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I. On the Structure, Relations, and Functions, of the Ligamenta Rotunda Uteri.

II. On the Diagnosis and Treatment of Retained Menses.

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* Prize Essay on the Uterine Appendages during Parturition & Gestation, Summer Session, 1865.

On the Structure, Relations, and Functions, of the Round Ligaments of the Human Uterus.

Though the subject of this paper may appear somewhat trivial and unbecoming for that of an inaugural dissertation, yet I have been led to hope that a closer investigation into the structure and functions of the round ligaments of the uterus of the human female, might lead to more important conclusions regarding their use, than have been hitherto recognised.

Having lately been engaged in considering the conditions of the uterus and its appendages* during utero-gestation and parturition, the round ligaments necessarily came under my—

Dionis, Chirurgical operations, 1733. p. 196

Cheselden, Anatomy of the Human body 1778. Ed. XI.

l.c. l.c.

notice, On looking into the literature of the subject I found that Authors of Systematic works on Obstetric Anatomy and Physiology either avoid the subject altogether, or treat it as if undeserving of careful consideration. Nevertheless it must be said the minute anatomy of these structures has been most carefully investigated by Rainey, Kolliker, Raw, and others, but their results do not appear to be very important.

In the present paper I propose to review, as briefly as possible, the writings of those Authors who have considered this subject, and then to describe my own observations and the conclusions which I think they justify.

Literature on the subject.

So far as I can gather from the older writers* the two round ligaments of the uterus were regarded as ordinary fibrous fasciculi, serving to retain the uterus in position in the pelvis; and thus we find even Sir Charles Bell describing them as two tendons, from which the external coat of muscular fibres of the uterus took their rise. This external coat, he says, consists of strongly marked muscular bundles taking their origin from the above named structures on either side, and radiating outwards over the body and fundus of the uterus, both anteriorly

Bell.

* Dr Jn. Duncan on Uterine Displacements. p. 11.

⁂ Philosophical Trans. 1850 part II. page 515.

and posteriorly. Later, and even at the present time, we find Authors speaking of the round ligaments as being "composed of contractile fibrous tissue, similar to that of the uterus, along with vessels and nerves".*

But it was not until 1850, that their true structure and relations were made known. In that year Mr Rainey read a paper on this subject, to the Royal Society of London*, in which he described, not only their attachments and minute anatomy, but also ventured on a theory as to their probable use, which, as I shall presently show, was neither new, nor at all probable. With regard to their attachments he says, "the usual statement concerning the relations of the round ligaments is erroneous, for they cannot be said to pass through the external abdominal ring and become lost in the Mons Veneris, but rather, to arise by three fasciculi of tendinous fibres arranged as follows: the inner one takes its origin from the tendon of the internal oblique and transversalis muscles near to the symphysis pubis; the middle one, from the superior column of the external abdominal ring near to its upper part; and the external fasciculus from the inferior column of the ring just above Ginbernats ligament."

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He also points out that no part of these structures

* Zeitschrift für Geburtshülfe July 1851.

descends through the external abdominal ring, but Rainey.
that which is described in the text books of Anatomy,
and commonly seen in the dissecting rooms, is merely
a line of lymphatics running in that direction; How
far this statement is correct I shall endeavour to
describe presently. With regard to their structure
Mr Rainey declares that they ought to be looked upon
as true muscles, for he shows, by careful dissections
and microscopical preparations, that they are composed
not only of connective tissue and muscular fibre of
the involuntary kind, but also of that of the striped
or voluntary variety, throughout their whole lengths,
excepting about an inch from their uterine
extremities. Arguing from these facts he says—
His Theory.
"The only way in which the round ligaments can
act, considering the position of their attachments
and the direction of their fibres, must be, by—
bringing the uterus nearer to the symphysis pubis,
and thus tend to draw it forward from the vagina,
in this way increasing the length of the latter.
The object of such changes in the position of these
parts is necessarily to assist in sexual intercourse,
by causing the semen to be attracted more into the
upper part of the vagina and vicinity of the os uteri".

According to M. Raii*, who has written an elaborate

* Theory & Practice of Midwifery, Dr Churchill, p. 48.

† Magendie's Physiology. p. 408.

paper on this subject, the round ligaments are the continuations of the muscular fibres, both superficial and deep, of the uterus, for two thirds of their extent; and he appears also to consider that some of the fibres are attached to the horizontal ramus of the pubis near to the symphysis; in this important point therefore he coincides with Rosenberger*. M. Rau considers their function to consist in tilting forward the fundus uteri towards the end of pregnancy and during the early stage of labour. However we find Magendie, who wrote more than twenty years before, and who appears to have considered the round ligaments to be merely fibrous in structure, holding a similar view, thus he says† — "at the latter months of pregnancy, the round ligaments offer an obstacle to the further ascent of the uterus, and then direct the fundus uteri forwards, which must have an advantageous effect for the abdominal circulation, by lessening the compression of the great vessels." Other authors, as Churchill, Favre, Tyler Smith, Priestley &c., describe the round ligaments, as ligaments, guiding and regulating the ascent of the uterus in early pregnancy. Looking to Continental writers, we find M. Velpeau in the Anatomie Chirurgicale

Rau

Rosenberger

Magendie

Modern authors.

Velpeau.

* Manual of Histology - Köllikers

† The Mechanism of the Gubernaculum Testis, J. Cleland M.D.

Vol. II. and Mayqriers in his Nouvelles Demonstrations Accouchements, announcing the same hypothesis as that which was subsequently enunciated by Mr. Rainey in the paper already quoted. Finally, it is stated in the 6th edition of Quains Anatomy that, during utero-gestation, "the round ligaments become enlarged and their muscular structure more marked." Mayqriers. Quain.

Kölliker*, it is also important to state, has verified the views of Rainey as to the muscularity of these structures, stating, in his Manual of Histology, that "the muscular fibres sometimes extend to the uterus itself." Kölliker

And Dr. Cleland†, in his Prize Thesis on the Gubernaculum testis, showed by dissection, that muscular fibres are reflected from the internal oblique and transversalis muscles, and these passing 'upwards' sheath the ligament; his account of their pelvic attachments does not entirely agree with that of Rainey, inasfar as he described "a number of aponeurotic fibres inserted into the labium;" and said nothing of the 'inner set of fibres' which that observer mentions. Cleland.

Now, on considering the foregoing observations one is naturally struck by the obvious meagreness of the conclusions that have been drawn by the various authors. For, if these structures have really the considerable attachments at their pelvic

extremities, as described by Rainey, Raw, Rosenberger, Cleland & others; and the peculiar arrangement of fibres at their uterine attachments, described by Bell; and further, if their structure is muscular to the degree which has been stated; or, above all if we add to these facts the most indubitable one that they undergo great development during utero-gestation, — it becomes evident that, — firstly, they must subserve some important function in the human economy, and secondly, — in all probability this function is brought into play after the ligaments have become fully developed, i. e. at the end of pregnancy. But though we may form our own conjectures from the researches of others, yet it is neither expedient nor becoming to lay them before scientific observers, without having tested, so far as possible, the accuracy of the data upon which they are founded, by actual dissection and careful investigation.

Summary of the preceding

With this view I have taken every opportunity to dissect the parts in question, and have made microscopic and other preparations, together with the accompanying drawings to illustrate and confirm the truth of the following illustrating facts: —

※ Op. cit.

† Op. cit.
Dr. Banks on the Wolffian bodies.

Following the example of most German writers on similar subjects, let me first examine briefly what is known of the development of the Round Ligaments of the Uterus. Developm.t

Dr. Cleland* states that these structures first appear when the Wolffian bodies begin to Atrophy, as two peritoneal elevations extending from the corner uteri on either side to the groin, these exactly correspond with similar elevations which he has observed in the male, and which afterwards become transformed into the Gubernaculo testium. Cleland.

