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RELATIONS OF THE PELVIC VISCERA IN THE INFANT.

BY

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THE RELATIONS OF THE PELVIC VISCERA IN THE INFANT.

In January 1886, Dr Johnson Symington read before this Society a very valuable paper on "The Position of the Uterus and Ovaries in the Child," in which he succeeded, by the aid of frozen sections, in giving a much clearer conception of the relations of these viscera in the child than is to be obtained from the study of most text-books on anatomy. It is my intention in this communication to lay before this Society some observations upon the relations of the pelvic viscera as they exist in the new-born infant. The conclusions to which I have been led are founded upon the examination by the frozen sectional method of seven full-time infants, four male and three female, and of one six-months' male fœtus. The infants were, with one exception, placed upon the back during the freezing process, and sections were made and drawings obtained in the usual manner. In seven out of the eight cases there were no naked eye pathological conditions in the pelvis; but in one of the full-time female infants there was abdominal and pelvic peritonitis, and, as will be seen, this condition had led to a change in the normal relations of the tubes and ovaries.

In the new-born infant the bladder, the Fallopian tubes, the ovaries, and part of the body of the uterus cannot with strict accuracy be spoken of as pelvic viscera, for they lie above the plane of the pelvic brim; but as the child grows and the pelvis enlarges, these organs descend below the brim, and it is convenient for descriptive purposes to apply the term "pelvic" to these structures as well as to the rectum, cervix uteri, vagina, and urethra. The relations of the pelvic viscera in the infant are greatly influenced by the form and dimensions of the bony pelvis at birth, and it is therefore necessary to state briefly the characters of that part of the infant's skeleton.

The sacrum, which in the fœtal state is quite straight, is very nearly so in the infant at birth, having only a small anterior concavity. The wings of the sacrum also are slightly developed, and hence the length of the bone is greater than its breadth. From

several measurements I find the length of the sacrum to be on an average 2·7 ctms., and the average breadth to be 2·0 ctms.; thus the sacral index in the new-born infant is 76, and the sacrum, therefore, is markedly dolichohieric. In the adult, on account of the relatively large size of the sacral alæ, the platyhieric condition is arrived at, the sacral index being 112. The sacrum in the infant, therefore, resembles that bone in the bush Kaffir, in the Andamanese, in some Australian tribes, and also in the higher apes. The promontory of the sacrum is feebly developed at birth. The iliac bones, also, have in the infant an almost inappreciable anterior concavity, and the iliac fossæ can scarcely be said to exist. The angle of divarication of the ilia is much greater at birth than in adult life. Cleland gives 86° as the angle of divarication at birth as compared with 50°·5 in the adult female, and 53° in the adult male skeleton. The following were the measurements of the interspinous and intercristal diameters in six infants' pelves:—

	Interspinous diameter.	Intercristal diameter.		Interspinous diameter.	Intercristal diameter.
Case 1,	6·2 ctms.	6·3 ctms.	Case 4,	4·8 ctms,	5·3 ctms.
„ 2,	5·5 „	6·0 „	„ 5,	5·5 „	6·0 „
„ 3,	4·8 „	5·2 „	„ 6,	4·9 „	5·4 „

In the adult female the average measurement of the interspinous diameter is 23 ctms., whilst that of the intercristal diameter is 25·5 ctms.

The rami of the pubic bones are stumpy, and, therefore, the symphysis is short. The primary ossific centres are present in the innominate bones, but they are separated by cartilage, and the acetabulum is principally cartilaginous.

The pelvis, as a whole, differs markedly from the adult condition. Superficial inspection is sufficient to show that the pelvic canal has a different form when compared with its form in the full-grown pelvis. The canal is somewhat funnel-shaped, and the pelvic brim is very oblique to the horizon. The greater obliquity of the pelvis in the infant is seen in the relation which the promontory of the sacrum bears to the symphysis pubis. The promontory is situated at a much higher level as regards the symphysis in the infant than in the adult, and, therefore, the plane of the brim comes to run nearly perpendicularly to the horizon. On the other hand, a line drawn from the lower border of the symphysis pubis to the tip of the coccyx runs very nearly parallel to the horizon, and this fact demonstrates the absence of obliquity in the plane of the pelvic outlet.

Varying statements have been made with regard to the length of the various pelvic diameters in the infant. It is evident at a glance that the distance between the promontory of the sacrum and the upper border of the symphysis pubis (the conjugata vera)

is greater than either the transverse or oblique diameters of the pelvic brim. In the adult pelvis, on the other hand, the conjugata vera is less than either the transverse or the oblique diameters of the inlet. In the infant the conjugata vera has an average length of 3·5 ctms., whilst the transverse diameter at the brim measures about 2·5 ctms.; in the adult female pelvis the conjugata vera measures about 10 ctms., and the transverse about 12·5 ctms. In the infant, therefore, the brim of the pelvis is longer in an antero-posterior than in a transverse direction, whilst in the adult the transverse diameter at the brim exceeds the antero-posterior. It has, however, been pointed out that the conjugata vera in the infant does not truly represent the antero-posterior diameter of the pelvic brim, and that the true pelvic inlet is bounded posteriorly by the body of the 3rd, instead of that of the 1st, sacral vertebra. A line drawn from the upper part of the body of the 3rd sacral vertebra to the upper border of the symphysis pubis may be taken as representing the antero-posterior diameter of the brim, and this diameter has been called the conjugata vera inferior. Balandin, Fehling, Litzmann, and Veit, to whom we are indebted for most elaborate statistics of the pelvic diameters in the infant, take the conjugata inferior, and not the conjugata superior, as the antero-posterior diameter with which the transverse and oblique diameters at the inlet may be most usefully compared. I have measured the pelvic diameters in the case of six infantile pelves, and the results of these measurements are embodied in the following table:—

