**Notes on midwifery / by J.M. Munro Kerr.**

# NOTES ON MIDWIFERY

BY

J. M. MUNRO KERR, M.D.

GLASGOW:

PRINTED FOR THE AUTHOR BY

JAMES MACLEHOSE AND SONS

PUBLISHERS TO THE UNIVERSITY

1911

# PREFACE

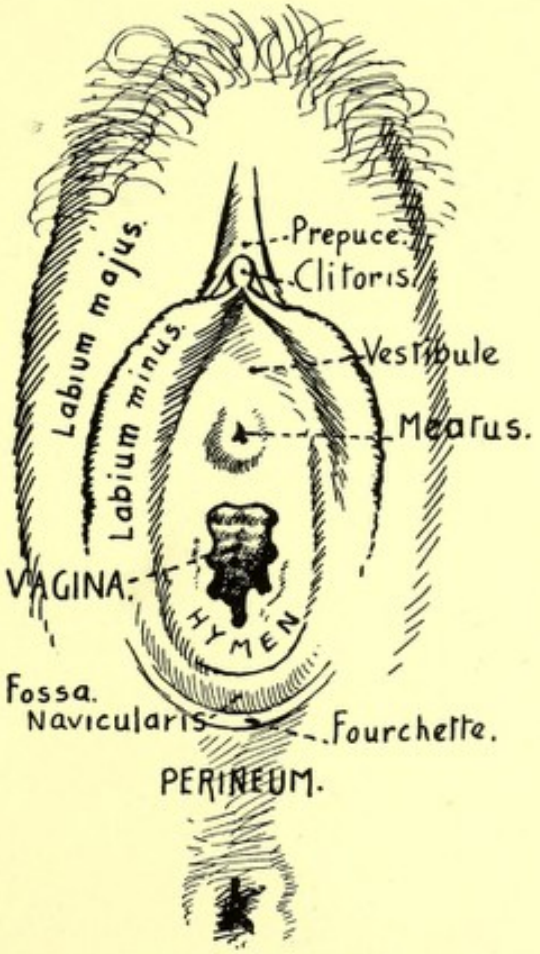
THE following notes are a synopsis of lectures delivered at Anderson's College Medical School. They are specially written for students of my own Class, but it is hoped that they may be of assistance to others commencing their obstetric studies.

## THE ANATOMY OF THE REPRODUCTIVE ORGANS.

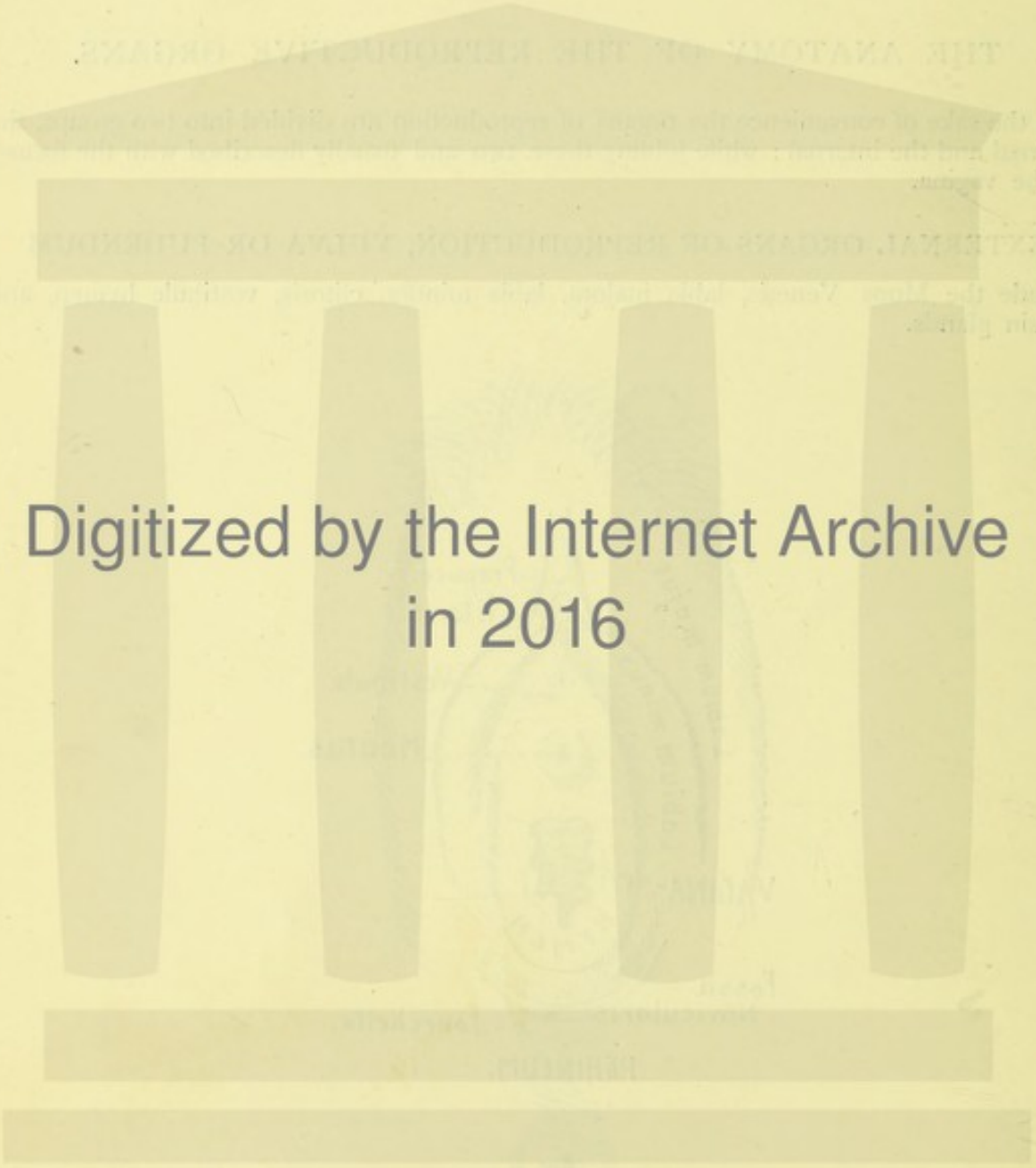
For the sake of convenience the organs of reproduction are divided into two groups, the external and the internal: while joining these two and usually described with the former is the vagina.

### EXTERNAL ORGANS OF REPRODUCTION, VULVA OR PUDENDUM

include the Mons Veneris, labia majora, labia minora, clitoris, vestibule hymen, and certain glands.




*The Mons Veneris* is a prominent cushion over the front part of the symphysis pubis. Its integument is thickly covered with hair after puberty. The prominence is due to the large amount of adipose tissue present.



*Labia majora.* Situated on each side of the aperture of the vagina are two longitudinal folds of integument. They are thicker in front where they merge into the Mons Veneris. Behind, they pass into the perinaeum, the anterior part of which is termed the posterior commissure. Just internal to the posterior commissure is a thin crescentic fold called the "fourchette," which, as a rule, is torn at the first delivery. Between the posterior commissure and the fourchette is a small space, the "fossa navicularis." Labia majora have two surfaces, an external covered with hairs and continuous with the skin, and an internal nearly resembling mucous membrane and richly supplied with sebaceous glands. At birth they are separated, and the "nymphae" are quite apparent, but in children and the adult virgin state the two surfaces are closely applied the one to the other. After child-bearing, however, they again become more or less separated, and as age advances they atrophy and allow the nymphae to be seen protruding. They consist of the tissues and structures of the integument. Beneath that is a layer of fibrous tissue corresponding with dartos tunic of the scrotum. The greater part of each labium consists of adipose tissue, richly supplied with blood-vessels, nerves, and lymphatics. The round ligament of the uterus terminates in the labia majora. Occasionally a prolongation of the vaginal canal may be found in one or both. These canals are termed the canals of Nuck, and into them a hernia of the intestines, omentum, and ovaries and tubes may occur. Even the uterus on some known occasions has passed into one of these canals.

*Labia Minora.* These are two folds of soft skin covered with stratified epithelium and fibrous and unstriped muscular tissue on the inner surface of the labia majora. Behind, as a rule, they become merged into the labia majora about the junction of their middle and posterior thirds, but sometimes they pass further back, unite, and then form the fourchette fold. The one passing over the clitoris unites with the similar fold of the opposite side and forms the "prepuce," while the other, the internal fold, passes under and, uniting with its fellow of the opposite side, is inserted into the back part of the clitoris, and forms the "frenum." They vary much in size, in some cases being enormously developed. They are richly supplied with blood-vessels and nerves, nerve terminations and sebaceous glands.

*Clitoris.* At the very anterior part of the vulva projecting between the prepuce and frenum is the small erectile body the clitoris. It is made up of two corpora cavernosa and a glans. Each corpus cavernosum, as in the male, is attached by a crus to the ramus of the pubes. It consists of connective tissue. The arterial and nervous supply of the clitoris is abundant, and is derived from the internal pudic vessel and nerve respectively.

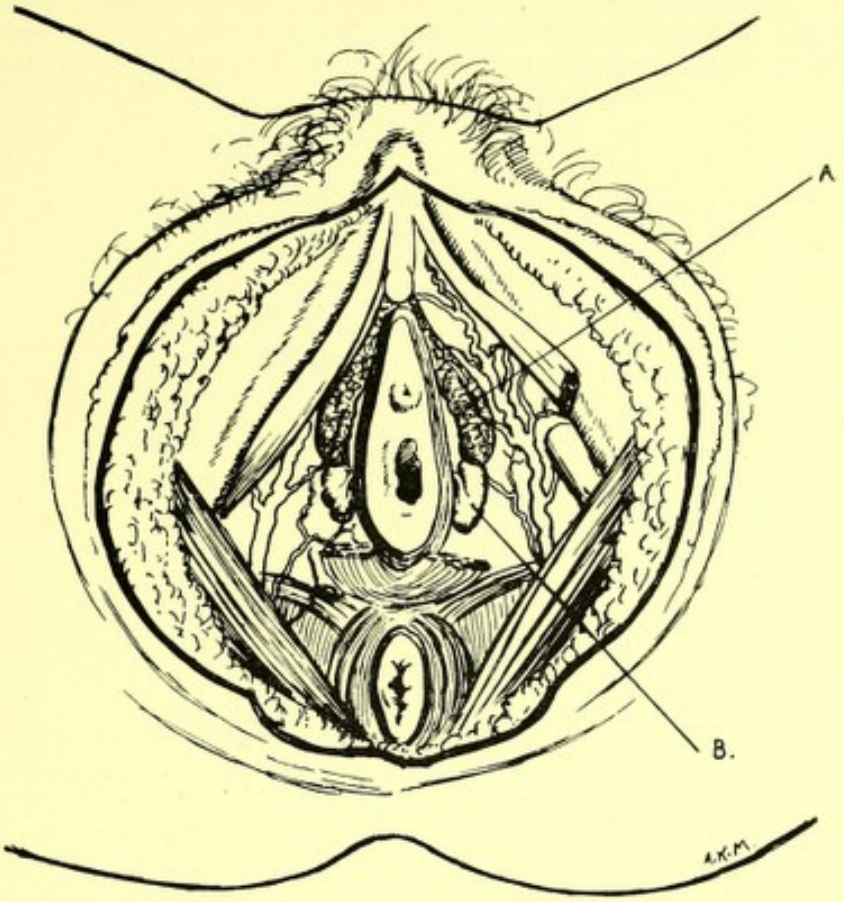
Occasionally the clitoris, instead of measuring 1½ to 2 cm, may reach the length of 1–2 in. and resemble its analogue, the penis. In such cases sometimes the question of so-called hermaphroditism may be brought up.

*Vestibule.* Between the labia minora and in front of the vagina is this small triangular space. From the centre of its posterior margin and about 1 in. below and behind the clitoris is the entrance to the urethra, the meatus urinarius. It is readily made out by touch on account of the prominence of its margin. Immediately behind the meatus is the entrance of the vagina.

*Bulbi Vestibuli.* Underneath the mucous membrane, and extending backwards from the vestibule and on each side of the entrance to the vagina in front, are the bulbi vestibuli. They are composed mainly of erectile tissue and are about 1½ in. in length. In front they taper to a point, the pars intermedia, where they pass into the crura clitoridis. They are embraced by the fibres of the bulbi cavernosus and ischio-cavernosus muscles.

*Glands of Bartholin.* On each side of the vagina, behind, and underneath the superficial fascia are these two glands. They are about the size of a haricot bean and are com-

pound racemose glands. Their ducts open at the side of the vagina, just outside the hymen or margins of vaginal office. These glands secrete a yellowish substance, more especially during sexual excitement. They frequently become inflamed.

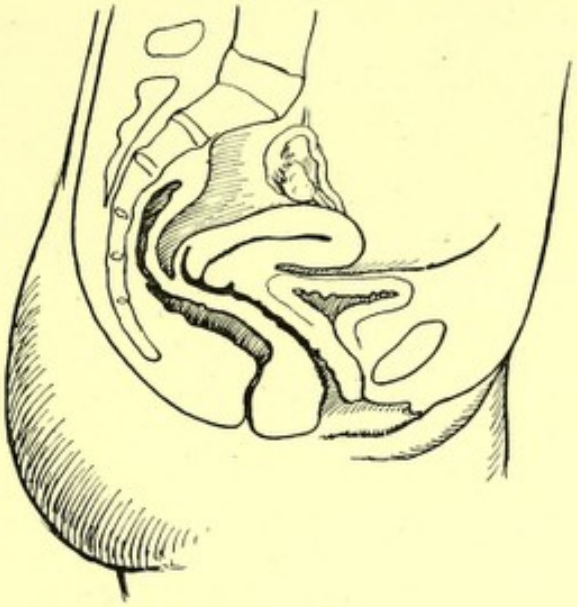



A. Bulbus Vestibuli. B. Bartholin Gland.

*Hymen.* The hymen, as seen in the adult, is a fold of mucous membrane stretched across the entrance to the vagina. In the virgin state, although sometimes the case, it seldom completely closes the entrance to the vagina. In shape the perforation is usually crescentic, with the concavity directed upwards. Sometimes it is cribriform, while at other times there is only a small central foramen or slit. The loose processes, the remains of the hymen after child-birth, are termed the carunculae myrtiformes. The hymen, as a rule, is ruptured at the first intercourse, but sometimes it remains intact, and may even form an obstruction to delivery. Budin has recently described a case where delivery occurred with singularly little damage to the hymen. This might be a matter of importance from a medico-legal point of view.

*Vagina.* The vagina is a fibro-muscular tube flattened between the bladder and urethra in front and the rectum behind. On longitudinal section it appears as a transverse slit in the pelvic floor having its anterior and posterior walls lying in apposition. Its general diection is parallel to the pelvic brim, viz. 60 deg. to the horizontal. It thus forms an acute angle with the long axis of the uterus. It does not run exactly in a straight line, the slit being S shaped on longitudinal section. The entrance to the vagina is sagittal and is very narrow. In passing upwards the canal gradually expands and is most distensible. In the non gravid the canal is only in its upper third within the pelvis. When the uterus rises up during pregnancy the canal is dragged up, and becomes more vertical.

The anterior wall is shorter than the posterior by about an inch, and is closely bound to the urethra and bladder by connective tissue. The posterior wall measures about $3\frac{1}{2}$ in. and is adherent to the wall of the rectum, except at the extreme upper part, where it comes into close relationship with the peritoneum. This connection with the rectum at the lower part is very close, but on passing upwards it becomes less, so that the vaginal wall may be stripped off without much difficulty.



At the sides of the vagina abundant loose connective tissue is found, and at the lower part are the two levator ani muscles. The upper portion of the canal embraces the cervix uteri, which projects for some distance into it. The vaults so formed are termed the anterior and posterior and lateral "fornices."

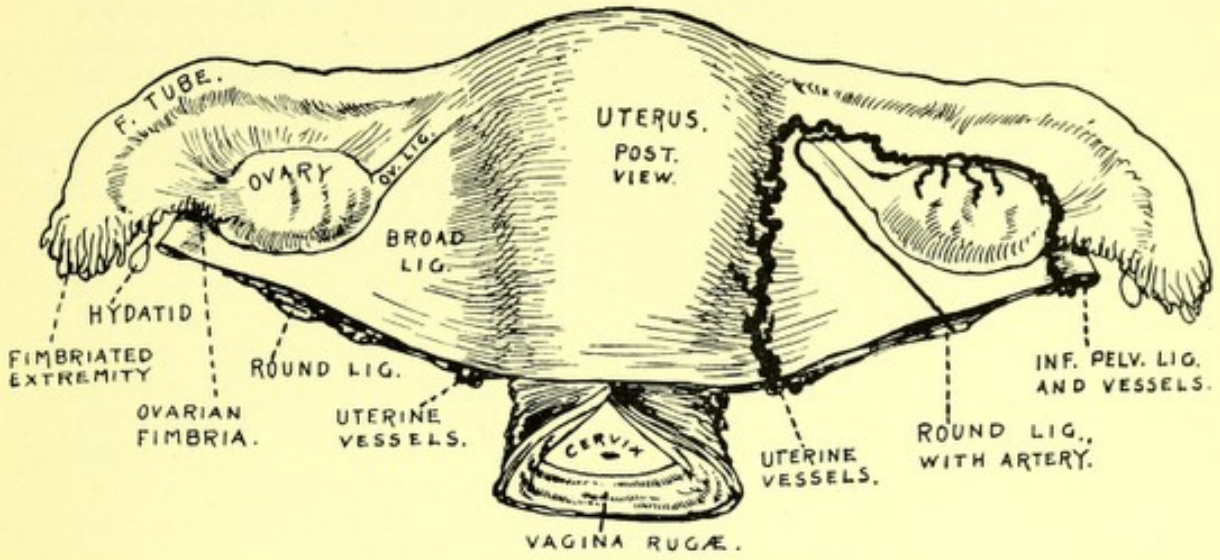
Running up the centre of each wall, but most marked on the anterior, are two longitudinal ridges, the anterior and posterior "columnae rugarum." These are most distinct in the lower part of the canal, and gradually disappear in passing upwards. Extending transversely from these in muliparae are numerous folds or ridges of mucous membrane, the "rugae vaginae." As a result of child-bearing they usually become stretched and gradually obliterated.

The walls of the vagina are made up of a fibrous, muscular, and mucous coat. The fibrous, the most external, contains, in addition to the ordinary fibrous tissue, a large quantity of elastic tissue, and is rich in blood-vessels. The muscular coat contains fibres running in a circular, longitudinal, and oblique direction, but different layers cannot be distinguished. The mucous membrane consists of a submucous and mucous layer, the latter being covered with large squamous epithelial cells. There are no glands. The secretion from the epithelial cells of the canal is slightly acid (preventative to invasion by pyogenic organisms).

*Uterus.* The uterus is a hollow muscular organ with very thick walls, suspended in the pelvis between the bladder and rectum, and connected below with the vagina, into which a part of the organ, the "portio vaginalis" projects.

At the upper angles, termed the cornua, the Fallopian tubes are attached. The organ is pear-shaped, flattened from before backwards, and measures in the virgin state 3 in. in length, 2 in. in breadth, and 1 in. in thickness. It weighs about $1\frac{1}{4}$ oz. It has two surfaces—an anterior and a posterior, the former almost flat, the latter markedly convex. It is divided into a corpus or body, and cervix or neck. The point of division is indicated internally by the os internum and externally by a slight constriction round the organ termed the "isthmus."

*The Corpus* is all that portion of the organ above the os internum. It is divided into two portions, the fundus, the body proper. By the fundus is understood that portion of the body above the insertion of the Fallopian tubes.




The cavity of the body is smooth and triangular in shape, with an opening at each angle, the two upper at the cornua for the Fallopian tubes and the one at the lower angle, the os internum. The two walls, the anterior and the posterior, are in the virgin state practically in contact, being separated by only a little mucus. The uterus is made up of serous muscular and mucous coats.

The serous coat is simply the peritoneum, which completely covers the body both in front and behind. In front it reaches only down to the isthmus, but behind it even covers a small portion of the cervix. At the sides, where the two layers of peritoneum come together to form the broad ligaments, there is a small portion of the body left uncovered. The peritoneum is loosely adherent to the muscular coat, and can be stripped off it, except over the fundus, to which it is bound very closely. The muscular coat, which averages about $\frac{3}{8}$ in. in thickness, consists of irregularly directed involuntary muscular fibres. In the non-pregnant uterus no distinct distribution into layers can be made, as can be done to some extent in the gravid organ.

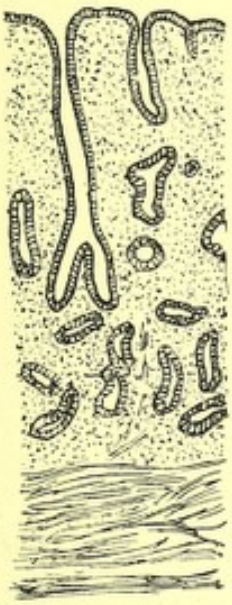
The endometrium or mucous membrane, whose average thickness is about $\frac{1}{8}$ in., is in its deeper part applied directly to the muscular coat. There is no intervening submucosa. (The muscular coat is really a submucosa.) The superficial surface is covered with columnar ciliated epithelium, and from it numerous glands sink into the substance of the membrane (Fig. p. 6). The movements of the cilia are not, as was at one time stated, from the os upwards, but from the fundus downwards, so that from the upper extremity to os externum the movement of the cilia is in one direction. The membrane itself may be divided into a glandular and an interglandular portion.

*The glands* vary much in size and shape. Some appear as slight depressions simply of the surface, others are long tubes running right down to the muscular tissue and often penetrating into its substance, so that portions of glands may be seen surrounded by muscle fibres. In the deeper parts of the membrane, the glands not infrequently become turned at the ends, as if from the resistance of the muscular coat. In sections such as the one from which the figure was taken, the glands present all sorts of shapes, according to the direction in which they have been cut, and even occasionally nests of epithelium cells may be met with when the knife has not

cut completely through the wall of the gland. The glands have a kind of basement membrane, a differentiated portion of the stroma, and they are lined with the same columnar epithelium as that which clothes the surface. The form of the cell is columnar, and the oval nuclei are situated a little below the middle of the cells. *The inter-glandular portion* which forms the supporting framework of the membrane consists of round and spindle-shaped cells, the nuclei occupying almost the whole cell and delicate interlacing fibres. In the substance of the inter-glandular tissue numerous fine capillaries ramify.

*The Cervix.* The cervix is cone-shaped, the apex of the cone projecting down into the vagina, and forming the portio vaginalis. At the very apex is situated the external os, which in the virgin state is a small transverse slit which feels just like a dimple, giving the same impression to the finger that pressing the tip of the nose does. In the woman who has borne a full time child the os externum feels more circular and patent, and its edges are generally irregular, due to the small lacerations that occur during the passage of the child. The margins of the os externum are termed the lips—they are anterior and posterior and are of equal size, although the anterior feels larger, as it is reached more readily by the examining finger.

The cervix may be divided into two parts—the vaginal and the supra-vaginal portions. The first is that part projecting into the vagina; the latter is the remainder. Some, however, describe a third part, the intermediate portion. These divisions of the cervix are not of much obstetrical importance; but in connection with hypertrophy of the cervix and the changes in the organ, the result of prolapse, these divisions will be more particularly referred to.



The cavity of the cervix is spindle-shaped, with two openings, one at each end, the os externum and os internum. The surface of the canal is rough owing to the numerous rugae passing off from the two longitudinal columns. This arrangement of the folds of mucous membrane is termed the "arbor vitae uterina."

The cervix has only a fibro-muscular and mucous coat, as only a very small portion of its posterior wall is covered with peritoneum. The fibro-muscular coat contains a large quantity of muscular tissue, but where it differs from the corresponding coat of the body is that the fibrous tissue is in great abundance. Besides ordinary fibrous tissue there is a large quantity of fibro-elastic tissue. We will see later how this gives to the cervix in pregnancy and labour a purely passive rôle. The mucous membrane of the cervix is of two kinds. In the canal the surface is covered by columnar ciliated epithelium, which only differs from that lining the body in that the epithelial cells in the cervix are more columnar and their nuclei are situated nearer the base. The glands, which are wide and branching, are numerous crypts in the mucous membrane, and are lined by the epithelium already described.

On the outer surface of that part of the cervix which projects down into the vagina, the portio vaginalis, there is a covering of squamous epithelium. This is present in several layers, and covers the portio vaginalis right up to the external os. It has all the appearance of the surface epithelium of the vagina. On this surface of the cervix there are no glands, but often little bodies like seeds of pearl barley shining through the epithelium are seen. These are little retention cysts from the canal glands, which have become swollen up and are termed ovula Nobothi.

A description of the uterus would not be complete without a passing reference to the features of *the organ at different ages.* In the infant the cervical portion is very

much longer than the corporeal; also the mucous membrane possesses no glands. As age advances and puberty approaches the glands develop as little depressions in the surface, and cilia appear on the surface epithelium. The cervix increases slightly in length, but the body steadily grows, until it comes to be about $\frac{3}{5}$ of the whole organ. After the menopause, changes again occur, and the organ gradually atrophies. The mucous membrane becomes very much thinner and more fibrous, and the glands, so numerous in the active reproductive life of the individual, gradually disappear. They are seen running obliquely through the atrophied membrane.

*Ligaments.* There only remains to say a word or two regarding the position of the uterus and its supports. The cervix, as we have seen, is firmly attached all round to the vagina and on its anterior wall to the bladder, but besides these supports, there are certain ligaments that have to be considered. In front there are the utero-vesical behind the utero-sacral, and at the sides the broad and round ligaments.

*The utero-vesical ligaments* are simply the folds of peritoneum passing from the uterus to the bladder. They give little support to the organ.

*The utero-sacral ligaments*, on the other hand, are of the greatest importance in supporting the uterus. They are folds of peritoneum in which are continued fibrous and muscular tissue. Coming off the sides of the uterus, just above the isthmus, they run backwards, embrace the rectum in their course, and are inserted into the 2nd and 3rd sacral vertebrae. They form the upper lateral boundaries of the pouch of Douglas.

*Ligamenta lata or Broad ligaments* are two sheets of peritoneum which, after forming the anterior and posterior covering of the uterus, come into apposition and extend from the sides of that organ to the upper part of the floor and lateral walls of the pelvis. Along their upper and internal borders the two layers are closely applied to one another, but at their bases and outer borders they are separated. The upper part of each ligament envelopes the Fallopian tube and is termed the meso-salpinx, while the part beyond the fimbriated end of the tube is called the infundibulo pelvic ligament. Between the folds of the ligament, Fallopian tube, round and ovarian ligaments, parovarium or organ of Rosenmüller and numerous blood-vessels and lymphatics are found, these are supported by a loose fibrous tissue in which a few muscular fibres are to be found. At the lowermost part of each ligament also are to be found the ureters as they make for the bladder past the side of the cervix.

*Round Ligaments* are two flat cord-like bundles of fibres, of about 5 in. in length, attached in front and a little below the Fallopian tubes. Their general course is upwards, forwards, and outwards between the broad ligaments, the anterior layers of which they raise into distinct ridges. They then make for the internal inguinal ring, pass along the canal, and become lost in the labia majora. Each ligament consists of fibrous and muscular bundles, blood-vessels, lymphatics, and nerves.

*Position of Uterus.* The normal position of the uterus is just about parallel to the horizon when the subject is in the erect posture. This position of the organ is, however, constantly changing with every respiration and movement of the body. These alterations, however, are but slight. The condition of all others that influences the position of the uterus is the amount of distension of the bladder. Whenever the bladder becomes filled the uterus is straightened and displaced upwards and backwards, but returns to its former position whenever the viscus is emptied. Distension of the rectum with faeces also to some extent displaces the uterus in an upward and forward direction.

*Fallopian Tubes.* These are two tubes running from the upper angles of the uterus along the free border of the broad ligaments. They are about 4–4½ in. in length. The great part of the tube is divided into "isthmus" and "ampulla." The latter, the ampulla, is the longer portion, being a little short of $\frac{3}{5}$rds of the whole; it is also

softer, less resistant, possesses a much wider lumen. The small portion running through the uterine wall is termed the "interstitial" part (pars interstitialis). The tube communicates with the uterus by a very small opening—the ostium uterinum. The other end of the tube floats freely in the pelvic cavity, and its opening is called the ostium abdominale. The ampulla becomes constricted just before the opening of the ostium abdominale, and is surrounded by numerous finger-like processes termed fimbriae. This part surrounded by the fimbriae is called the "infundibulum" or pavilion, but more often simply the fimbriated extremity. One of the fimbriae larger that the other, and hollowed out into the form of a gutter, is attached to the outer margin of the ovary. Occasionally it does not quite reach the ovary. The direction of the tube is first of all horizontally outwards, it then passes upwards and backwards, and gradually curving round about the ovary is finally directed downwards, backwards, and inwards.

The tube is surrounded by the peritoneum of the broad ligament in its whole circumference, except for the infinitesimally small part on the under surface, where the two folds come together. The peritoneal covering ceases about the infundibulum. This relation of the peritoneum to the tube is of importance, as we shall see in connection with tubal pregnancy. The muscular coat contains a circular and longitudinal layer of muscular fibres, the latter, the external, is by no means very distinct. The mucous membrane is of considerable thickness. Its surface is covered by cylindrical ciliated epithelium. The depressions are so deep and numerous in the mucous membrane that on transverse section the latter presents all the appearance of having numerous glands. These are not glands. The stroma of the mucous membrane is made up of round and spindle cells and a number of fine fibres. The fimbriae are simply prolongations of mucous membrane with a few fibres of muscular and fibrous tissue. They are covered by ciliated epithelium, and the movement of the cilia is such as to establish a current towards the abdominal ostium.

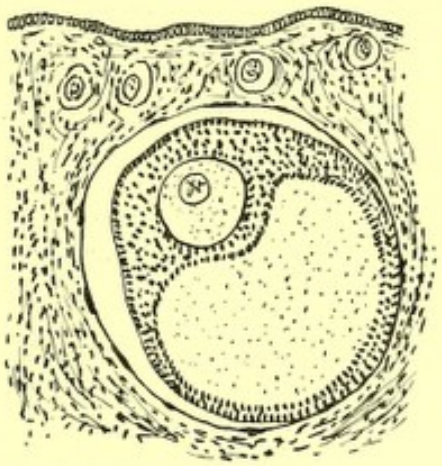
*Ovaries.* The ovaries are two almond-shaped bodies attached obliquely to the posterior layer of the broad ligament: this attachment being termed the mesovarium. At

their point of attachment, the hilum, the blood-vessels and numerous lymphatics enter. They measure on an average $1\frac{1}{2} \times \frac{3}{4} \times \frac{1}{2}$ in., and weigh about 80 grains.

In addition to the attachment to the broad ligament each gland is united to the uterus by the ovarian ligament and to the extremity of the tube by the ovarian fimbria. The *ovarian ligament* is a band of fibro-muscular tissue running from the corner of the uterus immediately below the Fallopian tube to the inner part of the gland. The *ovarian fimbria* is a specially long grooved fimbria, not however always present, which extends to the outer margin of the ovary.

The ovaries are placed at the sides of the pelvis often in a depression termed the fossa ovarica, a little below the level of and behind the fundus. Considering, however, their attachment, it is not to be wondered at that their situation is by no means constant.

The ovary consists of a fine fibro-cellular stroma, embedded in which are the terminations of numerous blood-vessels, nerves, lymphatics, and, most important of all, the Graafian follicles.



On making a longitudinal section of the ovary one sees that the stroma may be divided into a cortical and a medullary portion. The medullary portion, which contains no Graafian follicles, is smaller than the cortical, and consists of loose connective tissue, with a considerable amount of non-striated muscular tissue. It is very vascular, and contains groups of polyhedral cells, the remains of the Wolffian body. The cortical portion consists of a stroma of connective tissue, with Graafian follicles embedded in it. The most external part of the cortical stroma, which presents the appearance of a separate layer, is termed sometimes the tunica albuginea. Outside of everything, and covering the gland right up to the hilum, is a layer of cubical epithelial cells, the germinal epithelium, so that the ovary does not lie embedded, but is attached to the broad ligament.

The Graafian follicles are found to consist of a limiting membrane made up of two layers, an external tunica fibrosa, and an internal "tunica propria," richly supplied with blood-vessels. On the inside of these limiting membranes, which cannot be very distinctly separated, is a lining of several layers of columnar epithelium, termed the "membrana granulosa." At one point of the "membrana granulosa" the epithelial cells are grouped together, and constitute what is known as the "discus proligerus," which in its centre contains the female cell or ovum. Filling up the space not occupied by the discus is the clear fluid called the "liquor folliculi," the quantity of which really determines the size of the follicle. The Graafian follicles just described vary greatly in size.

