IV.—ON THE POSITION OF THE UTERUS AND OVARIES IN THE CHILD, WITH REMARKS ON THE GROWTH OF THE FEMALE GENITALS.

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(Read before the Edinburgh Obstetrical Society, 13th January 1886.)

Uterus.—The attempts that have been made to determine the position of the adult uterus by an examination of the cadaver do not appear to be regarded by some gynaecologists as of much value in the settlement of the vexed question of its normal position; indeed, the results obtained by this method would appear to be frequently considered misleading, erroneous, and in direct opposition to the results of clinical observation.

Hart, and Barbour, in referring to the chief means employed in order to ascertain the situation of the uterus, state that frozen, spirit, or chromic sections "are not specially valuable, as there is some post-mortem change in the uterine position not yet thoroughly understood," p. 50.

Schultze, in contrast with his well-known views as to the position of the uterus in the living body, says that in the cadaver its position is not constant, but in the majority of cases it is found with its hinder surface lying against the posterior wall of the pelvis, or, at least, in contact with the anterior wall of the rectum.

H. Fritsch holds that the gynaecologist can obtain no assistance in this difficult subject from anatomical preparations, and that what careful clinical observation fails to discover is scarcely to be brought to light in any other manner. In Fig. 1 of his work he gives a diagrammatic mesial section of the female pelvis to illustrate the physiological position of the uterus with the bladder and rectum empty. The uterus is shown antverted and anteflexed, and lying upon the bladder. In contrast with this his next figure shows the position of the uterus in the cadaver, with bladder and rectum also empty. In this case it is represented as retroverted, and lying up against the rectum. It appears to me that the value of post-mortem studies in connexion with this subject has been unduly depreciated, and that the post-mortem changes in the position of the uterus have been greatly exaggerated. Clinical observers are generally agreed that, in the living body, if the bladder be empty, the uterus is more or less antverted, and that whilst Schultze may have somewhat exaggerated the degree of anteversion, his views are in the main correct.

1 Manual of Gynecology, 1882.
2 Lageveränderungen der Gebärmutter, 1881.
3 Die Lageveränderungen der Gebärmutter, 1885.
very frequently assumed that this is not the position which the uterus is found to occupy after death, the uterus being in the latter case retroverted. In support of this we are referred to drawings of frozen sections by Henle, Cruveilhier, Luschka, and Braune, and to the very positive statements of Claudius of Marburg, who asserted that "the uterus is only in its normal position when along with the broad ligaments it touches the posterior wall of the pelvis and the rectum." Henle's section, which is often employed to illustrate the post-mortem position of the uterus, shows that organ retroverted, so that its long axis is nearly parallel with that of the vagina. For several reasons this woodcut is of but little value. We have no definite information as to how much of the body was frozen, and the drawing itself presents several unusual features, which indicate an abnormal condition of the uterus. The woodcut in Cruveilhier's *Traité d'Anatomie*, 5th edition, 1874, like almost all the illustrations in that work, is simply a copy of Henle's. The sections of Luschka and Braune show the uterus retroverted; but, on the other hand, a number of specimens have been figured by very reliable authorities in which the position of the uterus closely corresponded with the results of clinical examination. This will be readily apparent by a reference to the following works:

E. Q. LE GENDRE.—*Anatomie Chirurgicale Homalographique*, Paris, 1858. Plate 18.—Mesial section of pelvis of woman aged 30, probably multipara. Uterus anteflexed.

RÜDINGER.—*Supplement zur topographisch-chirurgischen Anatomie des Menschen*, 1879. Plate 4.—Coronal section of body of female aged 21. Fundus of uterus directed forwards and to the right.

HASSE.—"Beobachtungen über die Lage der Eingeweide im weiblichen Beckeneingange," *Arch. f. Gynäk.*, Bd. ix. Uterus anteflexed.

HIS.—" Über Präparate zum Situm Viscerum," *Arch. f. Anatomie*, 1878. He figures 4 female pelves, in all of which the uterus is anteflexed and antevorted.

FÜRST.—"Ein einfach plattes Becken, u. s. w.," *Arch. f. Gynäk.*, 1877. Uterus anteflexed.

