A Lecture ON HERNIA OF THE UTERUS IN MEN AND WOMEN.*

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AN eccentric old man, whose aches and pains were ascribed to hysteria by his doctor, made a curious will: he left his riches to his dear wife, and his womb to the doctor, *if he could find it*. Although the probabilities were against the doctor, his search might have been successful, as I will endeavour to prove. Observations in the wards and operating-rooms of the hospital have by this time taught you that almost any abdominal viscus may stray into the sac of an inguinal, or a femoral hernia. The common thing to occupy a hernial sac is a piece of omentum, or a loop of bowel; among uncommon things we may mention the vermiform appendix, the caecum, or a persistent vitello-intestinal duct; rarely, a pouch of the bladder, a loop of ureter, or the fundus of the gall bladder may be found in it. It is the practice among surgical writers to denote by special terms the viscus which occupies the hernial sac. Thus, we have such names as "enterocele," "epiplocele," "cystocele," and the like. When some of the internal reproductive organs of girls or women are lodged in the sac of an inguinal or a femoral hernia, for example, the ovary, Fallopian tube, or the uterus, we employ the terms "oöphorocele," "salpingocele," and "hysterocele," or any combination of these names as the occasion demands. The great safety of modern operative surgery, especially in its application to the treatment of inguinal and femoral herniae, has led to a significant increase in the accuracy of our knowledge in regard to the contents of hernial sacs. Twenty years ago it was exceptional to perform operations on such herniae in children and infants; to-day it is the rule. We know that the sac of an inguinal hernia in female infants often contains some of the internal genitalia; usually it is the ovary, occasionally the tube and ovary. In exceptional cases the tube, the ovary, and the greater part of the uterus occupy the sac, sometimes accompanied by a loop of bowel or a piece of omentum. These displaced elements of the reproductive organs may become strangulated, or undergo axial rotation, and lead to acute symptoms demanding urgent surgical treatment. Many of the glandular bodies found in the sacs of inguinal herniae of infants, apparently girls, prove to be testes when they are examined microscopically.

In adult women it is exceptional to find representatives of the internal genitalia in hernial sacs, but they occur with sufficient frequency to lie outside the category of surgical curiosities. Hysteroceles occur at all ages—in infants, adults, and old women, in spinsters as well as mothers. In nearly all the published cases (and records of more than fifty are available) an operation was undertaken for the relief of an irreducible or a strangulated hernia, when, to the surprise of the surgeon, a uterus with one or both sets of its appendages have been found inside the sac; in many of these instances the uterus has been of normal size, but in some cases it was smaller than usual and occasionally malformed. A uterus occupying the sac of an inguinal hernia has become gravid, and when the pregnancy ripened the fetus was extracted by Caesarean section. Even in such ill-starred circumstances the fetus has survived although the patient lost her life.

The best known cases are those reported by Ledesma (1840) and Fischer (1842). Among recent cases may be mentioned one observed by Nores in Buenos Aires (1901); in this instance the greater part of the gravid uterus remained in the abdomen, but the legs of the fetus and the placenta were in that portion of the uterus which occupied the hernial sac. Delivery occurred spontaneously; the child was dead. There was difficulty in extracting the placenta, so Nores opened the hernial sac; it contained septic fluid. The woman survived the operation only two hours.

The rarity of hernia of the uterus has led several writers to play the part of case collectors. Among the various papers on this subject the monograph by Cranwell, of Buenos Aires, is the most complete.

During the last ten years some interesting cases of inguinal hysterocele have been published by Birnbaum, Andrews, Cranwell, Kellock, Jopson, and Rushton Parker. In all the reported cases of inguinal hysterecomy the operation has been performed under the impression that the women were suffering from an irreducible or a strangulated hernia, and in the course of the operation the surgeon has found the uterus in the hernial sac, sometimes alone, but occasionally accompanied by intestine. In a few cases, especially those reported in recent years, the herniated uterus has been removed with success (inguinal hysterecomy). Although the astonishment of the surgeon may be great on finding a uterus in the sac of an inguinal hernia in a woman, it would certainly be greater at finding a uterus in the sac of an inguinal hernia in a man. Bewildering it may be, but such things happen, as I will endeavour to show.