According to Kölliker† a "fine thread like structure (Leistenband) springs from the ducts of the Wolffian bodies, and loses itself in the muscles of the Abdominal wall, this, when arrived at its full development, is destined to become the Gubernaculum testes of the male, or the round ligament of the female." Kölliker

Dr. Banks, from whose work on the Wolffian bodies the above quotation is taken, very clearly shows the strict analogy of these organs in the male and female; though from his own observations on the Ducts of the Wolffian bodies I am lead to believe that there is some slight difference in their respective attachments at their visceral extremities. For he has proved that it is the Müllerian duct Banks.

* Since writing this I have made several further dissections which however are only confirmatory of the statements made in the text.

in the female which goes to form the Generative organs, and to which the Round ligament is Attached; but that the excretory ducts in the male form the Vasa deferentia, and that it is to these the Gubernacula pass to be inserted.

Dr Cleland on the other hand has traced the Gubernaculum in its passage through the abdominal wall, and has also dissected out the analogous parts in the female foetus. demonstrating thereby a very close resemblance in the pelvic extremities of these structures.

The principal object of this paper is however to describe the structure and functions of the Round Ligaments, and therefore I will pass on at once to the consideration of the former. viz-

I. The Structure of the Round Ligaments.

In order to make my observations as conclusive as possible I noted the following conditions in each case: 1st the Condition of the uterus, 2nd the thickness of the Round ligaments, 3rd their direction, 4th their pelvic Attachments, and 5th their uterine insertion. Mode of Observing.

From the notes of 11 dissections* of the round

ligaments in the unimpregnated state of the uterus, the following may be stated to be the most constant conditions.

Their thickness may be correctly compared to to that of a goose-quill, but this varies remarkably even during the unimpregnated state of the uterus, thus during the six months that I have been in connection with the Pathological Theatre I have met two cases of females who have died during the menstrual period, and also one in a similar condition, in a private post mortem examination, in all of these the round ligaments were increased in thickness, on account of the greater vascular activity of the uterine organs at that period. Again, when the uterus becomes hypertrophied from any cause unconnected with impregnation, as a from a fibrous tumour occupying the middle coat or cavity of the organ these structures are considerably thickened, such cases are frequently met with, so that this observation is easily confirmed. A few months ago a woman was examined in the Royal Infirmary who had a beautiful subperitoneal fibrous tumour of the uterus, in this case the uterus was not enlarged, and the round

Thickness & Direction of the Round-Ligaments varying with the condition of the Uterus

ligaments were of the usual thickness.

Relations. Direction.

The direction which the round ligaments take when the parts are quiescent, is directly outwards, upwards, and slightly forwards; but when anything occurs that leads to an alteration in the position of the uterus, then of course this direction becomes modified.

Pelvic attachments

The attachments of the round ligaments at their pelvic extremity is a matter of great importance, but it is also one which is somewhat difficult to make out. The following however is the result of my dissections:—

The attachments in the inguinal canal are by far best seen at or near the time of the full development of the uterus, the so called ligament is then seen to enter the internal abdominal ring and almost immediately to become thinner to a remarkable degree, owing to the fact that it here receives two of the tendinous fasciculi which in a great measure compose its bulk. The inner one of these is blended with the fibres of the conjoined tendon, whilst the outer arises from the tendon of the external oblique where it forms the outer pillar of the external abdominal ring. Another set of fibres passes downwards and has a distinct bony attachment

to the horizontal ramus of the pubes near to the symphysis pubis. The remaining fasciculus emerges from the external opening and its component tendinous fibres spread out and are lost in the cellular tissue of the labium and mons-veneris. It is this last set of fibres which is commonly supposed to be the ligament itself. Rainey, however, as before stated, denies its presence altogether, for he distinctly asserts that no part of the round ligament is prolonged beyond the external abdominal ring, and what is taken for the ligament is only a line of lymphatics passing from that opening to the mons veneris. This statement appears to me to be erroneous. For after the most careful microscopic examination of the disputed structure I have always found it made up of fibrous elements similar to the structure of the other muscular attachments. There can be no doubt that glands do exist in this situation but they are I think wholly independent of this fasciculus. There is also another fact which is incompatible with Dr Raineys view, viz. that it corresponds in relation to the central bundle of fibres of the analogous organ in the male, viz. the Gubernaculum testis,

that is, to that part of it which has its attachments at the bottom of the Scrotum.

The mode of insertion of the round ligaments into the uterus now demands our attention, and in order to elucidate my view of this arrangement I have ventured to construct the diagrammatic drawing accompanying this paper. (Plate I) Uterine insertion

As they approach their place of insertion, which is just anterior to, and below the uterine ends of the Fallopian tubes, the fibres of the round ligaments spread out in a radiating manner over the body and fundus of the uterus both anteriorly and posteriorly, forming in fact, the "muscles of Bell" before described.

But Sir Charles Bell regarded them as muscles arising from the two round ligaments as tendons, Whereas the view I take, is that, Considering the muscular structure of the round ligaments, their important functions, and the fixed-ness of their pelvic attachments, these external muscular fibres of the uterus are the expanded insertions of the round ligaments.

Looking at it from this point of view one cannot help being struck with the completeness and beauty of the arrangement, and the mode

in which the ligaments grasp the uterus must be regarded as perfect—, and points most conclusively to the functions of these structures.

Before leaving the subject of the relations of the round ligaments let me remark in passing that it not unfrequently happens that during utero-gestation one ligament becomes more developed than the other and thus admits of the ascent of the uterus more on that side, or rather a tilting of the whole organ over towards the side of the shorter ligament. The cause of this unequal development has not I believe been explained, but I think it is possibly due to the development of the placenta on the same side as the longer ligament, for we know that the uterus is of greater thickness about the placental site, and it does not appear improbable that the round ligaments attached near, and deriving nutrient arteries from, the neighborhood of that centre of vascular activity, should also undergo increased growth. But be this as it may, a lateral swelling is produced on the side of the shorter ligament, by the gravid uterus, and this is apt to be mistaken for an Ovarian Tumour unless the practitioner guards against the

Irregular developement

Probable Cause.

error. As previously stated the minute anatomy of the round ligaments has been investigated by Kölliker, Rau, Rainey and other excellent microscopists, and therefore my observations can be little more than confirmatory of their statements.

As assistant to the Pathologist of the Royal Infirmary I have enjoyed peculiar facilities for obtaining uteri in the unimpregnated condition, and therefore have had ample opportunities of examining the minute structure of the Round Ligaments; but it has been principally through the kindnesses of Mr. Turner and Dr. Reiller that I have been enabled to examine the ligaments of the Gravid uterus.

Minute Structure.

The structure of these organs is collectively, composed of striated muscular fibre, plain muscular fibre, fibrous and fibro-cellular tissue, vessels, nerves, and lymphatics.

The striated muscular element exists in the greatest abundance towards the pelvic extremity, and gradually lessening in quantity as it passes towards the uterus is finally lost about one inch or one inch and a half from that organ. As represented in Plate II fig. II. Kölliker avers

that the striped muscular fibres sometimes extend up to the uterus itself, but after the examination of a great number of ligaments I have not met with this condition in the Human Female, In the monkey however it was well seen in the case of a uterus given to me by Mr. Turner. The plain muscular fibre, similar to that of the uterine parietes, exists most abundantly in that part of the Round ligament which is in direct continuity with the uterus itself, few of these fibres being beyond the middle of the ligament.
Intermixed throughout the whole, but more especially in the tendinous pelvic attachments, the fibrous and fibro-cellular tissue exists in considerable quantity,

Each of these essential component elements varies in relative proportion according to the degree of development of the uterus. Thus at the full time of utero-gestation, the muscular tissue is in greater preponderance, the fibrous element not having undergone hypertrophy. About a month after parturition however the muscular structure has entirely disappeared, and in one case

Relative proportion varies with condition of uterus.

I examined these parts 14 days after delivery but only granules and fibrous tissue were seen. The arteries of the round ligaments are large and appear to be derived from those of the uterus, this fact I have twice demonstrated in the Human female by throwing a carmine & gelatine injection into the uterine artery of one side, in both cases the injection travelled as far as the point where the ligaments had been cut through close to the inguinal canal. The lymphatics according to Rainey lie principally along the outer side of the round ligaments, and are prolonged, he says, downwards through the external abdominal ring.

Arteries — whence supplied.