D. B. HART.—*Topographical and Sectional Anatomy of the Female Pelvis*, 1885. Plate 2.—Mesial section of pelvis of adult woman. Long axis of uterus nearly coincided with axis of inlet.

All the above-mentioned plates are drawings of frozen preparations except those of His; the latter hardened the viscera *in situ*.

1 *Medical Times and Gazette*, 1865.
2 *Handbuch der Anatomie*. Eingeweide, fig. 340.
3 *Die Lage der Bauchorgane*, 1873. Pl. 5, fig. 3.
4 *Topographisch-anatomischer Atlas*, Leipzig, 1875. Pl. 2.
by injecting into the bloodvessels a solution of chromic acid. This list is by no means an exhaustive one, but it is evident from it that the results of clinical and post-mortem examinations are not so widely opposed as some would make us believe.

I have ventured to wander somewhat from the immediate object of my paper, because the existence or amount of displacement of the uterus after death is especially important in connexion with the determination of the position of this organ in the child, as in them we must depend almost entirely upon the study of the cadaver. Even were it desirable to make digital examinations of the pelvic organs in children, the small size of the body of the uterus would render the diagnosis of its position almost impossible. Subjects are usually frozen lying upon their backs, and in this position the large and heavy body of the adult uterus would tend to become displaced backwards more readily than this organ would in the child, where it is not only absolutely but even relatively smaller. Still, had it been proved that the adult uterus fell back after death into the retroverted position, this would have diminished to some extent the value of any deductions that might be drawn from its post-mortem examination in the child.

Compared with the enormous amount of literature bearing upon the question of the position of the uterus in the adult, its relations in the child have been, comparatively speaking, neglected. It is true that numerous expressions of opinion on this subject can readily be found; but so far as I am aware there are no published drawings of frozen sagittal sections of the pelves of females between the periods of infancy and adult life, except two rather diagrammatic figures by Pirogoff of girls twelve and seventeen years of age, and a plate in Le Gendre's work made from a girl eighteen years old. In the latter both bladder and rectum were distended, and the uterus fixed between them.

D. B. Hart's very valuable and extensive *Atlas of Female Pelvic Anatomy*, 1884, contains no illustrations bearing upon this subject, and this is also the case with Martin's *Atlas of Obstetrics and Gynaecology*, translated by Fancourt Barnes, 1881.

In 1853 Boullard published a thesis, in which he asserted that the uterus of the child was normally anteflexed, the flexion occurring at the union of the body with the larger and more rigid cervix. The opinion of Boullard has been widely accepted, and is still often taught, especially by French gynaecologists. Thus A. Courty writes: "In the child the neck (of the uterus) is very large, the body very small... The isthmus is indicated at this age less by a contraction than by a change of direction between the neck and the body, for the results of Boulland's researches, con-

1 *Quelques mots sur l'uterus*, Paris, 1853.
2 *Practical Treatise on the Diseases of the Uterus, etc.* Translated from the third edition by Agnes M'Laren, 1882.
firmed by my own observations, is that there is very frequently, if not always, anteflexion of the body on the cervix.” Anteflexions of the uterus are usually divided into the congenital and the acquired. In referring to the former Courty writes: “This is an exaggeration of the usual conditions of form and inclination of the uterus in the fetus, in the child and young girl at puberty, often even in the adult multipara” (p. 427).

Several very competent observers do not support the generally accepted idea that the child’s uterus is normally anteflexed. For instance, Klob¹ says, p. 56: “Up to the commencement of puberty the uterus is neither bent forwards nor backwards; only at the development of that period does it assume a slight curve forwards, the angle of the curve coinciding with the level of the internal orifice.”

Langerhans² made sagittal frozen sections of forty new-born female children, but, unfortunately, his results have only been published in abstract and without illustrations. He generally found the uterus anteverted and anteflexed, but never met with a retroversion.

Bandl³ found the uterus in the new-born child sometimes straight, at other times slightly flexed. He believes that the membranous body, as opposed to the firmer cervix, renders an alteration in the axis of the uterus in the cadaver very probable, but he doubts if it exists in the living. In older children, in whom the body of the uterus has acquired greater firmness, that organ is much more frequently found straight.