	I.	II.	III.	IV.	V.	VI.
Length of infant,	39 ctms.	42 ctms.	40 ctms.	42·5 ctms.	40 ctms.	42 ctms.
Conjugata superior,	3 „	3·6 „	3·1 „	3·8 „	2·9 „	3·4 „
Conjugata inferior,	2·1 „	2·6 „	2·6 „	3·0 „	2·0 „	3·0 „
Transverse diameter,	2·7 „	2·2 „	2·3 „	2·5 „	2·5 „	2·0 „
Oblique diameter,	2·5 „	3·1 „	2·5 „	3·0 „	2·6 „	3·1 „
Distance between ischial spines,	2·0 „	1·7 „	1·8 „	1·8 „	2·3 „	1·6 „
Antero-posterior diameter of outlet,	1·5 „	2·0 „	1·5 „	1·6 „	1·8 „	2·4 „
Distance between ischial tubers,	1·8 „	1·5 „	2·0 „	2·0 „	2·0 „	1·7 „

The smallest child measured 39 ctms. in length, and the largest 42·5 ctms. The average lengths of the diameters as obtained from the above table are as follow:—

Diameter conjugata superior, . .	= 3·3 ctms.
Diameter conjugata inferior, . .	= 2·55 „
Diameter transversa (at brim) . .	= 2·36 „
Diameter obliqua (at brim) . .	= 2·80 „
Distance between ischial spines, . .	= 1·86 „
Antero-posterior diameter (at outlet) .	= 1·80 „
Distance between tuberosities of ischium,	= 1·96 „

The above figures represent the absolute lengths of the dia-

meters; in the following table I have placed side by side the relative lengths of the diameters obtained by Balandin and by myself in the new-born infant, and by Litzmann in the adult female. The conjugata vera is represented by 100.

	Balandin, 14 pelves.	Ballantyne, 6 pelves.	Litzmann, in adult pelvis.
Conjugata vera, . .	100	100	100
Transversa at brim, . .	105	92	129
Obliqua at brim, . .	108	109	120
Distance between ischial spines,	75	72	96
Antero-posterior at outlet,	92	70	119
Distance between ischial tuberosities, . . .	73	76	115

From the study of the foregoing table it will be seen that my figures agree with those of Balandin in showing that in the infant the longest pelvic diameter at the brim (leaving out of account the conjugata superior) is the oblique; but they differ in the fact that whilst Balandin gives the antero-posterior diameter as the shortest, my measurements would seem to show that the transverse is the shortest brim diameter. In the adult female pelvis, as every obstetrician knows, the shortest diameter at the brim is the antero-posterior, the longest is the transverse, whilst the oblique occupies an intermediate position. With regard to the distance between the ischial spines and that between the ischial tuberosities in the infant, my results tally with those of Balandin; but as regards the antero-posterior diameter of the outlet, my figures are larger than those obtained by Balandin. In the adult the three above-named diameters are all greatly increased in their relative length, showing the extent to which the lower part of the pelvis opens up in the adult. In the adult female pelvis, therefore, the ischial tuberosities and the ischial spines are much more widely separated than in the infant, and the separation of the tuberosities is relatively greater than that of the spines.

Such being the characters of the pelvis in the infant, it is easy to understand how several of the viscera which are pelvic in position in the adult come to lie above the brim of the pelvis at the time of birth. The bladder, rectum, and the uterus and annexa may now be conveniently studied in detail.

The Bladder.—Symington, in his work upon the *Topographical Anatomy of the Child*, states that the description of the bladder in the new-born infant given in the text-books of anatomy is meagre, unsatisfactory, and even inaccurate, and with this statement I can fully concur.

Position of the Bladder.—The bladder of the infant is even when fully distended almost entirely an abdominal organ. In the six months' fœtus, a male, the bladder, which was distended with clear, pale-yellow urine, lay, as will be seen in the drawing of the sagittal