Briefly, the history of the development of a follicle seems to be as follows: Early in foetal life processes or "egg-tubes" project from the germinal epithelium. Portions

of these get cut off and form little nests or clumps of epithelial cells, and from these the greater part of the Graafian follicles arise. The surrounding stroma forms the outer layer of the follicles. There are no follicles formed after birth. The number of follicles formed in each ovary is enormous; it is calculated that each ovary at birth contains 80,000. Few, however, reach maturity, for, as a rule, only one follicle ruptures at each ovulation, which usually corresponds to a menstrual period. Thus only about 400 follicles rupture in a woman's lifetime.

## ARTERIAL, VENOUS, NERVOUS, AND LYMPHATIC SUPPLY OF THE REPRODUCTIVE ORGANS.

*Arterial Supply.* The uterus is supplied by the ovarian and uterine arteries and a small branch from the vessels which run along the round ligament. The ovarian artery, which takes its origin from the aorta, passes down to the lateral wall of the pelvis, then along the upper border between the layers of the broad ligament to the corner of the uterus, where it turns at right angles and runs down the side of the uterus to anastomose with the uterine. In its course it gives off branches to the ovary and tube. The uterine artery, which is derived from the anterior division of the internal iliac, passes along the base of the broad ligament towards the cervix, where it turns upwards at right angles and runs along the side of the uterus and anastomoses with the ovarian. Some branches anastomose with the vaginal branch of the internal iliac, the latter of which supplies the vagina, except in its lowermost part, where terminal branches of the internal pudic take up part of the blood supply. The external generative organs are supplied by branches of the internal and external pudics. The arteries of the two sides communicate very freely. Both outside and in their course through the uterine wall the arterial vessels run a very tortuous course. They end in capillaries situated in the deeper parts of the mucous membrane.

*Venous Supply.* The venous supply is also very abundant. The different branches correspond in the main to the arterial. At certain parts they are especially abundant, and form plexuses. The more important of these are found round the entrance and lower part of the vagina and at the sides of the uterus and the hilum of the ovary (Pampiniform Plexus).

*N.B.*—The ovarian vein on the right side opens into the vena cava, on the left into the renal. This arrangement is the reason why congestion of the left ovary is more common than congestion of the right.

*Nerve Supply.* The nerves of the reproductive organs are derived both from the spinal and sympathetic systems. Thus the uterus and upper part of the vagina are supplied with branches from the second, third, and fourth sacrals, and from the hypogastric and ovarian plexus, while the lowermost part of the vagina and external organs of generation are supplied by the external pudics. To the side of and behind the cervix is situated the cervical ganglion, from which and to which numerous nerve fibres run. Although there are both spinal and sympathetic fibres to the uterus and vagina, parturition is not directly controlled by the former, for it goes on much as usual, even when there is complete paraplegia. This will be discussed more fully when speaking of the mechanism of labour.

*Lymphatic Supply.* These take their origin amongst the cells of the mucous membrane and are very numerous. They unite into a few large vessels, which pass mainly to various glands in the lowermost part of the posterior wall of the abdomen and pelvis (mostly between the iliacs and in front of aorta). A few vessels pass

along the round ligament to the inguinal glands, to which glands also the lymphatics of the lower part of the vagina go.

*Bladder* when empty lies within the true pelvis immediately behind the symphysis pubis. In that state it is generally figured in vertical section as being Y-shaped, the upper wall being folded in between the anterior and posterior walls. Sometimes, however, the two walls are found in apposition. Its anterior wall is connected loosely by fibrous tissue to the posterior surface of the symphysis pubis and rami of the pubes and ischium. Its base and lower part are closely adherent to the supra-vaginal portion of cervix and vagina. Its adhesion to the latter is intimate, but to the former very loose, so that the bladder may readily be stripped off that portion of uterus. As the organ distends it gradually rises out of the pelvis, and becomes globular in shape. In so doing it raises the peritoneum before it. When much distended it may be felt as a round swelling above the symphysis pubis. Such a condition has, times without number, been mistaken for a tumour. If, however, one makes it a rule always to empty the bladder before examining any abdominal swelling, such a mistake will never occur.

*The Urethra* measures about 1½ in. and is almost vertical, being slightly concave with the concavity forwards. It is closely incorporated with the anterior vaginal wall. The canal is very dilatable. Being very short, infective organisms readily gain entrance, and so cystitis is not uncommon.

*Ureters.* The position of the ureters deserves most careful attention, for, situated as they are, close to the uterus, they are very readily pressed upon by the distended or displaced organ, while in operations upon the uterus such as hysterectomy the ureters may readily be injured. The ureters at first lie over the psoas muscles behind the peritoneum. They then cross the common or internal iliacs and enter the true pelvis just external to the sacro-iliac synchondrosis. From there they curve round and pass between the layers of the lower part of the broad ligament, past the sides of the cervix and along the anterior wall of vagina, to enter the bladder at the level of the junction of the middle and upper third of the vagina. They lie about ⅜ in. from sides of cervix.

*Rectum.* The general direction of the rectum is downwards, backwards, and inwards from the left sacro-iliac synchondrosis to the anus The upper third is completely invested by peritoneum which forms the meso-rectum, while the lower two-thirds is loosely connected with the posterior wall of the vagina. Distension of the rectum with foetal matter causes a slight displacement of the uterus upwards and forwards, and it may interfere with the engagement and descent of the child.

*The Mammary Glands.* The mammae or breasts exist in both sexes, but in adult life only in a rudimentary form in the male. In infancy the differences in the breasts in the two sexes is not so marked, and indeed in infants, both male and female, engorgement of the breasts is not very uncommon.

Their size and weight varies greatly in different individuals. Before puberty they are small, but they enlarge considerably as the reproductive organs become more fully developed. During, and still more so after pregnancy, they become much enlarged; as old age comes on they atrophy along with the other reproductive organs.

The glands are situated over the large pectoral muscles in the form of two large hemispherical eminences. Transversely they extend from the sternum to the axillary line, and longitudinally from the third to the sixth or seventh ribs. Their bases are circular and concave, and separated from the underlying muscles by a layer of fibrous tissue. Just below the centre of the outer convex surface is the nipple, a conical eminence of about half an inch in diameter, and of a darker hue than that of the skin. Surrounding the nipple is an areola. The hue of the nipple and areola

varies greatly with the complexion of the individual. In the virgin state, however, it is generally a lighter or darker pink. Very early in pregnancy, as we shall see, this tint becomes much darker, especially in brunettes.

The mammary gland is a compound gland made up of numerous vesicles which are united together to form lobules, and these again form lobes from each of which there is a secretary duct called galactoferous duct. A large quantity of adipose, fibrous and fibro-elastic tissue surrounds the glands, from which processes are sent into its interior, dividing it up into the lobes mentioned. In the nipple and areola there is no fat. The galactoferous ducts, about twenty in number, converge towards the areola, where they become dilated somewhat and form small reservoirs for the milk. In the nipple the ducts are more constricted, run parallel to one another, and open by numerous small orifices on its summit.

The nipple is composed of bundles of muscular and fibrous tissue traversed by the ducts. Its surface is much wrinkled, and is covered with numerous papillae, which are highly sensitive. On the surface of the areola are many projections, often spoken of as Montgomery's glands. They become much enlarged during pregnancy. Supernumerary mammae are sometimes present; they are usually situated on the chest and towards the axilla.

# THE PHYSIOLOGY OF THE FEMALE GENERATIVE ORGANS.

THE generative organs, as regards reproduction at least, are active only during a certain period of the individual's existence. In women, roughly speaking, the period lasts for thirty years, and extends from the time of onset or "puberty" until the time of the disappearance of the function the "menopause." Observe I have said active as regards reproduction, because it must never be forgotten that they perform other functions. Thus their absence is usually associated with mental weakness, and their removal has occasionally resulted in most serious mental and nervous disturbances. Again, in osteomalacia, as Fehling first pointed out, the disease may be cured by removal of the ovaries. It is now admitted by all that there is an internal secretion from the ovaries.

In form, in general character, and in manners the girl becomes altered at puberty. The figure becomes fuller, the breasts more developed, the pelvis more capacious. The uterus, too, becomes gradually altered in shape, the ovaries become larger, and the Graafian follicles begin to mature and rupture.

Sexual maturity, in addition to the general characteristics described, manifests itself by the two processes of "menstruation" and "ovulation." First consider these processes separately and then the relationship they bear to each other.

1. *Menstruation* is the periodic discharge of blood from the uterus normally occurring in every healthy well-developed woman from puberty until the menopause, except on the supervention of pregnancy or lactation, when the process is usually suppressed. These periodic sanguineous discharges are spoken of as the "menses," "monthlies," "periods," etc.

The onset of menstruation in healthy, well-developed subjects commences with puberty. The first two or three menstrual periods may be a little irregular in regard to the duration and the intervals between their occurrences. That irregularity soon disappears. This time of puberty is a particularly trying one, and disorders of the digestion, of the nervous system, and of the blood are frequent.

In this country the average age for the process to become established is the fifteenth year. It is quite compatible with perfect health that it should first occur in the twelfth or thirteenth year, or be delayed until the eighteenth or nineteenth. Menstruation occurring unusually early (precocious menstruation) is very rare. I have never seen it before the ninth year. A sanguineous discharge from infants five to six days after birth is not uncommon, but it is not proper menstruation and does not come on again. Late or delayed menstruation is usually found associated with a defective development of the uterus or ovaries or both.

Many circumstances influence the onset of menstruation. The most important of these are climate, race, environment, heredity, general health, and the condition of the uterus. In warm climates, and with the more southern races, menstruation is earlier. Residence in cities, early sexual excitement and luxurious surroundings favour an early onset.

*The intervals between the periods*, viz., from the commencement of one period to the commencement of the next, varies. With some it is 21 days, with others 28,

30, or even occasionally longer. These periodicities are sometimes referred to as "menstrual types." Thus we speak of the 21, 28, or the 30 day "type," and so on. Of all these types the 28 day one is the most common. In some few cases the type is an irregular one, 21 days alternating with 28 days, or there may be other variations. Each woman in health has a type of her own, any departure from which points to some pathological condition more or less serious.

*The quantity of the discharge and the duration of the periods* are also very variable. As regards the quantity of blood lost, if more than 10 or less than 2 ozs. be lost, the condition may be considered abnormal. As regards the duration of the periods four or five days is about the average. If it continues for more than six or less than two days, there is generally some local or general disturbance present.

*Three Stages of a Menstrual Period.* (1) The stage of invasion, usually lasting some hours, sometimes a couple of days, and marked by a feeling of congestion in the pelvis, and possibly a slight discharge of mucus tinged with blood; (2) a stage of persistence, when the discharge consists of bright blood; (3) a stage of decline, when the discharge becomes gradually paler. A leucorrheal discharge, continuing for a day or two after menstruation, is a common occurrence.

The local changes may be summed up by saying that all the pelvic organs become more or less congested—tubes, ovaries, uterus, etc. The breasts, too, become full and turgid. But of special interest is the condition of the mucous membrane of the uterus at these times. Very varied have been the statements regarding these changes. At present the teaching of the most competent observers is that as the menstrual period approaches the uterus becomes congested, more especially the superficial part of the mucous membrane. The capillaries become dilated, and blood is effused into the inter-glandular tissue partly from transudation and partly from rupture of the vessel walls. The effused blood percolates into the uterine cavity, carrying with it a varying portion of the epithelial lining and superficial parts of the mucous membrane. The denuded portions of the surface as the period passes off become repaired from the epithelium left on the surface and from that which lines the glands. By this means in some five days after each menstruation the epithelial covering is again entire and unbroken. Microscopically, menstrual blood is found to consist of blood, mucus, and epithelial debris. The blood is in no way different from other blood. The odour is due to its retention in the passage, and its non-coagulability when present to mixture with mucus.

Most women at each menstrual period suffer from certain discomforts, chiefly derangements of the nervous and digestive system, such as headaches, loss of appetite, lassitude, etc. Sometimes these are very slight indeed, but very rarely are they altogether absent. That there is a general disturbance at each menstrual period is further evidenced by the fact that the pulse and temperature of the individual show a slight rise during the period of congestion, with a corresponding gradual fall as the discharge subsides and disappears. It has also been observed that the blood pressure is raised before onset of flow and lowered after.

The time of the disappearance of the menstrual function is termed the menopause "Climacteric," or popularly the "change of life." But rarely does it occur suddenly, usually the duration of the periods and the intervals between them become more irregular until the process gradually ceases altogether. The age at which the menopause occurs is very different. In about 50 % of women it occurs between the ages of 45 and 50. In 25 % between 40 and 45, and in 12 % between 35 and 40, and 50 and 55 years. In is very rare indeed to find a woman in health menstruating after 55 or ceasing to do so before 35. The menopause as a rule, occurs later in married than in single women, in those who have borne children, and when the onset of the process is early.

After the menopause the uterus becomes smaller, the muscular being largely replaced by fibrous tissue. The vaginal portion of the cervix becomes much shrunken,

so that as age advances it becomes less and less prominent. The vaginal walls become lax, and the length of the canal is diminished. Fibrous bands form in the vaginal vaults. The external organs of reproduction and the mammae become atrophied. Then, too, disturbances of the various systems are common, and especially does the nervous system seem liable to become affected. Flushings, feelings of heat and cold, faintings, etc., are frequently complained of. There generally occurs an increase in the quantity of fat present in the tissues. Hair frequently appears on the face. After a longer or shorter time all these local and general disturbances disappear and the general health and bodily vigour improve.

2. *Ovulation.* By ovulation is meant the maturing and rupturing of Graafian follicles. This important process, like that of menstruation, continues during the reproductive life of the individual except in the event of pregnancy and lactation, when, as a rule, it remains in abeyance. When considering the anatomy of the ovary we saw how the Graafian follicles develop, and I told you then that no further formation of follicles occurred after birth.

Now, how does *this maturing and rupturing occur*? It is believed, for the process has never been witnessed, that as puberty approaches a certain number of the follicles become larger and migrate towards the centre of the ovary. Later on from time to time one of them proceeds towards the surface, and becomes more vascular and still further enlarged from an increase in the quantity of the liquor folliculi. As the follicles reach the surface they form round, smooth projections. The most mature, the one that is about to rupture, becomes more vascular than the others from a development of blood-vessels in the tunica propria. Gradually the follicle becomes more and more distended and the projecting part of the wall more and more thinned out until it finally gives way, and the ovum is shed surrounded by a portion of the "discus proligerus." The wall gives way from the gradual thinning, and the degeneration that necessarily ensues in it from the pressure of the contained fluid. The rupture, however, is brought about in all probability by the congestion occurring at the menstrual period, although other causes of an accidental nature may hasten it, such as blows, falls, straining at stool, or lifting heavy weights, etc.

After the rupture and shedding of the ovum blood is effused into the follicle. This body is called a *corpus luteum* because of the yellow appearance of the cells of the surrounding stroma. The colour is due to the presence of lutein cells. The lutein cells are large many-sided cells, with a small nucleus which stains badly. The altered stroma with the abundant lutein cells gets arranged in the form of festoons, and into the loops of these the ordinary connective stroma projects. These processes of connective tissue project further and further towards the centre of the clot. Finally all that is left is a star-shaped body consisting of processes of connective tissue, and called a "corpus fibrosum." It takes about three months for these changes to occur. Finally a small pit or cicatrix marks the spot on the surface of the ovary where the follicle ruptured. A corpus luteum, such as I have described, is sometimes spoken of as a "false corpus luteum" or a "corpus luteum of menstruation." Neither term is altogether satisfactory.

But should pregnancy occur more extensive changes take place, owing to the hyperaemia of the ovary during pregnancy, and then develops what is termed the "true" or "corpus luteum of pregnancy." It then takes twelve months for the corpus luteum to pass through its different phases. About the third month of pregnancy it is usually about its height, when it forms a pointed vascular prominence on the surface of the ovary, and averages about half an inch in diameter. The changes that take place are just the same as those that occur in the corpus luteum of menstruation, only more distinct and on a larger scale.

The corpus luteum, even one presenting the appearance of that of pregnancy, has no medico-legal value as an evidence of pregnancy, for in certain diseases of the

reproductive organs an unusually large corpus luteum may be found at the time of operation.

*The Connection between the two Processes.* The most important theory of the relationship of the two processes is the one propounded by Pflüger in 1865. It is known as the "Ovulation Theory." It is to the effect that the ripening follicle sets up an irritation in the ovary, but only when the irritation has reached a certain height is it sufficient to cause marked congestion of the uterus and menstruation. For many years this seemed a satisfactory enough explanation, but the cases of pregnancy occurring prior to the establishment of menstruation, or while menstruation was suppressed, as during lactation, weakened the theory. A little later it was still further shaken by the investigations of Leopold and others upon ovaries removed at or about the time of menstruation, for they found that in a considerable number of cases the age of the corpus luteum did not correspond to the date of the menstruation. Again, it has frequently been remarked that menstruation does not always cease after the removal of both ovaries. As a result of these two last observations there followed a period when the close connection between ovulation and menstruation was questioned and the ovulation part was dismissed, and writers began to speculate just as they had done before on the cause of menstruation and its periodicity. Some said the process of menstruation is not controlled by the ovaries but by nerve centres in the cord, or by ganglian along the course of the Fallopian tubes. Others again suggested that the periodic variations in the metabolic processes evidenced by rise of temperature, pulse, and excretion of urea was the cause (Cyclical Theory). While Geddes and Thomson went further and practically returned again to the oldest theory of the ancients, that the process is a periodic discharge by the organism of substances not required.

Let us consider what we know about the two processes, and let us discuss the matter under the two following heads.

1. *Ovulation without Menstruation.* That ovulation may occur without menstruation is evidenced by the following facts:

(*a*) Pregnancy has occurred in cases before menstruation has become established, after the menopause, and during lactation when menstruation has been suppressed. (*b*) Ovulation has been proved to occur in certain cases where, while the ovaries were well developed, the uterus was infantile or absent. (Had a case of this nature.)

2. *Menstruation without ovulation.* It is claimed that menstruation may occur without ovulation for the two following reasons: (*a*) After removal of the ovaries menstruation sometimes continues. There are cases on record where this is reported to have occurred. They are very rare, however, and it must always be remembered that a portion of ovarian tissue, and a very little is all that is required, may have been left behind, or that a supernumerary ovary was present. Supernumerary ovaries have been found, but their presence is probably not so often the cause as a small residue of ovarian tissue. All authorities are now agreed that without ovarian tissue menstruation is impossible. (*b*) In ovaries removed at or shortly after menstruation, either in the operating theatre or in the post-mortem room, corpora lutea have sometimes not been found, or if found have not corresponded in point of age to the date of menstruation. Now this has been distinctly proved by Leopold and others, although it must be remembered that in his more recent investigations Leopold found that ovulation and menstruation correspond more closely than he believed was the case when he made his earlier contributions to this subject.

Strassman, by injecting gelatine into the ovaries of some of the lower animals, has produced a sanguineous vaginal discharge—an artificial menstruation. Also, after removal of the ovaries for tumours or any other cause it is very common to get a sanguineous discharge from the uterus a few days after the operation. Are these two facts not further evidence of the control the ovaries exercise over menstruation. But

even although we admit that ovarian tissue is essential to menstruation are we any nearer the reason of the monthly periodicity of the process? Certainly not, that remains a mystery, and as well may we ask why the cardiac pulsations are 60–70 per minute, or the respiration 18 per minute. Periodicity in nature is quite beyond the bounds of legitimate speculation.

I therefore support the "Ovulation Theory" of Pflüger with slight reservations. I believe that from the ovaries comes the stimulation that sets up the congestion in the pelvis generally, and in the uterus and ovaries more particularly. Whether the Graafian follicles rupture exactly at the time of menstruation is I believe largely a matter of accident, for when a follicle is ready to rupture a sudden jerk, a straining effort is quite sufficient to cause it to give way.

# CHANGES IN THE MATERNAL ORGANISM.

## THE RESULT OF PREGNANCY.

WHOLE organism is affected by pregnancy, owing to disturbance of mental, physical, chemical, conditions. Shall consider each system separately.

*Reproductive System.* Chief alterations occur in uterus.

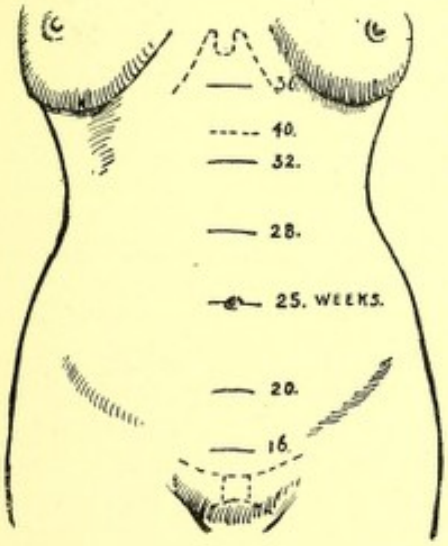
| | Length. | Width. | Depth. |
|---|---|---|---|
| Non-gravid uterus | 3 | 2 | 1 |
| Uterus at end of ninth month | 13 | 9 | 8 |

Weight—non-gravid, 1½ oz.; full time, 24 oz.

*Body.* *Muscle fibres* greatly increased; fifty times longer and three times broader. Certain amount of hyperplasia as well. Three layers of muscle fibres—*Outer*, transverse and longitudinal; *Middle*, thickest, forms net-work round vessels. *Inner*, circular—specially round orifice of os internum and Fallopian tubes. Uterine wall first thickens, then with distension becomes thinner. At term fully ½ in. in thickness.

*Connective tissue*—increased and fluid in its interstices, much greater, consequently uterus feels soft. It hardens from time to time when it contracts. These alternate contractions and relaxations (1) help circulation of blood; (2) maintain foetus in longitudinal lie; and (3) are an aid to diagnosis of pregnancy.

*Shape* becomes altered; from being pear-shaped becomes more rounded, then in last few months returns to ovoid shape again. Great development of fundus (part of uterine body above insertion of tubes) in later months evidenced by situation of tubes at level of umbilicus. Lower uterus segment also developes in later months, but more in labour. *Position*—at first increased anteflexion due to increase in weight of body and softening of lower part of body (Hegar's sign). Supposed to sink in pelvis and so cause flattening of abdomen in first two months. Fundus can be felt above pelvic brim at end of third calendar month; a little above umbilicus at end of sixth month and on level of ensiform cartilage at end of ninth month. During last weeks uterus again sinks down (lightening). Uterus is dextro-verted in about 80 per cent. of cases. It is also slightly twisted to the right round its own axis so that the anterior surface looks to the right. About the end of fourth month uterus



is in contact with anterior abdominal wall. At term whole anterior surface is directly applied to abdominal wall, no intestines intervene; at lowermost part bladder intervenes. Posterior wall rests against the iliac vessels, vena cava, ureters, psoas muscles, promontory of sacrum, lower two lumbar vertebrae. About middle of lumbar vertebrae separated from vertebral column by coils of intestines (to some extent this varies with firmness of abdominal walls). Distended organ rests on brim of true pelvis and is surrounded by large intestine.

*Position of upper margin of Fundus at end of each lunar month.*

End of 3rd month (12th week) Finger's breadth above symphysis pubis.
„ 4th „ (16th „ ) Four fingers' breadth above symphysis pubis.
„ 5th „ (20th „ ) At umbilicus.
„ 6th „ (24th „ ) Finger's breadth above umbilicus.
„ 7th „ (28th „ ) Three fingers' breadth above umbilicus.
„ 8th „ (32nd „ ) Midway between umbilicus and zyphoid.
„ 9th „ (36th „ ) At zyphoid cartilage.
„ 10th „ (40th „ ) Sinks down (lightening).

Only approximately correct—varies with amount of liquor amnii, number of foetuses, position of foetus, size of pelvis (deformed pelvis abdomen more distended). Calculation of age of pregnancy from above uncertain.

*Mucous Membranes* altered into Decidua (p. 28).

*Peritoneum*, slightly thickened at first, becomes stretched and scarred and after delivery wrinkled.

*Arteries, Veins, Nerves, Lymphatics.* *Arteries* become markedly enlarged, thickened, and more tortuous. *Veins* become enormously dilated; large sinuses formed in uterine wall, which are closed by contractions of muscular fibres. *Nerves* increase in size, and especially the cervical ganglion. Uterus more easily excited to contractions during pregnancy. Contractions controlled by ganglia. *Lymphatics* greatly enlarged and increased fluid in interstices of uterine wall—favours absorption of septic material.

*Cervix.* Slight hypertrophy, consistency markedly changed; it becomes very soft and can hardly be distinguished from soft vaginal wall (important sign of pregnancy). No alteration in length of cervix, only apparent shortening due to widening out of lower part of uterus. Cervix is closed by plug of mucus during pregnancy, called the "operculum" (preventive against entrance of micro-organisms). Exact position of cervix is slightly altered with alteration in position of growing body.

*Lower Uterine Segment.* Great discussion whether part of body or part of cervix. It is bounded above by Retraction or Bandl's ring, and below by internal os. This portion plays passive rôle in labour. It is quite distinct from the sixth month of pregnancy, but only becomes markedly developed during a protracted labour. (Specially interesting in connection with Rupture of the uterus.)

*Vagina and Vulva.* Increased vascularity. Parts become soft and swollen. Rugae much thickened. Pulsation in enlarged arteries (vaginal pulse). Colour becomes port wine shade. In external genitalia similar changes. Veins often become varicose.

*Fallopian Tubes and Ovaries.* Tubes become congested and lengthened, sometimes slight alterations of connective tissue cells into decidua-like cells. Ovaries enlarged and congested. Corpus luteum much larger—longer life-history. Ovulation usually suppressed. At term the ovaries are situated close to the uterus about level of umbilicus.

*Ligaments and Joints.* All ligaments affected. Round, enlarged, and lengthened, and can be easily palpated passing down side of uterus about level of umbilicus; left specially easily felt, owing to uterus being twisted to right. Slight alteration in joints, cartilages softer and greater. Mobility at sacro-iliac joint; questionable if any at pubes.

*Mammae.* First change, darting shooting pains, as early as second week sometimes. Tenderness, fulness, and vascularity increased. Very characteristic changes in areola and nipple, especially in prima-gravidae. Areola larger, darker, more oedematous-looking, and moist. Montgomery's glands on surface more distinct. By third month secretion can be expressed from gland. Large veins appear on surface, breast feels full, tender, and throbbing, often knotty from accumulation of secretion. Secondary areola, a tinted area outside true areola, developes about sixth month. Not constant this second areola; indeed, it is only distinct in women of dark complexion.

*Changes in the Abdominal Wall.* Said to be a flattening of hypogastrium in second month. Very doubtful, for soon there occurs progressive increasing distension.

*Striae Gravidarum.* Red at first, white later (often seen on the breasts also), caused by stretching and laceration of the cutis vera. Not peculiar to pregnancy; any distension of abdomen may cause them. *Distension of abdomen* and shape varies with uterine contents and strength of abdominal wall. If abdominal wall feeble, may have extreme separation of recti muscles; have seen uterus project between them. *Umbilicus* becomes everted. *Pigmentation* specially marked in linea alba, which becomes linea nigra in women of dark complexion.

*Alteration in Carriage of Pregnant Women.* Owing to distension and increased weight in front, pregnant women throw shoulders back, and appear to be exaggerating prominence of abdomen.

*Urinary System.* Most important changes frequently occur in this system. *Kidney* very frequently congested and "cloudy swelling" of epithelium of tubules (see under Eclampsia). *Ureters* pressed upon, especially the right, because of flexion of uterus to right,—may become dilated. *Bladder* congested and specially pressed upon during early and late months, hence increased frequency of micturition at these times. Difficulty in passing urine in early months; always suspect displacement of uterus backwards. *Urine* increased in quantity from increased metabolism and heightened arterial tension. Albumen in small quantity found in 10 per cent. of cases. Lactose often found.

*Digestive System.* Digestive system disturbed in 80 per cent. of cases. Hyperacidity due to increased secretion of hydrochloric acid. Earlier symptoms—usually sickness, and especially in the morning. Morning sickness of pregnancy usually begins towards end of first month; have seen it by tenth day of pregnancy. Gradually gets less during third month and passes off by end of third month. Its severity varies; only about 20 per cent. of women escape. Other digestive disturbances are heart-burn, flatulence, pyrosis, constipation.

*Vascular System.* *Heart* increased slightly in size and weight, especially left ventricle. Softening of heart-sounds, and not infrequently slight murmur over mitral and pulmonic areas. Nothing approaching proper condition of chlorosis occurs. Leucocytes increased (more marked in puerperium), red cells and fibrin also slightly increased; total quantity of blood increased. Thyroid gland and spleen become distinctly enlarged.

*Respiratory System.* In later months, until "lightening" occurs, difficulty in breathing often complained of. Frequency of respirations slightly increased. Capacity of lungs little altered in normal sized women, but if pelvis deformed, lung capacity being less, women very liable to bronchial catarrh. Quantity of carbon-dioxide eliminated is increased.

*Nervous System* often much disturbed. Neuralgias common, especially in face and teeth. Teeth often much destroyed. All the senses may be disturbed; temperament often altered, *e.g.*, abnormal likes and dislikes for articles of food; salivation; irritability of temper common.

Besides all these changes the body is increased in weight quite apart from foetus, placenta, etc. (impaired metabolism causes this). Pregnancy affects women very differently, some never so well as when pregnant, others unwell the whole time.

## SIGNS AND SYMPTOMS OF PREGNANCY.

*Arranged chronologically.*

| | |
|---|---|
| End 1st month. | Amenorrhoea.<br>Morning sickness.<br>Breast—darting pains, feeling of fulness. |
| „ 2nd month. | All the above, and in addition—<br>Changes in the areola of nipple.<br>Severe digestive disturbances.<br>Increased frequency of micturition.<br>Increased anteflexion. |
| „ 3rd month. | All the above, and in addition—<br>Secretion can be expressed from nipple.<br>Uterus just felt above symphysis pubis.<br>Vaginal discoloration.<br>Hegar's sign. |
| „ 4th month. | Size of uterus.<br>Softening of cervix.<br>Uterine souffle.<br>Ballottement.<br>Sickness has disappeared. |
| „ 5th month. | Signs already mentioned.<br>Size of uterus.<br>Foetal movements felt by physician.<br>„ „ „ by mother (quickening).<br>Foetal heart-sounds heard.<br>Appreciation of alternate contractions and relaxations of uterus. |
| „ 6th month. | Signs already mentioned.<br>Size of uterus.<br>Secondary areola in breast. |
| „ 7th month. | Signs already mentioned.<br>Size of uterus.<br>Striae of abdomen and breasts. |
| „ 8th month. | Signs already mentioned.<br>Size of uterus.<br>Foetal parts easily felt.<br>Funic souffle (very rare). |
| „ 9th month. | Signs already mentioned.<br>Size of uterus.<br>Ballottement cannot be felt.<br>General. |

End 10th month. Uterus sinks down (lightening).
Foetal head becomes fixed (if prima-gravida).
In last ten days premonitory symptoms of labour (p. 36).

## SIGNS AND SYMPTOMS: RELATIVE DIAGNOSTIC VALUE.

*Certain.*
1. Foetal heart-sounds.
2. Foetal movements felt by physician.
3. Ballottement.

*Uncertain.*
1. Breast changes in primipara.
2. Amenorrhoea.
3. Softening of cervix.
4. Alternate contractions and relaxations of uterus.
5. Vaginal discoloration.
6. Morning sickness.
7. Progressive enlargement of uterus.

## SIGNS AND SYMPTOMS CONSIDERED IN DETAIL.

Signs are divided into certain and uncertain, objective and subjective, etc. There are three signs, any one of which if present makes pregnancy a certainty.

*Three certain signs are*: (1) Foetal heart-sounds. (2) Foetal movements felt by physician. (3) Ballottement. All others uncertain.

*Foetal Heart-sounds* may be heard at end of fourth lunar month. Resemble tic-tac of watch under pillow. Average rate 130–140, slow down during uterine contractions. Rate slower in large and male, quicker in small and female children. Sounds very easily disturbed. Sound heard best over back of child. Difficult to hear if large quantity of liquor amnii and thick abdominal wall. Heard best below umbilicus in all Cranial and Transverse positions, and above umbilicus in breech presentations. From position of greatest intensity tell position of child to some extent, for where heard best there the back is situated.