Köllicker⁴ in a valuable monograph gives the results of his examinations of the uterus in the fetus and child. He says that up to the sixth month of fetal life the relations of the uterus and vagina are such that flexion of the uterus cannot occur. Towards the end of fetal life and the first year after birth a slight degree of anteflexion occurs, which may be due to the body being thinner than the cervix. This anteflexion is also favoured by the fact that while the fundus is fixed by the tense round ligaments, so that it cannot move backwards, it is pressed upon from above by the sigmoid flexure, and is thus bent forwards. He believes, however, that many uteri of about this age are straight, or show only a slight S formed curve, of which the upper part is concave forwards. Köllicker gives drawings of a frozen sagittal section of the pelvis of a new-born child, and also one of an infant nine months old. He has a drawing of a mesial section of the pelvic viscera of a girl aged 17 years, but, unfortunately, it was made after the removal of the viscera from the body.

From the above summary of the literature of this question it will

¹ Path. Anatomy of the Female Sexual Organs. Translated by Kammerer and Dawson, 1868.
² Arch. f. Gynäk., Bd. xiii.
³ Centralblatt f. Gynäk., No. 10.
⁴ Über die Lage der weiblichen inneren Geschlechtsorgane, 1882.
be seen that not only is the position of the uterus in the infant still a subject of dispute, but also that satisfactory observations respecting its relations in children of more advanced age are very limited.

In several female children I have endeavoured to determine the position of the uterus by means of frozen sections. In all of them the entire body was frozen, the pelvis divided in the mesial plane, and the sections carefully traced before they thawed. In addition to a few foetuses I have made sections of female children aged six weeks, two months, six months, fifteen months, one year and ten months, two years and two months, six years, and thirteen years.

In the foetus the empty bladder is flattened from before backwards, and on vertical mesial section its cavity forms with that of the urethra a continuous slightly curved line. At this time the bladder reaches higher up than the uterus, and the whole of the anterior surface of the latter lies in close contact with the bladder.

The rectum is usually distended with meconium, and lies in contact with the uterus, so that there are no coils of intestines in the pouch of Douglas. The axes of the uterus and vagina form a very obtuse angle.

Fig. 1 represents a life-sized drawing of a section of the pelvis of a child aged six weeks. This infant was only 17 inches in length, and the centre at the lower end of the femur was very small. It was probably born at the seventh or eighth month, and may be regarded as corresponding to an ordinary nine months'
fœtus. It will be seen that the bladder is still almost entirely an abdominal organ. The uterus was displaced to the right side, so that after the mesial section of the pelvis had been made, a slice had to be removed from the uterus, in order to open its cavity. The uterus was antevorted, and also somewhat anteflexed. When I received this infant, the abdomen was greenish and somewhat distended with gas. This probably accounts for the anteflexion, and also increased the anteversion, the distended intestines having pushed the uterus and also the bladder downwards and forwards. It must be remembered that the lateral displacement of the uterus favoured the anteversion and anteflexion, since the bladder projects farther back in the mesial plane than at the sides.

About the time of birth a series of important changes commence in the pelvis and the contained viscera, which must have a marked influence upon the position and range of mobility of the uterus. The pelvis increases in size more rapidly than the portion of the trunk above it; the bladder not only descends, but also alters its shape; the rectum becomes more tortuous, and the axes of the vagina and urethra become more horizontal. In order to trace the progressive steps of these changes and their effects upon the position of the uterus, we require a series of mesial sections of the bodies of females from early infancy to adult life. Unfortun-

![Diagram](image-url)
flattened from before backwards, so that it only possesses anterior and posterior walls. Soon after birth it begins to descend into the pelvis. The lower end of the bladder does not move down so much as the upper part. Such being the case, it can easily be understood how a fold is formed behind the urethra—the posterior limb of the empty diastolic bladder (Hart). The time of formation of this posterior limb varies somewhat, but I have several times seen traces of it in newly born male children.

Fig. 2 represents a section of a child aged two months, in which the bladder was empty. The posterior limb was quite distinct in this case. The child was well developed and rather fat. The uterus was straight, and intestines lay in front of it and upon bladder.