mesial section of the pelvis (*vide* Plate, Fig. 1), almost entirely above the pelvic brim, only a small part of the lower and posterior segment lying below that plane. In the case of a full-time male infant (Fig. 2), in which the bladder was very greatly distended with urine, a still smaller part of the lower end of the viscus lay below the pelvic brim, in the plane of which lay the vesical openings of the ureters. In this specimen the section passes slightly to the right of the middle line, for it cuts through the right ureter at its point of entrance into the bladder. In the case of another full-time male infant (Fig. 3), in which the bladder was only partially filled with urine, the same relation of that viscus to the plane of the brim was found to exist. In this case the whole bladder cavity is not laid open, as the section was made considerably to the right of the middle line of the body. In the cases of three full-time female infants (Fig. 4), in all of which the bladder was empty, an almost inappreciable part of the vesical cavity lay below the plane of the brim. Symington states that fully half the bladder in the infant lies within the cavity of the true pelvis and below the plane of the brim. The specimens above mentioned do not show this disposition of the bladder, but in three of the cases (two male and one female) there existed a circumstance which may serve to explain the difference in position of the bladder. This circumstance consisted in the presence of a loop of the lower end of the descending colon or of the upper end of the sigmoid flexure within the pelvic cavity, lying in the female infant in the right part of the utero-rectal pouch, and in the male infants in the recto-vesical pouch. In the other female infants the bladder was empty, and was not therefore distended at its lower end; and it must not be forgotten that in them there lay part of the *uterus* within the pelvic brim. In the case which Symington figures in his *Atlas* (p. 68), in which half the bladder lay in the pelvis, the infant was a male, therefore there was no uterus to fill up the brim, the bladder also was distended, and bulged backwards towards the sacrum; and further, there was no loop of sigmoid flexure in the pelvis, the posterior vesical wall lying in contact with the rectum, and the recto-vesical pouch being empty. If the pelvis contain in addition to the rectum a twist of sigmoid flexure, and more especially if the subject be a female, it is difficult to see where room can be found within the pelvis for fully half the bladder. The arrangement of sigmoid flexure to which I have above alluded is, I believe, a very common one in the infant, and I find that Jacobi (*Archives of Pediatrics*, 1888, p. 204) makes the statement that "the sigmoid flexure is bent upon itself several times in the narrow pelvis of the infant." In the case of male infants in whom no loop of sigmoid flexure exists in the pelvis, and in which the bladder is distended, that organ may be found lying to some extent below the plane of the brim; but in the female infant, where the uterus partly fills up the brim, and in male infants, where the sigmoid

twist occupies the pelvic inlet, the above-described position of the bladder must be the usual one. The bladder is, therefore, practically entirely an abdominal organ at birth.

In my specimens the vesical orifice of the urethra lay very nearly at the level of the upper border of the symphysis pubis, and in all only a very small part of the vesical cavity lay behind a line dropt vertically through the orifice of the urethra. The position of the upper end of the bladder varies with the state of distension of the viscus. Of three cases in which the bladder was empty, in two its upper end lay 2·3 ctms. above the symphysis pubis, and in the other case (in which the infant was frozen in the genu-pectoral position) it lay 3 ctms. above the level of the symphysis. In one case in which the bladder contained a little urine, its upper end was 2·5 ctms. above the symphysis; and in another case in which the bladder was enormously distended, its upper margin was found 2 mms. above the umbilicus (4·5 ctms. above the symphysis). It is probable that the empty bladder in the infant reaches nearly half way to the umbilicus.

The Form of the Bladder.—The bladder of the infant is often described as pyriform in shape, with the larger end superior; but frozen sections have clearly shown that except in cases of over-distension this is not the normal form of the viscus. In the cases in which the bladder was quite empty, its cavity was seen to form a continuation of the urethral canal, and the anterior and posterior walls were in complete apposition. In one of Symington's cases (fig. 27 in his *Atlas*) the bladder, which contained about 1 drachm of urine, is seen to have an egg shape, the larger end of the ovoid being directed downwards and backwards, and in one of my cases (Fig. 3), in which the bladder contained a few drops of urine, the viscus is seen to have a somewhat triangular form, the base being below and the apex above. In this case there was a very small vesical cavity, but even with this small cavity it could be clearly seen that the larger portion of the cavity was situated inferiorly and not superiorly. In the six months' fœtus the bladder, which was pretty well filled, had a somewhat ovoid form, but there was no great difference in the size of its two poles. In another case (Fig. 2), the bladder was over-distended, reaching above the umbilicus, and in this solitary instance the upper end of the bladder cavity was larger than the lower. It may be concluded that the normal form of the partially distended bladder is ovoid, and that, as Symington states, the larger end is directed downwards and slightly backwards. The rugæ on the bladder walls are well seen in the empty bladder, and in the partially filled organ these are present only at the upper end, whilst in the fully distended viscus these are absent altogether. It is easy to conceive that as urine begins to dribble into the empty bladder, it will first accumulate at the lower end of the organ, and there separate the walls and smooth out the rugæ; and that as the distension becomes more

marked, the upper part of the bladder will also become distended, and the rugæ will disappear both at the upper and lower extremities of the viscus. The important fact with regard to the form of the bladder in the infant is, that the broad end is directed downwards.