(2) *Foetal Movements felt by Physician.* May feel and see movements (stirrage). Felt as early sometimes as end of fourth month. Movements felt by mother and called "quickening" do not make pregnancy a certainty; she may be deceived by flatulence, contractions of uterus, etc.

(3) *Ballottement* or repercussion is the sensation felt when the head is pushed away, and then slowly poises itself back on the fingers of obstetrician; carried out as follows: *Internal.* Place patient on back, and pass two fingers into anterior fornix of vagina; jerk foetus away, and child's presenting part will poise itself on fingers again. *External.* Place patient on side and one hand above and one below enlarged uterus, and "bob" child between them. Very valuable sign, for can be appreciated even if child is dead. Felt from fourth month until eighth, after that lost, unless excessive quantity of liquor amnii.

*Uncertain Signs. Amenorrhoea* uncertain, because menstruation may continue during early months before decidua-reflexa and decidua-vera become blended. Very rarely during whole of pregnancy. Besides, other conditions, such as anaemia, phthisis, etc., may be associated with amenorrhoea. Always of most value when previous menstruation has been absolutely normal.

*Breast Changes* have been already mentioned. (1) Darting, shooting pains as early as end of second week. (2) Alteration in areola—it becomes darker, especially in

brunettes, and larger, puffy, and moist. Glands of Montgomery become more distinct. (3) Secretion may be present from third month onwards. (4) Large, full, and throbbing later, knotty and large veins on surface. (5) Secondary areola from sixth month onwards. Symptoms always most characteristic in prima-gravida. In women who have borne children and have nursed, secretion remains for long time, and areola changes do not disappear entirely. Secretion may be present in breast in fibroid tumours, (I have never seen it in ovarian tumours,) and in cases of dysmenorrhoea, but in none of them are the changes in areola present.

*Morning Sickness.* Only an uncertain sign, for other conditions, such as endometritis, alcoholism, may be associated with it. Only in 20 per cent. not present. Specially valuable if associated with amenorrhoea and breast changes, for these are only signs available in first two months.

*Quickening.* Movements of foetus felt by mother about the seventeenth or eighteenth week; first felt often quite suddenly, causing much nervous disturbance. May be confused with flatulence, uterine contractions. Employed for calculating probable date of delivery.

*Changes in Uterus and Vagina and Abdomen.* Already fully detailed.

*Differential Diagnosis of Pregnancy.* Often extremely difficult, must be most careful in giving a definite opinion.

(1) *Pseudocyesis.* Spurious pregnancy. Specially liable to be encountered in women with no family and anxious to have child, and especially about the menopause, and not infrequently in those recently married, or unmarried, who have subjected themselves to the risk of impregnation. Slighter forms easily diagnosed, and patient easily convinced. In graver forms, accompanied by sickness, breast symptoms (not changes in areola), distension of abdomen, quickening (so described), patient may be very difficult to convince. Diagnosis is come to by—clear percussion note over distension, absence of foetal heart-sounds, absence of vaginal and uterine changes, and disappearance of distension under chloroform when a more complete bimanual examination of uterus is possible.

(2) *Haematometra.* Distension of uterus with blood from atresia of cervix (if associated with imperforated hymen, condition obvious). No changes in breast or cervix. Mistake only possible in early months.

(3) *Chronic Metritis.* Only in early months may be confused, especially in cases where a second pregnancy occurs soon after first, often can only be differentiated by policy of "wait and see."

(4) *Myoma.* No amenorrhoea, as a rule menorrhagia. No softening of cervix; absence of foetal movements, etc. Specially confusing if myoma associated with pregnancy.

(5) *Ovarian Tumour.* Not infrequently associated with amenorrhoea for one or two months. Consistency much the same, especially in parovarian tumours; indeed, they are very easily confused with hydramnios (excessive liquor amnii). In ovarian tumours consistency of cervix not altered, no breast changes. Absence of foetal heart sounds and movements, etc. Careful bimanual examination, if need be under anaesthesia, invariably clears up condition.

(6) *Ascitis.* Careful physical examination by percussion when patient's position changed, makes diagnosis obvious. But ascitis with malignant masses in abdomen may very closely simulate pregnancy. Careful bimanual examination makes matters clear.

(7) *Encysted Peritonitis.* History usually of some recent inflammatory affection. No change in uterus, but amenorrhoea may be present in cases of "super-involution" of uterus. In tubercular encysted peritonitis, may be more insidious in onset.

(8) *Tumour of other organs of abdomen* very occasionally may cause distension of abdomen similar to pregnancy. History and careful examination clear matters up.

At all stages these conditions may simulate pregnancy, but mistakes in diagnosis are usually made not from the obscurity of case, but from incomplete, hurried examination.

*Diagnosis that Woman has borne Child.* May be impossible, especially if child born very prematurely. If full-time child been born, cervix usually lacerated, vaginal walls smooth, fourchette usually torn and hymen gone, striae usually but not always present. Breasts generally heavy, and areola relatively dark. If she is again pregnant, must depend upon condition of cervix and vagina.

## DURATION OF PREGNANCY AND PREDICTION OF PROBABLE DATE OF DELIVERY.

The average duration of pregnancy is ten lunar months, forty weeks, or 280 days from the last menstrual period. Probably varies in different individuals. Certainly varies in lower animals. Great difficulty in determining duration of pregnancy because impossible to fix definitely its commencement (fertilization). The place where fertilization occurs is unknown, and its time of occurrence in regard to insemination is quite uncertain. All we can do is to calculate the age of a particular pregnancy from certain occurrences,—menstruation, insemination (rarely), quickening, etc. Most important for physician to tell how old a pregnancy is, and when probable date of delivery will likely occur; he, nurse, and patient wish to make arrangements.

## METHODS FOR CALCULATING AGE OF PREGNANCY AND PROBABLE DATE OF DELIVERY.

(1) *Most common method is from last menstrual period.* Menstruation and ovulation occurring so frequently about same time, fertilization occurs most frequently shortly after or shortly before a period.

Duncan found that the average number of days between last day of last menstrual period and date of delivery was 278 days. He found great variations, however, as much as 60 days more than that number. Taking 278 as the average, we have to add that number of days to last day of last menstrual period. Now, nine consecutive calendar months are equal to 275 days when February is not included and 273 when it is, consequently to get 278 days take nine months forward (or three months back, which is the same thing), and add three days if February is not included and five if it is. (A rough and ready method, and one generally employed, is to date three months back from the first day of the period, and add seven days.)

(2) *From Single Insemination.* Very rarely available. Duncan found duration from such date 275, and the greatest variation from that 30 days (just half the number of days of variation if menstrual period taken). When this date is available, calculation is easy.

(3) *From Date of Quickening.* Very uncertain; usually "quickening" occurs about seventeenth or eighteenth week, consequently add 23 weeks to date quickening experienced.

(4) *Height of Fundus.* Table already given; very uncertain.

(5) *Length of Uterus.* Table given very uncertain.

(6) *Length of Child.* Foetal ovoid in utero is half length of foetus; length of foetus at different months (see page 30). Measure length of ovoid with callipers and double it, and thus get length of foetus, from which conclude age of foetus (very uncertain).

(7) *From date of occurrence of early discomforts*, such as morning sickness, pains in breasts. When menstrual date not available, calculate by other methods and strike an average.

*Protraction of Pregnancy.* It would appear that pregnancy may sometimes be protracted. In such cases there often occurs an attempt at labour at the time expected. Matters quiet down, or the os may remain slightly dilated. The children are usually large, and are not infrequently born dead, partly because of their size and difficulty in delivering them, but also because the placenta has undergone extensive degeneration. Legitimacy can, of course, only be questioned if the child is born 300 or more days from the death of the father, or last proved intercourse.

*Examination of Pregnant and Parturient Woman.* Be most careful, mistakes so serious. Always follow certain routine. Every possible care taken against infection (p. 44).

(1) *History.* Ask few questions regarding general health, family history, etc. If multipara, enquire regarding previous pregnancy, labour, and puerperium. Then enquire into present condition, especially regarding early symptoms - menstruation, breasts, etc.

(2) *Examination.—Inspection.* Gait and appearance of patient, appearance of breasts, especially of areola, and extent and situation of abdominal swelling.

(3) *Palpation.—Breasts.* Milk can be expressed after third month. *Abdomen. Early months*: only bimanual examination of any value. Size, shape, degree of anteflexion of uterus, any softening of tissues between body and cervix (Hegar's sign). *Later months.* Degree of distension, height of fundus, alternate contractions and relaxations, foetal movements, ballottement. Distension varies with quantity of liq. amnii, size of child, foetus, number of foetuses, etc.

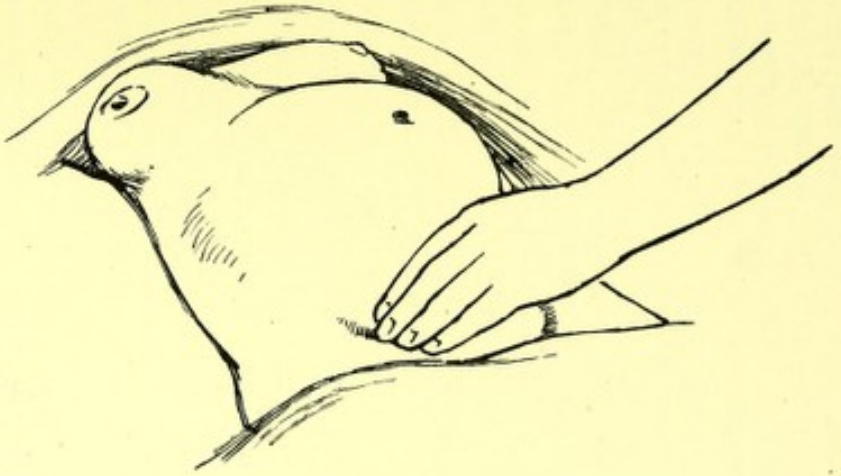
*Last weeks and early in Labour.* Palpation most valuable because: (1) Can determine presentation, position, and attitude of child. Size of foetal head; relative size of foetal head and maternal pelvis; fixation or mobility of head at brim. Can do all this at end of pregnancy and early in labour. (2) Limits number of vaginal examinations, and so lessens the risks of infection.

*Abdominal Palpation* (p. 26). Four "grips"—two for lower pole, one for upper, and one for each side. Two for lower pole: (1) *Grip for lower pole*—stand on patient's side, pass palmar surface of finger down each side into iliac fossae, and feel between two hands foetal part situated at pelvic brim, head round, hard and smooth, movable apart from trunk. (2) *Grip for lower pole*, known as Pawlick's grip—face patient, grasp presenting part between thumb and fingers. *Grip for upper pole*—stand facing patient, pass hands over fundus breech commonly felt there —round and softer, two prominences with a depression between; cannot be moved apart from trunk. *Grip for sides of uterus*—one hand over each side, keep one hand steady and feel what is underneath other hand. Smooth rounded curved surface,—the back running into the head, movable apart from trunk at one end, and the breech immovable apart from trunk at other end. On other side, irregular parts moving under hand—the limbs. Ease with which the examination is carried out varies greatly.

*To carry out palpation satisfactorily requires a great deal of practice.*

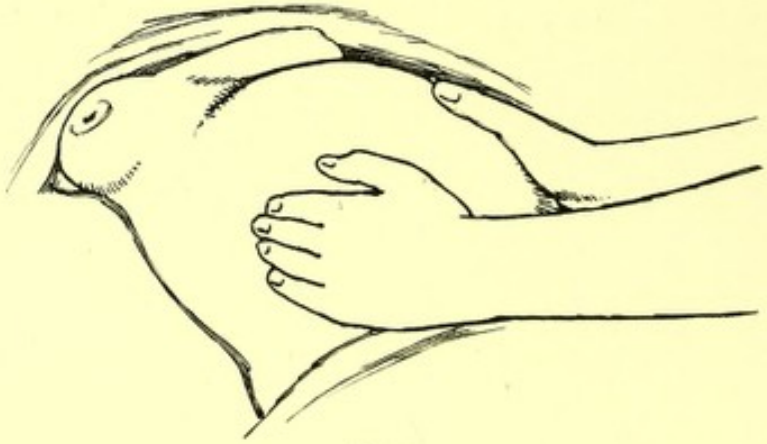
1. Patient must be on back and be quite comfortable.
2. Accoucheur must be quite comfortable, and his hands must be warm.
3. Must slide hand gently over abdomen, not suddenly raise them and place them down.

Grip 1.



Grip 2.

Grip 3.



Grip 4.

PALPATION OF POSITION OF FOETUS.

*Percussion* has very limited application, useful in differentiating distension of uterus from ascites, etc. As a rule absolute dulness over uterus (*physometra* gas in uterus, sometimes tympanitic note; very rare condition, found sometimes with macerated foetus when membranes have ruptured some days previously).

*Auscultation.* (1) *Foetal Heart.* Press uterus up to stethoscope. Often difficult to hear, especially in dorso-posterior positions, for sounds heard best over back of child. Mistakes occur only if mother's heart is beating very rapidly, say 120 per minute. Take note of strength and rate of foetal heart. During second stage should auscultate foetal heart every half hour to see how it is standing the strain of labour.

(2) *Uterine Souffle.* Blowing sound heard over large venous vessels to side of uterus; not placental, as was at one time thought.

(3) *Funic Souffle.* Blowing sound, heard very rarely indeed over cord, especially in case when twisted or pressed on.

(4) *Movements of Child.*

(5) Separation of placenta; dull "scrunching" sort of sound. } No importance.

(6) Irregular contractions, flatus gases from intra-uterine decomposition. }

*Vaginal Examination.* Great care in cleansing hands and cleansing vulva (p. 44). Two fingers usually employed; if canal very narrow, use one. Position of patient—Dorsal or left lateral; more accurate diagnosis if patient in dorsal decubitus. Two fingers in vagina and other hand over fundus to steady uterus. Size, shape, consistency, and position of body and cervix is determined. In early months increased size, globularity, and anteflexion most valuable signs. In later months ballottement, presentation, and position of child, state of cervix as regards dilatation. In all cases note condition of surrounding parts, and of vaginal canal as regards colour, secretion, etc., also condition of bony canal as regards size.

*Rectal Examination.* Very rarely required, but very useful in doubtful pelvic conditions. Gloved finger should be employed.

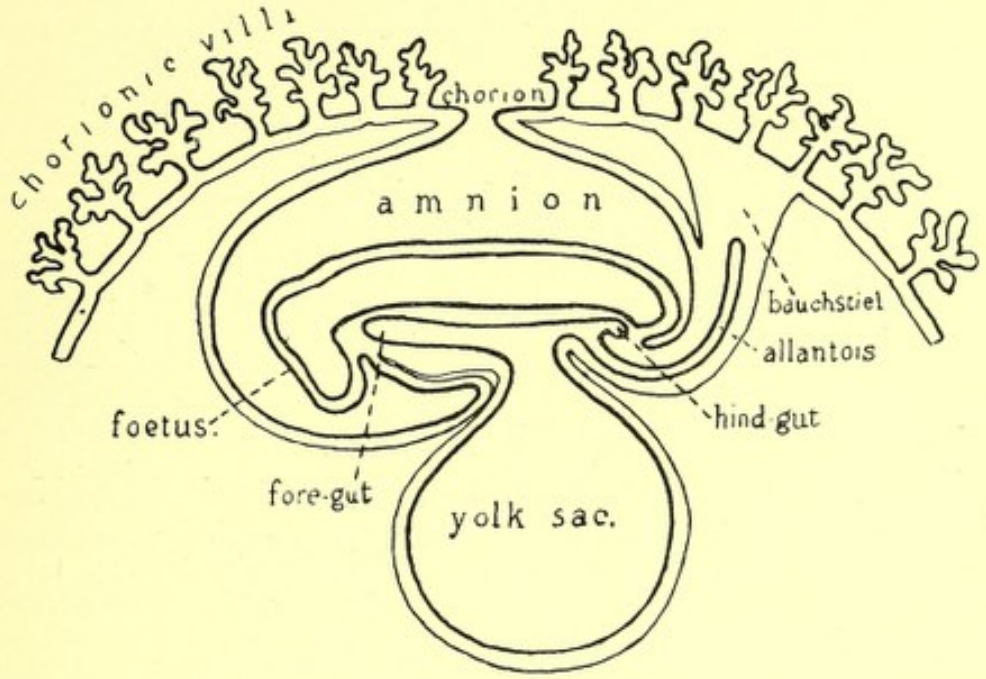
*Management of Pregnancy.* Lead simple ordinary life. Diet plain and not excessive; fluid should only be taken between meals; alcohol, except in very small amounts, most injurious, should never be prescribed unless absolutely indicated. Clothing should be suitable to season of year and comfort of patient. Moderate exercise most valuable. Above all, the excretory organs should be kept acting well—bowels carefully regulated, skin kept warm. Kidney should be aided to act well by large quantities of fluid between meals. Patient should sleep in an airy, well-ventilated room. Baths according to custom, except that cold baths not very suitable owing to chance of aggravating any congestion of kidneys. Should be careful at menstrual periods, especially if any feelings of discomfort at these times (suppressed menstrual activity). The urine should be carefully examined every three or four weeks from third month onwards. Nipples should be very carefully attended to; crusts removed. Morning and evening they should be washed, and weak spirit and lanoline applied on alternate evenings.

## ANATOMY AND PHYSIOLOGY OF FOETUS IN UTERO.

*Changes in the Embryo.* Details regarding the development of the embryo belong to embryology. We shall only consider the formation of the membranes, the placenta and cord, the physiology of the foetus in utero.

*The Membranes.* There are three layers of membranes surrounding the ovum; the outermost one is known as the Decidua, the middle one the Chorion, and the most internal one is the Amnion. The *Decidua* is simply the altered mucous membrane, and is

divided into the "decidua serotina," the part of the mucous membrane upon which the ovum becomes implanted; the decidua "reflexa or capsularis" which surrounds the ovum; while all the remaining mucous membrane is known as the "decidua vera." About the end of the third or fourth month the decidua reflexa (capsularis) and decidua vera become fused into a single membrane. This membrane does not come away completely at birth, portions of it are attached to the Chorion, but part is left behind and comes away in the lochia. The mucous membrane which forms the decidua becomes much thickened, $\frac{1}{3}$ in. at end of third month, when it is thickest. Two layers are readily distinguishable, a superficial, or "stratum compactum," and a deep one, or "stratum spongeosum." The stratum compactum contains few glands, for




these are flattened and compressed. The epithelium degenerates. The greater mass of the interglandular tissue is altered, and its cells become large, ovoid, and endothelial-like, with large oval nuclei. They are called decidual cells. When the placenta separates and the decidua comes away the line of cleavage is through the deeper portion of the stratum compactum. The stratum spongeosum consists of dilated glands and altered interglandular stroma. The fine vessels are much dilated.

*The Chorion and Amnion.* These two membranes arise from mesoblast and epiblast. It will be remembered the foetus sinks down into the blastodermic vesicle and the extra-embryonic somatopleure rises round the embryo until the folds meet and unite. There are thus formed two sacs separated from each other, the inner one the amnion, the outer the chorion. Very soon, however, these sacs become more or less intimately attached to each other, although they can always be separated as can be demonstrated after the birth of the placenta.

*The Chorion* has epiblast outside and mesoblast inside, while the amnion has epiblast inside and mesoblast outside. At an early date little projections form on the chorion; first of all simple epiblastic nodules, later mesoblastic processes extend into these, and so are formed the villi of the chorion. Into each villus a loop of blood-vessel extends. In the early ovum the whole surface is covered with villi, before long part of the villi atrophy (chorion laeve), while part developes and grows (chorion frondosum) and forms the foetal portion of the placenta.

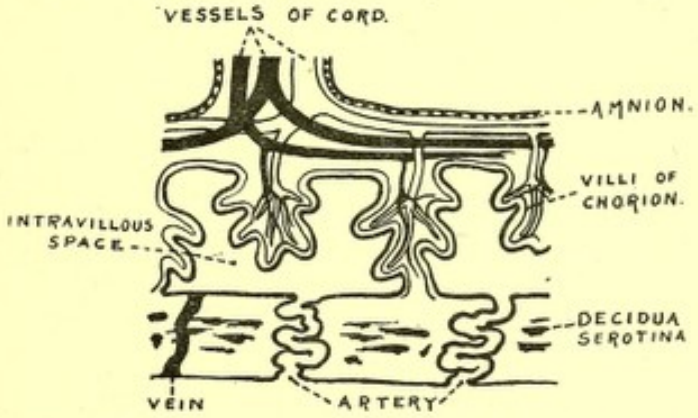
The fully developed villi which form the foetal portion of the placenta consist, as has been seen, of epiblast and mesoblast. They are fine branching, shaggy processes of foetal connective tissue covered on the surface by two layers of foetal epithelium. The innermost layer of this epithelium is known as Langhan's layer, and consists of nucleated cells with a distinct cell-wall; the outermost layer is known as the syncytium, and consists of masses of nucleated protoplasm without any cell-wall; the other structure of the villus is the fine loop of blood-vessel which courses along the margin. The great majority of the villi are loose and are washed with maternal blood; some, however, are attached by processes of syncytium to the decidua serotina.

*Amnion.* The amnion, we have seen, consists of epiblast in its inner and mesoblast on its outer surface. The epithelial lining consists of large flat nucleated cells, with small spaces at the junction of the differentic cells. The mesoblast connective tissue of the amnion is loosely attached to that of the chorion, but at all times the two membranes can be easily separated.

*Liquor Amnii.* Inside the amnion is the liquor amnii, which increases in amount up to the seventh month. The average amount at term is from 1–2 pints; average specific gravity is about 1010. It contains chlorides, phosphates, loose cells, some albumen and urea. The fluid comes from the epithelium cells, but probably chiefly from the blood of the foetus, and undoubtedly the foetus sometimes passes urine into the liquor amnii. In later months the liquor amnii contains epithelial debris, lanugo, and sometimes meconium.

The liquor amnii serves several purposes—it allows free movement of foetus. protects foetus from injury, and, during labour, with the membranes dilates the cervix.

*Placenta.* We have seen that the foetal portion of the placenta is the chorion frondosum and the maternal portion is the decidua serotina; between these two is the inter-villus space full of maternal blood, which washes the villi. The only little difficulty in understanding the placenta is the correct appreciation of the inter-villus space. Briefly this space arises as follows. The fertilised ovum, when it reaches the uterus, sinks into the mucous membrane, and becomes completely surrounded by this




mucous membrane. The early ovum, in point of fact, actually corrodes the mucous membrane, and it does this by means of the nucleated protoplasm known as the trophoblast. This trophoblast corrodes the blood-vessels and small haemorrhagic areas form, which areas gradually increase in size, communicate and form the inter-villus space. Into this space the blood is carried by the branches of the uterine arteries and carried away by the uterine veins. Owing to the tortuosity of the arteries the blood flows very slowly through this space. By this means the projecting villi of the chorion are slowly washed by maternal blood, and

so there can occur an interchange from the maternal blood to the foetal blood of suitable materials for the nourishment of the child, and from the foetal blood to the maternal blood of all waste materials from the child. The placenta, therefore, performs the function of stomach, lungs, and kidneys to the foetus in utero.

The placenta at full time is about 7 in. long; it is usually ovoid, and it may be of any shape; it weighs on an average 15 oz. It grows until the 36th week, and at full time occupies on an average one-fifth to one-fourth of the entire internal surface of the uterus. It is situated on the postero-lateral wall in 60 per cent. of cases, and on the antero-lateral wall in 40 per cent. On looking at the placenta the foetal surface is smooth, being completely covered by amnion, which can be readily stripped off up to the cord, but the external or maternal surface is rough and divided into cotyledons. At the margin of the placenta, and dotted throughout, are small white infarctions.

*Cord or Funis.* The cord or funis is about ½ in. in diameter, but is often thicker; average length is 20 in., same length as child, but this varies greatly. It is inserted generally to the centre of the placenta, but it is not infrequently near or at the margin, when it is spoken of as battledore. The cord consists of a covering of cubical epithelium of the amnion, continuous with the epidermis of the foetus. It consists chiefly of connective tissue and a large quantity of mucus known as Wharton's jelly. At one time early in foetal life there are two veins and two arteries, but the right vein disappears. The remains of the allantois and the umbilical vesicle may be occasionally seen. The cord is usually twisted from left to right. Abnormalities in the cord are considered later.

*Development and Physiology of Foetus. First month* (end of). The ovum is about the size of a pigeon's egg, chorion completely surrounded by villi, the embryo 1 cm. long, extremities distinct, cord short and thick.

*Second month* (end of). Ovum about the size of a hen's egg, villi have disappeared, except over placental area; embryo about 4 cm. long (1 in.–1¼ in.); centres of ossification have appeared.

*Third month* (end of). Ovum about the size of a goose's egg, embryo 9 cm. long; differentiation of sex begins to show; nose visible, placenta distinct.

*Fourth month* (end of). Foetus 16 cm. long, sex distinct, lanugo appears on the skin, cord quite distinct and twisted, placenta well formed, decidua-vera and reflexa have become blended, foetal movements distinct, heart-sounds heard.

*Fifth month* (end of). Foetus 25 cm. long, lanugo and vernix caseosa, other fatty substances, secretion by the sebaceous glands mixed with the scales of the epidermis; child, if born alive, makes a few movements.

*Sixth month* (end of). Foetus measures 30 cm., nails distinct, hair on eyebrows, and the child, if born alive, will breathe, and may live a short time.

*Seventh month* (end of). Foetus measures 35 cm., pupillary membrane has disappeared, one testicle in scrotum; child, if born alive, may live for some days.

*Eighth month* (end of). Foetus measures 40 cm., and may weigh as much as 4 lb.; lanugo now disappearing, nose prominent, skin very red; child born alive may be reared occasionally.

*Ninth month* (end of). Foetus measures 45 cm. Weight of child may now have reached 5 lbs. or slightly more; skin still red, nails nearly up to finger-tips, cartilage of nose distinct and firm, but the ears still very soft.

*Tenth month* (full time). Child's length is 50 cm. or 20 in., average weight is 6½ lbs., although this may vary very greatly. First children usually smaller and lighter. Ages and size of parents distinct effect on weight.

The mature foetus hair on head, both testicles in scrotum, nails well over finger-tips, urine in bladder, lower bowel full of meconium. It at once cries when born, has healthy pink appearance, firm limbs, and is well nourished.

*How to tell Age of Child born Prematurely.* Several appearances useful, length specially so. Its length in centimetres is month squared for first five months, and then month multiplied by 5 for last five months. Thus, 1, 4, 9, 16, 25, 30, 35, 40, 45, 50 ($2\frac{1}{2}$ cm. = 1 in.). Other features detailed above. Centres of ossification most certain.

*Foetal Respiration.* In utero the foetus obtains its oxygen through the placenta; it does not require a great deal of oxygen, as its nourishment is already prepared in the maternal organism and its temperature kept at a uniform level, seeing that it is contained in the liquor amnii.

Immediately after birth the child makes deep respiration and the lungs become inflated and the pulmonary circulation is established.

*Circulation.* While the foetus is in utero there is practically no pulmonary circulation, although there is a little for the nourishment and development of the lungs.

Early circulation is allantoic, but that soon gives place to the foetal placental. This circulation is as follows: The foetal heart drives the blood along the umbilical arteries, which are branches of the internal iliacs to the placenta. From the placenta the purified blood is returned by the umbilical vein which empties this blood through the "ductus venosus" into the vena cava (a small quantity of the returned blood goes to the liver), from the inferior vena cava the blood passes into the right auricle. The right auricle thus comes to receive the oxygenated blood from the umbilical veins, the blood which has passed through the liver, and the blood from the lower extremities of the foetus. This mixed blood is directed from the right auricle by the "Eustachian valve" through the "foramen ovale" into the left auricle, thence it passes into the left ventricle, and from there is driven into the aorta. From there part of it goes to the head and neck, and the rest is carried downwards. From the head and neck the impure blood returns by the superior vena cava and passes into the right auricle, and then into the right ventricle, and on into the pulmonary artery. Very little of it, however, goes to the lungs; the bulk of it is carried by another foetal structure, the "ductus arteriosus," and mixes with the blood that has been already driven into the aorta from the left ventricle. The blood carried down by the aorta goes in part to the lower limbs, but the bulk of it passes along the umbilical arteries to the placenta. It is obvious, therefore, that the head and upper part of the foetus is supplied with much purer blood than the lower parts. In the later months the Eustachian valve separates the streams less completely, and so the upper part is supplied with slightly less pure blood, and the lower part with a little purer blood.

At birth a very complete and sudden change takes place. With the first respiration that the child makes the lungs are expanded, and the blood which passed through the ductus arteriosus is directed to the lungs. The ductus arteriosus soon becomes obliterated, as do also the umbilical arteries and the ductus venosus. The foramen ovale takes longer to close, and occasionally remains permanently patent.

*Nutrition.* Before the placenta is established the ovum is nourished by the substances absorbed by the trophoblast and the chorionic villi. Later on the child derives all its nourishment from the mother through the placenta. Whether the placenta alters the substances or not is unknown.

*Excretion.* Without doubt the child occasionally passes urine into the liquor amnii. Meconium is sometimes also expelled, but no large quantity as a rule, unless immediately before the death of the child. The main excretion of waste material, however, is through the placenta. Such secretions as bile, pepsine, appear as early as the sixth month. Intestinal secretion (meconium) consists of bile, pigment, and epithelial debris.

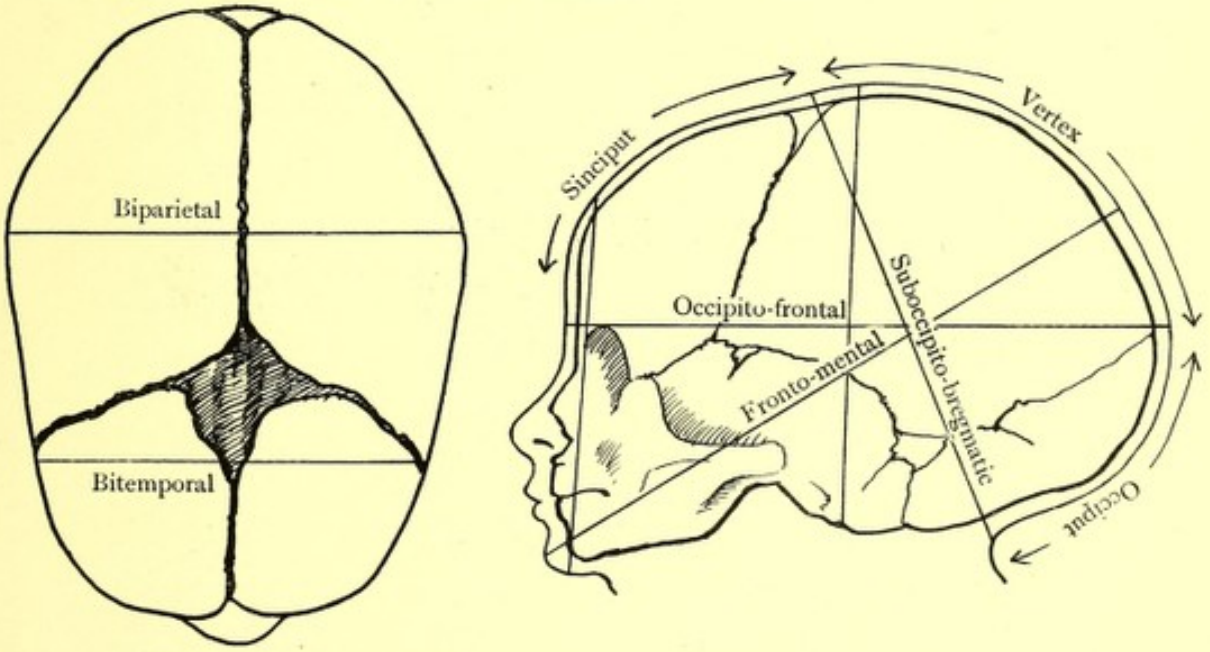
# LABOUR.

## PHYSIOLOGY AND ANATOMY OF LABOUR.

*Factors of Labour are:* (1) Passenger—the foetus. (2) Passage—the pelvis. (3) Powers —the uterine contractions and auxiliary forces.

### 1. THE PASSENGER: THE FOETUS.

The normal foetus measures 20 in. in length, but in utero it lies with its legs, arms and head flexed; in this attitude it measures 10 in. The body is very compressible. *The head*—most difficult part to deliver. During delivery the membranous bones of the cranial vault become moulded and *overlap* at the sutures and fontanelles; occipital and frontal bones under the parietals, and the posterior parietal usually under the anterior parietal. Base of skull—the most incompressible part, for protection of basal ganglia, and especially the medulla.