Fig. 3 was taken from a section of a child fifteen months old. It shows the effect of a distended bladder in pushing back the uterus.

In the children, one year and ten months and two years and two months, the bladder was empty; in the former the uterus was retroflexed, and in the latter anteflexed. These, however, cannot be regarded as normal sections, the displacements of the uterus being the result of pressure upon the abdominal walls. I used these bodies for the purpose of ascertaining the alterations in the position of the larynx in over-distension and acute flexion of the head, and in fixing them in position before freezing, pressure was
made upon the abdominal walls. They show the necessity of care in the manipulation of the body after death.

The most interesting specimens that I have to bring under your notice are those of the sections of the pelvis in two girls aged six years and thirteen years respectively.\(^1\)

In the girl six years old, the trunk was divided by a series of horizontal sections down to the level of the umbilicus, but the pelvis was divided by a vertical mesial section. The bladder was empty, and afforded an excellent example of its configuration when in diastole. Its upper surface was concave and covered by the peritoneum. Its anterior surface, which looked downwards as well as forwards, was in contact with the lower part of the anterior abdominal wall, the back of the pubes, and the retropubic pad of fat (Hart). The posterior surface, which looked backwards and slightly downwards, was in relation to the cervix of the uterus and the upper part of the anterior vaginal wall. Both the anterior and posterior surfaces of the bladder were devoid of peritoneum. If a mesial section be made of a pelvis, in which the bladder is in diastole, the cavity of the bladder, along with that of the urethra, possesses a \(\Upsilon\)-shaped form, the two limbs of the \(\Upsilon\) being formed by the bladder and the stem by the urethra. In this case the anterior limb of the bladder was about 3 cm. in length, and the posterior nearly 2 cm. The axis of the uterus was straight, there being no indications of anteflexion or retroflexion. Its direction nearly corresponded with the axis of the pelvic inlet, but it was more vertical. There were no traces of peritonitis nor of adhesions, but the space in front and behind the uterus was occupied by serous fluid, the coils of the small intestines having been floated up above the level of the top of the uterus. It is difficult to estimate the effect of this fluid upon the uterine position. As the uterus was less anteverted than usual, we may assume that the uterus had sunk in the fluid, but it is worthy of notice that it nowhere touched the rectum.

The girl aged 13 years was well developed. After the body had been thoroughly frozen in the horizontal position a vertical mesial section was made of the entire body. The pelvis was divided almost exactly in the mesial plane, but in consequence of a slight displacement of the uterus to the left side only the upper part of its cavity was opened. The bladder contained a small quantity of frozen urine, and the rectum was empty. The walls of the bladder were much thicker than they are usually represented in diagrammatic sections. The urethra was 1\(\frac{1}{2}\) inches in length. The anterior vaginal wall measured 2 inches, and the posterior 2\(\frac{1}{2}\) inches, or nearly the average length in the adult. The pouch of Douglas contained a loop of small intestine. After the left half of the section had been traced, embedded in plaster of Paris and

\(^1\) I hope to publish shortly a work containing coloured lithographic plates of these two specimens.
hardened in spirit, I removed a thin slice from the uterus so as to open its cavity in its whole length. Fig. 4 was made from a careful life-sized drawing of this section of the uterus. From this figure it will be seen that with the exception of a slight curve near the external os the axis of the uterus was straight. Although there were no traces of any flexion of the body upon the cervix, still there was marked anteversion, the uterus lying upon the bladder, and its long axis forming with the horizon an angle of about 20°.

These specimens support generally the views of Klubs, Bandl, and Köllicker. The recognition of a class of anteflexions as "congenital," in the belief that the uterus is normally anteflexed in the infant, and that they represent a persistence of that condition, appears to me to be based upon an erroneous conception. I believe that the uterus is less anteverted in the child than in the adult, but probably the adult uterus is more frequently anteflexed.