The Relations of the Bladder.—In the infant the anterior vesical wall is in close contact with the anterior abdominal wall, and there is no intervening pouch of peritoneum. The reflection of the peritoneum from the anterior abdominal wall on to the posterior bladder wall usually takes place a little below the level of the umbilicus, and from 2 to 3 ctms. above the upper border of the symphysis pubis. In one case in which the bladder was overdistended, the peritoneum passed to the posterior surface of the bladder about the level of the umbilicus. The anterior surface of the bladder, triangular in shape, is, therefore, entirely uncovered by peritoneum, a fact of great importance to the surgeon who may be contemplating operative interference for stone. Posteriorly the peritoneum passes over the bladder wall, reaching in the male infant to a point immediately below the vesical orifice, and here coming into relation with the small prostate gland, another fact which is of great importance surgically. In the female infant the peritoneum does not descend so low posteriorly, for its point of reflection on to the anterior uterine wall lies above the level of the internal urethral orifice. In the infant the posterior relations of the bladder are less constant than are its anterior relations. In one male infant the bladder was related posteriorly to a loop of sigmoid flexure, and to the commencement of the rectum; in another the anterior surface of the cæcum was in relation with the posterior vesical wall, but in this case the cæcum lay mesially, and was therefore abnormal in position; in a male fœtus of six months the bladder was related posteriorly to the rectum and to some coils of small intestine; and in yet another premature infant with dropsy, the posterior bladder was in contact with ascitic fluid which lay in the recto-vesical pouch of peritoneum. In the female infants the bladder lay in close relationship with the uterus posteriorly, but in one case there intervened a loop or two of small intestine, which lay in the utero-vesical pouch of peritoneum, and in this case also the right Fallopian tube lay behind and a little to the right side of the bladder, being also in the utero-vesical pouch. The hypogastric arteries run laterally to the bladder, converging towards the umbilicus.

The Size of the Bladder.—The bladder is relatively small in infants, and this fact is at least one of the causes of the frequency of micturition in infants and young children. When empty the cavity of the organ measures from 2 to 2·5 ctms. in length; but that the bladder can in exceptional circumstances be greatly distended with urine is proved by one of my cases in which its upper wall reached to a point 1 or 2 millimeters above the umbilicus. It is

rare for the bladder to contain more than 1 drachm or 1½ drachms of urine at a time at birth.

The Urethra.—In the female infant the urethra is pelvic in position, and runs at first downwards parallel to the axis of the pelvic canal, it then turns slightly forwards and ends at the meatus urinarius externus, about 1 ctm. in front of a line drawn vertically downwards from the lower border of the symphysis pubis. Dr Symington has demonstrated that in the young female chimpanzee the meatus urinarius lies behind a line drawn vertically downwards from the symphysis. There is no approach to this condition seen in the human female infant. The length of the urethral canal alone is about 4 ctms. in the female, and a little more than 6 ctms. in the male infant. I have passed a No. 10 catheter with ease through the infantile urethra.

The Ureters.—In two cases I traced the course of the ureters by injecting them with quicksilver. They lie immediately internal to the external and internal iliac vessels at the brim of the vessels, and dip down under the broad ligaments close to the sides of the uterus, and rise again slightly to open into the bladder at or immediately above the plane of the brim.

The Rectum.—The relations of the rectum may now be considered. This part of the intestinal canal is relatively larger and more vertically placed in the infant than in the adult. Its large size and vertical position are taken advantage of by the physician, who often finds it useful to take the infant's temperature by means of the thermometer passed into the rectum. It is also probable that the rectum may come to be more generally employed in diseases of infancy for the purposes of alimentation by nutritive enemata than it has hitherto been. The rectum in the infant may, as in the adult, be divided into three portions. The first part is nearly quite vertical, and passes down in front of the sacrum to the lower part of that bone, where it turns slightly forwards to become continuous with the second part. If the first part of the rectum be empty, as in one of my cases where the infant lived for six days, it frequently forms one or two lateral bends; but if it be distended with meconium, as in the other infants observed, this part of the bowel is nearly quite straight. The second part is very short in the infant and runs downwards and forwards. The third part is relatively long, and passes downwards and slightly backwards to terminate at the anus. This part of the intestine is, therefore, more worthy of its name, *rectum*, in the infant than in the adult, where it is far from being a straight tube. Its straightness, large size, and vertical position may have not a little effect in favouring the production of prolapsus recti, a common malady in the infant, and the rational treatment of this disease will, therefore, be to use palliative measures until the infantile disposition of the rectum becomes changed into the adult. The peritoneum descends in both male and female infants in front of

the rectum to about the level of the fourth sacral vertebra posteriorly, and to that of the middle of the symphysis pubis anteriorly. Posteriorly the rectum is in contact with the anterior surface of the sacrum and coccyx, and has in the upper part of its course a meso-rectum.

The Sigmoid Flexure in the Pelvis.—It may be well here to restate the fact that in several of the infants examined a loop of the sigmoid flexure formed one of the pelvic contents. In the male infants it lay in the middle line or a little to the right of it; between the rectum and bladder in the recto-vesical pouch, and in one female infant it lay in the right compartment of the pouch of Douglas behind the right broad ligament.

The Anus.—The anus in the infant is directed downwards and slightly backwards. On account of the small degree of development of the gluteal regions in the infant, the anus does not lie in a depression between the buttocks as it does in the adult. A recognition of this anatomical fact would tend to save many a one from the rather humiliating position of having failed to diagnose a breech presentation. A peculiarity pointed out by Symington is, that a line dropped vertically from the tip of the coccyx will pass through the anal aperture, and this fact I was able to demonstrate in several of the sections made. In the infant, therefore, the anus is situated relatively posterior to the position it occupies in the adult.