In the Monkey, as before stated, I have found these structures to be entirely muscular. In the Dog the fibres are pale but distinctly striated, and the same may be said of them in the Sheep and Cow.

The changes which the Round ligaments undergo during utero-gestation must now be considered. As soon as impregnation has occurred the vascular activity of the uterus and its appendages is greatly increased, and the latter undergo more or less change

Changes during pregnancy.

as the former is modified. Thus the muscular elements of the round ligaments undergo hypertrophy, and the thickness of the structures is thereby considerably increased. As the uterus rises in the abdomen they gradually assume a more and more vertical position until at the full time they are almost perpendicular.
Their point of insertion, at the full time, into the uterus also appears altered, but this is due to the greater proportional development of the posterior part of the fundus, thus causing an approximation of their uterine insertion anteriorly. They however still retain their proper relation to the Fallopian tubes, which, as has been already mentioned, are situated above and behind the round ligaments.
One point only now remains to be considered, viz. What change does impregnation and gestation effect on the <u>length</u> of these ligaments? Do these ligaments increase in Length?
In the unimpregnated condition I have always found them to vary in length from 4 to 5 inches, but as a post mortem examination of a woman exactly at the full time of pregnancy is a rarity of meeting with, which I have not had the opportunity, I cannot speak positively on this subject. Nevertheless

Tyler Smith Manual of Obstetrics.

judging from the Specimens of Gravid uteri I have seen, and possess, I think it probable that this elongation is very slight. For it must be noticed that their insertions are relatively much lower down in the gravid uterus, than in the unimpregnated organ, as I have before explained, and when it is considered that the internal inguinal rings have a level which is about one-third of the distance between the pubes and umbilicus, it becomes evident that the round ligaments do not require much increase in length to adapt themselves to the enlarged uterus.

Having thus obtained a knowledge of the developement, relations, and structure of these parts, let us now, with the helps of the foregoing data, enquire into their functions. Functions & mode of action.

In order the more fully to elucidate my views of the principal use of the Round Ligaments we must glance for a moment at the mode of expulsion of the foetus from the uterus by the Contraction of the fibres.

Müller, Michaelis, and Wigand consider the contraction of the uterus at the full time commences at the cervix, and then

passes up to the body and fundus of the organ; this, as Wigand has observed, first elevates, and then depresses, the presenting part; and its great use is, according to Michaelis, to prevent prolapsus of the umbilical cord, and descent of the arms of the fetus before the head, the cord and arms, when lying low in the uterus, being swept upwards beyond the risk of danger, at the commencement of each pain. These views are supported by Denman, Rigby, Tyler Smith, and others. Dr Smith thinks that the above described action is analogous to that which Magendie has shown takes place in the stomach, and Müller in the heart of the Frog.

I do not know whether these observers have any other data besides those just mentioned, but if these are all they must surely be insufficient.

The observation of Wigand may be otherwise explained than by the commencement of the contraction in the Cervix, as I shall presently attempt to show; and now that we have good reason to believe that parturition is initiated by changes which take place in the Decidua, and not

as was supposed by Power and others by the irritation of the child's head on the "Sphincter" of the Cervix, or by any of the numerous causes which have been assigned by other observers; it may be justly doubted whether this theory be correct, for it is very probable that the contractions about the cervical portion of the uterus are very slight, owing to the extreme thinness of its parietes at this part.

The mode of action of the perpendicular fibres is very obvious, for arising as it were in the cervix they sweep upwards over the body and fundus of the uterus both anteriorly and posteriorly; this layer is very thin, and the contraction of its fibres necessarily exerts a force downwards and backwards, i.e. in the axis of the uterus.

action of perpendicular fibres of the gravid uterus

The action of the circular fibres requires more consideration; they undergo their greatest development above the line of the broadest part of the ovoid, i.e. in the upper part of the body and fundus uteri, by this arrangement a large amount of force, generated by the contraction of these fibres, is brought to bear unopposed, on the contents of the uterus, for

of the circular fibres.

if the circular fibres had been equally developed above and below this line, their forces, even before the escape of the Liquor Amnii, would have, in a great measure, neutralised one another, and after the rupture of the membranes, especially in those cases where the 'waters' drain away completely, labour would have ceased, and the child squeezed by the antagonistic action of these fibres.

But that such is not the case every uncontracted (and especially dried) gravid uterus shows, so that I think I am justified in stating, that it is highly probable, though not actually proved, that the circular fibres act by exerting a force on the contents of the uterus which is directly in its axis, and from above, downwards and backwards.

But there are still two sets of fibres in the uterus which were described and figured by W. Hunter, and named by Ruysch the "Detrusores placentæ." These consist of two sets of concentrically arranged fibres, one around each Fallopian tube at its entrance into the uterus. It is these arrangements of fibres which indicate the formation of the single

Detrusores placentæ

uterus by the union of the two Müllerian ducts, which remain separate in the lower Mammalia and constitute the cornua uteri.

By the contractions of these muscles, two forces are generated, which, so long as the Liquor Amnii is present become diffused and act almost directly downwards, but when the membranes are ruptured their mode of action is more complex, for now the two forces acting in different directions, exert their powers on the same body — the Fœtus, which must therefore be propelled in the direction of their resultant. Now what is the direction of their resultant? If we construct on the lines formed by the above forces a parallelogram, and then find its diagonal, it will be demonstrated by prolonging the diagonal, that it passes directly in the axis of the uterus, If, as the diagonal represents the resultant of these two forces, it is thus shown that they act upon the Fœtus in such a manner as to propel it in the axis of the uterus and from above, downwards and backwards. Thus it is proved that those fibres of the uterus which undergo development

during utero-gestation, act during parturition by exerting a combined force which is directly in the axis of the uterus and from above downwards and backwards.

Effect of a "Pain."

We have now to consider the effect of one of these combined actions, which in Obstetric 'parlance' is called a "Pain".

When a 'pain' occurs the uterus is at first felt to be slightly lifted up as it were, as was observed by Wigand; and the presenting part is pressed firmly against the os, probably, as I shall presently attempt to show, before the tilting up motion takes place.

Argument.

Now, as in the first stage of labour the os and passages are comparatively unyielding, and again, as even in the second stage it requires very strong efforts on the part of the expelling body to effect the propulsion of the child along the curved passage towards the outer world, it becomes evident that, were the gravid uterus the simple ovoid, attached only by its utero-vaginal connections to the pubes, and pelvis, and floating thus loosely in the abdominal cavity, as we see it represented diagrammatically in the lecture=

= rooms, or pared down and deprived of its all-important appendages as is too often seen in museum preparations and casts, — the passively resisting parts, viz. the os and afterwards the passages, would react on the expelling body, (the uterus,) through the fœtus, (the body being expelled,) and thus repel it as a whole so far as the said utero-vaginal attachments would allow. This is the problem on which depends my theory of the principal use of the round ligaments of the uterus, and I think it explains very reasonably the observation of Wigand just quoted.

Formularised it runs thus: —

If the combined weight of the expelling body and its contents be less than that of the resisting surface, then the body which the former is expelling is reacted upon by the latter and is repelled.

Examples of this law are numerous, such as the Sky-rocket, the Cannon, &c. &c. but take for instance a portable steam-engine, and let its piston-rod be forced against a sufficiently strong stone-wall, then, (if the

Example.

former hypothesis be correct,) the whole weight of the engine being less than that of the resisting surface, the stone-wall; it will be repelled by the reaction of the latter on its piston-rod, unless its wheels have been properly Scotched to begin with.