Ovaries.—The ovaries, like the testicles, are at first situated in the abdomen; and in the process of development both these organs descend, the former into the pelvis and the latter into the scrotum. While, however, the testicles usually reach their permanent position in the scrotum before the end of foetal life, the ovaries in the new-born child are usually found lying at the brim of the true pelvis, with only their uterine ends projecting into its cavity. Very soon after birth they descend, so as to lie against the upper part of the side wall of the pelvis, their upper extremities being internal to the external iliac arteries, or often just below them. They have now acquired a position practically similar to that in the adult, but perhaps a little higher.

The want of agreement in the results of the researches of Schultze, His, and Hasse on the position of the ovaries may be regarded as demonstrating that it is not constant; but I think that most of the variations can be easily explained. The ovaries usually lie in a sagittal plane against the side walls of the pelvis, with their long axes more or less vertical, so that their surfaces are internal and external, borders anterior and posterior, and extremities superior and inferior. Fig. 4 shows the left ovary in a girl aged 13 years, which was exposed from the inner side by making a mesial section of the pelvis, and then removing some coils of the intestine. From this it will be noticed that the Fallopian tube runs upwards along its anterior border, and then arches backwards.
above its upper extremity. The ligament of the ovary passes outwards, and then turns upwards to be attached to the lower end of the ovary. A fold of peritoneum, called the infundibulo-pelvic ligament, descends from the brim of the pelvis to the ovary. The ovary is not firmly fixed in any one position, but, like the uterus, it possesses normally a considerable range of mobility. The alterations in its position are mainly due to changes in the uterine position. Schultze1 has shown that if the uterus be well anteverted, the ovarian ligaments draw the lower ends of the ovaries downwards and forwards, so that their long axes are directed from above downwards and more or less forwards. As the body of the uterus moves upwards and backwards, the ovaries are pushed in the same direction, but their lower ends more than their upper ones, consequently their long axes come to incline from above downwards and more or less backwards.

Lateral displacements of the uterus are very common, and His2 has shown that this influences the position of the ovaries. Thus if the uterus be displaced to the left side the right ovarian ligament is put upon the stretch, and draws the lower end of its ovary inwards, so that instead of lying vertical it tends to become transverse.

I have satisfied myself, from an examination of the ovaries in children, of the correctness of the views of Schultze and His; but as the ovaries in young children are softer than in the adult, they are very apt to become altered in shape from the pressure of neighbouring organs.

Growth of Genitals.—The sexual organs are generally believed to undergo a special and marked increase in size as well as in functional activity at the period of puberty. We possess, however, very few accurate observations as to the growth of the male genitals; and even in the case of the female organs, attention has been almost entirely confined to the uterus. The uterus of a new-born child differs not only in size, but also in its external and internal configuration, from that of the adult. The cervix is longer, thicker, and firmer than that of the body. On opening its cavity the arbor vitae will be found extending along its whole length—body as well as cervix—and there is no constriction corresponding to the internal os. Some authors give precise measurements of the relative length of the cervix and body; but in reality it is not easy to distinguish precisely the boundary between these two portions, since there is no internal os, and the arbor vitae reach to the top of the uterus. The upper third or so is generally much thinner and more flexible, and may be taken as representing the body.

It is generally stated that the uterus undergoes little or no

1 Die Pathologie und Therapie der Lageveränderungen der Gebärmutter. Berlin, 1881.
2 "Die Lage der Eierstöcke in der weiblichen Leiche," Arch. f. Anat., 1881.
change until puberty, when it rapidly increases in size, the body growing faster than the cervix, so that the uterus soon acquires its adult characters. The arbor vitae are said to disappear in the body of the uterus about the fifth or sixth year, only a median ridge remaining, which is usually obliterated at puberty.

Kölliker\(^1\) says that he knows no organ that varies, in different subjects of the same age, so much in its size and development as the uterus during the latter months of foetal life, in the new-born child, and in the girl up to puberty. The uterus of a new-born infant may have the walls of its body so thick and firm that a flexion appears very improbable; and, on the other hand, in a girl 10 years old they may be very thin and flexible.

Subjoined will be found a table giving the length of the uterus, and notes with regard to the arbor vitae, prepared from specimens in my own possession. I have also added those described by Kölliker, which are indicated by the letter K. The list is by no means so complete and extensive as I should wish, but I have not yet finished my investigations on this subject.