Men are sharply distinguished from women by what are known as the primary sexual characters. These are directly associated with the function of reproduction, and comprise in women the ovaries, the Fallopian tubes, and the uterus. The recognition of a boy or a girl depends entirely on a visual examination of the external genitalia. The presence of a penis and scrotum is accepted as a sufficient indication that the child is a boy, their absence leaves no doubt in the mind of the mother that her offspring is a girl, and on these signs the child is named accordingly. At the time of our nativity there is no other method available for determining sex. Later in life we have to consider what are known as secondary sexual characters; these are features which enable us to distinguish man and woman from each other irrespective of the organs of reproduction. Man possesses a beard and greater muscular development than a woman, greater physical strength, a more powerful voice, and often an abundant growth of coarse hair on the skin. The hair on his pubes passes upwards to the umbilicus, whereas in woman it is as a rule sharply restricted to the mons veneris. In adult men there is often a growth of long hair on the tragus.

Secondary sexual characters normally become manifest at puberty—by which term we signify reproductive maturity. In girls puberty is strikingly declared by the institution of menstruation and the development of the breasts (mammas). In boys it is indicated by a marked alteration in the voice due to enlargement of the thyroid cartilage and a corresponding increase in the length of the vocal cords, and the appearance of coarse hair on the lips and chin. Next to the possession of a penis, the most striking feature in the external genitalia of a male is the presence of testicles, one in each half of the scrotum, but these are not always present, and if a male child has a diminutive penis and an empty scrotum, the relatives, midwife, or doctor on occasions have their wits sorely taxed to decide with certainty its sex. This brings me to what I may call the core of my subject. The only true test of sex is the gonad or genital gland. The possession of ovaries indicates the female, and the presence of testes the male sex. The testes differ from the ovaries in an important particular, for under normal conditions the ovaries occupy a position in the pelvis, one on each side of the uterus, but each testis during fetal life descends from the renal region, passes down the inguinal canal, and takes up a position in the scrotum. The cause of this extraordinary migration of an abdominal organ, and even the actual forces which produce it, remain a mystery, although the matter has been made the subject of much investigation and still more inconclusive speculation. In some instances one or both testes fail to traverse the inguinal canal, they may even fail to enter it; but when this happens it is a certain indication that the gland is imperfect. In the early days of medicine, before the exact function of the ovaries was discovered, there could be no certain test for the determination of sex, and it came about that when an individual appeared with a diminutive penis and an empty scrotum, especially if the scrotum was incompletely closed in the middle line (hypospadiac male with a perineo-scrotal fissure), and a

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rounded movable body occupied each inguinal canal, there would be much excitement and speculation as to the sex of the child. Such unfortunate individuals have been called from the earliest time hermaphrodites (Hermes and Aphrodite), and when they attained the pubic condition and assumed the secondary sexual characters, some of which belong to men and others to women, the difficulties of determining their sex were increased. It may seem strange when I tell you that no sure method of determining sex in doubtful cases was available until von Baer (1829) discovered the human ovum (egg), and thus established the nature of the ovary (ovarium). The change which this observation has wrought on theory and practice is enormous. It is now recognized that the testis is the distinguishing feature of a man, and the possession of an ovary the mark of a woman; and although it is true that among the *invertebrata* there are many animals in which it is normal for one to possess male and female reproductive organs in a functional condition (true hermaphroditism), there is no instance on record in which a human being has survived its birth possessing a conjoined functional ovary and testis (an ova-testis), or a perfect ovary on one side and a perfect testis on the other.

To-day it is recognized that the term "hermaphroditism" (or, in its shortened and more euphonious form, "hermaphroditism") as employed by biologists, is inapplicable to mammalia with imperfect genitalia, internal or external. It is customary now to term such "pseudohermaphrodites," and more than 95 per cent. of these unfortunate individuals are undeveloped males.

It is important to bear in mind that the secondary sexual characters are often useful aids in sex-determination. Berthold (Koenigsberg) was once examining the larynx of a patient, 22 years of age, dressed and educated as a woman. This organ so resembled that of a man as to make him suspicious of the sex. He cautiously made inquiries, and elicited that the genitalia were not normal. Subsequently it was ascertained that the genital glands furnished spermatozoa, and thus satisfactorily proved that the patient was a man.