*The Vertex*—region between anterior and posterior fontanelles and parietal eminences. *Occiput*—region behind posterior fontanelle. *Sinciput*—region in front of anterior fontanelle.

*Sutures.* (1) Frontal—between the two halves of frontal bone. (2) Sagittal—between the two parietals. (3) Coronal—between frontal and parietal bones. (4) Lambdoidal—between the occipital and parietal bones. (5) Temporal—*Fontanelles* are spaces at angles of bones. (*a*) Anterior great fontanelle or bregma—at junction of frontal, sagittal and coronal sutures; diagnosed by its large size, its lozenge shape, the anterior long acute angle, and the four sutures running into it. (*b*) Posterior—at junction of sagittal and lambdoidal sutures is small, three sutures enter it, no space felt during labour. (*c*) Lateral—anterior and posterior at ends of coronal and lambdoidal sutures.

Size of head after being moulded in occipito-anterior position:

| | | |
|---|---|---|
| 1. Occipito mental, - | $5\frac{1}{2}$ in. | from posterior fontanelle to chin. |
| 2. Occipito-frontal, - - | $4\frac{1}{2}$ in. | from occipital protuberance to frontal eminences. |
| 3. Biparietal, - - - | $3\frac{1}{2}$ in. | between parietal eminences. |
| 4. Fronto-mental, - - | $3\frac{1}{2}$ in. | chin to level of frontal eminences. |
| 5. Trachelo-bregmatic, - | $3\frac{3}{4}$ in. | anterior fontanelle to anterior margin of foramen magnum. |
| 6. Suboccipito-bregmatic, | $3\frac{3}{4}$ in. | anterior fontanelle to midway between occipital protuberance and foramen magnum. |

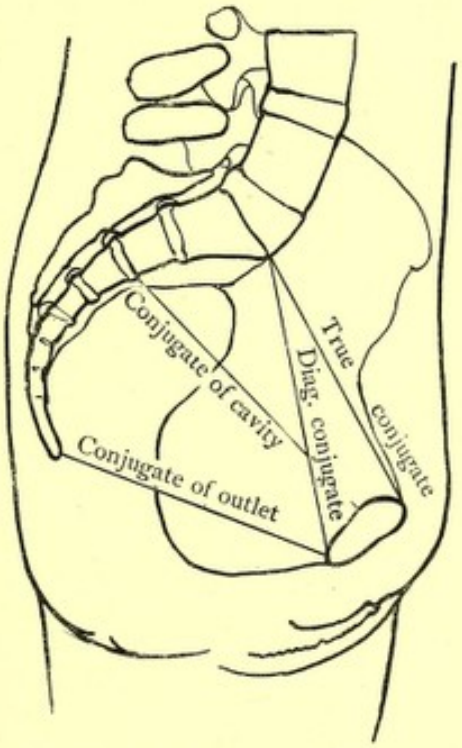
*Circumferences.*

1. Occipito-mental, - 18 in.
2. Occipito-frontal, - - 14 in.
3. Suboccipito-bregmatic, - $11\frac{1}{2}$ in.

*Movements of the Head.* (1) Flexion and extension. (2) Lateral flexion. (3) Rotation.

## 2. THE PASSAGE: THE FEMALE PELVIS.

The pelvis of the male: (1) Bones stronger and rougher. (2) Deeper in proportion




to size. (3) More funnel-shaped. (4) Outlet smaller. (5) Subpubic angle more acute (in female the angle is obtuse). (6) Transverse diameter of brim in male and infant

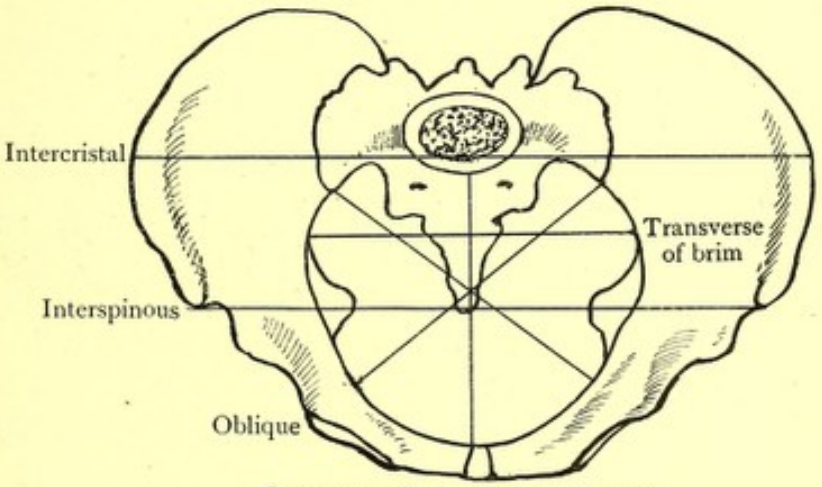
nearly equal to antero-posterior, but in female it is longer. In the infantile pelvis the ilium, ischium and pubis are not anchylosed till age of eighteen. (The pelvis closely resembles that of the ape.) Recent investigations of Thomson's go to show that sex characteristics are stamped on pelvis at birth. Pelvis of different races differs; roughly speaking, women high in the racial scale have a pelvis wide in transverse diameter, and those low in scale transverse and conjugate diameters nearly correspond.

*The Pelvic Articulations.* The sacro-iliac synchondrosis allows of slight antero-posterior "nutatory" movement of sacrum (or, if sacrum fixed, of ossa innominata on the sacrum) round an axis situated at the lower margin of second sacral vertebra. This is much nearer the sacral promontory than the coccyx, so pelvic outlet is increased when the thighs are flexed and the inlet when the thighs are extended. This, we shall see, is made use of in the management of parturition in contracted pelvis (Walcher's position). The other articulations, symphysis pubis, sacro-coccygeal and lumbo-sacral, need not be detailed.

*True Pelvis* is divided into brim or inlet, outlet and cavity.

The *inlet or brim*, or superior strait, is reniform, and divides the true pelvis below from the false pelvis above. Landmarks are—Promontory of sacrum, sacro-iliac synchondrosis, pubic spine, and symphysis pubis. The *outlet*, or inferior strait, is rhomboidal, and is bounded by top of coccyx behind, symphysis in front, and tuberosities of ischium at sides.

The planes of the brim and outlet are represented by lines drawn from the anterior to the posterior limits of the pelvic boundaries. The inclination of brim to horizon with women erect is 60 deg. and of outlet 12 deg. The axis of the brim and outlet are lines drawn at right angles to the middle point of plane of brim and outlet. *Cavity*: Curved funnel-shaped tube. Posterior wall, curved, measures $4\frac{1}{2}$ in.; its anterior wall is flat and measures $1\frac{1}{2}$ in. On the lateral walls of cavity there is a faint ridge called ilio-ischiatic line (ilio-pectineal eminence to spine of ischium) which divides the anterior from the posterior inclined plane of ischium.




Conjugate of brim (True conjugate)

The axis of the true pelvis is found thus: Prolong the conjugates of brim and outlet to meet in front, and from this point as centre draw to sacrum an infinite number of radii representing the planes of the true pelvis at different levels. Take the middle points of those parts of the lines which lie between pubes and sacrum. A line joining these points represents the true axis, and approximately the line of passage of the child through the pelvis. The axis of expulsion of foetal head is a little different, because perineum is distended and coccyx is tilted back.

*Measurements of Bony Pelvis.*

| | | | |
|---|---|---|---|
| *External*— | Intercristal diameter, | $10\frac{3}{4}$ in. | Between widest parts of iliac crests. |
| | Interspinous ,, | $10\frac{1}{4}$ ,, | Between anterior superior spines of the ilia. |
| | External conjugate diameter, | 7 ,, | From depression below last lumbar spine (lower angle of Michaelis rhomboid) to anterior part of upper edge of symphysis. |
| | Oblique or diagonal conjugate, | $4\frac{3}{4}$-5 ,, | From sacral promontory to lower edge of symphysis. |
| *Brim*— | True conjugate diameter, | $4\frac{1}{2}$ ,, | From promontory to upper edge of symphysis. |
| | Transverse ,, | $5\frac{1}{4}$ ,, | Greatest transverse diameter. |
| | Oblique ,, | 5 ,, | Sacro-iliac synchondrosis to ilio-pectineal eminence of other side. |
| *Cavity*— | Antero-posterior ,, | $5\frac{1}{4}$ ,, | Upper edge of third sacral vertebra to middle of pubes. |
| | Transverse ,, | 5 ,, | Between points corresponding to lower edges of acetabula. |
| | Oblique ,, | $5\frac{1}{4}$ ,, | Between centres of sacro-sciatic and obturator foramina. |
| *Outlet*— | Antero-posterior ,, | 5 ,, | Tip of coccyx to lower edge of pubis. It may be increased to 6 in. by pushing back coccyx. |
| | Transverse ,, | $4\frac{3}{4}$ ,, | Between ischial tuberosities. |
| | Oblique ,, | $4\frac{3}{4}$ ,, | Middle of lower edge of sacro-sciatic ligament to junction of pubes with ischium. |

*Sub-pubic angle*, 90 deg. to 100 deg. (In the male it is 70 deg. to 75 deg.)

In each plane there are *two oblique diameters*, the *right*, measured from the right sacro-iliac synchondrosis, and the *left* from the left sacro-iliac synchondrosis.

The oblique diameters of cavity and outlet, being measured from membranes instead of bone, are variable.

*Summary.*

| | Conjugate. | Oblique. | Transverse. |
|---|---|---|---|
| *Brim*, - - - - - | $4\frac{1}{2}$ in. | 5 in. | $5\frac{1}{4}$ in. |
| *Cavity*, - - - - - | $5\frac{1}{4}$ ,, | ($5\frac{1}{4}$ in.) | 5 ,, |
| *Outlet*, - - - - - | 5 ,, (6 in.) | ($4\frac{3}{4}$ ,, ) | $4\frac{3}{4}$ ,, |

*N.B.*—From above downwards the conjugata increase by $1\frac{1}{2}$ in. (when coccyx is tilted back), while the transverse diameters decrease by $\frac{3}{4}$ in.

## 3. THE POWERS: THE FORCES OF LABOUR.

Matthews Duncan estimate is 3 lbs. to the square inch. The chief force is the uterine contractions. Secondary in importance are the *Auxiliary Forces*: (1) Gravity, weight of ovum; acts chiefly during the first stage of labour when patient is sitting or walking. (2) Contraction of abdominal muscles; forced expiration during second stage; semi-involuntary. (3) Contraction of vaginal muscles during second stage. (4) Reflected force of pelvic floor, during second stage; the presenting part of the

foetus is driven downwards and backwards by the contractions of the uterus and abdominal muscles against the pelvic floor. The latter resists it involuntarily, tending to drive it upwards and forwards. Consequently the presenting part is forced forwards in the line of the resultant of the two forces, viz. round the symphysis pubis.

(II.) *The Uterine Contractions.* These are an exaggeration of the uterine contractions of pregnancy. They are: (1) *Rhythmic*, period of increment, acme, and decrement. (2) *Involuntary*, may be present in coma, narcosis, or paraplegia, but may be influenced (inhibited, seldom increased) by emotion, such as fright, or by reflex causes, such as an over-distended bladder or loaded rectum. (3) *Intermittent*, so preventing exhaustion of the mother and allowing placental circulation to go on during intervals. (4) Said to be *peristaltic.* (5) *Painful*, hence generally called "*pains*"; sensation limited to height of contraction; begins in the sacro-lumbar region, and comes round to the front and down thighs; due to colic of uterus, also attributed to stretching of soft parts (cervix, etc.) and of ligaments, and to pressure on the nerves. Degree of pain varies greatly. Some women have absolutely no pain in first stage. (6) As labour advances contractions increase progressively in *duration*, *frequency*, and *intensity*. They are often called *true labour pains* to distinguish them from false or spurious pains, which have no effect on the os or bag of membranes, are felt mostly in the abdomen, are spasmodic and variable as regards site, intensity, and periodicity, and are generally removed by treating the cause, *e.g.* by emptying the bowels or bladder. Occasionally an opiate is required.

During a true pain the uterus becomes harder and the fundus comes forward to the middle line till the longitudinal axis lies approximately in the axis of the brim. As labour advances the lower uterine segment and cervix become stretched and dilated. The higher Bandl's ring rises, the thicker becomes the retracted portion above and the thinner the lower uterine segment. In obstructed labour this lower uterine segment gets very thinned, and, if labour is allowed to continue indefinitely, ruptures.

## PHENOMENA OF LABOUR.

Three stages of labour: (1) Stage of dilatation from commencement of labour until os fully dilated. (2) Stage of expulsion from full dilatation until child expelled. (3) Stage of placental separation and expulsion from time child expelled until placenta expelled.

Besides these three stages there is another often referred to as a Premonitory Stage.

*Premonitory Stage.* Variable duration: several days or week or two. Head becomes fixed at brim in primipara if no disproportion between foetal head and maternal pelvis. "Lightening" occurs. Discomfort from breathing ceases, but pressure below increased, so frequency of micturition; greater difficulty in walking, increased vaginal discharge. Cervix gradually obliterated from *internal* os downwards, so cervical becomes continuous with corporeal cavity.

*First Stage.* From commencement of labour until cervix fully dilated. Commencement indicated by: (1) Rhythmical uterine contractions. (2) Dilatation of os externum. (3) Blood-stained mucous discharge ("show")—occasionally "operculum" expelled from passage.

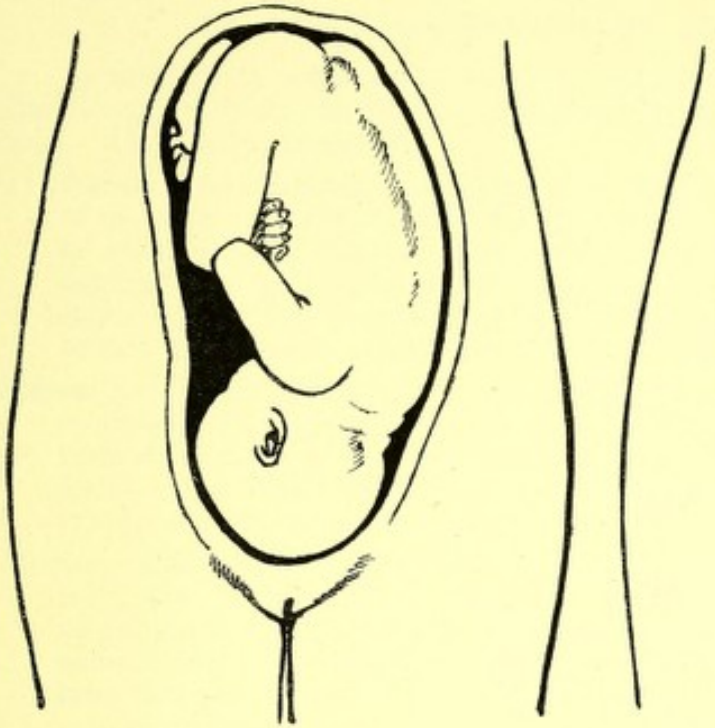
Uterine contractions press on fluid contents of uterus, fluid pressure is distributed equally, but as os externum (when cervix obliterated) is part which presents

least resistance, membranes, called "bag of membranes," protrude through it. This protrusion of membranes increases with each contraction or pain. Portion of waters in front of presenting part termed "fore-waters," portion coming away after birth of child termed "residual waters." During each contraction presenting part seems to recede but does not do so; it is the fore-waters becoming tense that gives impression that presenting part advances and recedes at this stage. Cervix plays passive rôle—drawn up very little—"lower uterine segment" slightly increased, and bladder is drawn up. Extent to which presenting part descends varies greatly; often very little descent during this stage. Rapidity of dilatation of os varies greatly; have seen it take three or four days, but averages 14 hours in a primipara. Degree of dilatation at a particular time commonly estimated as size of a shilling, florin, crown, etc., or by number of fingers which can be inserted. When fully dilated and at height of a pain membranes rupture; often do so before full dilatation, and not infrequently rupture does not occur, and has to be done artificially with some sharp-pointed sterilized instrument; both premature rupture and non-rupture cause delay. Occasionally membranes rupture before labour commences (specially in abnormal presentations); the labour is then termed "dry," and is always protracted. Very occasionally child is born surrounded by membranes, then said to be born with a "caul."

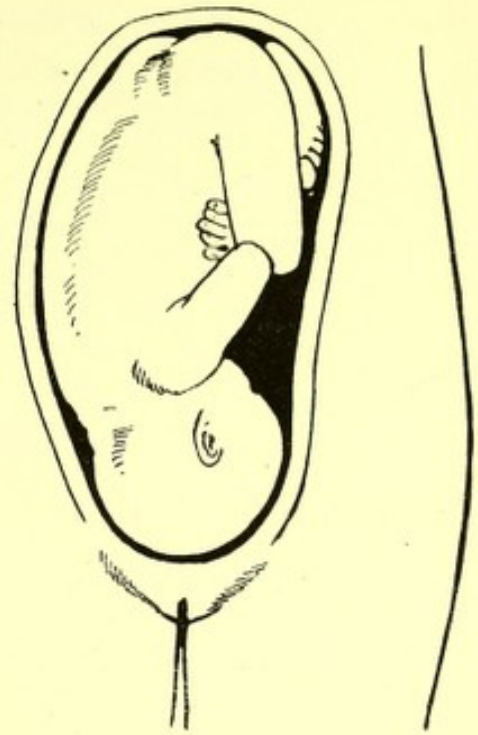
*Second Stage.* Often after rupture of membranes, period of rest. Soon contractions become more severe, frequent and "bearing" down. Can often tell by sound patient makes that she has passed into second stage. Head descends by direct pressure of uterine wall on foetus. Various movements occur (see Mechanism of Labour, p. 42). On surface of head an oedematous area forms over part not pressed upon (caput succedaneum); only forms on living children. Its situation naturally varies in different positions. Head pressing on pelvic floor causes bulging of floor; anus is dilated and becomes D-shaped. Gradually dilates vulvar orifice; when greatest circumference escaping called "crowning." After escape of head the vulvar orifice retracts over remainder of head; fourchette usually torn; shoulders then escape, and often enlarge the tear. After shoulders escape trunk quickly follows along with "residual waters," but little or no blood. Not until head of child is born does fundus of uterus sink down; height is same as during first stage; sinks down (retracts) as trunk escapes.

Immediately child is born should cry lustily. Duration of this stage is about 40–60 minutes in multipara and 2½ hours in primipara.

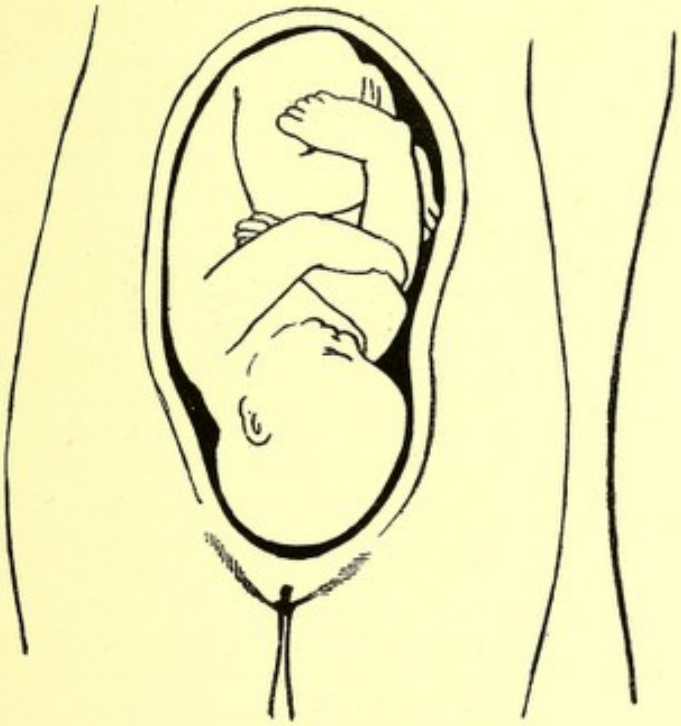
*Third Stage.* Stage of separation and expulsion of placenta. Uterus retracted so that fundus at level of umbilicus broad and globular. Period of quiescence, then contractions begin. (Note condition of "retraction" and "contraction"; if uterine muscle inert, then have "atony" and post-partum haemorrhage.) Walls are in contact with placenta. Separation is gradual, and is due to (1) Diminution of placental site from retraction. (2) Alternate contractions and relaxations of uterus. (3) Haemorrhage between placenta and uterine wall (Retro-Placental Haematoma). Placenta is gradually separated, and is expelled edge first through os most frequently (Duncan, confirmed by Champneys). Surface first (Schultze) if placenta situated at fundus if expelled too early and cord pulled upon. As placenta slips into lower segment and vagina, fundus rises slightly, and lower part of uterus becomes broader, more and more of cord slips out of the vagina. As placenta escapes it drags membranes after it. After escape of placenta fundus sinks down and remains firmly retracted, but very soon it rises a little higher. This stage when properly conducted lasts 30 minutes on an average.



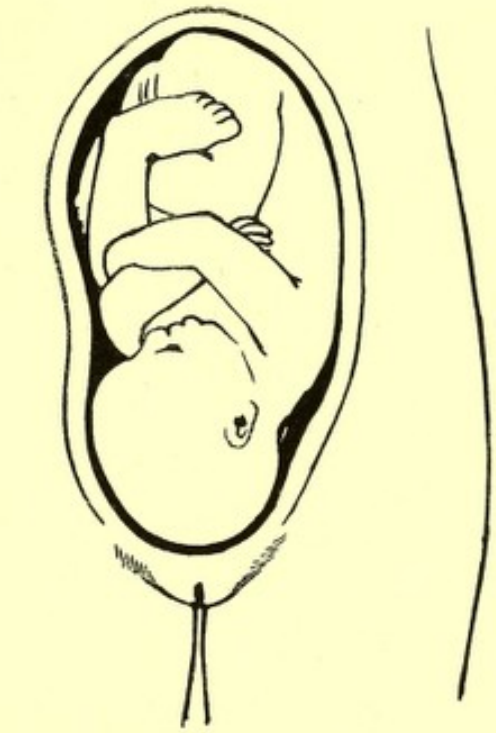
First Vertex.



Second Vertex.



Third Vertex.



Fourth Vertex.

## MECHANISM OF LABOUR.

By mechanism of labour is meant the manner in which the child is born, and the alterations in attitude and position that occur during its passage through the parturient canal. Three terms employed:

(1) *Attitude.* Relationship of different parts to one another. Thus the general attitude of the child in utero is one of flexion. (2) *Presentation.* Relationship of long axis of child to long axis of uterus: (i.) Longitudinal—(*a*) Cranial, (*b*) Breech, axes correspond. (ii.) Transverse or oblique (cross-birth)—The two long axes do not correspond. The frequency of each "Presentation" is: Cranial, 96 per cent.; breech, 3.5 per cent.; transverse or oblique, .5 per cent.

*Reasons for Cranial Presentations.* (1) Head accommodates itself best to lower segment of uterus. (2) Gravitation—Head heaviest. *Conditions favouring Breech and Transverse presentation.* (1) Premature birth. (2) Death of foetus. (3) Malformation of foetus. (4) Plural pregnancy. (5) Multiparity. (6) Malformation of uterus. (7) Tumour of uterus and adnexa.

*Position.* The relation a particular part of the child occupies to a particular part of the pelvic brim of the mother. As regards the child in vertex presentation, the occiput is taken as the denominator, in face and brow presentations the chin, in breech the sacrum, and in transverse or oblique the shoulder. The part of the maternal pelvic brim taken is the end of the oblique diameters; thus there are four "positions" for each presentation.

The standard or normal position is the "First Vertex Position." Long axis of the head in right oblique diameter occiput anterior (L.O.A.). This occurs in 60–70 per cent. of cases. The vertex presents because the child lies in utero in a flexed attitude, thus taking up least amount of room. The reason why child head engages so often in right oblique diameter is owing to presence of rectum on left side. (2) Twisting of uterus to right.

*Standard or Normal Position. First vertex,* long axis of head in right oblique occiput anterior (L.O.A.). To arrive at other vertex positions turn head in direction of hands of watch and stop at end of each oblique diameter. Thus *second vertex* is long axis of head in left oblique occiput anterior (R.O.A.). *Third vertex* is long axis of head in right oblique occiput posterior (R.O.P.). *Fourth vertex* is long axis of head in left oblique occiput posterior (L.O.P.).

Having understood vertex positions, all other presentations and positions readily arrived at. Take face positions.

*Four Face Positions.* Put head in corresponding vertex position and extend head. Thus, *First face position,* long axis of face in right oblique diameter, mento (chin) posterior. *Second face,* long axis of face in left oblique, mento (chin) posterior. *Third face,* long axis of face in right oblique, mento (chin) anterior. *Fourth face,* long axis of face in left oblique, mento (chin) anterior.

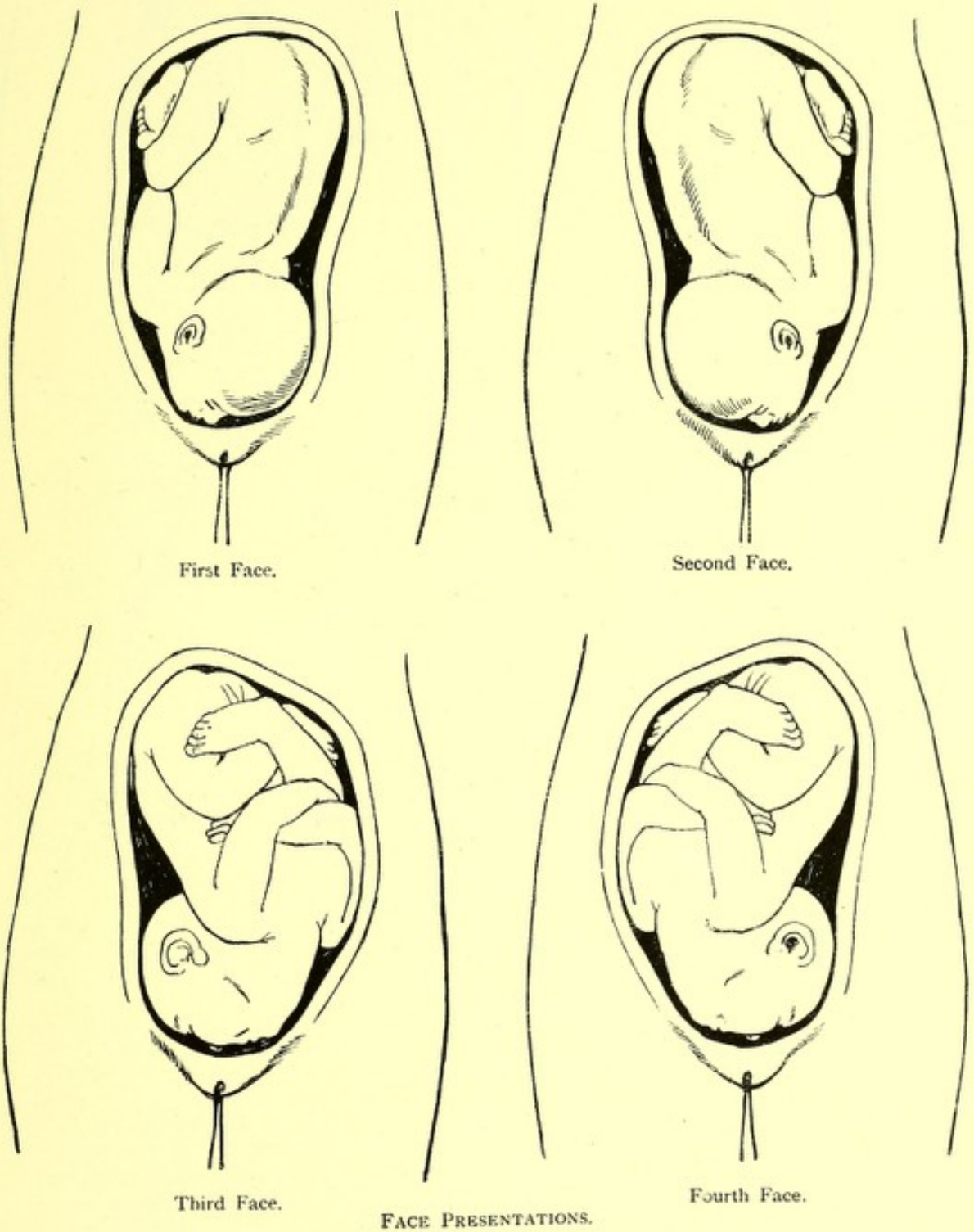
*Four Breech Presentations.* Place child sitting in pelvis in such a way that the long axis of its head is in corresponding vertex position. Thus, *First breech*—When long axes head runs so that it corresponds to right oblique diameter with occiput anterior breech will be found occupying left oblique, *sacrum anterior. Second breech*—Breech in right oblique, sacrum anterior. *Third breech*—Breech in left oblique, sacrum posterior. *Fourth breech*—Breech in right oblique, sacrum posterior.

*Four Transverse or Oblique Positions.* Place head in corresponding vertex position, and push head over towards side occiput points. Thus, *First transverse position*—Head to left, dorso anterior. *Second*—Head to right, dorso anterior. *Third*—Head to right, dorso posterior. *Fourth*—Head to left, dorso posterior.