In this example the cylinder represents the uterus, and the piston-rod the fœtus, but the stone-wall represents the resisting os or passages, this last does not appear to be very apt, for we have in the former two independent objects acting against each other, the stronger naturally overcoming the weaker, but in the latter case, the os & passages are in connection with the uterus, are in fact continuous; hence it pulls & pushes against itself, as a man pulls on, or thrusts his leg into, a Wellington boot. True, but we must take into consideration the tubular nature of these parts at the time of parturition, and the comparative thinness of the supra-cervical portions of the uterine parietes. In the first instance each "pain" would produce a stretching of the lower part of the uterus, and the effect

of the stretching of an elastic and dilatable tube is to produce a diminution of its calibre, which is exactly the opposite to what we desire in the case of the uterus; there in the second place, from the comparative undevelopement and consequent thinness of the uterine parietes just above the cervix,—a fact which I have observed in all the preparations of the Gravid uterus which I have seen, more especially in two dried ones in the Museum of the College of Surgeons,— rupture would be imminent in this situation from the same cause,

But I conceive that these difficulties and dangers have been foreseen and provided against by Nature, by the formation of two muscles, which passing almost vertically upwards from either Inguinal canal, clasp the body and fundus of the uterus, as before described, and thus bind it down and keep it in position during the "bearing down pains", and as the uterus contracts, so do they, continuing to follow the organ down until it has

Application

* During a recent discussion on this subject at the Royal Medical Society, Dr Wyllie brought the idea into stronger light, that Prolapsus might be prevented by these ligaments during the Puerperal month.

completely expelled its contents, and may even then act by assisting to prevent inversion* & prolapsus of the uterus during the relaxed state of the passages. Thus, then I consider the principal use of these so-called ligaments, is to bind down the uterus and keep it in position during parturition. The slight upward rise of the organ at the commencement of each pain ascribed by Michaelis, Wigand and Müller to the contractions of the uterine fibres beginning in the cervix, is accounted for in the following manner;— the presenting part of the fœtus is pressed firmly against the os or passages at the commencement of the pain, and as before stated, the latter reacts upon the uterus through the fœtus, and the "round ligaments" not having yet taken up the contracted condition initiated in the uterine parietes, yield slightly to the increased strain, and allow of a corresponding movement upwards on the part of the uterus.

Mr Rainey's theory of the use of these structures does not appear to me feasible, for, as I have already described, the round ligaments in the unimpregnated state of the uterus are comparatively in an undeveloped state, and apparently much

too long to act efficiently for the purpose described by him, thus actual measurement shows these structures to vary in length from four to five inches, whilst the distance from the internal inguinal ring to the insertion of the round ligament of the same side into the uterus is only three inches at the most, and therefore in the generality of cases they would require to contract nearly one-third of their length to move the uterus towards the pubes, that such an extensive contraction could take place in structures containing so little muscular tissue as the round ligaments at this time, seems to me incredible.

The theory of Anagenesis, subsequently described by Rau is I think correct, but I should feel inclined to go a step further and say, that not only do the round ligaments tilt the fundus uteri forward and prevent compression of the vessels of the abdomen, but also bring the axis of the uterus into that of the plane of the brim in order to facilitate labour.

This latter and obvious deduction from the foregoing considerations occurred to me whilst working at the subject, but whether I have obtained it from some Author or

arrived at it spontaneously I am now unable to say.

In Conclusion I may state that I have thought it unnecessary to enter into the Phys. and Comps. of the mere Action of the Diaphragm and Abdominal muscles as accessary to parturition, and holding Uterus in position during the expulsive efforts of the mother, for it is evident that these alone do not perform the labor function; if it were so, each time the mother opened her glottis to respire the uterus would rise in the abdomen; and further, cases of parturition going on perfectly whilst the woman was comatose, paraplegic, or <u>dead</u>, prove beyond doubt that these accessary powers are not essential to the process.

Whether the functions of the round ligaments already detailed end here, it is impossible for me now to state, but I think it probable that when their importance becomes in due time recognised, they will be found, on closer investigation, connected with some of those pathological conditions of the uterus which are as yet but very imperfectly understood; thus for example it is

not improbable that spontaneous rupture of the uterus is sometimes caused by their deficiency, because if one or both ligaments were ruptured, and enlarged, or otherwise incompetent, what would follow when labour occurred?

The presenting part would be felt to advance with each pain and then to retire as the reaction of the resisting passages impinged on the uterus, and in consequence, the latter would soon tear itself at its weakest part, viz, just above the Cervix uteri either anteriorly or posteriorly, in a transverse direction, i.e. in the direction of the fibres.

Summary of the Uses of the Ligamenta Rotunda Uteri.

Summary

1. To bind down the uterus and to keep it in position during parturition.
2. To tilt forward the fundus uteri - to relieve the abdominal vessels, and to bring the axis of the uterus into that of the plane of the brim of the pelvis.
3. Perhaps to regulate the ascent of the uterus during utero-gestation.

IV. On the Diagnosis and Treatment of Retained Menses.

In the present paper I wish to describe briefly the symptoms which arise from the retention and accumulation of the menstrual fluid in the cavity of the uterus, with a view to discuss the diagnosis of this affection from other causes leading to the enlargement of that organ; to try and point out and explain the probable causes of the grave symptoms which so frequently result from the present simple mode of effecting the removal of the pent up secretion; and to describe a method of operating calculated to avert these causes.

It is unnecessary to do more than merely enumerate some of the more common abnormalities which obstruct the natural outflow of the menstrual secretion, for these are fully described in all modern works on the diseases of women.

They may be either congenital, or acquired, to the former class, the imperforate hymen complete or partial absence of the vagina

and congenitally imperforate os uteri, belong; to latter, the following may be mentioned as the most frequent; adhesions of the nymphæ, vagina, or cervix, from ulceration and granulation of the opposing surfaces,— or complete stricture of the vagina from sloughing and cicatrization.

As a consequence of any one of the above mentioned conditions, the natural secretion monthly accumulates in the uterus, until either from the resulting malaise, the non-appearance of the menstrual flow, or the symptoms of advancing pregnancy, the patient or her friends become alarmed, and medical advice is sought.

'Hæmatometra' is generally stated to be an uncommon affection, I have myself only seen two cases, but when it does occur it requires considerable professional knowledge and skill for its diagnosis and successful treatment.

Error in the diagnosis of such a case would probably destroy the reputation, if not the life, of the patient, and would certainly be injurious to the professional

* Clinical Notes on Uterine Surgery - by Dr. M. Sims.

fame of the medical attendant; for pregnancy is too often suspected and death may follow delay.

Instances of such mistakes are on record, but let me quote one as an illustration; "A young lady in the country had retention of the menses, pregnancy was suspected by the family physician, Dr. Farre was sent for to decide the nature of the case; but before his arrival the hymen ruptured spontaneously; a large quantity of retained menses was suddenly evacuated; irritative fever set in, and the patient died in a few days." * Now, had the true nature of this case been detected, the stigma of odious suspicion would have been avoided, and perhaps the ladys life saved by a timely and judicious operation.

It is therefore absolutely essential that this affection, above all others, must be accurately diagnosed; and, as that can only be attained by a careful consideration of the Symptoms first, and afterwards by a physical examination, it becomes necessary to describe them.

According to the Statement of Dr Meigs the amount of menstrual fluid secreted at each period is from four to six ounces, but this calculation can only be approximative, for it is difficult to collect the fluid for actual measurement, and it is well known to vary in quantity even in the same woman, finally it is not difficult to conceive that the quantity evolved when the fluid is retained may be considerably altered, both from the resulting ill health, and the action of confined fluid on the mucous membrane of the uterus. I mention this in order to point out, that although the Statement cannot be relied on as a scientific truth, yet it is sufficient to establish a point of some importance in the diagnosis of retained menses, viz. the <u>extreme slowness</u> with which the uterus must necessarily enlarge, in contradistinction to pregnancy for instance. Thus taking the maximum amount of fluid supposed to be secreted every month, viz- six ounces, it would, at the very lowest computation, require two years and a half to reach the size of the

fully developed uterus — but as it appears probable, that the thinner portions of the fluid are absorbed, (and nothing but a thick tarry fluid remains,) this calculation of the rate of increase of the uterine tumour is far too high; and we may reasonably estimate it at four years.

The above supposition is not without other foundation than mere calculation, which, of itself, is often of much value in a clinical point of view. Allow me therefore to quote two cases which are to a certain extent confirmatory of this and other details of diagnostic value:

In April 1862 Dr Davis communicated a case of retained menses to the Obstetrical Society of London — in which the fluid had been accumulating for <u>eighteen months</u>, owing to adhesion of the lips of the cervix, and yet the uterus, he says, "was only the size of a <u>four months</u> gravid organ".