It is not my intention to discuss at length the fascinating subject of hermaphroditism, although it is of absorbing interest to biologists. My self-imposed task is to show you that a man may possess a well-formed uterus. My interest in this matter began twenty years ago, for while dissecting a male fetus, born at the eighth month, I found a uterus (corresponding in shape and size to that of a female fetus of the same proportions and corresponding period of intrauterine life) behind the bladder, communicating by means of a small vagina with the urethra in the situation of the sinus pudicus. Each Fallopian tube passed from the uterus as a mere thread, and then expanded into a fringed ampulla as it entered the inguinal canal and joined an oval body, which proved on micro-

scopical examination to be a testis, Fig. 1. The penis was small and hypospadiac.

Stonham described a similar case in 1888, which occurred in a boy aged 9 months. This boy had a congenital inguinal hernia, and an attempt was made to cure this defect. When the sac was opened a uterus with Fallopian tubes and bodies, supposed to be ovaries, were found. The child died, and the parts were carefully dissected.

The relations of the uterus and the glandular bodies are presented in Fig. 2. The genital glands were examined microscopically and found to be testes. In this specimen the vasa efferentia gradually lose themselves on the walls of the vagina. This appears to be the usual condition in such malformations.

For many years I have followed up this subject, and collected many instances in which men with incompletely developed external genital organs have been brought up as women, and late in life suffered from a strangulated hernia. In the course of an operation performed for its relief a genital gland of the shape and size of an ovary has been detected in the canal, sometimes associated with a Fallopian tube. When the supposed ovary has

been removed and submitted to microscopical examination, the investigators have been astonished to find that it was a testis. It sometimes happens that herniotomy is performed on a child with normal female external genitalia, the surgeon removes a rounded glandular body from the inguinal canal which he believes to be an ovary, but on microscopical examination it proves to be a testis.

A large number of such observations have accumulated since the operation known as radical cure of inguinal hernia has been so freely practised. F. L. von Neugebauer has collected with great industry scores of reported cases, and analysed them in a monumental work.

The most remarkable cases are those in which the surgeon performs an operation on a man with well-formed external genital organs for the purpose of removing a tumour from the scrotum, but the suspected tumour proves to be a uterus.

Among the recorded cases of inguinal hysterectomy performed on men the subjoined are worth mention:

Monsieur Brossard (Cairo) operated on a man, aged 26, in order to remove a tumour from the scrotum. This tumour proved to be a uterus situated in a sac within the tunica vaginalis testis; this uterus measured 9.5 cm. in

length. The genital glands associated with it were testes. The parts were examined microscopically by Professor Cornil, and he states that the testes were normal and spermatogenesis active. The uterus possessed an endometrium possessing glands furnished with cylindrical epithelium.

Arnolds has observed and reported the description in detail of a man, aged 59, whose external genitals were well developed, though he was a cryptorchid at birth. At

Fig. 1.—Internal genital organs of a male child, showing a uterus with a narrow vagina opening into the sinus pudicus.

Fig. 2.—The internal genital organs of a boy, 9 months old. He had well-developed uterus and Fallopian tubes associated with testicles (after Stonham).

the age of 15 a testicle appeared in the left inguinal canal; he was married at the age of 40 to a widow who had children by her first husband, but remained barren to this man, although there is reason to believe that he was potent. He came under Arnolds's care on account of a troublesome swelling in the left inguinal region about the size of a fist, which after careful consideration was thought to be a malignant tumour. This induced Arnolds to dissect it out in its sac entire. In the course of the operation a pedicle was found leading into the abdomen; this pedicle had a lumen. When the tumour was subsequently dissected it contained a well-developed bicornate uterus (uterus bicornis unicolis), with Fallopian tubes and genital glands occupying the position of ovaries, but on microscopical examination they were proved to be testes. The pedicle with the lumen prove to be the cervical canal.