*Cranial Presentations. Relative Frequency of Different Positions.*

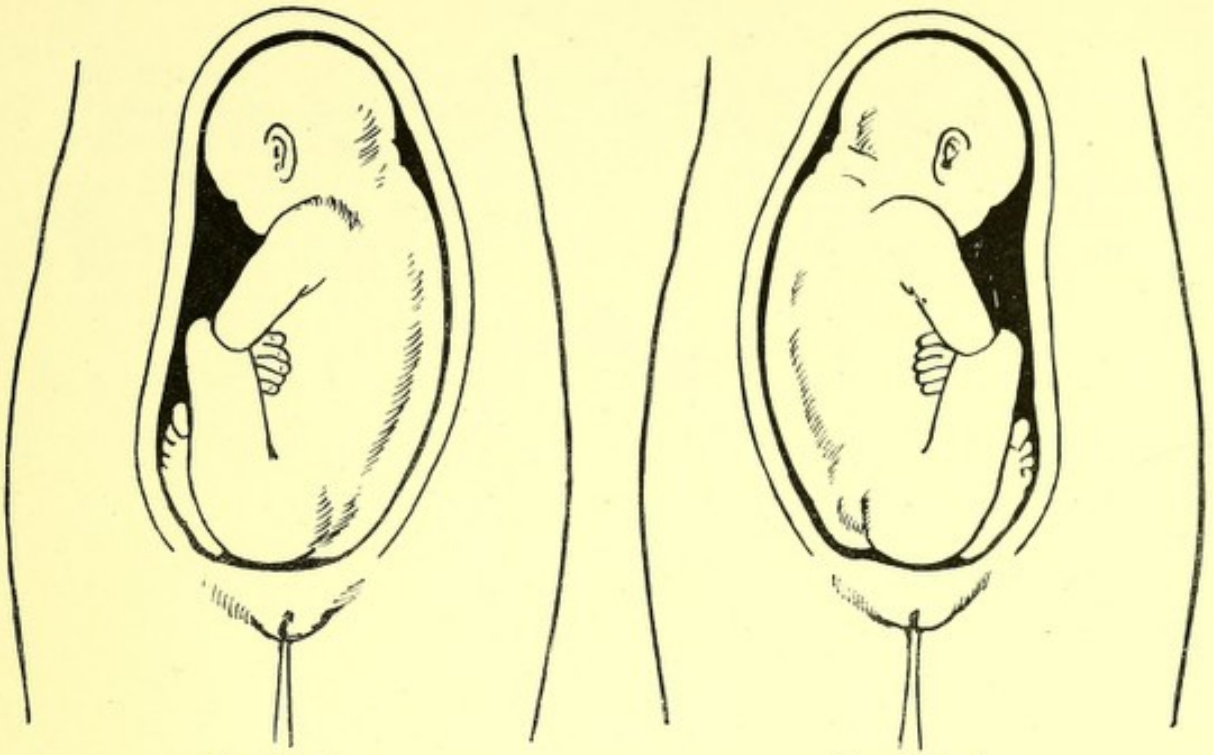
| First. | Second. | Third. | Fourth. |
|---|---|---|---|
| 65 | 10 | 20 | 5 |

These figures refer to cases that terminate as first, second, third, or fourth. But early in labour many second cases are in third position. *At end of pregnancy and the commencement of labour head is often really in transverse diameter.*

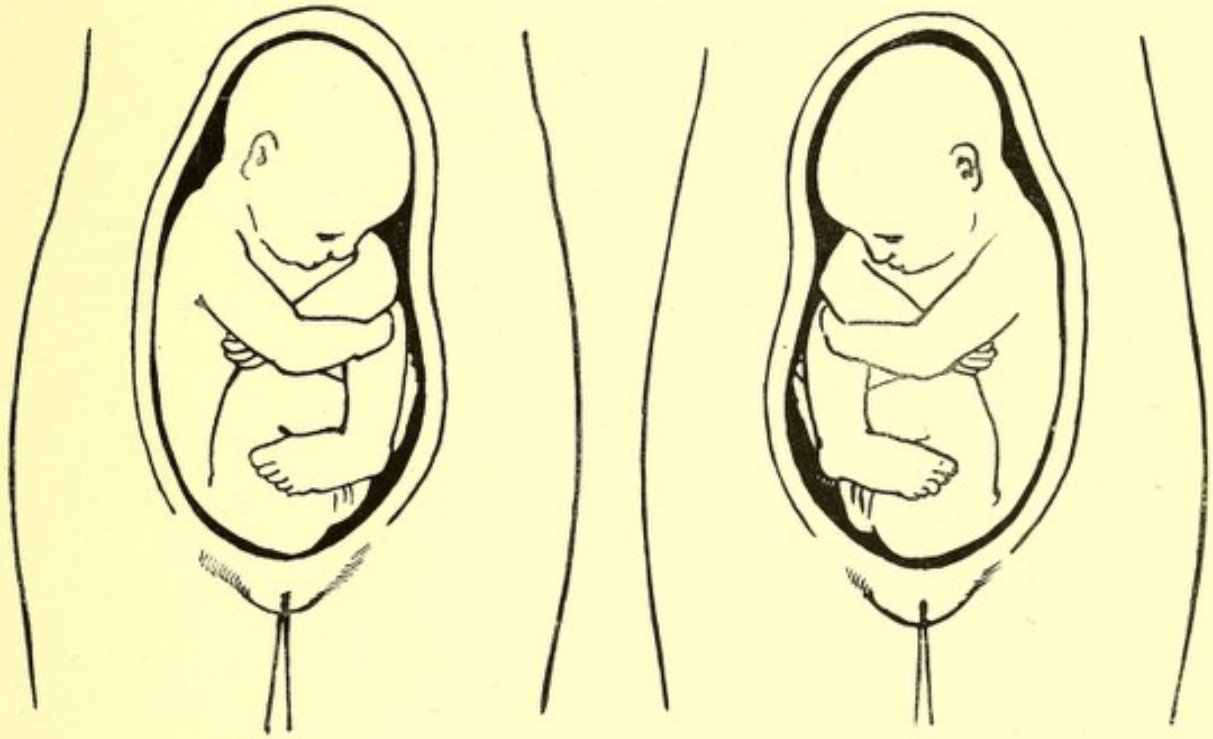


First Face. Second Face. Third Face. Fourth Face.

FACE PRESENTATIONS.



First Breech. Second Breech.



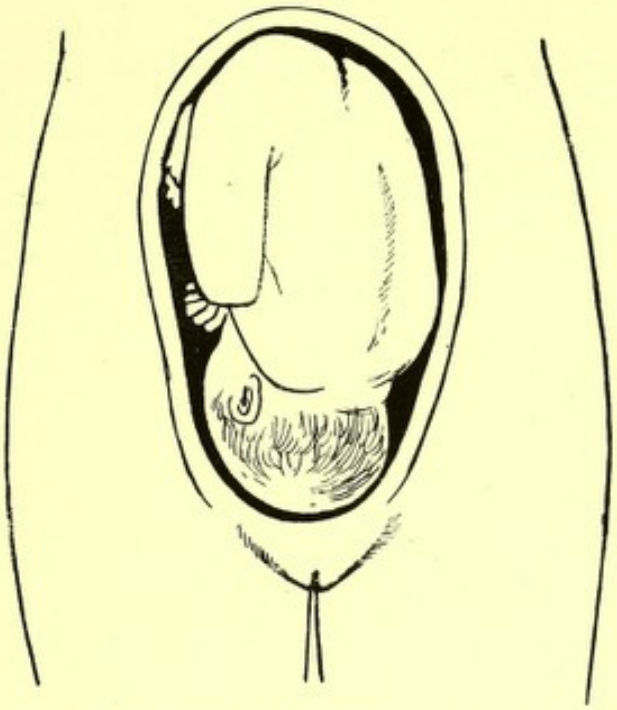
Third Breech. Fourth Breech.

BREECH PRESENTATIONS.

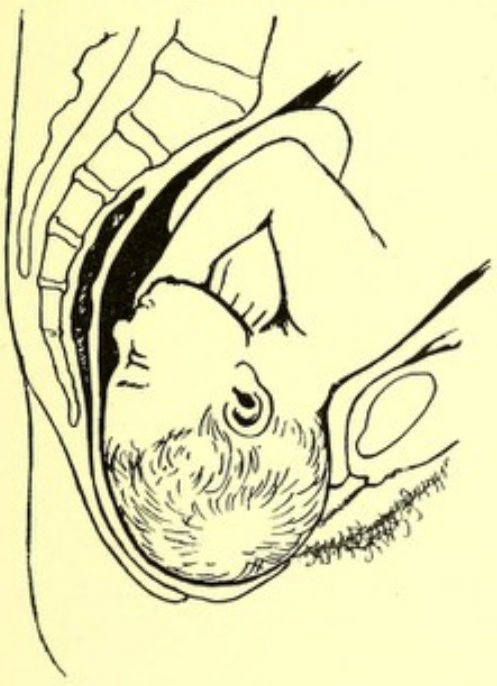
*Details of Mechanism of Birth in First Vertex Position.* Long axis of head in right oblique occiput anterior (L.O.A.). *Diagnosis—Abdominal palpation*: Head fixed at brim if primipara; hand sinks down lower into left side of pelvis; back runs up on left side of uterus; limbs on right side (movements more marked on that side),

breech towards right side of fundus; heart-sounds below and to the left of umbilicus. *Vaginal examination*: Posterior fontanelle easily felt in front; anterior felt with difficulty behind; position of sagittal suture and lobe of ear also useful.

During whole of labour descent. The movements that occur are: (1) *Flexion.* (2) *Internal rotation* of long axis of head into conjugate of maternal pelvis. (3) *Extension.* Birth of head by so-called extension. (4) *External rotation* or Restitution.



(1) *Flexion.* Due to fact that head already flexed and resistance of pelvis causes flexion to be increased (this very marked indeed in generally contracted pelvis). Often very slight if head small.



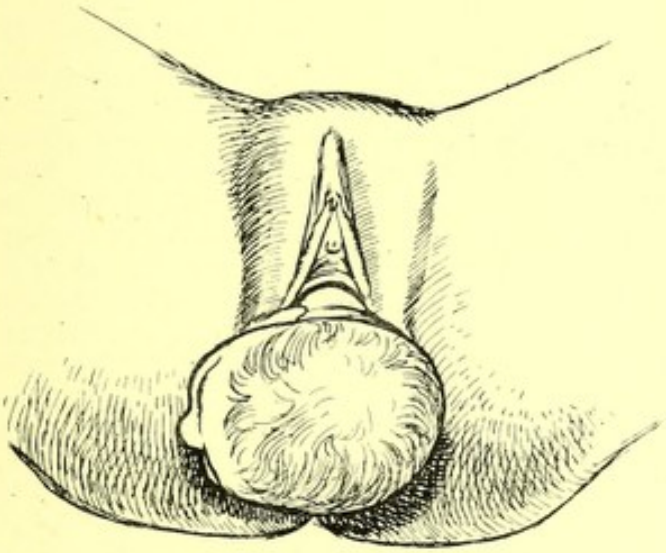
*Older Theories. Lever Theory.* Spinal column attached nearer occiput, consequently occiput pushed down and flexion produced. *Wedge Theory* (Lahs), abandoned.

This increased flexion causes the sub-occipito bregmatic diameter to engage and descend, and consequently to pass more readily through pelvic cavity and vulvar outlet.

(2) *Internal Rotation.* Long axis of head changes from oblique into conjugate (or very nearly conjugate) diameter of maternal pelvis. This movement occurs at the floor, is caused by the gutter-shaped formation of the pelvic floor and general pelvic formation.

*Other Theories. Inclined Plane Theory. Wedge Theory*, abandoned. The result of this movement is that the long axis of the head is brought into the longest axis of the pelvis (conjugate).

(3) *Extension.* Commonly stated, head is born by movement of extension, caused by result of forces of uterine contractions acting downwards and backwards, and pelvic floor acting upwards and forwards. Mistaken idea that head becomes extended before born; only extended at very end of birth after sub-occipto bregmatic diameter has escaped. (Proof of this is position of posterior fontanelle; and universal advice given by all teachers to keep head flexed to prevent rupture of perineum.)



(4) *External Rotation or Restitution.* After birth of head, face of child comes to look towards right thigh of mother, and consequently assumes the position it was in at beginning of labour—hence called Restitution. Caused by rotation of the shoulders into conjugate diameter when they reach pelvic floor.

*Birth of Shoulders.* Shoulders enter pelvis in opposite oblique (first vertex, left oblique), when they reach pelvic floor rotation occurs (this is cause of external rotation or restitution). Anterior shoulder is pushed down and pressed against symphysis pubis and posterior sweeps over perineum. After birth of shoulders rest of trunk quickly follows.

*Caput Succedaneum and Moulding.* The caput succedaneum forms on right parietal bone, and as seen in illustration, head much elongated.

*Naegele and Litzmann's Obliquity.* Besides the movements and alteration in attitude referred to, it is frequently found that the sagittal suture does not run across the middle of pelvis equidistant from promontory behind and symphysis pubis in front. Not infrequently the head is tilted to one or other shoulder, which causes the sagittal suture to be nearer the promontory or symphysis pubis. If it is nearer the promontory, one speaks of an anterior parietal presentation (Naegele Obliquity). If nearer the pubis, then it is termed a posterior parietal presentation (Litzmann's Obliquity). The former is sometimes referred to as anterior asynclitism, the latter as posterior asynclitism. The matter is of great importance in connection with flat pelvis.

*Second Vertex Position.* Same as first, only left substituted for right. Left parietal bone presenting part and caput succedaneum forms upon it. *Third and Fourth Vertex Positions* considered under Pathology of Labour.

## MANAGEMENT OF LABOUR.

Three all-important things to attend to in management of a labour:

1. Prevention of sepsis.
2. Prevention of lacerations of cervix and perineum, and if they occur, repair them properly.
3. Prevent retention of membranes, viz. Proper management of third stage.

1. PREVENTION OF SEPSIS.

(*A*) *Natural Protection.* (1) Vaginal mucus—bacillus vaginae (Doederlein). (2) Constant shedding of vaginal epithelium. (3) Mechanical cleansing of liquor amnii, child and placenta and membranes coming down like a sponge over the parts. (*B*) *Aseptic and Antiseptic Precautions*: (1) Thorough cleansing of hands as if for surgical operation—soap and water, 10 minutes; biniodide and rectified spirit, 1 in 1000, 3 minutes; carbolic, 1 in 20; gloves (voluntary). (2) Thorough cleansing of vulva before any examination. (3) Instruments are sterilized by boiling. (4) As few vaginal examinations as possible (every examination is a danger); expose parts and separate labia before introducing finger for vaginal examination. (*C*) *Douching.* None before delivery unless decidedly septic, any haemorrhage, vaginal discharge. After delivery only if uterus badly retracted and haemorrhage. (Doubtful if it should be done after operative interference.)

2. PREVENTION OF LACERATION OF CERVIX AND PERINEUM, AND IF THESE OCCUR, REPAIR THEM.

*Cervix.* Always slightly lacerated. Extensive lacerations often result from administration of ergot in first and second stage, and too early application of forceps. Both procedures absolutely bad. *Perineum*: (1) Maintain flexion of head. (2) Allow head to escape slowly. (3) Avoid early application of forceps before perineum distended by presenting head. Place patient in left lateral position, pass left arm between patient's thighs and control exit of head; prevent occiput from catching against symphysis pubis; head must escape with sub-occipito bregmatic circumference passing through vulvar orifice. After head born see that shoulders escape slowly. They often enlarge a perineal tear.

3. PREVENTION OF RETENTION OF MEMBRANES, VIZ. MANAGE PROPERLY THIRD STAGE (p. 45).

*Other details to be attended to.* (*A*) When called to case go at once in case of any abnormality. (*B*) *Armamentarium*: Bag with detachable linen lining and containing two nail brushes, forceps, scissors, needles, needle-holder, sutures (catgut

and silkworm gut), catheter, Rotunda douche, tube (with vaginal and uterine glass nozzles), transfusion apparatus, hypodermic syringe. The drugs which should be included are the following: Tabloids of biniodide or perchloride of mercury (or carbolic), lysol, liquid extract of ergot and ergotin, chloroform, opium (laudanum or liq. opii sedativus), hypodermic tabloids of digitalin, morphine, strychnine, scopolamine, ergotin, and lotion for eyes of child (nitrate of silver, 2 grs. to 1 $\bar{3}$). (*C*) Preparation of room, bed, dishes, swabs, etc., clothes for child, etc. (*D*) *Make careful examination* (1) Palpation. (2) Auscultation. (3) Vaginal examination. Determine (*a*) if pregnant; (*b*) if in labour; (*c*) condition of pelvis and of cervix, degree of dilatation, consistency, condition of pelvis, vagina, vulva, perineum, presentation and position of child, if anything abnormal. (4) General condition of patient.

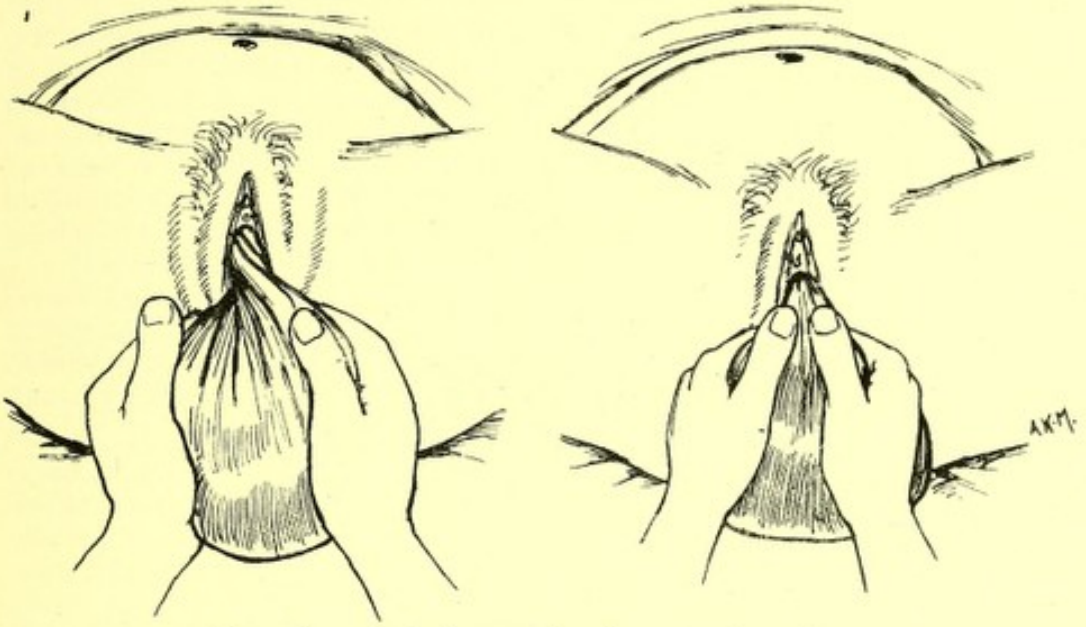
Management of Perineum.

*First Stage.* Simple fluid food. Patient should move about room during first stage, but not after membranes have ruptured. Bowels emptied at beginning of labour with an enema. Keep bladder empty. Sponge vulva and perineum with antiseptic lotion carbolic 1 in 40, biniodide of mercury 1 in 2000, or lysol 1 per cent.

*Second Stage of Labour.* Rupture membranes if os fully dilated. Examine after membranes rupture. Keep patient in bed. Sponge vulva frequently with swabs. Chloroform or scopolamine and morphine under conditions referred to later. Auscultate foetal heart every half hour. Don't interfere unless distinct cause for doing so on part of mother (watch pulse or temperature) or child. Management of perineum and birth of head and shoulders already referred to. Follow down fundus of uterus with hand as child is expelled. When head born feel if cord round child's neck; if so, slip over face of child or allow child to slip through the loop. Immediately child born, wash eyes and put in a few drops of nitrate of silver (2 grs. to the oz.) in all hospital cases and in suspicious cases in private. Then tie cord 1 in. from umbilicus and close to vulva orifice (latter ligature to mark descent of placenta and membranes). Immediately after child is born place patient on her back (danger of air embolism if allowed to remain on her side).

*Third Stage of Labour.* Most important to manage properly so that no portion of membranes is retained. Sit at patient's bedside, place left hand on fundus of uterus. Uterus rests for few minutes, then begins to contract; don't massage uterus unless it becomes atonic. Early kneading of uterus and expressing the placenta causes retention of membranes. When placenta has slipped into lower

segment then safe to express it; that usually takes about 30 minutes. Passage of placenta from body into lower segment is indicated by (1) alteration in shape of uterus (wider below and narrower above); (2) more of the cord slipping out of the vagina. Pulling on cord and tapping on uterus to feel if any impulse conveyed from uterus to cord are of no practical value. Whenever placenta has slipped into lower segment, knead uterus to establish strong uterine contraction, then grasp fundus between thumb and fingers and compress it firmly (Credé method). As placenta escapes, grasp placenta and membranes and carefully drag them out or twist placenta round so that membranes formed into a rope. Placenta and membranes must be carefully examined; best done by immersing them in water. After birth of placenta, uterus firmly massaged, and if not well retracted ergot and hot douche given. Patient then carefully sponged with antiseptic, any laceration sutured. (This may be done while waiting upon the placenta to separate.) An aseptic or antiseptic pad is then applied to vulva.



Alternative methods for removing placenta and membranes.

Binder generally applied, but no abdominal pad should be used. No douche should be given unless post-partum haemorrhage and hand has been introduced into uterus. Take pulse and temperature shortly after delivery. Pulse always rapid if any post-partum haemorrhage.

*Anaesthetic during Labour.* Chloroform certainly delays labour and favours post-partum haemorrhage and retention of membranes, because uterus does not retract so well. $\frac{1}{200}$ scopolamine and $\frac{1}{6}$ morphia very useful in very protracted labour. Spinal anaesthesia has been given up.

*Posture in Labour.* *Left lateral* very useful and excellent when care has to be exercised in preventing perineal laceration, also in dislodging presenting part from pelvis prior to doing version, etc. *Dorsal* one generally employed in other countries. Best position for examination third stage of labour, version, forceps, etc. *Walcher or hanging-leg position*, specially useful in contracted pelvis, because pelvic brim slightly increased. *Knee-elbow position*, specially useful in prolapse of cord and in replacing retro-displaced gravid uterus. (*Sim's position*, exaggerated left lateral, quite as good.)

## PUERPERIUM.

Puerperium extends from the birth of placenta until the generative organs have returned to the pregravid condition—a matter of six to eight weeks. Change is most marked in first fortnight, but not completed in that time.

*Three striking features of Puerperal State.* (1) The involution of uterus. (2) The discharge termed the lochia. (3) Establishment of lactation. First consider these and later other phenomena.

(1) *Involution of Uterus.* Process by which uterus returns to pregravid condition; never quite returns to that condition, always remains a little bigger, more movable and liable to displacement; after birth about level of umbilicus 4–5 inches above symphysis. First twenty-four hours uterus rises a little, and after that it steadily gets smaller, diminishing by about $\frac{1}{3}$ inch daily. By tenth or twelfth day cannot be felt from abdomen. Should make out involution curve upon chart. In taking height daily, following points should be attended to: (1) Measurements taken same hour each day. (2) Uterus should be pulled over to middle line. (3) It should be kneaded until it is in a state of contraction. (4) Bladder must be empty Frozen sections have demonstrated that lower segment disappears and cannot be distinguished by third day; cervix takes few days to assume its pregravid condition.

It is frequently spoken of as a fatty degeneration, but the modern view is that it occurs owing to autolysis. Certain amount of decidua always left behind, so that debris can always be scraped away. Thrombi form in vessels, and an endarteritis obliterans occurs in the medium and smaller vessels. New surface epithelium developes from remains of glands.

(2) *Lochia.* Discharge from raw uterine placental site and raw surface of body and cervix; consists of blood and decidual remains, later more serous, and in the last five or six days it has purulent appearance owing to presence of large quantities of leucocytes, degenerated muscular and fibrous tissue. Duration of discharge twelve days, and often returns a little when patient gets up. Quantity varies, but averages about 25 oz. It is greater if involution of uterus unsatisfactory, if placental site large, if cervix lacerated, if any membranes are retained, and if mother does not nurse. It is *less* as an individual peculiarity, if mother nurses, and always diminishes if sepsis occurs. Lochia pent up in uterus due to acute anteflexion (Lochiametra). Lochia escaping from uterine cavity should be sterile, but in vagina gets infected with all manner of organisms. Smell is heavy; if infected with saprophytic organisms becomes foetid, *often not foetid if infected with pyogenic organisms.*

(3) *Lactation.* Breasts alter very early in pregnancy, but abundant secretions rarely present before third or fourth day after delivery; often the "rush of milk" occurs very suddenly and causes great deal of discomfort. No such thing as "milk fever."

Details regarding lactation (see Infant Feeding).

*Other features of Puerperium.* After escape of child, feeling of chilliness; slight increase of temperature at end of labour. Very soon falls, and often remains sub-normal for a few days; any rise of temperature indicates septic mischief. Pulse rate follows temperature usually, but not always, for often pulse rate increased markedly during pregnancy, and continues during labour and early days of puerperium.

Pulse rate easily disturbed during puerperium. Distinct leucocytosis during puerperium. Kidneys and skin very active; lactose and peptones in urine. Micturition often difficult, especially in protracted and instrumental labours. Bowels very constipated. Irregular uterine contractions (after-pains) very common in multiparae, but in primiparae they indicate retained blood-clots.

*Management of Puerperium.* Puerperal complications are to be prevented by careful management of labour. Pulse, temperature condition, and height of uterus should be noted. If involution delayed, give douches and ergot and massage uterus. Bladder and rectum must be regularly emptied. Catheter only passed if cannot get patient to pass urine herself. Great danger of cystitis if catheter used any length of time, consequently put woman in knee-elbow position and bathe part with hot water before resorting to catheter. If after-pains troublesome, ergot and opium or morphia in some form. Toilet of vagina must be carefully attended to by the nurse; first few days frequent sponging of parts with antiseptic solution; after a week or so vaginal douching quite safe, and may be given. Sterilized vulvar pads should be changed frequently. Patient's comforts should be attended to, bathe in bed, teeth, nails, etc. Bed should be kept specially comfortable. Ordinary diet and a good deal of fluid. Certain articles of diet seem to affect the child; these should be avoided (see Infant Feeding). Time in bed after confinement 12–15 days; early rising in puerperium unwise. Convalescence should not be hurried. Before ceasing to visit patient make a careful vaginal examination in case uterus displaced. Most important to correct displaced uterus early, and put in pessary for few weeks.

# PATHOLOGY OF PREGNANCY.

In considering the Pathology of pregnancy it is common to discuss the various diseased conditions under the particular systems affected.

This arrangement I shall also adhere to, but before doing so let us consider a certain group of diseased conditions peculiar to pregnancy and at present described as the "Toxaemias of pregnancy." The commonest example of this condition is "Eclampsia," but icterus gravidarum and some cases of hyperemesis gravidarum are also examples of "toxaemia." They are all caused by abnormal and irregular metabolism. The following are reasons why they are so prone to occur:

(1) Secretions altered. (2) Elimination of waste material defective because less exercise is taken, secretions are altered, mechanical interference from pressure of enlarged uterus on surrounding parts. (3) Waste material of child to be got rid of. (4) Slight disturbances so often neglected and become serious later. In majority of cases, organs, especially liver, kidneys, sufficient for the increased strain; "compensation" so to speak, sufficient. If not cells damaged, "Autolysis" occurs. Parenchyma of liver and kidneys damaged. Whenever the cells in liver and kidney damaged more waste material accumulates in system, and the more waste the more the organs become affected with the changes mentioned. This condition of auto-intoxication is ever in evidence in pregnancy, and a constant lookout must be kept that it does not assume too great proportions.

## ECLAMPSIA.

*Some General Features of the Disease.* Generally speaking, complication of latter half of pregnancy; occurs about 1 in every 500 cases; more frequent in poorer classes than in wealthier and more leisured. Much more frequent in primagravida. Relatively more frequent in multiple pregnancy, and where there is any over-distension of the uterus. Seizures begin in 60 per cent. during labour, 20 per cent. during pregnancy, 20 per cent. during puerperium. Specially severe in certain years and in certain periods of the year; climatic influences. Slowly developing disease which gradually gains strength; generally preventable.

## PATHOLOGICAL ANATOMY.

Organs specially affected: kidneys, liver, brain, heart. Less constant similar changes in all others occur: spleen, intestines, etc.

*Kidneys*, 99 per cent. Degeneration of epithelium of convoluted tubules, cloudy swelling, fatty degeneration going on to coagulation necrosis in grave cases. Many capillary haemorrhages and thrombi. Degree of disturbance in tissues very variable, sometimes not more than cloudy swelling, but in grave cases great destruction of tissue.

*Liver*, 95 per cent. Very variable in severity. Degeneration of individual cells; in grave forms necrosis of smaller and larger areas of cells, fibrous thrombi intra and inter-lobular capillaries, haemorrhages; periphery of lobules specially affected.

*Brain*, 90 per cent. Larger or smaller haemorrhages and areas of necrosis, thrombi in capillaries of both cortex and central regions. *Heart*, 60 per cent. Cloudy swelling and fatty degeneration of muscle fibres, necrosis and interstitial haemorrhages.

Intestinal tract, pancreas, spleen, thyroid, etc., show similar changes, but less constant. *Blood.* Increase of white corpuscles and red corpuscles doubtful, and fibrin increased (?).

*Etiology.* The reasons for above changes uncertain. Probably secondary to poison or poisons produced. These injure excretory organs, and so more poisonous material accumulates in system. Nature of poisonous material not known. (1) Autolysis in cells of different organs, especially of liver cells. (2) Ferment from placenta. Everything very uncertain. There is no evidence in support of the view that the disease is due to bacterial infection.

*Clinical Features in different stages of Disease.*

1. Premonitory or pre-eclamptic stage.
2. Acute stage; convulsions.
3. Recovery stage.
4. Dying stage.

(1) *Premonitory Stage.* Premonitory symptoms present in over 90 per cent. of cases; "fulminating" type very rare indeed. Symptoms are: (1) *Headache*, which may continue for weeks, usually frontal, sometimes occipital, gets specially severe when convulsions imminent. Present in 70 per cent. of cases. (2) *Sickness and vomiting, but especially epigastric pain*; latter when severe usually means seizure imminent. (3) *Disturbance of vision* amounting to complete blindness, then convulsions imminent. (4) *Urinary symptoms*; large quantity of *albumin* only very *occasionally absent*; urea diminished. (5) *Oedema* often very slight in eclamptic cases. (6) Severe pain in back, etc. (7) Great restlessness, especially before seizure.

(2) *Acute Stage.* Commencement usually convulsions (sometimes begins with coma—this always very grave variety). After great restlessness twitchings begin about muscles of face round about angle of mouth. These convulsions generally same as epileptic seizure but no cry, as clonic spasms gradually pass off patient becomes comatose. At first patient wakes up from coma after ten minutes or so, and is sensible until another fit. Gradually coma becomes constant between fits. Frequency, number, severity of fits most variable. During this stage albumin greatly increased.

(3) *Recovery Stage.* Coma gradually passes off and patient generally becomes very restless, often maniacal—gradually becomes less dazed, but complains of headache, then often after many days quite clear and intelligent; not infrequently a considerable period of mental disturbance (for days, months); must be watched very carefully. Albumin often disappears very rapidly, but if it has been present for a long time it disappears much more slowly.

(4) *Dying Stage.* Coma deepens and hypostatic congestion of lungs and cardiac failure supervene. Death, no doubt, sometimes due to cerebral haemorrhage.

*Prognosis.* Very difficult, must exercise great caution. Following features influence it: (1) *Type of disease.* Most variable, but generally type grave or mild according to time of year and climate. (2) *Time of onset.* Generally most grave when convulsions begin in pregnancy, less grave if they commence in the puerperium, and least grave when they commence in labour, and especially if they commence late

in labour. (3) *Frequency, severity and duration of fits.* Naturally more grave if these pronounced, but more important is degree and duration of *coma*; most grave if early and pronounced coma. (4) *Condition of urine.* Good output better the prognosis. The quantity of albumin influences slightly the prognosis; more important is quantity of urea, especially in premonitory stage. Bile present always grave prognosis. (5) *Response to treatment.* Most favourable when respond immediately to treatment.

### *Treatment.*

*Prophylactic.* Disease largely preventable. Attend to any minor discomforts in digestion, simple food, plenty of fluid between meals, regulate bowels, examine urine regularly, if need be estimate urea, which is rough index of waste output.

*Premonitory Stage.* Stimulate all excretory organs. *Bowels.* Saline purgatives are best. *Skin.* Warm clothing, hot packs and vapour baths if need be. Pilocarpin dangerous, as it aggravates oedema of lungs. *Kidneys.* Large quantities of fluids—skim and butter milk amongst the best. Diuretic mixtures useful. *Lungs.* Fresh air. Thyroid extract said to be useful. If seizure distinctly threatening, absolute rest in bed; only fluid food. Venesection and saline infusion. Induction of labour in very grave cases.

*Acute Stage.* Protect patient during seizures from falling out of bed and biting tongue. Give 2 oz. salts by stomach tube (croton oil too uncertain). If patient too dazed, hot pack and steam bath if no oedema of lungs (otherwise just as dangerous as pilocarpin). Venesection in all cases (some prefer only in plethoric) and transfusion of normal saline solution into veins, cellular tissue, or into rectum. This dilutes poison, stimulates heart, and acts as a powerful diuretic. *Medicines.* Chloral or morphia only if necessary, and fits cannot be arrested by other means. *Chloral*—with or without bromide of potash 20 grs., with 25 grs. of bromide repeated if patient very restless; give by stomach tube or by rectum. *Morphia*—gr. $\frac{1}{2}$, if still restless $\frac{1}{4}$ every hour, until $1\frac{1}{4}$ grs. has been administered.

Many favour accouchement forcé with Bossi's dilator, Vaginal Caesarean section, Abdominal Caesarean section. Decapsulation of Kidneys as a last resort. If labour in progress, manual dilatation and delivery of child by forceps or version.

*Hyperemesis Gravidarum* (also termed pernicious or excessive vomiting of pregnancy) usually succeeds period in which vomiting moderate, but sometimes "fulminating" variety. Ordinary vomiting of pregnancy and other digestive troubles in 80 per cent. of pregnant women—begins early and ends in fourth month usually. Grave vomiting or hyperemesis occurs about 1 in 700 cases.

Three types of hyperemesis (Williams): (1) Reflex, (2) Neurotic, (3) Toxaemic.

(1) *Reflex.* Examples found in displacements of uterus, especially anteflexion, chronic inflammatory affections, and tumours of uterus and adnexa—usually most marked in first half of pregnancy. Treatment is to relieve these conditions by pessary vaginal douche, glycerine tampons, and operation. Must also attend to food and excretory organs, so as to keep metabolism satisfactory. (2) *Neurotic.* This type often associated with history of neurasthenia and indigestion, etc., but sometimes not. Careful dieting most important; sometimes necessary to stop all food by mouth and feed for week or ten days by rectum. Less grave cases small quantities peptonised milk at short intervals; chips of frozen milk often do good. This type may benefit from all manner of drugs; gastric sedatives, especially oxalate of cerium 5-7 grs. thrice daily supposed to be specially valuable in this condition. In very obstinate cases isolation in patient's own home, or, better still, a nursing home has wonderfully beneficial effect sometimes.