The Uterus.—The uterus differs in many points from that organ in the adult, and there also exists considerable difference of opinion as to what are the normal topographical relations of the infantile uterus. I have studied the uterus in the new-born infant in three cases by the frozen sectional method, and in many other cases by simple dissection, and have compared the results thus obtained with the conclusions of Boullard, Bandl, Klob, Kölliker, and Symington.

Position of the Uterus.—The uterus at birth is partly an abdominal and partly a pelvic organ. In the three full-time infants examined by the frozen sectional method, the proportion of the entire length of the uterus which lay above the pelvic brim varied from a little more than one-third to nearly a-half. In one of Symington's sections (*Trans. Ed. Obst. Soc.*, vol. xi. p. 36), the proportion of uterus lying above the pelvic inlet is less than one-third. It is probable that the proportion of the uterine mass which lies in the abdomen varies considerably in individual cases, and is influenced to some extent by the condition of the adjacent intestine. In the new-born infant the rectum and sigmoid flexure are distended with meconium, and this may serve partly to explain the high position of the uterus in the cases which are noted above.

With regard to the relation of the uterus to the horizon, and of the body of the uterus to the cervix, authorities are at variance. Most

writers assert that the uterus is normally anteverted, and some hold that it is also slightly anteflexed, whilst others believe that it is sometimes straight. I do not think that one position can be assigned to the infantile uterus as the normal; in my three cases, in all of which the rectum was distended and the bladder empty, the uterus lay in an anteverted position; but had the conditions been different—had the bladder been distended and the rectum been empty—the uterus would, no doubt, have occupied a nearly vertical position. I have not seen the organ anteflexed, although it may occur; and with regard to retroflexion there seems to be no doubt that such a position is in the infant always pathological, and, indeed, its occurrence is very rare, almost the only cases recorded being two noted by Ruge ("Zwei Fälle von Retroflexio Uteri bei Neugebornen," *Zeitschr. f. Geburtsh. und Gyn.*, Bd. ii., p. 24), in both of which the uterus was abnormal in structure. The presence of the rectum filled with meconium, and of the loop of sigmoid flexure, will tend very much to keep the uterus in a position of anteversion, and, as above stated, I look upon the vertical position and the position of anteversion as representing the normal lie of the uterus in the new-born infant. If the bladder be distended, the uterus will be more or less vertical; if undistended, it will be anteverted in position.

In one of the cases examined there was, in addition to the anteversion, a slight degree of torsion of the uterus. The anterior surface faced towards the front and the left in such a manner that the uterine end of the right Fallopian tube lay anterior to the uterine end of the left tube. In this case a loop of sigmoid flexure occupied the right compartment of the pouch of Douglas, and being distended with meconium, may by its pressure have caused the torsion of the uterus. The adult uterus has also in its normal position this slight degree of torsion, but, as is well known, in pregnancy there is in the great majority of cases torsion in the opposite direction, so that the anterior surface of the uterus faces to the front and to the right side. The torsion in pregnancy is usually ascribed to the presence of the rectum on the left side, and it is reasonable to suppose that the primitive twisting of the uterus seen in this case and in the adult *unimpregnated* uterus may be due to the presence of sigmoid flexure in the right side of the pelvic cavity in the pouch of Douglas.

Size of the Uterus.—In the infant, as is well known, the cervix uteri is relatively much larger, both in length and thickness, than the body of the organ. The average length of the uterus in the new-born infant is usually placed at 2·5 ctms., but in nearly all the cases I have examined I found this measurement exceeded. In one case the uterus measured 3·2 ctms. in length; in another infant the measurement was as much as 4·1 ctms., and even in a seven and a half months' infant the uterus was found to be 2·7 ctms. in length. In the case of four uteri from new-born

infants measured by Symington, in two the length was 2·5 ctms., in one it was 2·6 ctms., and in one it was 3·0 ctms. In the following table are given the average measurements obtained from the examination of the uterus in four infants:—

Length of uterus from anterior lip of cervix to fundus,	3·4 ctms.
Sound passes in to a distance of	3·2 „
Transverse diameter at fundus uteri, . . .	1·1 „
Antero-posterior „ „ „ „ . . .	0·8 „
Thickness of wall „ „ „ . . .	0·2 „
Antero-posterior diameter of cervix uteri, . .	0·9 „
Transverse „ „ „ . . .	1·25 „

The above table shows that in these infants the cervix uteri was larger both in the antero-posterior and in the transverse direction than was the fundus uteri, but the difference was not so large as might have been expected from the statements made by some authors. No doubt there are considerable individual differences depending upon the size of the infant, etc. It was also noted that, as a rule, the anterior lip of the cervix was very slightly longer than the posterior; but in one case the two lips were of practically the same length. The gaping condition of the os uteri was a notable character of all the uteri I examined, and in all of them the folds of the arbor vitæ were prolonged to the fundus. There was one longitudinal fold on the posterior wall which extended from os externum uteri to fundus; in the lower part of the uterus there were also many transverse folds, while near the fundus the folds ran in an oblique direction. On the vaginal aspect of the cervix some rugæ were usually seen, but only on the anterior lip. Posteriorly the peritoneum descended behind the uterus to a level one or two millimeters below that of the os externum, whilst anteriorly it descended to a point almost exactly half-way between fundus and os externum uteri.