Keiffer has described and figured a uterus removed from a hernial sac of a man who was the father of eight children. He argues that it looked like a uterus, but on microscopical examination it proved to be musculo-fibrous hypertrophy of the *utriculus prostaticus* with testicles and thickened spermatic cords. He states that so-called uteri in the male are of this nature. I cannot agree with him, for the *uterus masculinus* is developed from the same embryological structures, has the same shape and histological structure, even to the glands in the endometrium, as the female uterus. Moreover, I have satisfied myself from a critical examination of uteri removed from boys with normal testes, that such uteri are indistinguishable from those of girls of a corresponding age. The specimen represented in Fig. 3 is useful, for it serves to show that it is difficult, indeed impossible in some cases, to determine the nature of the sexual glands from a mere naked eye inspection. In this instance the external genital organs are those of a boy with undescended testes. The penis is normal in shape and size and the scrotum is apparently natural, but empty. Standing above the prostate is a uterus of the same size and shape as that of a girl of corresponding age and size. The genital glands occupy their proper relations to the Fallopian tubes, but they present the smooth ovoid contour of a testis rather than the elongated shape of an infant ovary. On microscopic examination the glands were found to be testes.

Embryology teaches us that the mammalian embryo is potentially hermaphrodite. The differentiation of the primary germ mass into an ovary or a testis is followed by a corresponding development of the correlated sexual organs. Thus, when the ovary dominates, the Müllerian ducts develop into Fallopian tubes, uterus and vagina, and the external genitalia assume the female type. When the testis is the dominating organ, the Wolffian ducts become vasa deferentia, and the external genitalia develop into the

elaborate organs characteristic of the male. Recent observations indicate that the full structural and functional development of either set of sexual organs, primary and secondary, require the full development of the dominant sexual organ (ovary or testis), and, if this be imperfect, the formation of the internal and external genitalia is imperfect also. This fact is in favour of the view that ovaries and testes furnish an internal secretion of great value during the development and growth of the body. What the force is which determines testicular or ovarian domination surpasses the wit of man to discover.

It may be, as some thoughtful biologists assume, that the sex is really determined in the egg even before fertilization, which means that the egg itself is either male or female. This may be so, but in the present state of knowledge it is presumptuous to affirm or to deny, but this may be stated with certainty: *The full development of the genital organs for either sex demands a fully-developed and functional gonad (sexual gland).*

Having placed before you the facts which I contend prove in the most positive manner that the uterus is not exclusively the property of women, I will now endeavour to explain to you how a uterus may occupy the scrotum.

It is common knowledge that the testicles leave the abdominal cavity usually in the course of fetal life and descend into the scrotum. We must also remember that the ovaries in fetal life descend from the renal region and at birth lie on the psoas and iliacus muscles, near the entrance to the inguinal canal (Fig. 4). Later in life they occupy a position in the true pelvis near its brim.

This alteration is coincident with the great change which takes place in the bony structures of the pelvis when girls become mature (or pubic). The experience of

surgeons connected with hospitals, especially those hospitals concerned with diseases of children, teaches that it is quite common to meet with rounded bodies in the inguinal canals of female infants, and it may also be mentioned that in many instances in which it is deemed necessary, on account of strangulation or axial rotation of these bodies, to remove them, when the glandular body suspected to be an ovary is examined microscopically it is occasionally proved to be a testis. In all the cases of *uterus masculinus* which I have had opportunities of examining the testes were tethered to the uterine cornua by short cords; it is easily

conceivable that when the spermatic glands attempt to obey the impulse which causes them to traverse the inguinal canals to reach their normal positions in the scrotum they drag the uterus with them. In connexion with this I think it is quite possible that in many instances in which the uterus is found occupying the sac of an inguinal hernia in women, and especially in female infants, a critical examination of the minute structure of the genital glands associated with

Fig. 3.—The internal and external genital organs of a boy, aged one month. He possessed a well-developed *uterus masculinus* associated with testes. The right kidney had two ureters.

Fig. 4.—The pelvic organs of a female fetus at birth: to show the relation of the ovaries and Fallopian tubes to the inguinal canals.

it would, in many instances, show that they are really testes, though their shape might lead the surgeon to regard them as ovaries, and this in spite of the fact that the external genitalia were characteristically female in type.