(3) *Toxaemic.* Most serious of all, usually seen in second half of pregnancy, and in most cases there has been a long period when vomiting was moderate. Many of cases have passed from type 1 and 2. If vomiting continues, great emaciation, temperature rises, pulse quickens, syncope, coma, and even death. Lesions found in liver in fatal cases same as those found in eclampsia. If all treatment fails to arrest vomiting, uterus must be emptied. N.B.—*Do not delay too long before emptying uterus, otherwise patient may not stand operation.*

*Jaundice and Acute Yellow Atrophy. Jaundice* not infrequent in connection with eclampsia and pernicious vomiting. *Acute Yellow Atrophy* when it occurs is a most grave condition, and is undoubtedly toxaemic in origin. Begins early with sickness, malaise, and after a time jaundice. These may increase and go on to excessive vomiting, jaundice, coma, convulsions, death. The urine is scanty, high-coloured, and contains leucin and tyrosin. The temperature rises as disease increases in severity. Distinct diminution of liver dulness may be made out in grave cases. Abortion may occur and give relief, but usually it is too late, and death follows. If suspected the only treatment, after giving a trial to ordinary remedies to improve elimination, is to empty the uterus, but the great mistake is generally made of delaying too long. In fatal cases of this disease, the liver parenchyma may be completely necrosed. The kidneys frequently are extremely necrosed.

## AFFECTIONS OF REPRODUCTIVE SYSTEM.

*Displacement of the Uterus. Anteflexion. In early months*—normal condition; often associated with excessive vomiting. Incarceration never occurs. *Treatment.* Pessaries and plugs in vagina little value. Postural treatment—pelvis raised sometimes beneficial. *In later months* specially marked in contracted pelvis, and if abdominal wall weak. In former, condition cannot be relieved; in latter, firm binder very useful. Specially troublesome sometimes after vaginal fixation, less so after abdominal fixation.

*Retroversion and Retroflexion* not infrequent. *Etiology*—been previously displaced in most of cases. Very occasionally acute retroflexion occurs during pregnancy from fall, etc, occasionally also caused by tumour of ovary or uterus. Overdistension of bladder is not a cause, but a result of the condition. *Clinical Features.* In large number of cases spontaneous reposition occurs. It is a frequent cause of recurrent abortions. Often no symptoms until uterus becomes incarcerated. This most frequent at end of third month, but sometimes a little later. Occurs earlier with "retroflexion" than with "retroversion." Earliest and most characteristic symptom, "*Dysuria*," going on to complete retention or "overflow incontinence." This caused by pressure of cervix on neck of bladder producing paresis of bladder and oedema. Bladder wall and portions of mucous coat, and even muscular and peritoneal coat expelled per vaginam. Cystitis naturally follows (pus and blood and blood clots expelled). Pressure of distended uterus also causes pelvic pain and obstinate constipation (one or two cases of intestinal obstruction recorded). General disturbances with sickness and vomiting follow later. If condition neglected patient may die of sepsis. Bladder has ruptured on several occasions. *Differential Diagnosis.* Diagnosis often not easy, although retention of urine rarely so complete with any other condition. On bimanual examination an elastic swelling in pouch of Douglas continuous with cervix is easily distinguished. Two conditions closely resemble it. (1) *Tumours* (ovarian cyst or myoma) in pouch of Douglas. In this condition cervix rarely drawn up so high. Generally possible to differentiate uterus from tumour, but with soft myoma very difficult. Especially difficult if coexisting pregnancy. Tumour can often be pushed

out of pelvis, but must be cautious in case it is. (2) *Sac of Ectopic Pregnancy.* In this condition often slight dysuria. But usually also history of some haemorrhagic discharge and recurrent attacks of abdominal pain or uneasiness. Sac rarely exactly in middle line, and cervix rarely so high up. In cases of great difficulty, uterine sound should be passed. Must be very careful in bimanual examination in case of doubt.

*Treatment* should first be directed to the bladder; keep bladder empty; if cystitis, wash it out with boracic solution. Try this for a couple of days. If uterus does not rise, then pressure with patient in "knee elbow" position or Sim's position. If still does not rise, leave for day or two, for sometimes it rises spontaneously after manipulation. If still does not rise, repeat manipulation under chloroform anaesthesia. If still unsuccessful, introduce watch-spring pessaries or Champetier de Robes bag and keep in for twenty-four hours, as sometimes constant pressure pushes uterus up. After replacement pessary should be introduced and worn until end of fourth month. In very obstinate cases abdominal section, except in cases where septic peritonitis; in such, empty uterus from vagina and drain pelvis.

*Partial Retroflexion.* Now more generally referred to as "Sacculation" of the gravid uterus. A portion of the uterus remains in the pelvis while the remainder developes in the abdomen. The condition may be produced by adhesion, keeping fundus fixed in Douglas pouch, or by tumours of uterus (fibroids), or ovarian preventing the uterus from rising up as it developes. But in some cases neither of these conditions has been present. As the portion imprisoned in Douglas pouch becomes rather oedematous, the condition is very confusing. What makes it specially so is the fact that the urinary trouble rather lessens as pregnancy advances. It simulates most closely: (1) pregnancy with a co-existing tumour of uterus or ovary, (2) ectopic pregnancy. A careful bimanual examination under anaesthesia will usually result in a correct diagnosis being arrived at.

*Treatment.* When reduction of the Sacculation is impossible, abdominal section should be performed. Extreme difficulty has been experienced in such cases in delivering the child per vaginam.

*Lateral Displacement of Uterus.* Slight degree common, especially in second half of pregnancy, the uterus is usually to right. *Marked lateral displacement about end of third month* when junction between body and cervix very soft (Hegar's sign) not infrequent, and may closely simulate co-existing tumour (ovarian cyst or myoma) and ectopic pregnancy. Careful bimanual examination will clear up diagnosis. No treatment necessary.

*Prolapse of Uterus.* Nature of condition readily recognised. Patient complains of feeling of weight and bearing down. Abortion not infrequent. Uterus usually rights itself as it enlarges. No case of pregnancy going to term with complete prolapse. Replacement usually easy; watch-spring pessary should be introduced to retain uterus in position, and kept in until end of fourth or fifth month. If cervix elongated and protrudes, danger of sepsis; must be most careful to prevent this at time of labour.

*Hernia* of uterus into inguinal canal very rare, and pregnancy in a uterus so situated extremely so. There are a few cases on record, however. *Ventral Hernia.* Presence of gravid uterus in Ventral Hernia causes dragging and great discomfort only relieved by firm abdominal binder. Favours malpresentations. There have been once or twice difficulties during labour when pillars of sac caught child. Same difficulties if recti muscles separated. *Hypertrophy of cervix.* Sometimes very great, but very rarely causes trouble during pregnancy and labour; wonderful how

it softens during labour. Best left alone, and not amputated unless necessary. If necessary to amputate, best time early in labour. Distinct danger of septic complications from large eroded cervix.

*Acute Oedema of Cervix.* Condition occasionally developes quite suddenly in slightly prolapsed uterus. *Oedema of Anterior Lip of Cervix.* Quite common complication of labour from pressure between head and symphysis pubis. Usually can be relieved by pressing lip over head during pain. This and other conditions considered in connection with parturition, for only then do they cause any trouble.

*Endometritis.* Acute from pyogenic organism, or from gonorrhoeal infection, usually serious only after delivery.

*Chronic Endometritis.* Existed of course before pregnancy; favours abortion, "accidental" and "unavoidable" haemorrhage. Sometimes associated with a peculiar condition "*Hydrorrhoea Gravidarum.*" This is an irregular watery discharge in the later months of pregnancy. It simulates premature rupture of membranes which may occur at any time. (Pregnancy after rupture of membranes may continue "grossesse extramembraneuse." In such a condition discharge more or less continuous, and often slightly blood stained. Appearance of placenta and retracted membranes characteristic.) In hydrorrhoea gravidarum discharge ceases for some time, and seems to accumulate, and then comes away in irregular gushes.

*Metritis.* Very rarely indeed acute; that liable to occur after delivery. *Chronic* favours abortion, sometimes associated with good deal of pain during pregnancy. Favours complications such as accidental, unavoidable, and post-partum haemorrhage.

*Malformations and Tumours.* Conditions considered in connection with the Pathology of Labour (p. 68).

## AFFECTIONS OF VAGINA AND VULVA.

*Vaginitis.* Leucorrhoea during pregnancy often very troublesome and distinctly dangerous if vaginitis is caused by gonococcic infection. Danger especially in puerperium, although may spread to uterus even during pregnancy. Ordinary leucorrhoeal, discharge often result of pressure, and can be relieved by supporting uterus with abdominal belt in latter months and regular vaginal douching. Patient must be instructed how to sterilise vaginal nozzle tubing and douche can. A gonorrhoeal infection must be dealt with by medical attendant, who should apply a weak solution of chloride of zinc to the vagina. This should be done by introducing a speculum, carefully washing out the vagina, then filling up the speculum with fluid, and slowly withdrawing the speculum. By that means the whole surface of the vagina has the solution applied to it.

*Pruritus.* General pruritus very distressing, generally manifestation of toxaemia—Sedatives useful; diet most important; Salisbury diet often useful. Lactate of calcium useful sometimes. *Pruritus Vulvae.* This is generally associated with vaginal discharge; astringent douches and sedative lotions or ointments. Liq. Carbonis detergens, lead and opium lotion, cocaine ointment. Calcium salts of value here also.

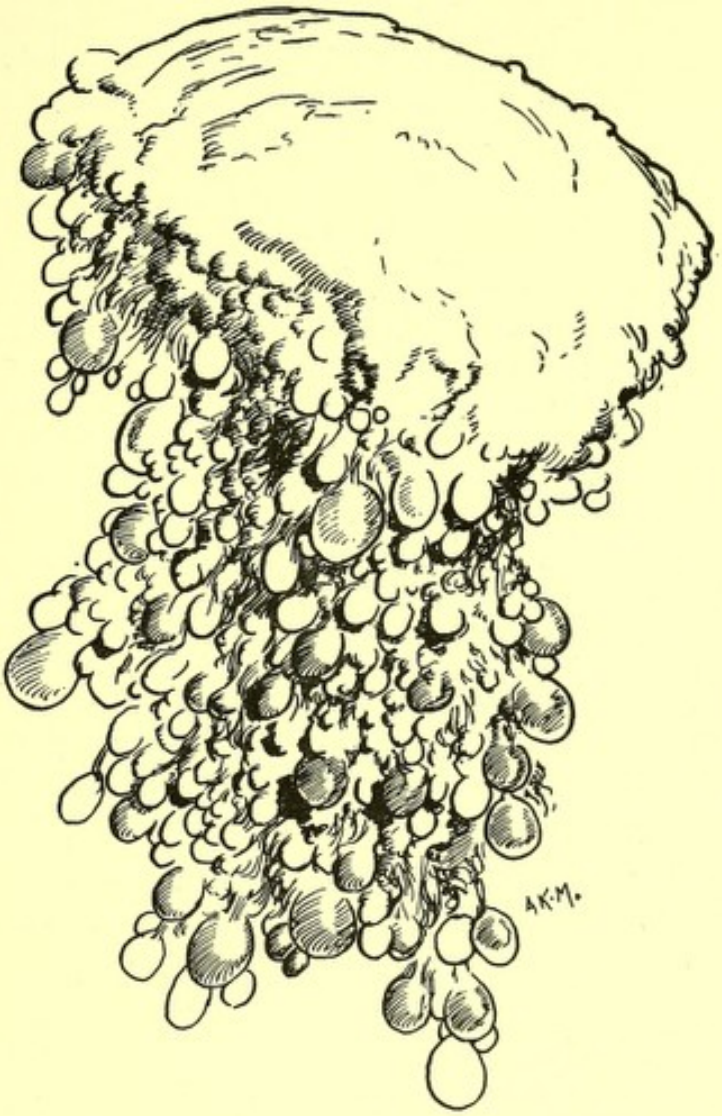
Urine should always be examined in case any sugar present.

*Herpes and Impetigo* are specially troublesome, and the latter very serious in pregnant women.

*Oedema* of Vulva may be part of general oedema. Sometimes present when little general oedema. Disappears with rest in the recumbent position and general treatment. If present during labour, punctures may be necessary.

*Bartholin's Glands.* Inflammation very often gonorrhoeal in origin. May be very serious if discharges during labour. Gland should be excised not simply incised.

*Diseases of Chorion.* Hydatidiform or Vesicular Mole (Cystic degeneration of chorion, Myxoma Chorii) is comparatively rare complication. Most frequently between twenty-five and thirty-five. Begins early in pregnancy. Most generally whole ovum involved, when generally no trace of foetus to be found. If degeneration occurs late, sometimes only trace of degeneration in a portion of the placenta. *Pathology.* Consists of a cystic




degeneration of the terminal villi. Cystic structures vary greatly in size; some small, only a millimetre or less in diameter, others size of hazel-hut. Virchow considered the condition a myxomatous degeneration of the chorion. *Marchand* contributions to the subject are the most important. He found that both Syncytium and Langhan's layer show marked and irregular proliferation. These masses of cells often burrow deeply into the decidua and even into the muscular wall of the uterus (rupture has occurred from this condition). The blood-vessels of terminal villi disappear and stroma becomes degenerated. Fluid from vesicles gives no reaction for mucin. Frequently associated with cystic degeneration of ovaries and especially lutein cysts; questionable if of any significance. Some moles more malignant than

others, but histologically no difference. Condition entirely connected with chorion; uterine tissues nothing to do with it. *Clinical Features.* (1) Size of uterus out of all proportion to size of foetus. At three months sometimes as large as seven months' pregnancy. (2) Haemorrhagic watery discharge, sometimes with small vesicles broken off from the mass; haemorrhage is often very slight but sometimes very abundant. (3) General disturbance, not infrequently absorption of necrosed and disintegrated masses lead to rise of temperature and pulse and cachexia. Occasionally metastatic growths appear in vagina, lungs, etc. *Diagnosis.* Generally not difficult; history very characteristic and great size of uterus. Seen it mistaken for placenta praevia. In cases of doubt watch for week or two, and, if not necessary before that time, dilate cervix and explore interior of uterus.

*Treatment.* Carefully remove the mass with fingers; cervix must be very gradually dilated as otherwise it may rupture. Having dilated cervix, use fingers, not a curette, to remove mass. Remove mass very gently in case of lacerating wall, then give hot intra-uterine douche. Patient must report herself every few months for some years, as chorion-epithelioma frequently follows.

*Chorion-Epithelioma.* Malignant growth composed of proliferating masses of chorionic epithelium. First described by Sänger in 1892 when considered by him a decidual sarcoma. Consists of masses of both Syncytium and Langhan's cells with numerous haemorrhages in their substance. Specially liable to have metastatic growths in lungs, vagina, and brain. *Clinical Features.* Can only develope after a pregnancy; generally after an abortion, and in 50 per cent. after a hydatidiform mole. Has originated from an ectopic pregnancy. Very occasionally has developed after a full time normal pregnancy. Sometimes earliest symptoms are those arising from metastatic growths, *e.g.* if in lungs, cough and haemorrhagic spit. Very generally condition made certain by history of a vaginal haemorrhagic discharge coming on a week or two after an abortion or rarely after full time labour. Bleeding may be sometimes very severe. Often discharge clears away for a time and then recurs. *Diagnosis.* May sometimes be difficult; condition usually thought to be result of some portion of ovum or placenta having been left behind in uterus. The uterus is curetted, and again bleeding recurs. In all cases of doubt the curette should be carefully employed, and the material removed microscopically examined. *Treatment.* If uterus contains chorion-epithelioma, immediate hysterectomy. Vaginal hysterectomy very suitable in this condition.

*Myxoma Fibrosum.* This condition is considered under the subject of "White infarctions" of the placenta.

## DISEASES OF AMNION.

*Hydramnios* (*Hydrops Amnii*). Excessive quantity of liquor amnii; sometimes as much as 4–5 gallons (normal quantity 2–4 pints). Generally comes on gradually, but occasionally suddenly, when it is termed "acute hydramnios." It is generally a complication of the second half of pregnancy. The liquor amnii is of usual composition. *Etiology.* Source of liquor amnii uncertain, so impossible to be certain about abnormal condition under consideration. No evidence that it is a syphilitic manifestation. Very generally some abnormality in foetus (although occasionally apparently quite healthy children born), such as malformations of foetus, enlargement of foetal liver, disease of placenta. Specially striking is the frequency of the condition in uniovular twins, and the fact that the foetus in the sac containing the hydramnios has its heart and kidneys hypertrophied. Some believe it is due to excessive urinary secretion (the condition has been found when foetus had atresia of urethra). Occasionally cardiac and renal diseases in the mother associated with hydramnios, but questionable how far these conditions are the

cause. Acute condition may follow an injury. *Symptoms* Cause great discomfort from pressing on surrounding parts, sickness, oedema of legs, difficulty in breathing, and cardiac disturbance. These especially marked in acute cases.

*Diagnosis.* Palpating abdomen fluctuant wave over whole of large globular swelling. Foetal heart sounds difficult to hear and foetal parts difficult to palpate. Ballottement distinct. Condition not unlike an ovarian cyst, especially a parovarian cyst. History and presence of ballottement most valuable. But pregnancy with an ovarian cyst sometimes confusing. Ascitis should not be mistaken for this condition; percussion clears that up. *Treatment.* If slight, leave case alone. In serious cases membranes should be punctured, and liquor amnii allowed to drain away gradually. Labour soon comes on. Be prepared for post-partum haemorrhage with hot douche and ergotin.

*Oligo-hydramnios.* Unusually small quantity of liquor amnii. Specially liable to have adhesions between foetus and amnion (amniotic bands). Two conditions have been found associated with this complication—malformation of urinary organs and thickened skin.

*Amniotic Adhesions.* Especially in cases when liquor amnii is scanty. All varieties of deformities may result.

## PLACENTA.

*Abnormalities of Formation.* These result from developmental errors and alteration in blood supply. Greater part of uterus may be covered by diffuse placenta (placenta membranacea). May be divided into a number of lobes (bipartite, tripartite, etc.). Each may be quite distinct from other with vessels running from each (placenta duplex or placenta succenturiata). This latter condition serious because a lobe may be left behind in the uterus. It might be suspected if a hole is found in membranes, and if in spite of the placenta coming away apparently complete haemorrhage occurs in puerperium. The placenta has sometimes a hole or defect in its substance (placenta fenestrata). If inserted to lower segment (placenta praevia). If the blood-vessels divide on the surface of membranes (placenta velamentosa). If cord inserted at margin of placenta (battledore placenta). If edges of placenta rise up round margin of chorion (placenta circumvalata). *Weight.* Usually a little over a pound. May be of great size, especially in syphilis and foetal dropsy, when it may weigh three or four pounds. In the toxaemias of pregnancy it is usually found enlarged.

*Diseases of Placenta.* Pathology of placenta not very satisfactory. *Infarctions.* All placentae have areas of obliterated villi. These, if only small, of no importance, but if extensive may interfere seriously with nutrition of child. These are senile manifestations, due in first instance to an endarteritis obliterans. Then follows a coagulation necrosis and fibrin formation, which binds together neighbouring villi. The appearance of these infarctions is white. *Red Infarctions.* If single not of much consequence, but if numerous they are not infrequently manifestations of chronic toxaemia, especially of renal origin and syphilis.

*Myxoma.* Very occasionally areas showing degeneration already referred to in connection with "hydatidiform mole" are found in the placenta. If of small size may not interfere with development of child. *Myxoma fibrosum* are simply white infarctions. Masses of degenerated villi with large dilated vessels running in substance (chorioagiomata) of no great significance and very rare. Other tumours, such as sarcomata, very doubtful.

*Cysts.* Most commonly on surface of placenta, underneath the amnion, result from degeneration of infarcts.

*Intra-uterine Death.* Diagnosis of this is difficult *in early months*, and can only be absolutely determined if uterus found not to increase in size. *In later months* cessation of foetal movements and absence of foetal heart sounds. Must always remember sometimes very difficult to hear heart sounds, even when pregnancy far advanced. Sensations such as feeling of weight, coldness in lower part of abdomen and general malaise, although said to be features of death of foetus, cannot be relied upon. If in doubt, watch uterus; if death has occurred, it will become smaller and breasts will become flabbier. For treatment, see Missed Abortion (p. 60).

## ABORTION—MISCARRIAGE.

*Abortion and Miscarriage.* Terms generally used indiscriminately. Sometimes distinguished; abortion implies expulsion of ovum before the sixteenth week, when decidua vera and reflexa become fused, and miscarriage implies expulsion of ovum between the sixteenth and twenty-eighth week.

*Frequency.* Difficult to estimate, but about every sixth or seventh pregnancy terminates in abortion. *Etiology.* Common to divide the causes into: I. Foetal, II. Maternal, III. Paternal.

I. *Foetal*—death, disease and malformation. The most important are errors in development and syphilis.

II. *Maternal.* (1) Diseases of different systems. (*a*) *Disease of Reproductive System.* Endometritis and backward displacement of the uterus most important. Tumours, especially fibro-myomata of uterus and adnexa. (*b*) *Excretory System.* Toxaemias, especially those associated with disease of liver and kidneys. (*c*) *Digestive System*—excessive vomiting. (*d*) *Nervous System, e.g.* chorea. (*e*) *Vascular System*—chronic valvular disease of the heart. (*f*) *Respiratory*—such as pneumonia, bronchitis, etc.

(2) *Poisons. Toxaemias*—poisons of *specific fevers*, especially smallpox, typhus, syphilis. *Metallic* poisons, as lead and mercury, gradually accumulating in system.

(3) *Accidental falls, injuries, etc.* Often exciting, but seldom real predisposing cause.

(4) *Criminal.* Ergot, savin, quinine, instruments.

(5) *Habit.* Repeated abortion. Rarely satisfactory explanation. Irritability of uterus varies greatly; in some individuals least fright, excitement, etc., sufficient, others can stand any accident. This also seen in connection with the operation of induction of labour; sometimes days before uterus will become active.

Most important causes of abortion are endometritis, backward displacement, syphilis, toxaemia.

III. *Paternal.* Syphilis most important, old age and debilitating diseases, such as diabetes, said to favour it.

*General Remarks.* Usually occurs at or about what would have been a menstrual period. In most cases small haemorrhages occur into the decidua serotina, and that leads to separation of ovum and its expulsion as a foreign body. In a few cases the uterus becomes active, and that leads to separation and haemorrhage and expulsion of ovum. In the first half of pregnancy the ovum is usually expelled more or less complete, but in the second half it resembles a normal labour, and first foetus, and then placenta, is expelled; even in later months foetus, placenta, and membranes may be expelled intact. When ovum is retained for any length of time in the uterus it may undergo dissolution, sometimes no trace of embryo to be found; usually small and shrivelled up embryo can be distinguished. Maceration very frequent. Mummification except in twin pregnancy, when one foetus dies, is very rare. Still rarer, retention for years and formation of "lithopoedion."

Retained embryo, if surrounded by membranes in which much effused blood, is generally referred to as a "mole." If great effusion into chorion, spoken of as tuberous mole.

*Symptoms.* (1) Pain, (2) haemorrhage, (3) dilatation of cervix. Degree of pain varies; in early weeks often very little. Haemorrhage often very severe even in quite early abortions. Dilatation of cervix varies, but usually not very great when case first seen.

*Varieties.* (*a*) Threatened.
(*b*) Inevitable (1) Complete.
(2) Incomplete.
(3) Missed.

*Threatened. Threatened Abortion.* Pain and haemorrhage; not great haemorrhage, only slight. If large clots, and much dilatation of cervix, abortion is usually inevitable. *Diagnosis.* May be question if woman pregnant; size of uterus, history, conditions of breasts guide one to a diagnosis. Must always exclude possibility of extra-uterine pregnancy by careful bimanual examination. *Treatment.* Treat case as threatened until compelled to conclude it is inevitable. Absolute rest in bed, light diet, sedative, such as opium by mouth or morphia hypodermically or as suppository, gr. $\frac{1}{4}$. In more chronic cases bromide, gr. xx, or ext. viburnum prunifolium 40–60 minims thrice daily useful. Liquid extract of ergot in small doses, 10 min., recommended by some. Purgatives to be avoided, bowels should be emptied by enema. When next period would have been due had pregnancy not occurred, rest in bed and sedatives.

*Inevitable. Complete.* Entire contents, embryo, membranes and placenta expelled. Can only be certain that abortion is complete if have seen that everything has been passed. If slightest doubt, explore uterus with finger. When abortion complete, haemorrhage soon ceases and cervix closes and uterus diminishes in size. If satisfied "complete," keep patient in bed few days. Douche only if manifestations of sepsis.

*Incomplete.* Great majority of abortions one sees are incomplete. Haemorrhage continues (sometimes at intervals), often very considerable. Os remains dilated and uterus enlarged (if only a very small portion of ovum left cannot rely on these features, haemorrhage will sooner or later return). In early months very often ovum and decidua reflexa come away and decidua vera left behind. Uterus must always be explored and completely emptied; finger best instrument; curette not nearly so good. Steady uterus from above and push finger through cervix, or rather push uterus down on finger. If not sufficient dilatation, *dilate with* metal dilator, sea tangle tents or gauze. If cervix very soft, metal dilator; if cervix quite rigid, better use sea tangle tents, and pack vagina with iodoform gauze. If much bleeding, pack uterus and vagina. When finger can be inserted, separate ovum completely. Then "express" by pressure between hand above and two fingers in anterior fornix. If ovum cannot be expressed, seize with "ovum" forceps. After emptying uterus with finger, go over surface with curette and douche out uterus with antiseptic lotion at temperature 115°. Full dose of ergot by mouth or ergotin hypodermically should be given.

*Missed.* In this variety abortion is threatened and quiets down, but ovum dies and is retained in utero.

It is often not expelled until what would have been "full time" is reached. Diagnosis often very difficult, and can generally only be determined by waiting to see if uterus increases in size. Usually in a typical case of this variety there is no discharge. *Treatment. Expectant.* Sooner or later ovum expelled. *Operative.* Dilate and treat as in incomplete variety. Personally I prefer former, and only have recourse to latter if general disturbance or continuous discharge.

*Prophylactic Treatment* Often most disappointing. Rest at "period times." If more than one abortion has occurred, rest in bed for five months. Prior to the pregnancy correct any displacement and introduce a pessary. If endometritis, curette. If syphilis, treat both parents for year. During this time no intercourse. When pregnancy occurs keep mother on antisyphilitic treatment. Sedatives such as extract viburnum prunifolium or potassium iodide often useful. Citrates to lessen coagulability of blood and favour excretion of waste. Chlorate of potash, 5 gr., thrice daily often prescribed. Seems sometimes to do good. Food should be simple, and bowels very carefully regulated.

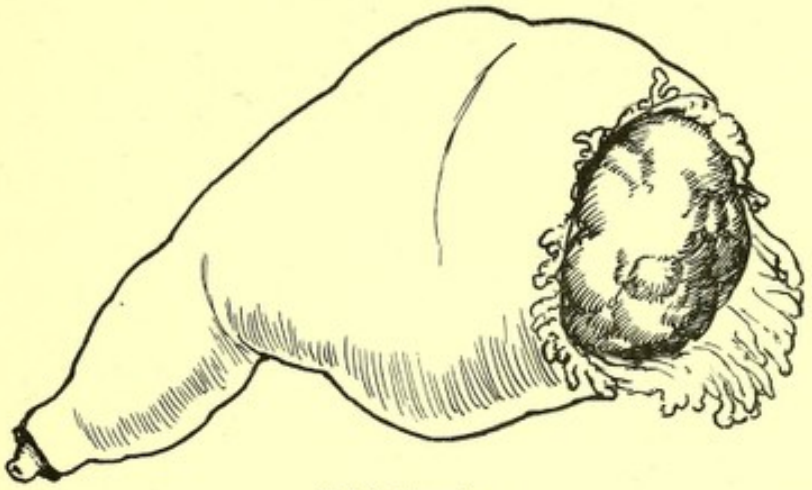
*Dangers of Abortion.* Septic infection of uterus and tubes very common, especially amongst poor, because no importance attached to an abortion. Subinvolution and endometritis from portion retained. Displacement of uterus. After expulsion of hydatidiform mole, chorion-epithelioma often developes.

## ECTOPIC OR EXTRA-UTERINE PREGNANCY.

Considered at this point because often simulates or is simulated by abortion.

*Pathological Anatomy.* Implantation may occur in different parts of tubes. It does so in following order of frequency: (1) Ampulla, (2) Isthmus, (3) Infundibulum, (4) Interstitial portion of tube, (5) Ovary, (6) Abdomen. Wherever ovum implants itself, destruction of tissue by the trophoblast occurs and haemorrhages result later; if pregnancy uninterrupted, formation of placenta (p. 29) corrodes tube wall.

I. *Ampulla.* (*a*) *Tubal Abortion.* Rather more frequent than tubal rupture.



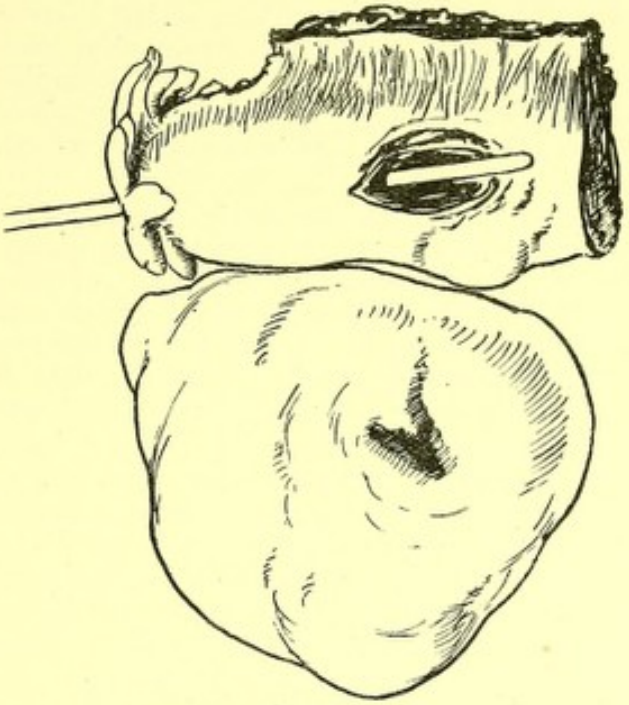
Tubal Abortion.

(*b*) *Tubal Rupture* from destruction of the tube wall by trophoblast and villi of chorion. Rupture often gradual process. Tube wall corroded; other times tube suddenly gives way. When rupture occurs it may be (1) Intra-peritoneal or (2) Extra-peritoneal. Rupture most commonly 5–7 weeks.

(1) *Intra-peritoneal Rupture* usually ends in profuse intra-abdominal bleeding, and if left alone a pelvic haematocele forms in Douglas pouch. Sometimes pregnancy goes on with placenta attached to tube, and ovum surrounded by membranes developes in general peritoneal cavity (tubo-abdominal).

(2) *Extra-peritoneal Rupture* between layers of broad ligament usually ends in a haematoma of ligament. Not infrequently, however, pregnancy goes on developing to later months when spoken of as "broad ligament" pregnancy; "Subperitoneo-

pelvic," and "Subperitoneo-abdominal," when it extends up from pelvis into the abdominal cavity. Very occasionally a second rupture into the peritoneal cavity occurs, then pursues course of an ordinary intra-peritoneal rupture (*vide* above).



Tubal Rupture, showing rupture and ovum.

(*c*) *Formation of Mole.* Very common. This may be associated with pelvic haematocele from slow "drip-drop" escape of blood from fimbriated end of tube. Rupture may occur, but more often keeps up irritation in pelvic organs. May suppurate and form pyo-salpinx.

(*d*) *May develope to later months without rupture.* Very rare.

II. *Isthmus.* Theoretically all the above terminations may occur, but almost invariably the tube ruptures and the special feature of the rupture is that it is intra-peritoneal, is accompanied with profuse haemorrhage, and is usually very early. Often occurs before any period missed. Implantation in this part of tube furnishes "fulminating" type.

III. *Infundibulum.* Nothing special. All terminations mentioned in connection with ampulla implantation may occur.

IV. *Interstitial* (graviditas in substantia uteri). Here usual termination is intra-peritoneal rupture which is usually late—third month. Bleeding is always very severe because of presence of uterine vessels. No doubt many cases terminate by intra-uterine rupture, and ovum is expelled as a uterine abortion, or goes on developing in the uterus. Rupture into broad ligament not recorded, neither any record of pregnancy going on to late months. Mole and haematoma may form and gradually shrink and become part of the uterine wall.