Another case is related in the Transactions of the same Society by Mr Baker Brown, in which the menstrual fluid had been retained for <u>two years</u> from <u>Atresia vaginæ</u>

and in which the uterus was again only "the size of four months pregnancy".

Here then we have two cases occurring within a short time of each other, (in the same year,) in the first, the affection had existed eighteen, and in the second, twenty four, months; and yet the organ was the size of a 'four months gravid uterus'.

Reverting to our calculation, we reason that if it requires four years, or a little more, of fluid accumulation to increase the uterus to a size equal to that of the full time of pregnancy, it will require eighteen months, or a little more, to increase it to that of a four months gravid uterus. And this I consider proven by the above cases.

Apropos to this subject let us enquire into the nature of the enlargement of the uterus from accumulation of the menstrual fluid, which we have seen takes place with remarkable slowness.

Does it consist in a gradual development of its walls as in pregnancy, or is it only a mere distension of the uterine cavity by the gradual menstrual accession?

* On the Diseases of Women. by Dr G. Hewitt.

I should never have thought it necessary to discuss this question had I not found among other authors no less a one than Dr Graily Hewitt* taking something like the latter view. He states, while speaking of retention of the menses from imperforate hymen, "The cavities (viz. the uterine, Fallopian, and vaginal.) containing the blood have their walls greatly thinned and otherwise altered".

This statement implies a principle so completely at variance with the ideas of the physiology and pathology of the uterus which I have imbibed in this school, that I felt constrained to examine the subject more closely. The necessary work for the preceding paper abundantly proved to me that all I had read and heard concerning the physiology of the uterus was correct; and my last winter sessions employment in the pathological department of the Royal Infirmary, together with observations made from time to time in the museums of the College of Surgeons & University

* Clinical Lectures on the Diseases of Women
Medical Times and Gazette March 1859.
by Dr Simpson.

likewise impressed me with the truth of the fact taught in this school, viz. that the behaviour of the uterus when its cavity is occupied by any body not natural to it, e.g. fibroid tumours of the middle and inner coats, is exactly similar to that which it assumes during pregnancy. This is a law peculiar to the uterus, but why it should be evaded in the case of retained menses, is to me at least, inexplicable. In Obstructed dysmenorrhœa its enlargement by development is well known, but it has been explained by Sir James Simpson as follows :*

"It is a pathological principle in the case of all other hollow organs with orifices or canals of outlet, that when their canals or orifices become stricture or obstructed, accumulation of the appropriate fluid takes place within their cavities, that muscular contractions are then excited in their walls for the expulsion of the accumulated contents, and if these accumulations become common or chronic, the muscular coats of the distended organs are apt to become

thickened and hypertrophied. This principle for example we see illustrated in the case of the bladder, where from stricture of the urethra, an obstruction is presented to the free flow of the urine, and the manifest indication for treatment in such a case is the removal of the obstruction. The same pathological principle applies to the uterus in the case of constriction of the os or cervix, and the same principle should guide us in the treatment of it."

One fundamental pathological law relating to hypertrophy is, that it commonly takes place from excess of function, just as atrophy does from a want of it. When a natural outlet, or orifice of a muscular viscus is narrowed or constricted, such as that of the bladder, (or a cardiac orifice) the cavity soon becomes dilated and its walls hypertrophied, to compensate, as it were for the greater force required to overcome the obstacle. But are these instances fairly comparable with the uterus? Truly it is a hollow muscle, and that of the highest order, but do its functions correspond with

those of the above mentioned viscera?
The natural flow of the menstrual fluid does not require an expulsive power to assist in effecting its exit, and if it did it might be asked whether the uterus in its unimpregnated condition would be able to perform that function. For the researches of Kölliker, Rainey, and others lead us to believe that that organ in its quiescent undeveloped state, is composed of simple fusiform nucleated embryonic fibres, ready as it were, on short notice, to develop into elongate, and assume the properties of muscular tissue. Whether the uterus can contract before this takes place I have not had sufficient experience to know, but judging from analogy it appears to me impossible. If, however, on the other hand, the menstrual fluid accumulates, and the uterus obeys the law I previously mentioned, it may readily be understood that an ordinary stimulus would send it into contractions, which, were the obstruction only partial, as in certain forms of dysmenorrhœa, would expel the

fluid contents; but if complete, as in retained menses, would only increase the discomfort of the patient, and from, as it undoubtedly does, one of the symptoms of that grave disease.

But have we any other grounds for our belief that the walls of the uterus develope in cases of retained menses? If not, may not Dr Graily Hewitts statement after all be correct? Let us consider the latter first, he says, and thereby embodies the opinions of other authors on the same point, "the walls of the cavities became greatly thinned &c." How so? John Hunter was the first who showed that hypertrophy was is often caused by intermittent pressure, atrophy by constant pressure. A gradual accumulation of menstrual fluid would assuredly keep up a constant pressure on the inner coat of the uterus and should therefore produce atrophy of that coat; in this way then we should have the cavity enlarged, and the walls "greatly thinned". But the same thing ought also to take place in pregnancy, or at least in

the case of intra-mural uterine tumours.
Again if it were so how do we to account
for the contractions of the organ in this
affection, described even by Dr Hewitt?
and lastly how do we reconcile it with the
fact that the uterus attains the size of a
'four months gravid organ'?. Looking round
for examples we see the dilatation of the
pelvis of the Kidney in hydronephrosis, of
the Gall bladder in cancer of the duodenum,
and so on ad infinitum, but examine these
only; do we find the walls of the gall
bladder or of the distended ureter 'greatly
thinned'? I think not. we do indeed
sometimes find a particular point weak
and sacculated, but the general wall is
intact and as good as ever; Nature meets
the emergency, and it is only under great
and continued provocation that she at
length gives way, and then only at one
or other of the afore mentioned weak points.
Finally, look at the 'distended' walls of the
Graafian vesicle, (or connective tissue capsule)
in the case of ovarian dropsy, and I think
the notion of 'greatly thinned walls' becomes

*Gooch on some of the most important diseases peculiar to women. Syd. Soc.

fanciful.

But to the former question as to whether we possess actual facts on which to base our statements of the development of the uterine parietes, we have not, I fear, much to answer. Dr Haldane kindly informed me that during the time he was Pathologist to the Royal Infirmary he dissected the body of a woman who died from peritonitis following the operation for retained menses. but unfortunately as yet I have been unable discover the report of this examination. After carefully searching many volumes on this subject, I have been rewarded in one instance only, by meeting with a case, which I cannot but regard as one of retained menses, though it does not appear to have been recognised. It will therefore require to quoted at length.

(1) Dr Gooch* says, "The following case was at first supposed to be pregnancy, and afterwards suspected to be hydatids; the result showed that it was neither one nor the other, yet I do not see how this could

have been known during the progress of the case," :

"A lady, the mother of a large family having ceased to menstruate for several months, and growing large in the abdomen, concluded that she was pregnant. At length there came on a profuse and perpetual discharge of water mixed sometimes with blood, by which her strength was so alarmingly reduced, that first one and then another practitioner was consulted about her, and I met a consultation of four. Through the walls of the abdomen the uterus could be felt, about as high as the umbilicus, and in the vagina the neck of the uterus was found obliterated, and its body elongated. As every attempt to restrain the discharge and support her strength had been unavailing, and she daily became more exhausted, a silver tube was introduced through the orifice of the uterus into its cavity, that if it was distended by an ovum the liquor amnii might be drawn off. The tube readily passed in, but on withdrawing the wire

no liquor amnii came away. A few hours afterwards she was seized with violent expulsive pains, under which she sank rapidly and died.

I was not present at the examination of the body; but the following statement was sent me by a gentleman who opened it:

The uterus was as large as the sixth month of pregnancy, and its cavity big enough to hold two fists; it contained neither fœtus nor hydatids, but a mass about the size of a goose-egg of stringy matter, like a soft placenta, and unattached to the inner surface of the uterus; this surface was red and irregular, like a granulating sore; its walls were thickened as in pregnancy, of a dark red hue, and a flaccid texture?

