age, in whom this occurs, will menstruate after the operation if an ovary has been conserved.

My aim in performing hysterectomy for fibroids is to abolish as completely as possible the menstrual

area of the uterus, and up to the present my efforts have been successful, and I have no complaint from any patient that this disagreeable phenomenon has manifested itself, although I have been at great pains by my own exertions, as well as by the efforts of those who have been associated with me in my hospital work, to keep in touch with women who have been so unlucky as to require such a serious operation as the removal of the uterus. The impotency of medical means to control uterine bleeding, as expressed in the famous verse :—"A woman, having an issue of blood twelve years, which had spent all her living upon physicians, neither could be healed of any," (Luke viii., 43), no longer applies. To-day, successful hysterectomy is a common thing.

BAER, B. F.—Supra-vaginal Hysterectomy without Ligature of the Cervix in Operation for Uterine Fibroids. A new method. *Trans. Amer. Gynaec. Soc., Philad.*, 1892, xvii., 235.

BARDENHEUER—*Die Drainirung der Peritonealhöhle. Im Anhang: Thelen : Die Total extirpation wegen Fibroid.* Stuttgart, 1881, 271.

BLAND-SUTTON, J.—Abdominal Hysterectomy for Myoma of the Uterus, with brief notes of twenty-eight cases. *Trans. Obstet. Soc. Lond.*, 1897, xxxix., 292.

————Lectures on the Surgery of Pregnancy and Labour complicated with Tumours. *Lancet*, 1901, i., 452.

————The Value and Fate of Belated Ovaries. *Medical Press and Circular*, 1907, ii., 108.

DORAN, A.—Subtotal Hysterectomy ; after histories of sixty cases. *Trans. Obstet. Soc., Lond.*, 1906, xlvii., 363.

GOFFE, I. RIDDLE—This surgeon furnishes an interesting account of the development of Total and Subtotal Hysterectomy for Fibroids, in *The Transactions of the American Gynaecological Society*, 1893, xviii., 372.

THOMAS C.—The after histories of one hundred cases of Supra-vaginal Hysterectomy for Fibroids. *Lancet*, 1902, i., 294.

POZZI, S.—*Traité de Gynécologie*, 1905, i., 424. This contains an interesting review of the serre-nœud and clamp period of Hysterectomy.

INDEX.

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