The Fallopian Tubes.—The Fallopian tubes in the new-born infant have an average length of from 2 to 3 ctms., and the right tube is usually a little longer than the left. There are at birth from three to five sinuosities on each tube, but in the fœtus at an earlier period of intra-uterine life these are more numerous, and are found at the uterine end of the tube as well as more peripherally (Fig. 5). Freund points out how the sinuosities disappear from the uterine end of the tube first, and he attaches considerable importance to their presence in adult life as an etiological factor in the production of hydro- or hæmato-salpinx.

The position and direction of the Fallopian tubes were ascertained by allowing the frozen sections to thaw partially, and by then removing the coils of small intestine which lay in front of the uterine appendages. In two cases which were treated in this way the tubes were seen to have a general direction outwards, backwards, and downwards. The downward direction of the tubes is

due to the fact that the uterine fundus lies above the plane of the brim. The uterine end and inner third of the tube lie at the level of the fifth lumbar vertebra above the brim of the pelvis, whilst the fimbriated end lies at or below the plane of the brim. In one case there was peritonitis in the new-born infant, and in this case the tubes and ovaries were both firmly adherent to intestinal coils to the cæcum on the right side and to the sigmoid flexure on the left; in this case also the tubes had a general upward direction, the result evidently of the peritonitic adhesions.

The Ovaries.—In the infant the ovaries lie in a somewhat vertical position, near to the uterine fundus and behind the Fallopian tube of that side. What is usually described as the outer end of the ovary is seen projecting upwards above the Fallopian tube, and the long axis of the ovary runs from above downwards and inwards. The surfaces of the ovary usually termed anterior and posterior are internal and external in the infant, and the borders are anterior and posterior. In one case, that in which there was a degree of lateral twisting of the uterus, the right ovary lay anterior to the uterus, and the left in a plane somewhat posterior to it; but as to the frequency of this arrangement I can make no definite statement. Since the ovaries lie above the plane of the brim, and since the broad ligaments are not at all tense in the infant, it is probable that both ovary and tube may occupy positions other than those described. It is difficult to lay down with any degree of definiteness their normal position at birth.

The Vagina.—In the new-born infant the vaginal canal is relatively long, and in the first part of its course it runs almost vertically downwards, it then changes its direction, and passes downwards and slightly forwards to end at the hymen. It does not, therefore, as in the adult, run upwards and backwards in a direction nearly parallel to the plane of the brim, but is in the infant more nearly parallel to the axes of the rectum and urethra. It forms with the uterus a very obtuse angle. The vagina varies in length from 2·5 to 3·5 ctms., and I have not noted any difference in the depth of the anterior and posterior fornices. Its form on section somewhat resembles an H, the anterior and posterior walls being nearly in close contact in the middle line. The vaginal walls are covered with numerous transverse rugæ.

The statements made in the preceding pages are founded in great measure upon a thesis on "Certain Anatomical and Pathological Conditions in the Fœtus and Infant at Birth," for which the Gunning-Simpson Prize and a gold medal were awarded in 1889; but I have supplemented the material which I then possessed by frozen sections of three additional new-born infants —two male and one female.