Such is the only report of a case of retained menses, in which an autopsy has been made, that I have yet met with.

But it must be admitted that even this may be pronounced doubtful.

Is it a case of retained menses at all?

The watery discharge intermixed with blood, and the absence of any mention of an obstruction

* Graily Hewitt and others.

** Clarke, Ramsbotham, Simpson, Lee.

° Dr Elkington of Birmingham. Obstet. Trans. Vol. I.

† Tomlinson Obstet. Trans. Vol. V.

in the passage, render its nature dubious.
The watery discharge* indicates hydatids,* Cancer*, polypi°, or tubercle† of the uterus, but the examination of the body did not reveal any one of these causes.
With regard to the discharge also I would draw attention to the fact that it occurred some "months" subsequently to the cessation of (the external signs of) menstruation; and further during this time the abdomen enlarged so that the lady thought herself pregnant. This swelling it will not be doubted was owing to the accumulation of the menstrual fluid from some cause unknown, perhaps adhesion of the lips of the cervix, after a time the increased weight caused the obstruction to yield partially, so that the thinner portions (serous) of the accumulation gradually oozed away, accompanied occasionally by a little blood. The patients health giving way, as usually happens, from the ~~the~~ menstrual retention, and subsequent dysmenorrhœa. (to say nothing of her numerous puzzled doctors). The soft mass found in the uterus after death appears to have

* That is to say unlike them inso-far that in its ordinary quiescent condition the uterus is incapable of contracting.

resembled the tenacious substance removed in ordinary cases of retained menses.
The main point however is the state of the uterine parietes, which were, as we have anticipated, similar to those of pregnancy.
The question then is like that formerly raised, namely, whether the parietes of the gravid uterus got thinner and thinner by distension, thicker and thicker by hypertrophy, or kept pretty nearly of equal thickness by gradual development during the whole of utero-gestation, each observer maintained his opinion on the strength of few observations, the one the result of observing the uncontracted uterus when drained by hæmorrhage, another from examining a uterus after delivery, and the last from a series of observations on the uterus in different circumstances.
All I am anxious to assert is, that it is erroneous to speak of "distending" the uterus, a phrase very common among the latest authors on the diseases of women. The uterus is an organ unlike the bladder and heart or any other viscus in or out of the human body*, it has an anatomy and

physiology sui generis. Nor do I know any organ so satisfactory and complete in all its details as this is. To speak of its distension by the menstrual fluid, is to speak of a physiological impossibility.

Another symptom of diagnostic value is the presence of hypogastric intermittent pain, together with a gradually increasing sense of weight and fulness in the pelvis.

The periodic pain is slight in the earlier months, but is more and more severe when the affection has existed for any length of time. It can only be referred to the cramp producing contractions of the uterus, which become more intense, and stronger, as its walls get more developed; the greater vascularity and hyperæsthetic state of the organ at each menstruation, accounting for its predisposition to contract and so produce the pain periodically. Here Dr. Tyler Smith's theory of the commencement of labour being initiated by the ovarian excitement at the tenth month, might find some support; but I think the predisposing causes above mentioned, with the presence the menstrual

fluid as a foreign body in the cavity of the uterus, acting as an excitant — are sufficient to explain these intermittent pains.

Next we have a class of symptoms, more or less resembling those of pregnancy: Constipation, frequent micturition, lumbar pains, nausea and vomiting, and sometimes even the breasts become turnid and painful. All these symptoms depend either on the presence of the uterine tumour pressing directly on the parts, or on the sympathetic influence which the uterus exerts on the mammary glands. Following upon these symptoms the state of the patients general health requires notice; she loses her apetite, her colour, and her spirits, she becomes in fact Chlorotic. It is this condition, together commonly with the abdominal swelling, which brings her at length to a medical adviser.

If the case is due to acquired obstruction to the menstrual flow, as from stricture of the vagina after difficult delivery, the patient soon calls the attention of her physician to the true seat of the malady

and a physical examination reveals the nature of the disease. But if on the contrary, it is due to a congenital cause, as imperforate hymen, then the case is different. The patient may speak very fluently of her general ill health, or of this or that sympathetic pain, but she requires close questioning, and much tact on the part of the physician, to make out her uterine history. And it must be done thoroughly, for if the practitioner were content with the simple fact of the enlarged uterus, a cessation of the menses, (they never having appeared) together with the accessory symptoms previously mentioned, he might very easily fall into the grave error of suspecting pregnancy, the results of which could only be disastrous both to himself and his patient. But if he elicited the simple fact that she either had never menstruated, or that the period of the last menstruation was far more distant than nine or ten months, as it probably would be in a case of retained menses, then such an error would be avoided, and a physical examination

would become necessary, this being the only safe means of diagnosis.

On placing the hand on the lower part of the abdomen the uterus is generally found enlarged, elastic, rounded, and fluctuating, it is variable in size according to the duration of the disease, sometimes reaching above the umbilicus: it is to be diagnosed from the swelling of pregnancy partly by the previous history, and partly by an examination of the state of the passages and absence of the sounds of the foetal heart.

In cases of retained menses from obstruction when we attempt to introduce the finger into the vagina the following causes for the retention may be met with.

I The labia may be adherent, leaving only a small orifice above for passage of the urine, it is more common in children than adults.

II. The Vagina may be entirely absent, nevertheless menstruation goes on, and the fluid accumulates in the uterus, which may be felt per rectum, and externally.

III The Vagina may be imperfect – this, according to Dr Hewitt, is more common than complete absence of the vagina; the finger passes inward only a short distance.

IV The Hymen may be Imperforate – in searching for record of cases of retained menses, this cause is by far most frequently met with.

"The finger" says Dr Grailly Hewitt, "when introduced into the Vulva, comes upon a very tense elastic swelling, constituted by the thickened hymen pressed downward and put on the utmost stretch by the fluid incarcerated above it."

V Stricture of the vagina, if complete may lead to retention of the menstrual fluid. it is due to adhesions of the opposite walls of the canal from wounds a lacerations, the history of which leads to a correct diagnosis.

VI The Os uteri may be congenitally closed or imperforate, or the lips may be adherent from injury during parturition.

VII Tumours external to the vagina, Cancer,

hypertrophy of the Cervix uteri, may occlude the canal and prevent the exit of the menstrual flow.

The diagnosis therefore of a case of retained menses may be summed up as follows:

Total absence of menstruation, or cessation of menstruation for a length of time; regular monthly lumbar and hypogastric pains, general ill-health and secondary symptoms of enlargement of the uterus, similar to those of pregnancy; hypogastric swelling; and obstruction in the vaginal or cervical canals.

I have not considered it essential to enter into a description of the microscopic and Chemical nature of the retained fluid, as I have nothing further to add to that already known, and described by Dr Müller in Henle and Pfeuffer's Zeitschrift. But I may state that Dr Sanders of Edinburgh has observed crystals of <u>hæmatine</u> in one case in which he examined the fluid microscopically some years ago; a fact which I do not find noted by authorities

of the subject.

Treatment

The treatment for the relief of retained menstrual fluid consists essentially in an operation for its removal from the uterine cavity.

This Operation, in its various modifications, is extremely simple, but experience has taught Surgeons and Accoucheurs that the results are frequently fatal. It would be interesting to obtain true Statistics of the results of the Operation, but the reports of cases are so scattered, and each writer is so careful to publish ~~only~~ his successful cases only, that a prolonged attempt in any part only ended by finding for two fatal, about twenty successful results from the Operation; but at the same time most Authors ~~are~~ comment on the extreme danger in which the woman is placed by the attempt to remove the fluid in the ordinary way.

The most common practice appears to

consist simply in making a free opening with a bistoury or scalpel through the obstructing structure, and in the case of an imperforate hymen a crucial incision is recommended; A large quantity of thick tarry fluid of ropy consistence is removed at the time, and continues to escape from the vagina for several days afterwards. Sometimes the patient recovers without a bad symptom, as was the case in the two patients who underwent the operation in Professor Simpsons ward in the Royal Infirmary this Winter Session, but sometimes again under apparently exactly the same circumstances, peritonitis or pyæmia result and the patients dies.