V. *Ovary.* Not many cases recorded. Rupture into peritoneal cavity usually occurs, but pregnancy may develope in substance of ovary.

VI. *Abdomen.* Very few cases indeed. Ovum may be implanted upon any peritoneal surface. May develope in later months or sac may rupture.

An ectopic sac is usually situated behind and to the side of uterus, seldom

exactly in Douglas or in utero-vesical pouch. It soon contracts adhesions to surrounding parts, and displaces uterus most commonly upwards and forwards. Uterus becomes much larger, and its mucous membrane greatly thickened. This decidua which forms is indistinguishable from decidua of ordinary uterine pregnancy.

*Clinical Features.* As seen at bedside, can distinguish four groups or types. (1) Woman suddenly struck down with abdominal pain, extreme collapse, with all symptoms of rupture of abdominal viscus. (2) Woman suffers for some time from abdominal uneasiness, pain, occasional faintings, and haemorrhagic vaginal discharge. (3) The woman suffers from pelvic haematocele. (4) The woman is found advanced in pregnancy.

(1) *Type.* Woman struck down suddenly with acute abdominal pain and extreme collapse; may be referred to as "fulminating type"; comparatively rare. Seen especially in cases where ovum implanted in isthmus of tube, when ruptures early, often before period missed. Cases of this type resemble cases of (*a*) fulminating appendicitis, (*b*) rupture of gastric or duodenal ulcer, (*c*) torsion of a pedunculated ovarian tumour. With these conditions there is seldom such extreme and sudden collapse and such blanching of face.

(2) *Type.* Woman suffers for some time from abdominal uneasiness, pain, occasional faintings, and haemorrhagic vaginal discharge. This type in 90 per cent. of cases. Most important to remember this. History of illness of greatest importance. Consider symptoms in detail. (*a*) *Abdominal pain and uneasiness.* Severity of these variable, but almost always present, caused chiefly by intramural tubal haemorrhages, also by colic of tube and uterus. Pain usually low in abdomen, and referred to one side; other cases more diffuse over whole lower quadrant. When sac becomes larger, and especially if haematocele forms, rectal tenesmus and pain on micturition are sometimes complained of. Usually rigidity over lower abdomen, especially to one side. (*b*) *Haemorrhagic vaginal discharge.* Often mistaken for menstrual period or threatening miscarriage. Blood comes from surface of uterus from which the decidua is separated, also from blood escaping from tube (doubtful). (*c*) *Amenorrhoea.* Very generally one period missed, rarely two periods missed before the pain and haemorrhagic vaginal discharge. *N.B.*—Not a few cases no distinct history of "missed period," as haemorrhagic discharge begins early. (*d*) *Nausea, sickness, faintness, even syncope* sometimes caused by haemorrhages into wall of tube, colic of tube, irritation of peritoneum. If intra-abdominal haemorrhage profuse, must naturally have these symptoms. (*e*) *Discharge of uterine decidua* purposely not considered until now because often never seen. When seen is, of course, most valuable sign. May come away piece-meal, but more frequently comes away as cast of uterine cavity. (*f*) Ordinary symptoms of pregnancy, not to be relied upon, often not present.

*Physical Examination.* Uterus usually enlarged and displaced forwards and to the side by gravid sac. Sac usually behind and to one side of uterus, rarely exactly at the side, and very rarely in front in the utero-vesical pouch. Sac often very tender to pressure. Consistency varies. Mass soon becomes larger by its growth, but also because contracts adhesions to surrounding parts—intestines, broad ligaments, etc.

*Differential Diagnosis.* In this type condition resembles salpingitis, appendicitis, and retroversion of the gravid uterus. *Salpingitis.* Long history of chronic abdominal discomfort and pain dating back to an infection; no menstrual period missed; swelling usually bilateral. *Appendicitis.* History, great rigidity of region, etc. *Retroversion of gravid uteri.* Swelling in pouch of Douglas large or more uniform than a tubal pregnancy. (This condition rarely resembles this type; more often resembles type (3).) Most confusing condition is small ovarian tumour or appendicitis with a uterine abortion.

(3) *Type.* Patient has a pelvic haematocele. Invariably, if questioned, patient has passed through second type; extremely rarely through first type She is now blanched, and complains of dull abdominal pain; often slight rise of temperature from absorption; tenesmus of bowel and dysuria very frequent. On examination, swelling is felt in Douglas pouch displacing uterus most generally upwards and forwards. Sometimes whole pelvis full of blood, and sometimes effusion so great that it extends up into abdomen, and can be felt above pelvic brim When blood becomes partially absorbed, tumour in Douglas pouch presents peculiar characteristic feeling; some parts soft, others feel hard. In this type condition most closely resembles cellulitis, retroversion of gravid uterus, myoma of uterus with pregnancy. *Cellulitis.* The history is of value, especially the fact that there has recently been a possibility of infection; temperature is raised, and there is great tenderness in Douglas pouch and in pushing upon cervix. *Retroversion of gravid uterus.* Usually can define fundus of uterus with haematocele, but not in retroversion of gravid uterus. In retroversion, history different, dysuria extreme, often complete retention. In extreme cases give anaesthetic, and, if need be, pass uterine sound. *Myoma of uterus with pregnancy.* In this condition, myoma often becomes very soft and oedematous. May be very difficult, but in myoma tumour more defined than in extra-uterine.

(4) *Type.* Ectopic pregnancy in late months Usually has passed through second type. Foetus often dies, may be after spurious labour with abdominal pain, haemorrhagic discharge, and expulsion of decidua. May, however, be alive when case comes under observation. In doubtful cases, most important to define fundus of uterus. In many cases uterus is taken to be a tumour, and ectopic sac the gravid uterus. In cases of extreme difficulty the patient should be anaesthetised, and, if need be, a uterine sound employed.

*Treatment.* Early cases, open abdomen at once and remove gravid tube securing vessels in both infundibulo-pelvic ligament and on uterine side. Generally ovary has to be sacrificed, but, if possible, save it. Remove all blood clots, wash cavity; pour in normal saline solution and close abdominal wound in layers. *Haematocele.* Expectant treatment (rest in bed, syrup of iodide of iron to promote absorption) not much favoured. Active treatment; remove all blood clot by the abdomen or through incision in posterior vault of vagina (vaginal coeliotomy). *Later months.* Great difficulty is with placenta. If child been dead for some time, placenta can be safely removed. With living child open into sac and remove child. Immediate separation of placenta should be tried, and any vessels secured that can be seized; if general oozing, pack cavity tightly with gauze, and bring out end of gauze through vaginal vault. (2) Alternative is to leave placenta, drain amnionic cavity, and then after few days remove placenta. Sepsis very apt to follow such a procedure. (3) Third alternative, tie off and cut cord close to placenta; close up abdomen and leave placenta to take care of itself. Sepsis frequently follows.

## DISEASES OF DIGESTIVE SYSTEM.

*Hyperemesis, Gravidarum, Jaundice, and Acute Yellow Atrophy* have been already considered in connection with toxaemias of pregnancy.

*Salivation* may be so extreme that several pints escape from mouth. Sometimes a pure neurosis, sometimes toxaemic. If latter, improve elimination and put patient to bed, and prescribe a milk diet for a week or two. Astringent mouth washes and large doses of atropin may be tried.

*Gingivitis.* Extreme inflammation and ulceration of gums very troublesome, careful and frequent cleansing of mouth with astringent lotions, and general tonics must be relied on.

*Appendicitis.* Condition may occur at any time of pregnancy, and is always grave if goes on to abscess formation. Features of the disease in the pregnant same as usual, but if occurs in puerperium difficult of diagnosis, because simulates so closely septic infection of uterus. Should be treated on exactly similar lines as in the non-pregnant. To induce abortion or premature labour an entirely wrong procedure.

*Intestinal Obstruction.* One or two cases where uterus has been retro-flexed, or where fibro-myoma been present. May, of course, occur as result of any of the ordinary causes producing that condition. Treatment abdominal section.

## DISTURBANCES OF URINARY SYSTEM.

*Albuminuria.* Ten per cent. of all pregnant women have albumen more or less distinct. Have referred to "Pregnancy Kidney" slight cloudy swelling of tubules probably. Reason explained in connection with toxaemias of pregnancy. (1) Pressure on renal veins. (2) Pressure on ureters. (3) Increased work on kidneys. (4) Metabolism defective. Often continues for long time, and does not yield to treatment. Danger of permanent damage to kidney quite apart from danger of eclampsia. Treatment considered in connection with eclampsia. Question often arises, should labour be induced? Certainly if albumen abundant and does not yield to treatment. After delivery, often many months before albumen disappears. Sometimes never disappears.

*Chronic Nephritis.* Becomes an extremely grave condition if pregnancy supervenes. Not only is there danger of eclampsia, but there is the danger of greatly increased injury to kidneys. Induction of premature labour or abortion must always be considered.

*Pyelitis.* Not very uncommon. Complication usually of the latter half of pregnancy comes on suddenly and so may simulate pleurisy. It is associated with rigor, high temperature, and rapid pulse. Right kidney generally affected (owing to the uterus being dextro-verted !). Most common in primipara. Severe pain is complained of in the loin, and tenderness on pressure. *Treatment.* Readily yields to treatment as a rule. Absolute rest in bed, milk diet, diuretics, urotropin. Occasionally the pyelitis, if not arrested, may develope into a pyelonephrosis.

*Floating Kidney.* In two cases seen the discomforts entirely disappeared in the second half of pregnancy when kidney pushed into its place.

*Diabetes.* Lactose not infrequently found in urine of pregnant and puerperal women, but the presence of glucose (Diabetes) is always very grave. Twenty-five to thirty per cent. of women die comatose. Abortion frequently occurs. The condition should be carefully watched and the uterine contents removed if the quantity increases in spite of antidiabetic diet. There is a slight glycosuria not infrequently found in certain women during pregnancy (possibly it is due to some affection of the pancreas). Have seen one or two cases of this kind.

*Haematuria.* May be of bladder or renal origin. Treated in ordinary way.

## DISTURBANCES OF NERVOUS SYSTEM.

*Chorea.* Usually the patients have had chorea in infancy. Always grave condition, for mortality is about 15 per cent Specially grave when movements become extremely severe and temperature rises. Induction of labour, if it is to be performed, must be carried out early ; very often it has no beneficial effect if delayed too long.

*Epilepsy.* Sometimes aggravated by pregnancy. If so, must give large doses of bromide of potash. Mother should not nurse.

*Peripheral Neuritis.* Is undoubtedly toxaemic, and this is borne out by fact that in so many cases hyperemesis precedes the neuritis. May attack either upper or lower limbs. There is paralysis of affected muscles. Gradually disappears after termination of pregnancy. May be necessary to induce labour. If not so severe, improve elimination, regulate food, and treat nerves with electricity.

*Paraplegia* occurring during pregnancy is very rare indeed. It may, however, occur in a few cases, and has persisted after delivery. Patients, the subjects of paraplegia, generally have quite an ordinary pregnancy and labour (labour painless).

*Goitre.* We have already seen that the thyroid gland enlarges slightly during pregnancy, so not to be wondered at that exophthalmic goitre is invariably made worse by pregnancy. It is questionable if it often commences during pregnancy. Seen two cases which developed shortly after a pregnancy. Once or twice tumour has attained great size. Tumour has been removed during pregnancy in a few cases, generally one relies on ordinary treatment of the condition.

*Apoplexy* is a rare condition during pregnancy, except in eclampsia. A very peculiar transient aphasia is sometimes observed, whether hysterical or organic doubtful. I once observed it in a case in eighth month of pregnancy. Been referred to by several writers.

## DISTURBANCES OF VASCULAR SYSTEM.

*Cardiac Disease.* Most commonly mitral disease. Mitral stenosis generally considered most serious, but aortic regurgitation is probably the most grave, only it is not often encountered in women. Must be remembered some cardiac murmurs heard in pregnancy are only functional. Disease tends to become worse with each pregnancy. Always grave condition if compensation fails, and prognosis is grave the earlier in pregnancy the failing compensation manifests itself. Grave cardiac lesions predispose to premature labour and intra-uterine death of the foetus. *Treatment. Pregnancy.* Patient shows no sign of failing compensation. Most important point is, do everything to favour good elimination. Diet simple, correct any digestive disturbances early, moderate exercise should be taken. Last few weeks small doses of digitalis or strophanthus. *Patient shows signs of failing compensation.* Put at absolute rest in bed and treat as before. If she improves, let pregnancy go on until labour supervenes spontaneously. If no improvement induce labour, and do not delay too long before doing it. *Management of labour.* During *first stage* watch patient most carefully, and give digitalis or strophanthus every three hours if required. If evident that right heart is embarrassed, perform venesection and remove 10 oz. of blood. *Second stage*, give anaesthetic, and extract with forceps or by version; don't allow any "bearing down." *Third stage*, encourage free bleeding, which is rarely profuse. If not enough from uterus, perform venesection. If too much post-partum bleeding, arrest it by hot douches; never give ergot. After delivery all danger not over, sometimes critical time comes in one or two days afterwards, consequently, watch patient very carefully, and administer cardiac tonics.

*Varices.* Varicose veins of leg often very troublesome and liable to become inflamed. Patient should keep feet raised when sitting down, should not "hang about" on feet, and should wear elastic bandage or stocking. If veins become inflamed, absolute rest in bed and application of belladonna and glycerine on lint to inflamed veins. The citrates of potash and soda should be given freely between meals.

*Anaemias.* Pernicious anaemia may follow a parturition in which much blood has been lost, but it is rare for the woman, the subject of pernicious anaemia, to become pregnant. Should that occur, induction of labour may be indicated if no improvement, but even with uterus emptied patient will probably succumb.

*Leukaemia.* Very rare condition, usually exists before pregnancy occurred. Induction of labour often fails to improve condition.

## DISTURBANCES OF RESPIRATORY SYSTEM.

*Pneumonia.* Serious complication. Premature labour often occurs, and, if this takes place when heart embarrassed by pneumonia, extra strain may be too much for it to stand. Treat in ordinary way; induction of labour not to be recommended. Child, if it survives, occasionally developes pneumonia few days after its birth.

*Chronic Bronchitis and Emphysema.* Not often encountered for woman rarely old enough, so condition usually improves with a few days rest in bed and suitable treatment. Naturally, condition favours occurrence of abortion and premature labour.

*Asthma.* Asthma which developes for first time in pregnancy is generally toxaemic in origin, consequently treatment should be directed to improve elimination. Asthma in an asthmatic subject must be treated in ordinary way. If no improvement, may be necessary to consider question of induction of labour.

*Phthisis.* Formerly taught that pregnancy arrested phthisis pulmonalis. This is, however, very doubtful, and certainly after delivery mother goes down hill very rapidly. Placenta usually acts as filter, but sometimes organisms pass to foetus; child, therefore, must be placed in most favourable conditions possible. As regards question of induction of labour, if disease early, and mother's condition quite hopeful, induction of labour should be performed. If mother's condition hopeless, leave case alone and after delivery do best for child.

## SPECIFIC DISEASES COMPLICATING PREGNANCY.

*Acute Fevers. Smallpox.* Prognosis more serious in the pregnant (confluent, and haemorrhagic forms more common). Abortion very frequent. If child survives, may have marks of smallpox upon it showing that disease can be transmitted through placenta.

*Enteric Fever.* Prognosis less favourable than in the non-pregnant. Favours abortion. In a few cases, bacillus been found in foetal blood.

*Scarlet Fever.* Distinct disease, and must not be confused with septic infection, in which there is often a rash similar to scarlet rash.

*Malaria.* In pregnancy an outburst may occur if woman has had disease or is resident in malarial district. Quinine should be given freely, very doubtful if it markedly favours abortion in this condition.

*Syphilis.* Very serious complication. (1) If *primary sore occurs in pregnant woman*, it generally becomes extensive, and much sloughing of genitalia may occur. Should infection occur early in pregnancy, child will probably become infected and abortion occur; should, however, infection occur later in pregnancy, foetus may escape, but great danger of its becoming infected during passage through vaginal canal. (2) *Woman already subject of syphilis*; abortion or premature birth usually takes place; poison may come to exhaust itself and living child may be born, which, however, will usually show manifestations of syphilis later. (3) *If father syphilitic*, and does not give primary sore to mother, abortion usually occurs, although mother may show no signs of syphilis (Colles' law).

*Treatment.* No individual allowed to marry until had full course of mercurial treatment. (2) Must have been free of any suspicion of disease for three years. (2) Immediately before marriage should go on antisyphilitic treatment for some months. If

*abortion occurs*, both parents must be put on antisyphilitic treatment for a year before pregnancy again permitted. When pregnancy occurs, mother should continue mercurial treatment during whole of pregnancy. Mother may nurse her child as it will do her no harm, although it would infect a healthy wet nurse.

## PATHOLOGY OF LABOUR. DYSTOCIA.

*General Remarks.* Not possible to define dystocia; natural variations in parturition important to recognise this and to appreciate when should interfere. Relative claims of mother and child must be considered.

Three factors in labour—*forces*, *passenger* or *child*, and *passage* or *parturient canal*. Always one or more of these factors disturbed in dystocia, and in particular case must always try and determine which at fault. Besides the disturbance of forces, passage and passenger interference may be necessary if mother or child in danger.

## FAULTS IN FORCES.

*Undue Strength of Forces. Precipitate Labour.* This is a peculiarity of certain individuals; partly result of undue strength of uterine contraction, but also to slight resistance offered by soft parts. Child may be born with one pain (process of dilatation painless). Dangers of precipitate labour are: rupture of perineum, post-partum haemorrhage, and injuries to the child. Remove every device which favours bearing down; patient should cry out during pains.

*Feeble Uterine Contractions* (uterine inertia). Must distinguish (*A*) primary, (*B*) secondary uterine inertia. *Primary* uterine inertia found sometimes in old and very young primiparae and when uterus is over-distended or contains many fibroid tumours. It may also be temporarily produced by fright. Hot drinks, massage, and quinine (5 grs.) best remedies. Sooner or later os dilates to full extent. Should only forcibly dilate cervix, if absolutely compelled to do so, in interest of mother or child. *Secondary uterine inertia* is the result of fatigue; uterus tired out. Encountered in second stage, and especially if labour prolonged. Here question to be decided is first: (1) cause of delay; (2) if obstruction in canal or child, adopt treatment recommended for particular condition; (3) if simply tired uterus, give it rest with opium (Batley's solution 20 m., or laudanum 25 m., or scopolamin $\frac{1}{200}$ and morphine $\frac{1}{6}$). When pains come on again see if progress made; if not, deliver artificially with forceps or by traction on the lower limbs.

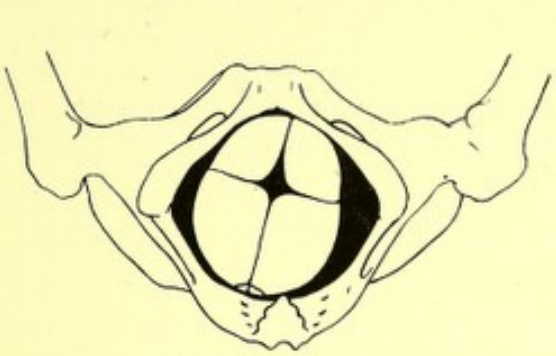
*Tetanic Uterine Contractions.* Must always be alarmed when those occur, for they always mean that there is great obstruction to passage of child, this fault being either on the side of the child or the parturient canal. It precedes rupture of the uterus.

## II. FAULTS IN THE FOETUS.

### Abnormal Presentation of Head.

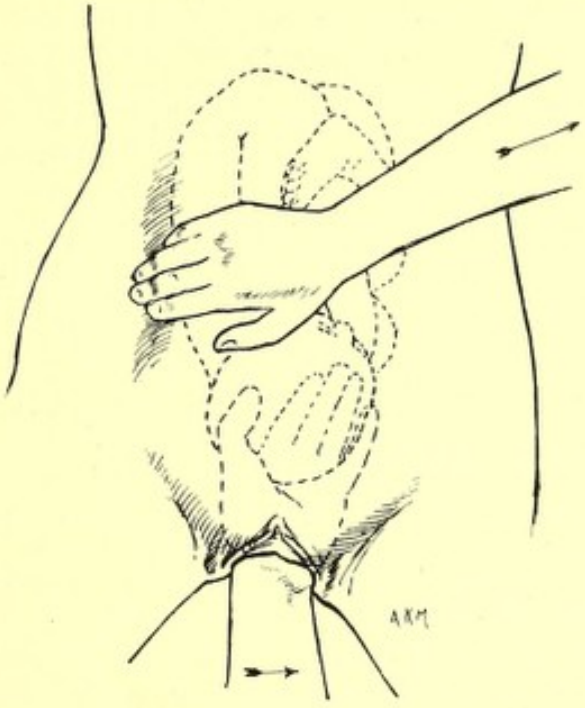
*Occipito-posterior Position.* Third and fourth vertex position. Take third *vertex position*. Long axis of head in right oblique occiput posterior. Frequency, 20 per cent. *Diagnosis.* Limbs unusually easily felt in front; foetal heart sound difficult to hear (round to sides or up towards fundus of uterus). *Vaginal examination.* Anterior fontanelle easily felt and in front. *Mechanism of birth.* Head starts less flexed; as it descends flexion occurs, and then rotation of its long axis into or nearly into conjugate diameter of pelvis. But head may take (*a*) *Long rotation*, so that it passes through second vertex position and occiput comes to front, or (*b*) *Short*

*rotation*, in which case occiput rotates into hollow of sacrum, when one gets a persistent occipito-posterior position. *The explanation* of the two rotations is that it depends upon which end of the foetal head strikes the pelvic floor first (viz. the degree of flexion of head). Consequently long rotation should be more frequent when head is large and pelvis small.



*Long Rotation.* When long rotation occurs the delivery is completed as if position had been originally a second vertex, viz. flexion, then birth of head by extension (so called), and finally restitution. This is usual termination.

*Short Rotation.* Persistent occipito-posterior position; unfavourable. Only very occasionally spontaneous delivery when forehead is pressed against symphysis pubis



and occiput sweeps over perineum and head born by movement of flexion. Usually delivery has to be completed with forceps; perineum generally lacerated; child not infrequently bruised and dead.

*Treatment of Third Vertex.* (1) Leave case to nature and see if long rotation occurs; most cases it does. (2) If after some time in second stage no progress, try manual rotation of head; hand passed into vagina and head grasped and occiput rotated to

front. At same time external hand must pull round anterior shoulder. Having rotated occiput to front, apply forceps and deliver. (3) If long rotation does not occur and manual rotation fails, deliver with forceps as persistent occipito-posterior.

*Fourth Vertex Position.* Long axis of head in left oblique diameter—occiput posterior. Mechanism as in third, with this exception that the fourth rotates into first when long rotation occurs.

*Caput Succedaneum and Moulding.* Caput succedaneum forms on right parietal in first and fourth, and on left parietal in second and third positions. Head becomes elongated in the occipito-anterior positions and more globular in occipito-posterior.

## SUMMARY OF MECHANISM IN VERTEX POSITIONS.

*First L.O.A.* (1) Flexion and descent. (2) Internal rotation. (3) Birth of head by so-called extension. (4) External rotation and restitution; face looks to right thigh; caput succedaneum forms on right parietal bone.

*Second R.O.A.* (1) Flexion and descent. (2) Internal rotation. (3) Birth of head by so-called extension. (4) External rotation or restitution; face looks towards left thigh; caput forms on left parietal bone.

*Third R.O.P.* Two mechanisms. A long rotation most common. (1) Flexion. (2) Rotation into second. (3) Rotation into conjugate diameter of pelvis. (4) Birth of head by so-called extension. (5) External rotation or restitution; caput forms on left parietal bone.

*Second Mechanism. Short Rotation.* (1) No marked flexion; indeed, less flexion. (2) Rotation of occiput into hollow of sacrum. (3) Usually requires artificial delivery, but sometimes spontaneous delivery by forehead being pressed against symphysis pubis and head being born by flexion when occiput swept over perineum. (4) External rotation or restitution.

*Fourth L.O.P. First Mechanism.* Long rotation: (1) Flexion. (2) Rotation into first. (3) Rotation into conjugate diameter of pelvis. (4) Birth of head by so-called extension. (5) External rotation or restitution; caput forms on right parietal bone. *Second Mechanism.* (1) Diminution of flexion. (2) Rotation of occiput into hollow of sacrum. (3) Usually artificial delivery, sometimes spontaneous birth by forehead being pressed against symphysis and occiput swept over perineum by extension.

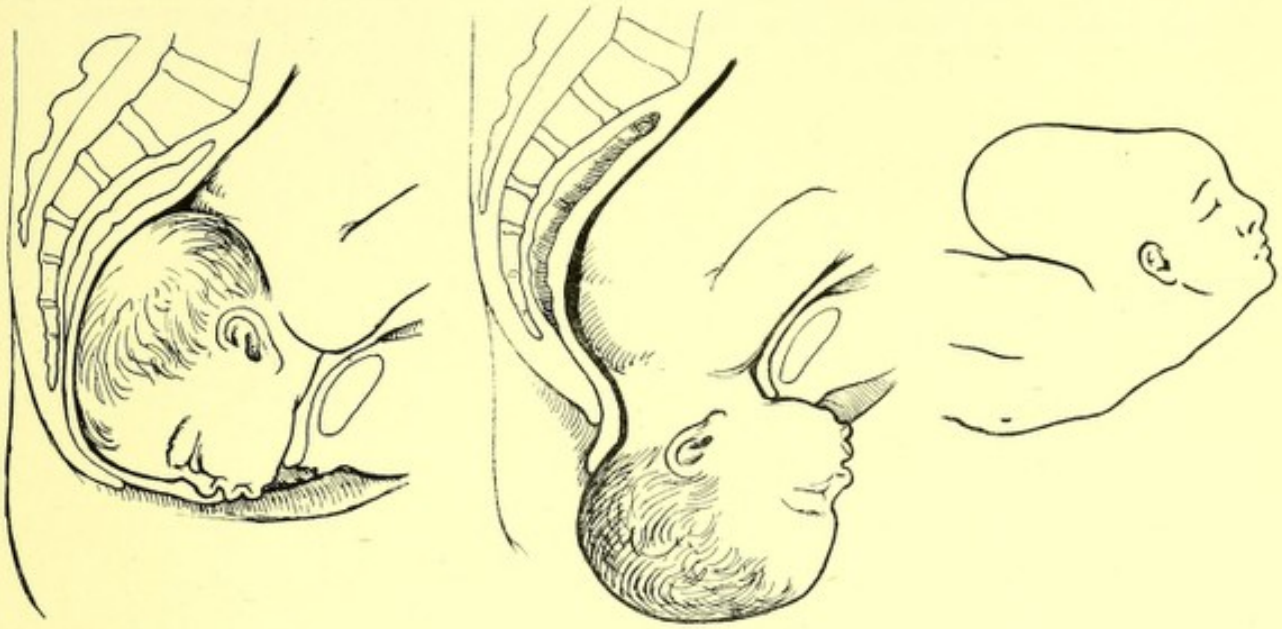
## FACE AND BROW PRESENTATIONS.

*Face Presentations* occur about 1 in 200 cases, may be (*a*) primary, and be present for some time before labour; or (*b*) secondary, and occur during labour. *Causes.* (1) Obliquity of uterus. (2) Slight deformity of pelvis. (3) Elongation of foetal head. (4) Tumours of neck of child. (5) Tumour of uterus or ovary.

*Diagnosis.* Usually recognised when os dilated and face felt by vaginal examination. *Palpation.* Depression between occiput and back can be felt, especially in third and fourth face positions.

*Auscultation.* If chest of child to front, may hear foetal heart sounds best over child's chest, but if back of child to front (heard best over that region), may be more difficult to hear sounds because trunk runs more towards middle of uterus. *Vaginal examination.* Orbital ridges; eyes, mouth, chin and nose felt. Very like breech, but mouth is distinguished from anus by alveolar processes, and the nose with anterior nares is very characteristic landmark.

*Mechanism.* Face presentation is looked upon as vertex in which head has become extended—four positions. Mechanism is same as vertex, only extension is substituted for flexion and flexion for extension. Chin is denominator.



*First Face.* Long axis of face in right oblique diameter—mento-posterior. Two mechanisms—long rotation, in which chin comes round to front; and short rotation, in which chin rotates into hollow of sacrum (comparable to occipito-posterior position of vertex). *Long rotation* generally occurs. (1) Extension and descent. (2) Rotation into a fourth face position. (3) Rotation into conjugate diameter of pelvis. (4) Birth of head by flexion. (5) External rotation or restitution. *Short rotation.* (1) Extension not so marked. (2) Rotation of chin into hollow of sacrum—persistent mento-posterior position. Spontaneous delivery is then impossible, for head cannot extend any further to let chin over perineum; craniotomy often necessary, but not be performed until attempted delivery with forceps, as face sometimes rotates during traction.

*Second Face Position.* Long axis of face in left oblique diameter—mento-posterior. Two mechanisms as before. *Long rotation.* (1) Extension and descent. (2) Rotation into third. (3) Rotation into conjugate. (4) Birth of head by flexion. (5) External rotation or restitution. *Short rotation.* (1) Extension not so marked. (2) Rotation of chin into hollow of sacrum—persistent mento-posterior position. Delivery as described in connection with first face position.

*Third Face Position.* Long axis of face in right oblique diameter—mento-anterior. (1) Extension and descent. (2) Rotation into conjugate. (3) Birth of head by flexion. (4) External rotation or restitution.

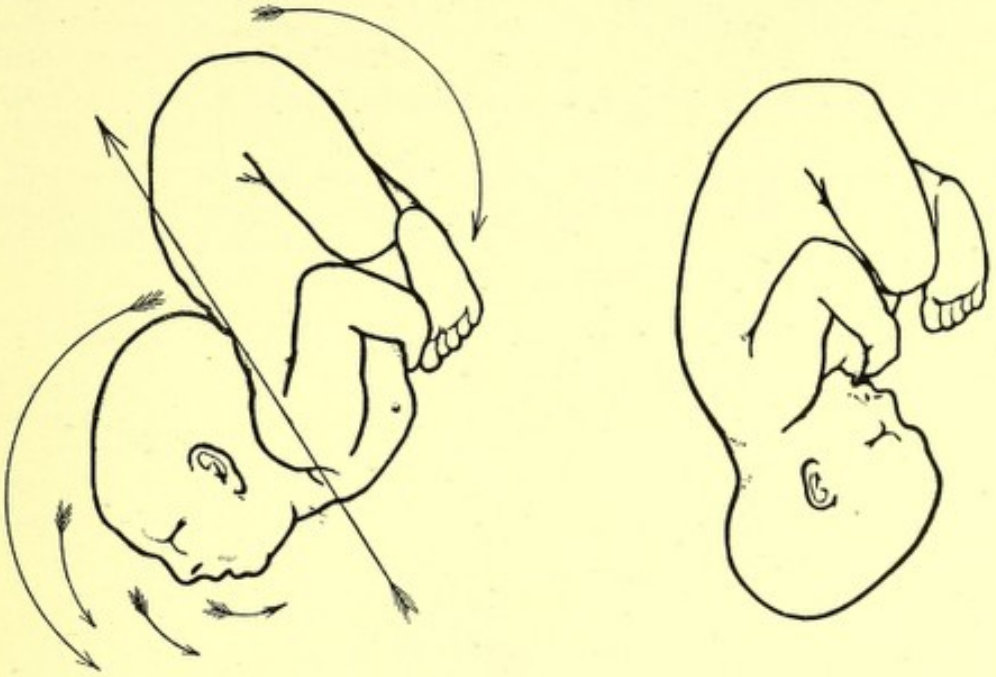
*Fourth Face Position.* Long axis of face in left oblique diameter—mento-anterior. (1) Extension and descent. (2) Rotation into conjugate. (3) Birth of head by flexion. (4) External rotation or restitution.

*Causes of these movements.* Same as those described for vertex positions.

*Caput Succedaneum and Moulding.* Caput succedaneum forms over malar bones and round angles of eyes and mouth. *Moulding.* Elongation of head.