Fig 1

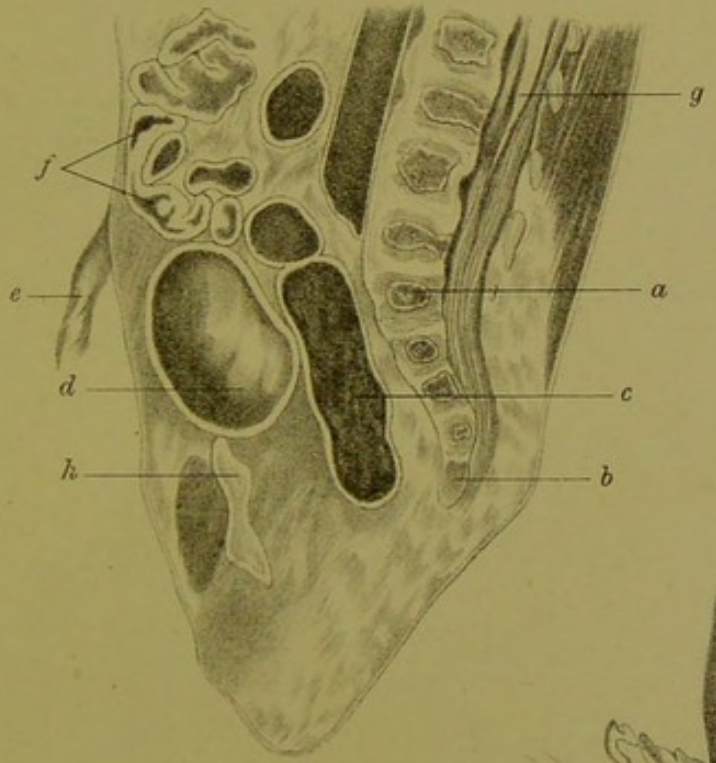
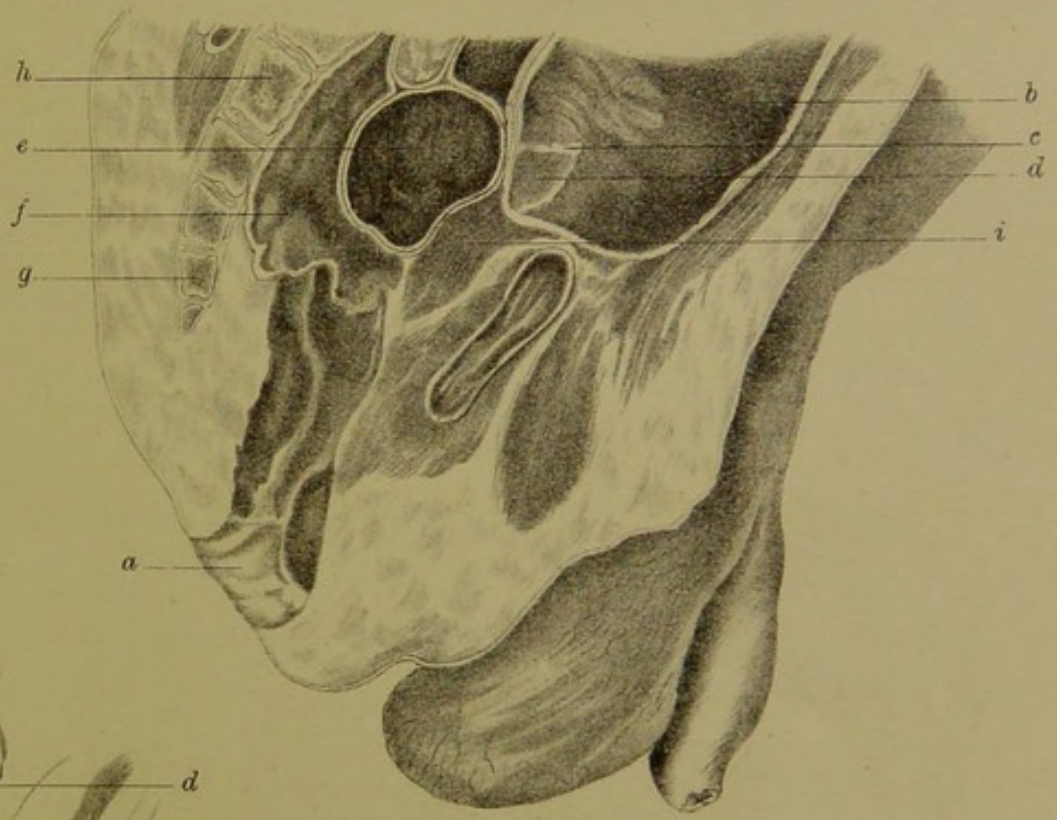