In some cases the peritonitis seems to be due to an effusion of blood into the peritoneal cavity, for this has been found in that situation after death; but in others the peritonitis is not to be accounted for except perhaps as a result of pyæmia.

⁂ Clin. méd. sur les maladies des femmes.

The preceding statements are on the authority of West, Hewitt, and Sims, as well as, so far as Class notes and memory can be trusted, that of Sir James Simpson and Dr Duncan.

The Cause of the pyæmia is commonly stated to be due to the retention of some of the fluid in the still uncontracted uterus - after the operation - which by contact with the air undergoes putrefactive changes - and this, lying in contact with the altered lining membrane of the organ -, induces pyæmia.

But if the effusion of blood along the Fallopian tubes into the abdominal cavity, produces the peritonitis which is the dreaded symptom after the operation, it becomes somewhat difficult to account for its occurrence at that particular time; and one naturally asks - why did it not escape from the tubes before the Operation ? -

The only rational explanation of its occurrence at all which I have met with is that of Bennett* who considers

* Edin. Med. Quarterly Journal Nov. 1865.

that "it is due to the contraction of the uterus, set up by the evacuation of the fluid, continuing and forcing the blood contained in the Fallopian tubes into the peritoneal cavity." Dr. G. Smith thinks this explanation may hold good in most cases of this kind, he says, (page 503) "The fatal result in some instances may be due to a combination of one or more circumstances. The sudden withdrawal of the distending force in cases where the Fallopian tubes have been thinned and enlarged must itself have an injurious effect on the vitality of the tissues of the part in question, a certain number of deaths are to be attributed to purulent absorption, the admission of air producing decomposition of the blood and pyæmia."

Another explanation has been advanced by Dr. Jn. Duncan, who in writing on Uterine Hæmatocele* endeavours to prove that the source of the blood is from the uterus by a reflux along the Fallopian tubes, and he refers to a previous paper by

by himself on the same subject in which he adduced cases to prove that continued dilatation of the uterine orifice of a Fallopian tube in the unimpregnated state occurred as a pathological condition. From this he would find reason to fear that evil might ensue from the open tube transmitting into the peritineal cavity, fluid that ought to pursue another direction.

It is however not satisfactorily explained why peritonitis does not occur from this cause before the operation. For were the effusion of menstrual fluid due to the contraction of the uterus as supposed by Bennett, why should it not occur at one of the menstrual periods when contractions, which give rise to the hypogastric pain at those times, take place? Again, were the Fallopian tube patent at its uterine extremity uterine hæmatocele ought surely to be present in cases of retained menses.

It appears to me that it would be

*Roedrun Ienus Utri Humani.

well worthy of the attention of those who may have the opportunity of observing the fact, whether or no, the valvular apparatus described by Raderer as existing in the gravid uterus is a reality. I do not find any mention of its existence in any other work but that of Raederer, and a quotation of his description may not be out of place here —:

"Tubæ, in uteris gravidarum vel puerperarum, eo fere modo aperiuntur versus uteri fundum, quo ductus choledochus ipsam tubam producitur, et altera paries valvulæ speciem facit, ovo ad uterum pressæ: ita semilunaris apertura fit. Dimidium pollicem & ultra in substantia uteri tuba excurrit. Vestitur tubæ cavum tenui quadam membrana, quæ in membranam uteri internam continuatur."*

I have copied his figure of this arrangement, and also that of the virgin uterus, in order to illustrate this hypothesis. but, as I have not been able to obtain a recent gravid

Plates VI & VII

uterus, it has been impossible to confirm this observation.
Nevertheless its presence and mode of formation is very conceivable, when the peculiar development of the uterine parietes is considered.
If it did actually exist it appears to me that it would enable us to explain the effusion of bloody matter into the peritoneal cavity after the operation for retained menses.
For I infer that, as the menstrual fluid collects, so the uterus develops, and assumes a condition similar to that of pregnancy, with this difference that the increase is slower, being proportionate to the contents. The uterine extremities of the fallopian tubes are therefore raised and approximate anteriorly; their uterine orifices also become closed by the formation of the valve like apparatus.
In this manner contraction of the uterus at the monthly period produces no evil effects, nor can Bennett's theory hold good.

Writers on pelvic, & uterine, hæmatocele who uphold the view that the origin of the blood is ~~from~~ the uterus, state that the mucous membrane of the Fallopian tubes secrete bloody matter during menstruation; and Dr Duncan states that he has himself seen the mucous membrane of the tubes tinged with blood in the autopsy of a woman dying during menstruation. Again Bennett and Lonpil state that cases of occlusion of the uterine extremities of the tubes have occurred, in which they have been found distended with bloody fluid.

If therefore we pursue the idea of the existence of the uterine orifice of the tubes being closed during the latter months of a case of retained menses, it becomes evident that it also ~~may~~ the Fallopian tubes may be distended with bloody fluid, which, by accumulation may amount to a considerable quantity. In such a case the tubes would be somewhat comparable to a vial or test tube, which when filled with fluid, covered with a card,

and inverted, will, when the card is carefully slid away, retain its contents; but, if a hole be made at the top so as to admit the air, then the fluid runs out. So in the case of the tubes which are pendent on either side of the uterus, with their lower extremities open; when the operation is performed and the fluid in the uterus is removed suddenly, air enters the organ, and the valve like arrangement of their uterine extremities is destroyed, in consequence the fluid they contain, obeying the law of gravitation, sinks into the peritoneal cavity.

I merely state this hypothesis because it appears to me more probable than that of Bennett, but whichever be correct the treatment remains the same.

The earliest record of an operation for retained menses is contained in a work called 'Spachii Gynæcia', in which Roussetus describes three cases where the fluid was removed by a kind of Cæsarian

Section, opening into the fundus uteri with the Actual Cautery, three were successful!.

The ordinary operation has already been described.

Dr Baker Brown, in a case already quoted, operated by means of a trocar and Canula introduced per rectum, in this case he was successful.

I have also found the record of a case in which the menses were removed through the urethra.

Other cases are recorded where the pent up fluid has escaped by fistulous openings, as for instance one related by Dr Graefe in Virchows Archives (1861) in which after two years obstruction the menstrual fluid escaped by an orifice in the left half of the rectes.

Drs G. Hewitt and Dr. Sims recommend an opening to be made through the obstruction in a valvular manner, and then to allow the fluid to drain away. but there are practical objections to this mode, such as the healing of the wound, and

the draining away being at once inconvenient and tedious.

The method I would adopt has been arrived at from a consideration of the causes of the dangers resulting from the usual Operation.

Thus it has been shown that the entrance of air into the uterine cavity is the great cause of the evil.

The instrument which accompanies this paper is devised of prevent the entrance of the air, and to remove the fluid in a cleanly and complete manner.

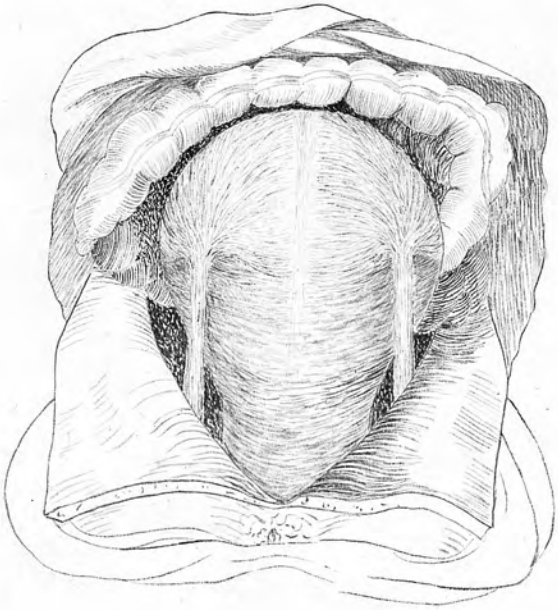
It consists of an ordinary Syringe, of a double action stop-cock, and of a a trocar and Canula so combined as to render it unnecessary to withdraw the trocar as usual. The Canula is curved to suit the Vagina and bears on its extremity the point of a trocar, the tube is perforated with a large hole immediately below the head.