An examination of the table supports, to a certain extent, the

| Age          | Length of Uterus | Remarks.                      |
|--------------|-----------------|--------------------------------|
| New-born     | 2·5 cm.         | Arbor vitae distinct in both body and cervix. |
| Do.          | 2·5 ″            | Do.                             |
| Do.          | 2·6 ″            | Do.                             |
| Do.          | 3·0 ″            | Do.                             |
| Do.          | 3·4 ″            | Do.                             |
| 6 weeks      | 2·0 ″            | K.                              |
| 2 months     | 2·5 ″            | Do.                             |
| 5 ″          | 2·4 ″            | Do.                             |
| 6 ″          | 2·8 ″            | Do.                             |
| 1 year 6 months. | 2·5 ″     | K.                              |
| 1 year 6 months. | 2·5 ″     | Do.                             |
| 6 years      | 2·5 ″            | Arbor vitae very faint in body. |
| 6 ″          | 2·8 ″            | Arbor vitae distinct in both body and cervix. |
| 6 ″          | 3·0 ″            | Arbor vitae faintly marked in body. |
| 7 ″          | 2·6 ″            | Arbor vitae distinct in both body and cervix. |
| 7 ″          | 3·0 ″            | Arbor vitae faintly marked in body. |
| 9 ″          | 2·10 ″           | Central ridge in body; fundus of uterus well developed; adult type. |
| 10 ″         | 3·5 ″            | Arbor vitae distinct in both body and cervix. |
| 10 ″         | 3·1 ″            | K.                              |
| 12½ ″        | 4·9 ″            | K.                              |
| 13 ″         | 3·0 ″            | Arbor vitae distinct in both body and cervix. |
| 16 ″         | 3·1 ″            | K.                              |
| 16 ″         | 4·4 ″            | K.                              |
| 16 ″         | 5·0 ″            | K.                              |
| 18 ″         | 5·3 ″            | K.                              |

\(^1\) Op. cit., p. 13.
views of Kölliker. The average length of the uterus in the newborn child seems to be about 2.5 cm., but Kölliker had one nearly 1 cm. longer. The three girls 16 years of age differ very considerably one from another; but this is easily understood, as it is well known that the period of puberty varies greatly in different individuals. My own specimens go to prove that the uterus does not undergo any marked increase in size between infancy and puberty. Thus all of them, with the exception of that of the girl aged 12½ years, were of the infantile type, the body of the uterus being very thin.

The time of disappearance of the arbor vitae from the body of the uterus seems to be somewhat variable. Thus in one specimen from a girl aged 6 years they were very indistinct, while they were well marked in children 9 years and 13 years old.

The rest of the genitals appear to grow more uniformly with the body generally than does the uterus. In the girl aged 13 the ovaries, Fallopian tubes, and vagina were much better developed than the uterus, and in several of the specimens in which the uterus was still infantile, the ovaries were nearly as large as in the adult.

V.—A CASE OF STRYCHNIA POISONING, WITH AN ANALYSIS OF STEINER'S VERMIN-KILLER.

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(Read before the Medico-Chirurgical Society of Edinburgh, 3rd March 1886.)

On the morning of the 10th November 1882, I was hastily summoned to 46 Coburg Street, Leith, to see a woman who was said to have taken poison. I reached the house at 9.22 A.M., and was met there by Mr Cousland, M.B., the Assistant House-Surgeon of Leith Hospital, who, on being called to the case about 9 o'clock, and recognising its urgency, had sent for me to see it with him.

The patient, a woman of 35 years of age or thereabouts, of middle height, and of well-nourished condition of body, was found lying in bed in the dorsal posture. She was perfectly conscious and rational, but somewhat flushed in face and excited in manner. The pulse was small and thready, 100 per minute; the respiration hurried; the pupils equal and dilated. There were no signs of vomiting or purging, nor any history that either had occurred.

On being asked as to what had caused this condition, the patient informed me, as she had already told Dr Cousland, that at 6 o'clock in the morning (about three hours and a quarter previously) she had swallowed, with suicidal intent, the contents of a packet of vermin-killer; and she pointed to the cover and advertisement-sheet of a threepenny packet of Steiner's vermin-killer, which were