Fig 2



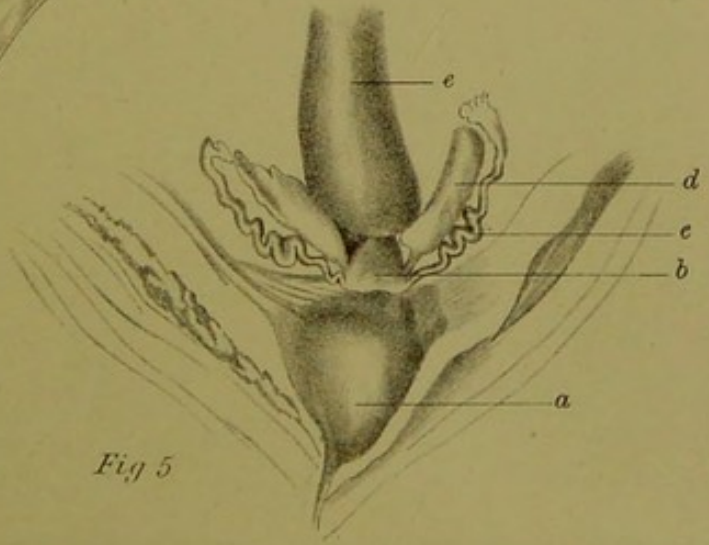


Fig 5

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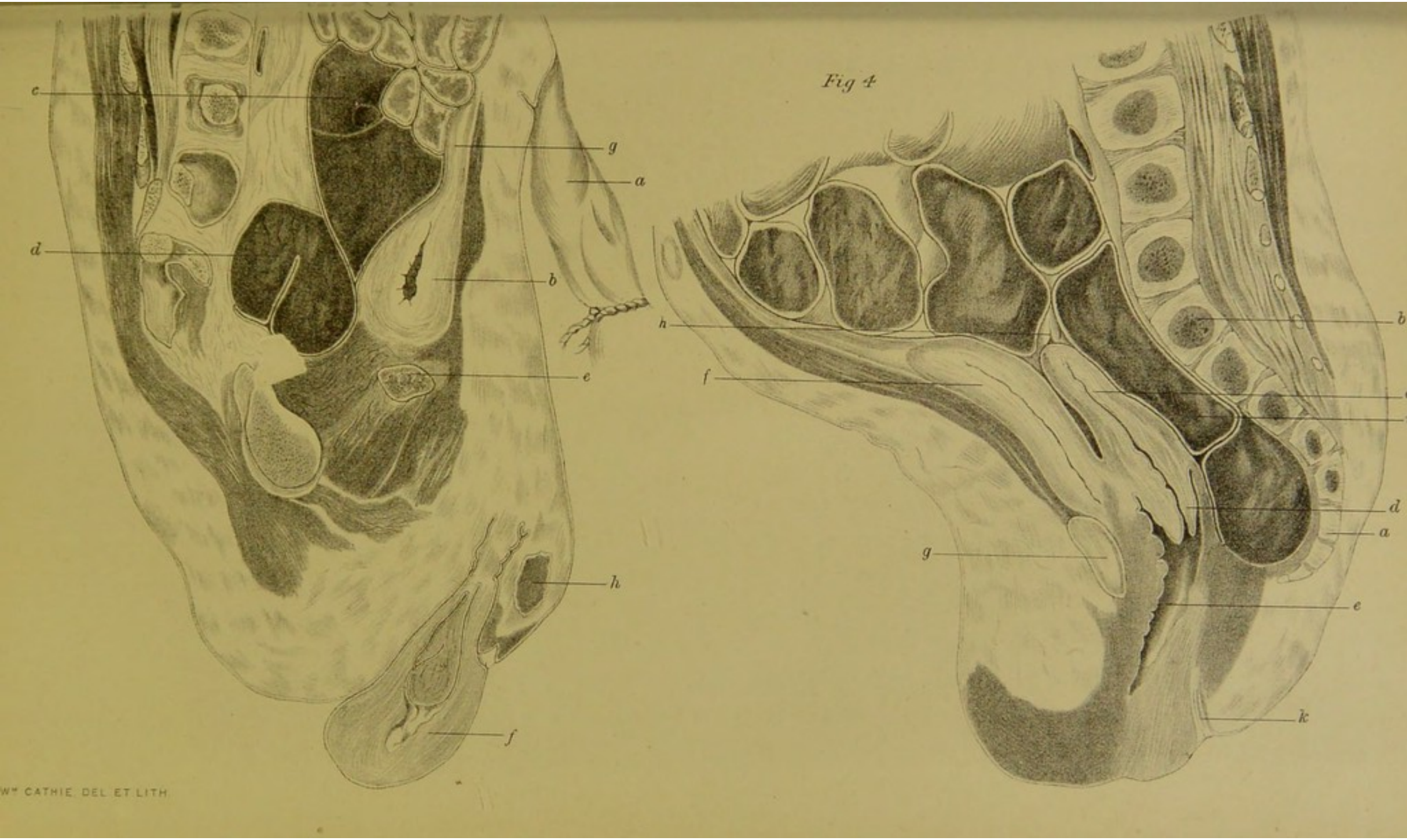

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Description of Plate.

Fig. 1.—Vertical sagittal section of pelvic region in six months male fœtus. *a*, 1st sacral vertebra ; *b*, coccyx ; *c*, rectum ; *d*, bladder, distended with urine ; *e*, umbilical cord ; *f*, coils of large intestine ; *g*, filum terminale of spinal cord ; *h*, pubic bone.

Fig. 2.—Vertical sagittal section of pelvic region of full-time male infant (section slightly to right of middle line anteriorly). *a*, anal aperture ; *b*, bladder, greatly distended with urine ; *c*, opening of left ureter ; *d*, vesical trigone ; *e*, loop of sigmoid flexure in pelvis ; *f*, rectum ; *g*, coccyx ; *h*, 3rd sacral vertebra ; *i*, prostate gland.

Fig. 3.—Vertical sagittal section of pelvic region of full-time male infant (still-born). Section is to the right side of the middle line. *a*, umbilical cord ; *b*, partially filled bladder ; *c*, cæcum and ileo-cæcal valve ; *d*, loop of sigmoid flexure in pelvic cavity ; *e*, pubic bone ; *f*, scrotum and right testicle ; *g*, urachus ; *h*, penis.

Fig. 4.—Vertical sagittal section of pelvic region of full-time female infant (frozen in genu-pectoral position). *a*, coccyx ; *b*, 1st sacral vertebra ; *c*, body of uterus ; *d*, cervix uteri ; *e*, vagina ; *f*, empty bladder ; *g*, symphysis pubis ; *h*, right ovary and Fallopian tube ; *i*, rectum ; *k*, anal aperture.

Fig. 5.—Dissectional view of pelvic viscera in six months fœtus (from above and from the front). *a*, bladder ; *b*, fundus uteri ; *c*, left Fallopian tube, showing tortuosities ; *d*, left ovary ; *e*, rectum.

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