The stop-cock fits on to any Syringe, and the Canula on to the stop-cock. The whole instrument is to be put together

the syringe can be used as a handle, the
Cannula is to be filled with water – in
order to prevent the entrance of a particle
of air which might lead to subsequent
decomposition of the fluid remaining.
The instrument is made to penetrate the
obstruction, if possible in an oblique
manner, and then the fluid is to be
drawn off by the syringe, an assistant
managing the stop-cock, from which
a flexible tube conveys the fluid.
In this manner the uterus may be
almost completely emptied, and even the
fluid in the Fallopian tubes might be
made to run into the uterus –.
On withdrawing the Cannula the finger
should simultaneously close the wound,
and a pledget of lint and a T bandage
should be applied to keep out the air.
The uterus in due time would then
return to its normal size and condition.
The remaining fluid would remain
undecomposed – and, after the lapse of
a week, a permanent opening might
safely be made.

Finally I would apologize for the hurried manner in which this paper is written, and more especially for my bad writing, which I never can to explain.

Drawing Accompanying
Mr J. M. Lowe's Thesis on
The Round Ligaments of the
uterus, and Retained Ovum
May. 1866.



An ideal sketch showing the manner in which the Round Ligaments are inserted in the Gravid uterus.

Fig. 1.

Fig. 2.

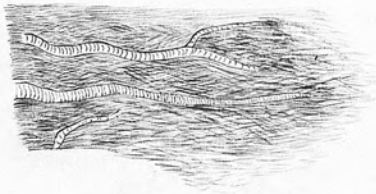
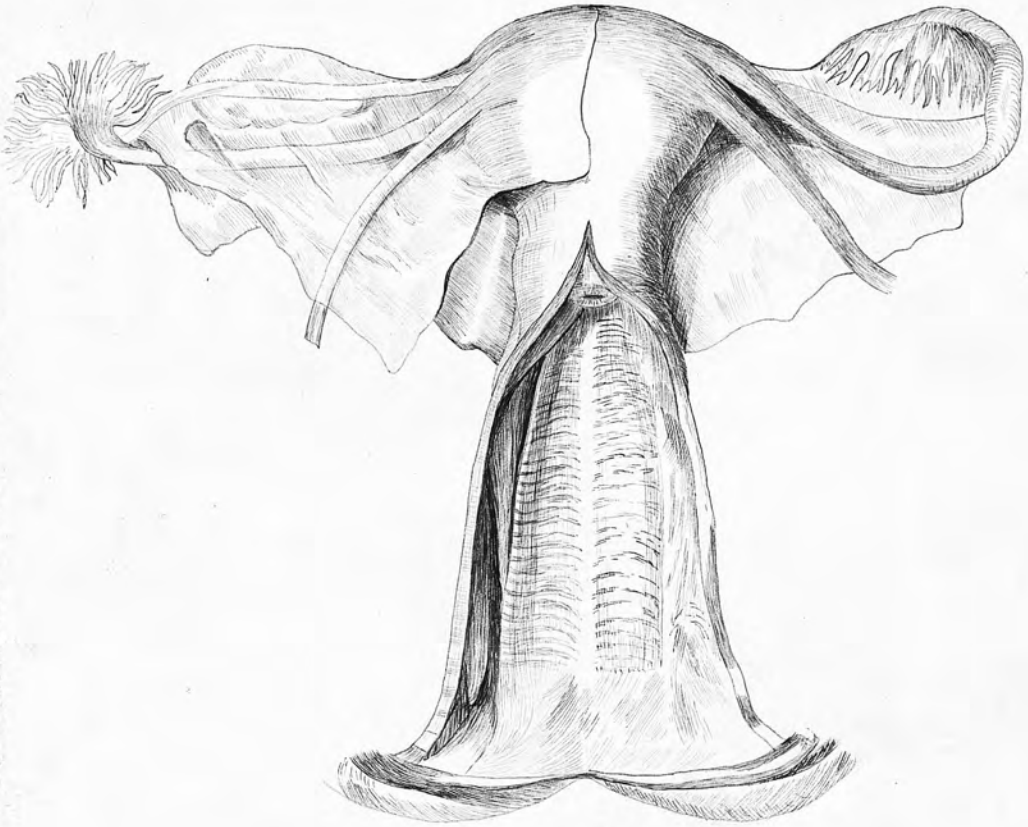
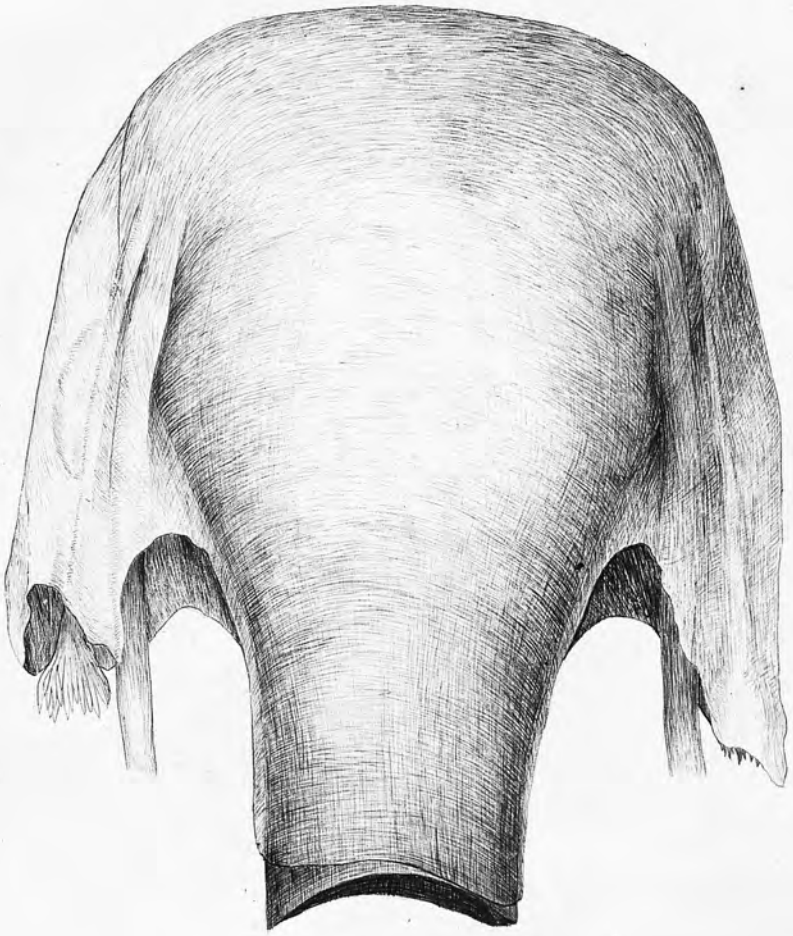


Fig. 1. Muscular fibre from the Round ligament.

Fig. 2. Termination of muscular fibre in fibrous tissue.
Ranvier.

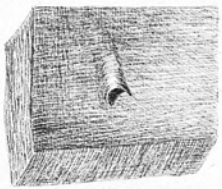


The Uterus and its Appendages. (After Ramsbotham.)

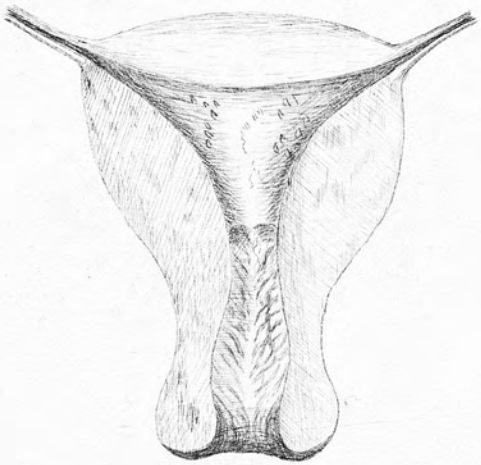


Drawing of a uterus about the sixth month of pregnancy.

Ad nat.



Apertura Tubæ in Uterum. (Roederer.)



Anterius uteri virginei planum. Rœderer.