It has long been known that horses, sheep, oxen, goats, and pigs, as well as cats and dogs, may be pseudo-hermaphrodites. All students of John Hunter's works know well the peculiar conditions of the reproductive organs which he described, and the specimens he set up (now preserved in the museum of the Royal College of Surgeons) under the farmer's title of "free-martins." Stock breeders are aware that "a cow calf twin-born with a bull calf is usually sterile"; it is known as a free-martin. This is a pseudohermaphrodite and possesses a uterus, but the genital glands (or gonads) are invariably testes.

Experience taught stock breeders long ago that animals with malformations of the external genitals are useless for breeding purposes, and they are, as a rule, fattened and utilized for food.

Although the subject of pseudo-hermaphroditism is profoundly interesting to the practical surgeon, it has never been properly considered from the standpoint of the alienist and jurist. To us to-day human ova and

Fig. 5.—Uterus and testes from a pig; removed in the operation of spaying.

spermatozoa are as distinct realities as potatoes and gooseberries to the gardener; although Leeuwenhoek's pupil Hamm discovered the spermatozoon in 1677, its real nature and importance was not established until Koelliker (1841) proved it to be a histological element of the testis, and furnished us with an unerring method of sex-determination.

That an individual with the external characters of a woman should possess testes is as startling as the fact that one with the fullest attributes of manhood should have a uterus in his pelvis or in the scrotum.

Pseudo-hermaphrodites sometimes contract marriages, rarely as men, usually as women. In some reported instances such unions have been attended with happiness.

Realizing that the external genitalia afford no positive indications of the nature of the internal genital organs, and especially the gonad (sexual gland), it is a fair assumption that some examples of sexual frigidity and sex perversion may be explained by the possibility that the individuals concerned may possess sexual glands opposite in character to those indicated by the external configuration of their bodies.

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ON THE INCREASE OF THE HAEMOLYTIC POWER OF SERUMS

RESULTING FROM THE EXPERIMENTAL INTRODUCTION OF ORGAN EXTRACTS DERIVED FROM OTHER ANIMALS OF THE SAME SPECIES.

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THE development of an increase of the normal haemolytic power of the serum of one animal by the introduction of extracts of the organs of another animal of a different species is well known. The object of the following experiments was to endeavour to demonstrate the development of a change in the serums of rabbits which had been injected with the organs of other rabbits, and, as the experiments will show, the plan adopted for the demonstration of this change was one in which use was made of a modification of the procedure introduced by Bordet and Gengou of fixation of the complement.

DETAILS OF THE PREPARATION OF THE AGENTS, ETC., USED.

1. *Emulsion of Red Corpuscles*.—Fresh sheep's blood was obtained, and the red corpuscles prepared in the usual way by whipping, centrifuging, and washing repeatedly in normal saline solution. A 5 per cent. emulsion was made up with a similar solution and stored in an ice box.

2. *Complement*.—The complement made use of was any small quantity which happened to be present in the rabbits' serums and the much more abundant supply to be obtained from the serum of guinea-pigs. The latter animal was anaesthetized and exsanguinated from the carotid artery, and, after whipping and centrifuging the blood, the serum was pipetted off and used in dilutions of 1 in 10 to 1 in 15.

3. *The Experimental Serums*.—Normal full-grown rabbits were exsanguinated under anaesthesia; the thoracic aorta was exposed and the abdominal viscera washed out with salt solution until the fluid returning through the inferior vena cava was free from blood; the liver and kidneys were then exposed, and if the latter, as frequently happened, were not completely washed free from blood, they were manipulated until this was secured. The organs were then removed, cut up finely, and ground into a pulp with pestle and mortar. The pulp was then dried over sulphuric acid in desiccators from which all air had been removed by an air-pump. Finally the dried tissue was ground up very finely and stored in an air-tight chamber over sulphuric acid. The time which elapsed between the death of the animal and the desiccation of the organs rarely exceeded four to five hours and often was much less.

Normal adult rabbits were then injected repeatedly at intervals of a week or two with one-third to one gram of the dried organs made up with 10 c.cm. of normal salt solution, the same animal receiving on each occasion a dose of the same type of organ, either liver or kidney. The dose of organ emulsion was injected into the peritoneal cavity. Serums were obtained in the usual way from blood derived from the auricular vein; without inactivating them they were diluted—one part of serum to three or four of salt solution.