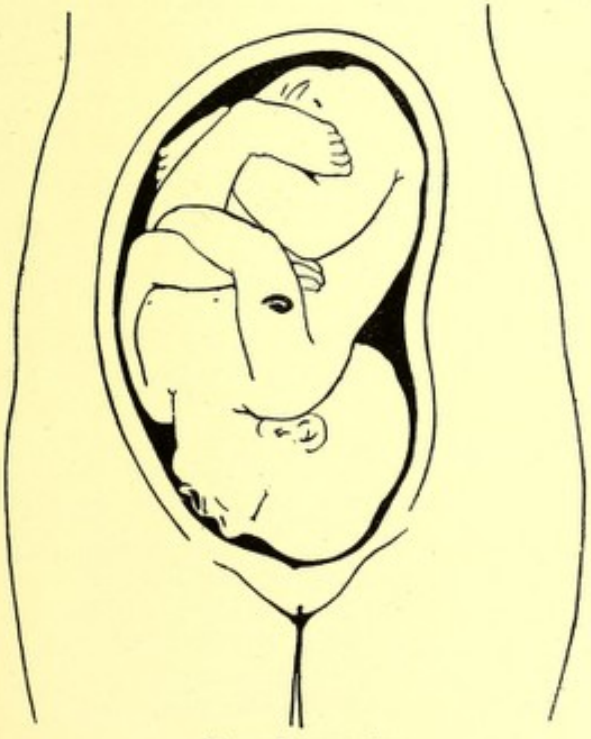
*Treatment of Face Cases.* Leave alone, and if not delivered spontaneously, deliver with forceps. *Mento-posterior positions.* Leave alone, as long rotation usually

occurs; if that fails, deeply anaesthetise, and try: (*a*) rotate into mento-anterior as described for occipito-posterior positions of vertex; (*b*) convert into vertex by Thorn's manoeuvre (flex head with hand in vagina, and flex body by pressing on chest with external hand while assistant pulls over the breech); (*c*) if fail in these manoeuvres, try forceps, as head sometimes rotates when it is pulled upon; (*d*) if fail with forceps, perform craniotomy.

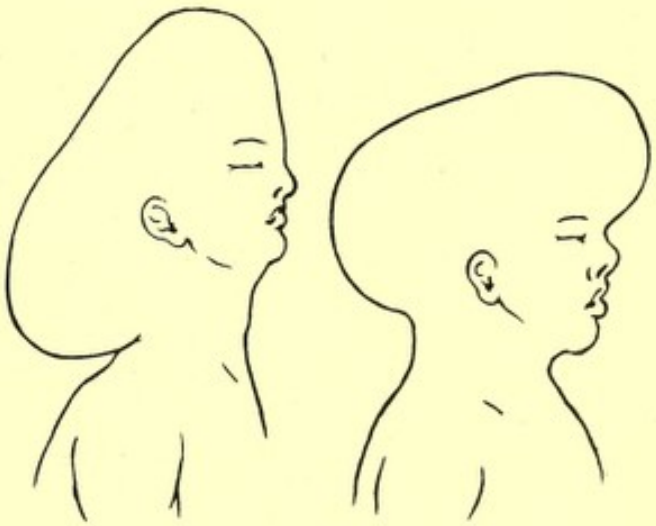


Thorn's Manoeuvre.

*Brow Presentations.* Midway between vertex and face; most unfavourable presentation of head, because long axis of head (occipito-mental diameter) is thrown across pelvis.



Brow Presentation.



Moulding of Head in Brow Presentation.

Diagnosis is not easy, because landmarks of face not easily felt; anterior fontanelle, bridge of nose, and supra-orbital ridges landmarks felt. *Palpation.* Head later in becoming fixed; may sometimes feel depression between occiput and back.

*Prognosis.* Very unfavourable for both mother and child.

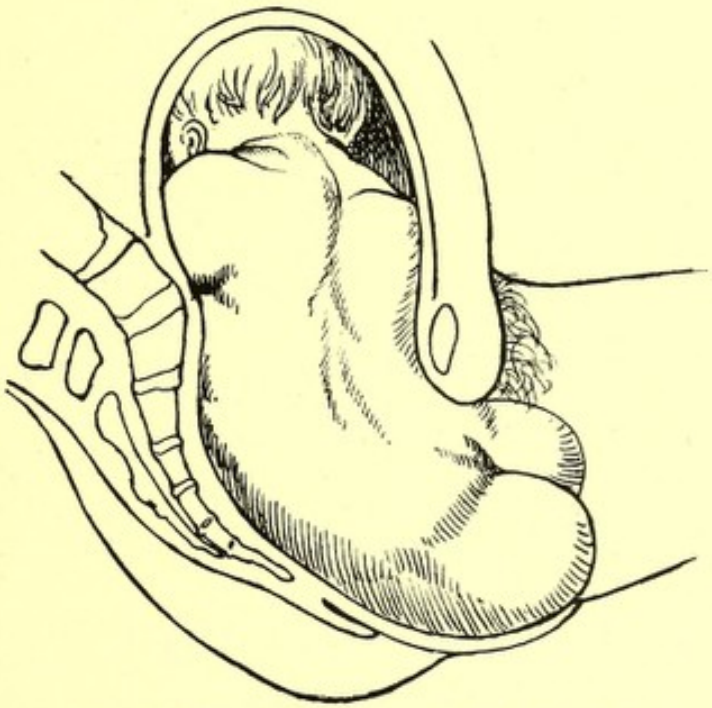
*Treatment.* If *recognised early*, version is the safest treatment. If recognised later and version dangerous because of condition of uterus, then convert into vertex by Thorn's method, and, if that fails, apply forceps. If delivery with forceps impossible, craniotomy must be performed.

*Prolapse of Arm.* At side of head; replace arm under anaesthesia when os fully dilated; then apply forceps.

*Nuchal Displacement of Arm*, viz. arm getting behind occiput; specially difficult to recognise and to replace. Deeply anaesthetise patient, and pass whole hand into uterus and push up arm; then apply forceps.

## PELVIC PRESENTATION. BREECH. FOOT. KNEE.

*Pelvic Presentation.* Specially favoured by (1) contracted pelvis; (2) death of foetus; (3) prematurity; (4) over-distension of uterus from hydramnios or twins; (5) deformities of foetus, *e.g.* hydrocephalus, etc.; (6) multiple pregnancy; (7) placenta praevia. The frequency of the presentation is about 3–4 per cent., taking full time and premature labours into account.



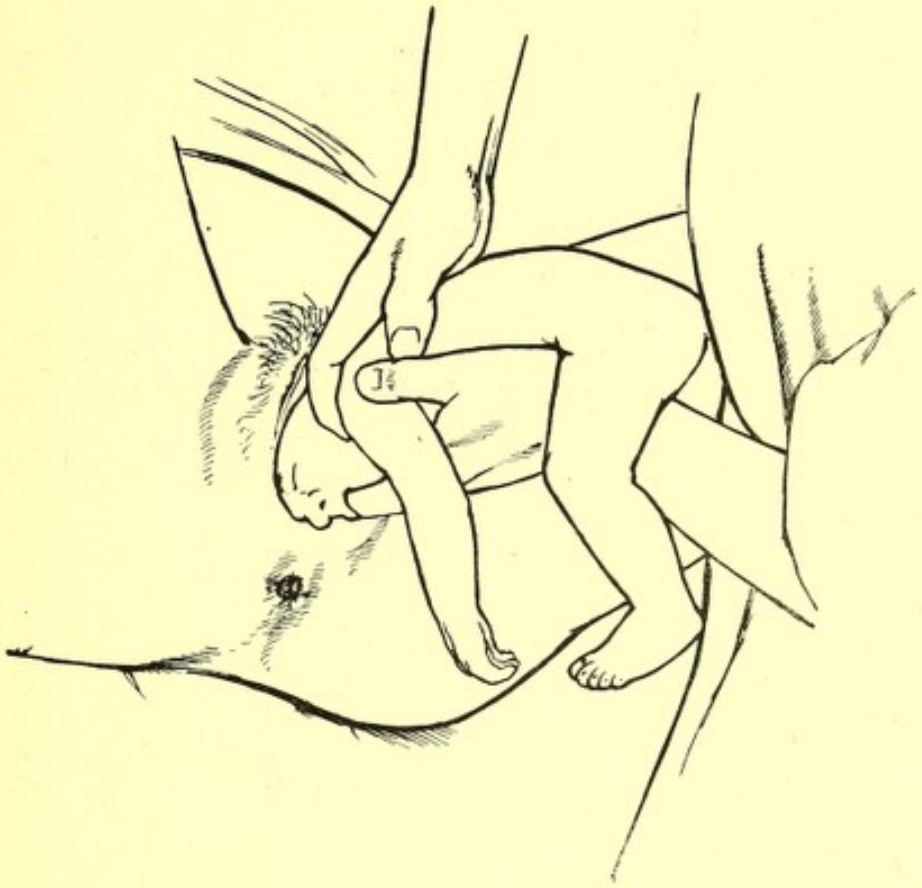
Lateral flexion of trunk during birth of breech.

*Breech Presentations.* The diagnosis of breech presentations is made by palpation. Foetal part at brim is softer and less regular than hard head. Part at fundus is hard and round, and head "ballottes" between palpating hands. This most valuable sign. Back and limbs of child as in vertex presentations. Foetal heart sounds heard best above the umbilicus. *Vaginal examination.* Membranes are sausage shaped. Presenting part is soft and irregular in outline; two bony prominences with depression between in which may be felt genitalia, but most

important rough surface of sacrum of foetus. *After rupture of membranes* free escape of meconium very valuable sign. It only occurs in head presentations shortly before death of child. Most frequently confused with face (p. 70); rough surface of sacrum is the landmark most to be relied on. Also may be confused with shoulder, but in latter ribs can be felt.

*Positions*, four in number. The sacrum is taken as the denominator.

*First Breech Position.* Long axis of breech in left oblique diameter—sacrum anterior (1) Descent. (2) Rotation into conjugate with lateral flexion of trunk. (3) Anterior hip is pressed below symphysis and posterior sweeps over perineum. (4) Trunk then follows. (5) Head enters in opposite oblique diameter and rotates into conjugate; usually some assistance is required to effect the delivery of the head because head is not moulded, head is largest part of child, and because uterus having expelled rest of foetus is acting at a disadvantage.



*Second Breech Position.* Long axis of breech in right oblique diameter—sacrum anterior; mechanism as in first sacral position.

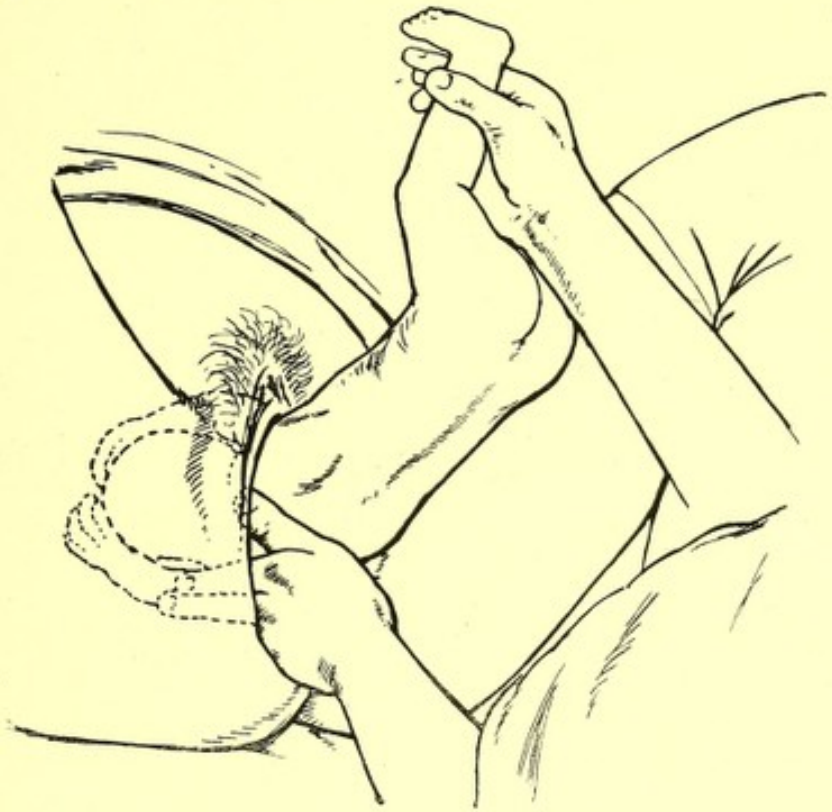
*Third Breech Position.* Long axis of breech in left oblique diameter—sacrum posterior; mechanism as before, only during passage of breech through pelvis sacrum usually rotates to the front.

*Fourth Breech Position.* Long axis of breech in right oblique diameter—sacrum anterior; mechanism as on third position.

*Management. First Stage.* On no account interfere; preserve membranes intact as long as possible. *Second Stage.* Don't interfere until breech expelled, beyond guiding it over perineum. When trunk comes as far as umbilicus, pull down

*Displacement of Arms.* Usually result of not following directions given for management of breech cases. Dislodge posterior arm first because more easily reached, and there is most room in hollow of sacrum. Seize child by feet, and pull trunk forwards, pass fingers along dorsum of child to shoulder, then down over humerus, and press down arm sweeping it over face of child. (It must not be hooked down, that causes fracture of humerus.) Other arm is dislodged either by rotating trunk until anterior arm comes to be posterior, or by bringing arm down from the front. Specially difficult if "Nuchal" displacement of arm. Dislodge by rotation and by manoeuvres already described.

*Impaction of Head.* Best treatment, I believe, is to apply forceps if manoeuvre already described prove futile. (See Forceps.)



*Occipito-posterior Position.* Head can usually be rotated into favourable position. Indeed, during birth of trunk, rotation should occur and should be encouraged if it does not take place spontaneously.

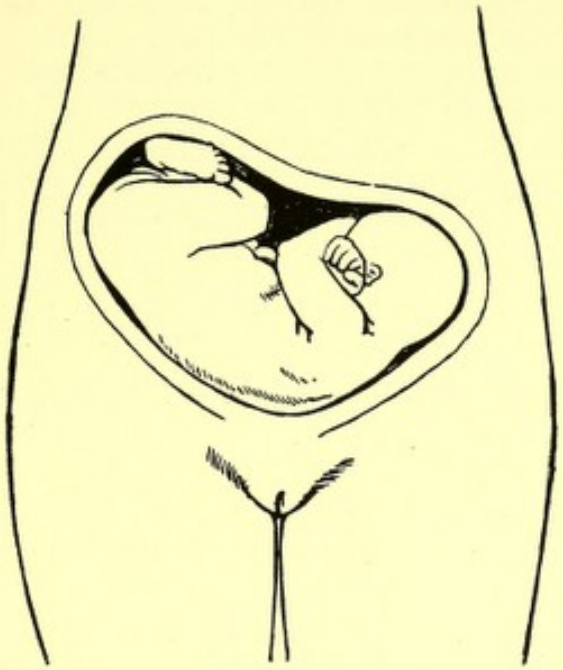
*Foot Presentation.* *Foot* is distinguished from hand by presence of heel; that is landmark to be relied on; less mobility and shortness of toes. Leave such cases alone, don't pull on foot unless absolutely necessary to hasten delivery. *Knee*—very rare presentation, resembles elbow, but it is distinguished by presence of two prominences. Bring down foot.

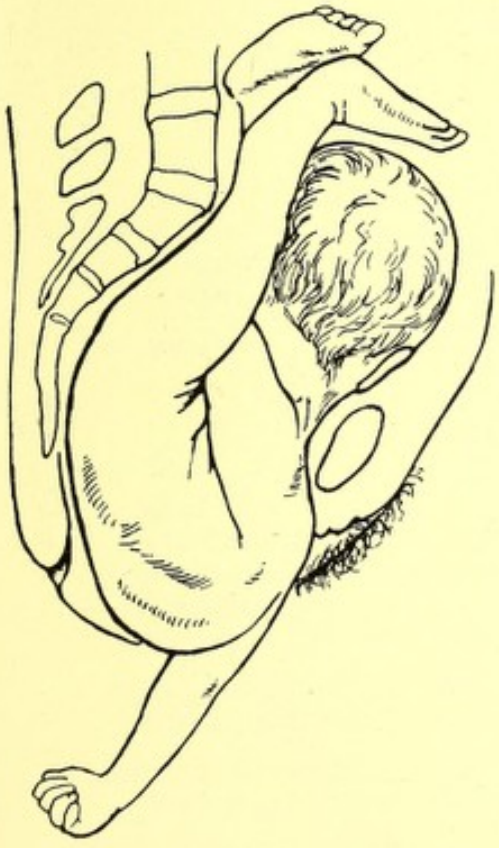
## OBLIQUE TRANSVERSE OR CROSS BIRTH.

Generally shoulder, but very often arm prolapses, occasionally elbow slips down.

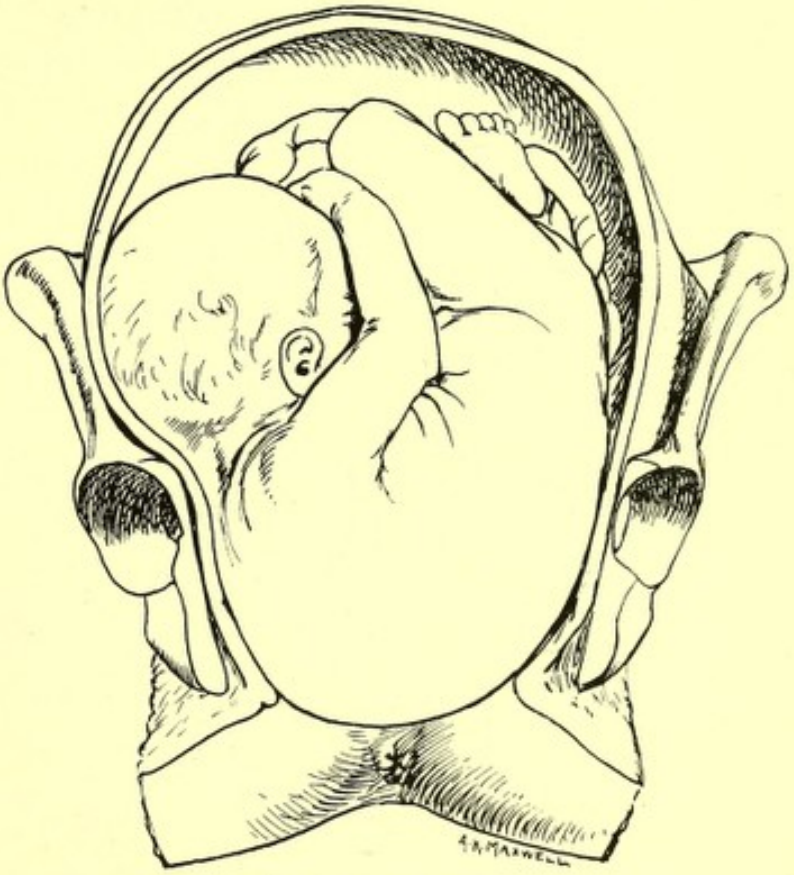
*Diagnosis.* Abdominal distension is often lateral. On palpation round hard head felt to one side and breech to other side of uterus. Auscultation heart sounds

heard below umbilicus. *Vaginal examination.* Bag of membranes sausage shaped. Difficulty in reaching presenting part. *Shoulder* part usually felt with clavicle spine of scapula and humerus radiating from it. Ribs most reliable landmark. *Elbow*





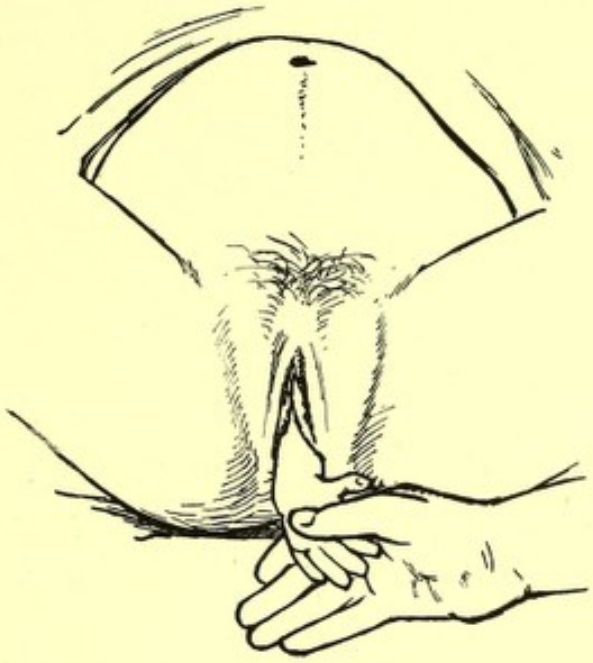
Spontaneous Evolution.



Partus Corpore Conduplicato.

is recognised by one bony prominence, and hand by absence of heel and mobility of fingers. *Prognosis.* Always unfavourable for child. Spontaneous delivery may occur very occasionally, if child small and pelvis roomy, in one of the three following ways. (1) *Spontaneous version*; corrects itself and is converted into vertex or breech presentation. (2) *Spontaneous evolution*, arm and shoulder driven down, and trunk and lower limbs driven past them, and then finally head born; child dead. (3) With *body doubled up* (partus corpore conduplicato).

*Treatment.* *Version* by external or bipolar methods. If not possible by either of these, then internal version may be employed. If waters long drained away and shoulder impacted in pelvis, *decapitation* should be employed.



*Arm Presentation.* Thumb points to head; "shake hands" and so tell which hand prolapsed. Push up prolapsed arm. If any difficulty, neglect hand and perform version. If impacted shoulder, decapitation.

*Foot and Arms.* Perform version and bring down foot.

## MALFORMATION OF FOETUS.

*Abnormal Size.* Peculiar to certain women to have large children; if presentation favourable and pelvis normal, not much trouble; but if pelvis is slightest degree deformed, dystocia may be extreme. Head causes greatest trouble, but sometimes shoulders give good deal of trouble also. If no pelvic deformity, can complete delivery of head with forceps in almost all cases.

*General Foetal Dropsy.* May have little trouble from limbs breaking off and if ascitis marked, but if abdomen punctured trunk readily extracted.

*Hydrocephalus.* Serious complication because so often overlooked. Specially apt to be overlooked if breech presents. Rupture of uterus not infrequent.

*Head Presenting. Diagnosis.* Head still movable above brim although labour has been in progress for some time. Presenting part difficult to reach, sutures and

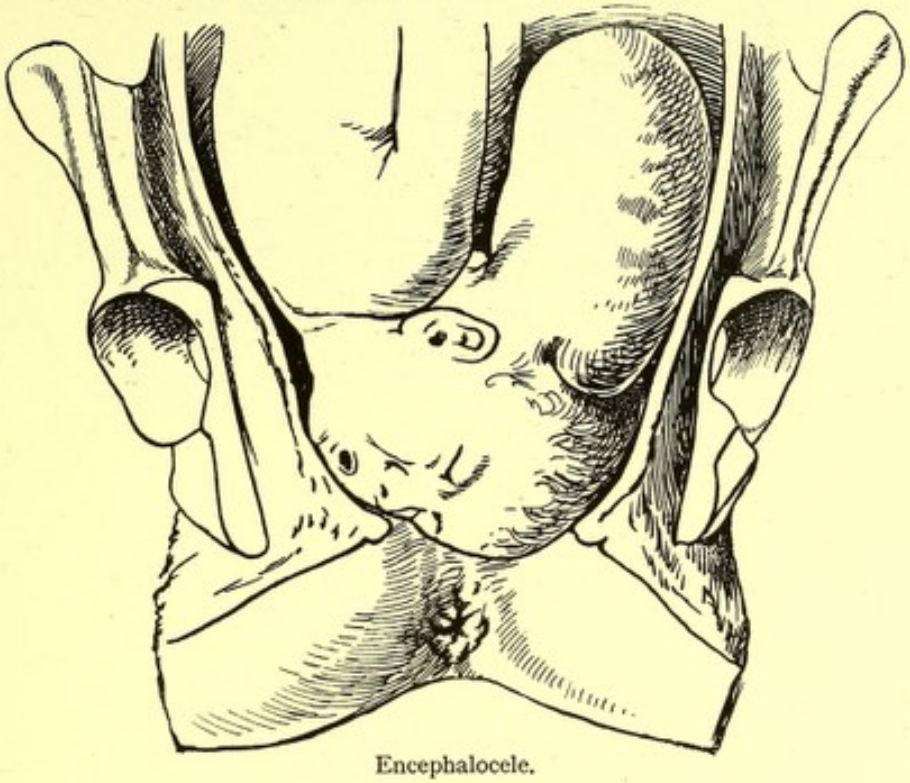
fontanelles very patent. *Treatment.* Perforation of head. *Breech Presenting.* Difficulty only occurs with after-coming head, and as base of skull well ossified generally, only suspect condition when cannot get head away. Uterus may feel unduly enlarged after trunk born. Not infrequently child's trunk is poorly developed

and may have spina bifida. Such conditions should always arouse suspicion if difficulty with after-coming head. *Treatment.* Perforation of head or tapping of spinal canal.

*Meningocele and Encephalocele.* Most commonly in vicinity of posterior fontanelle. May cause dystocia; usually burst if child pulled upon. Very often not recognised until after delivery.

*Large Shoulder Girdle.* Large shoulder girdle is seen especially in connection with large child. (Sometimes anencephalic foetuses have very large shoulders.) *With head presentation* child is very often lost owing to delay in delivery, traction upon its neck; sometimes necessary to use blunt hook or to divide clavicles (cleidotomy).

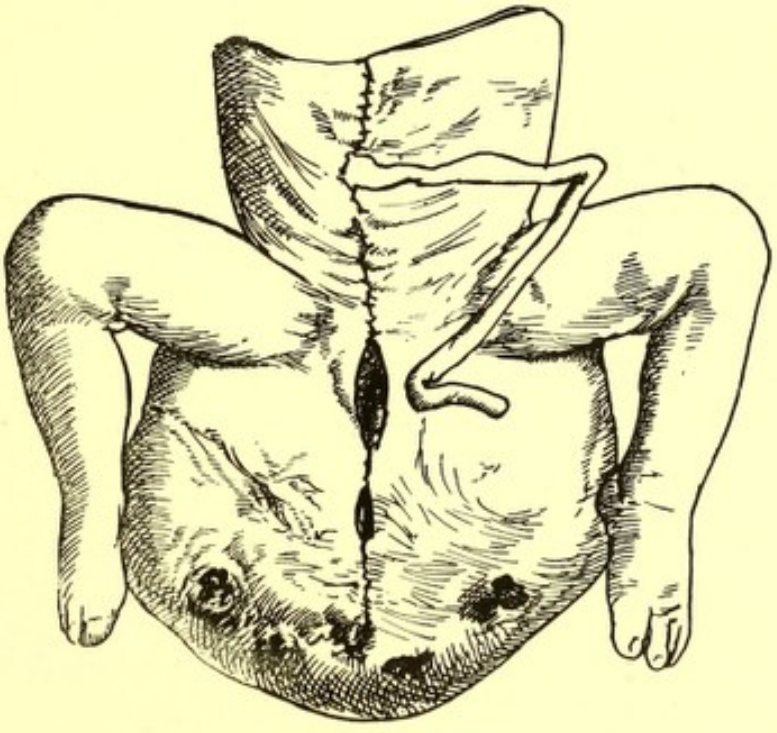
*With After-coming Head* special difficulty arises in bringing down the arms, and hook may be necessary to accomplish this.



Encephalocele.

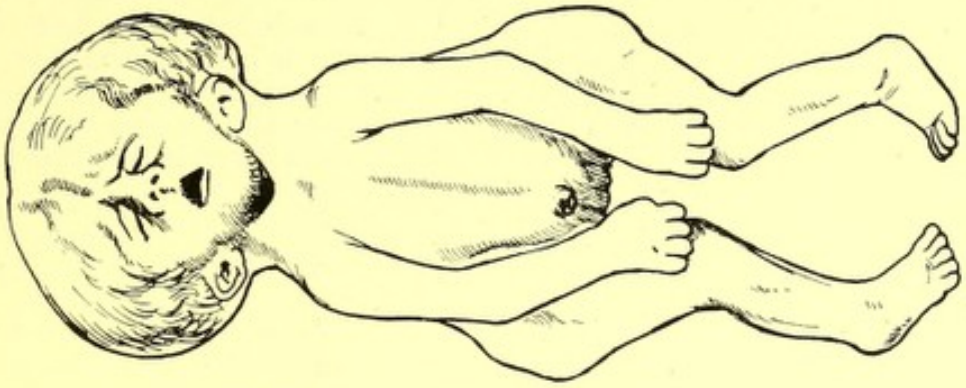
*Tumour of Neck.* Large bronchoceles may sometimes be a cause of difficulty, but rarely if ever is it extreme.

*Tumours of Abdomen.* Ascitis, hydronephrosis and other tumours of the child's abdomen are not infrequently a cause of dystocia. If presentation is head, the delay only

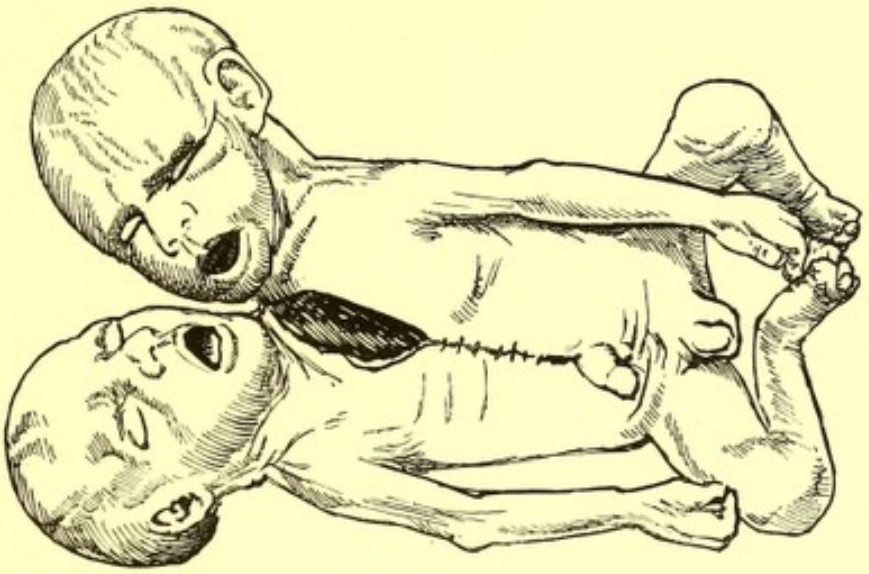


Tumours of Sacrum.

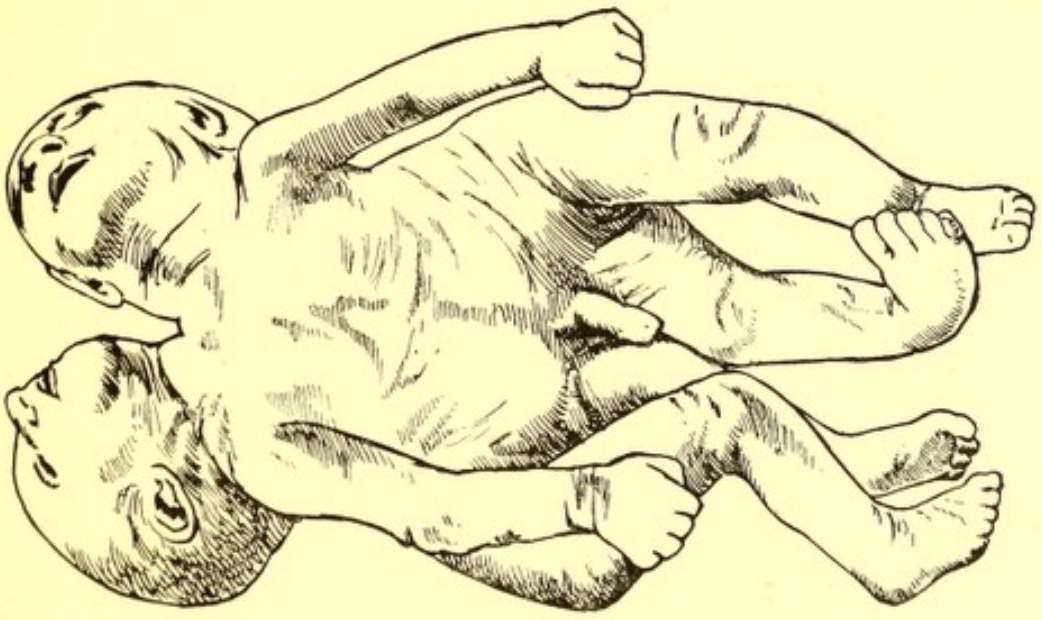
occurs after it escapes, but in breech presentation the descent of foetal pelvis is retarded. Should be suspected whenever the descent of trunk is retarded, and especially if head has been born without much difficulty and part of child already



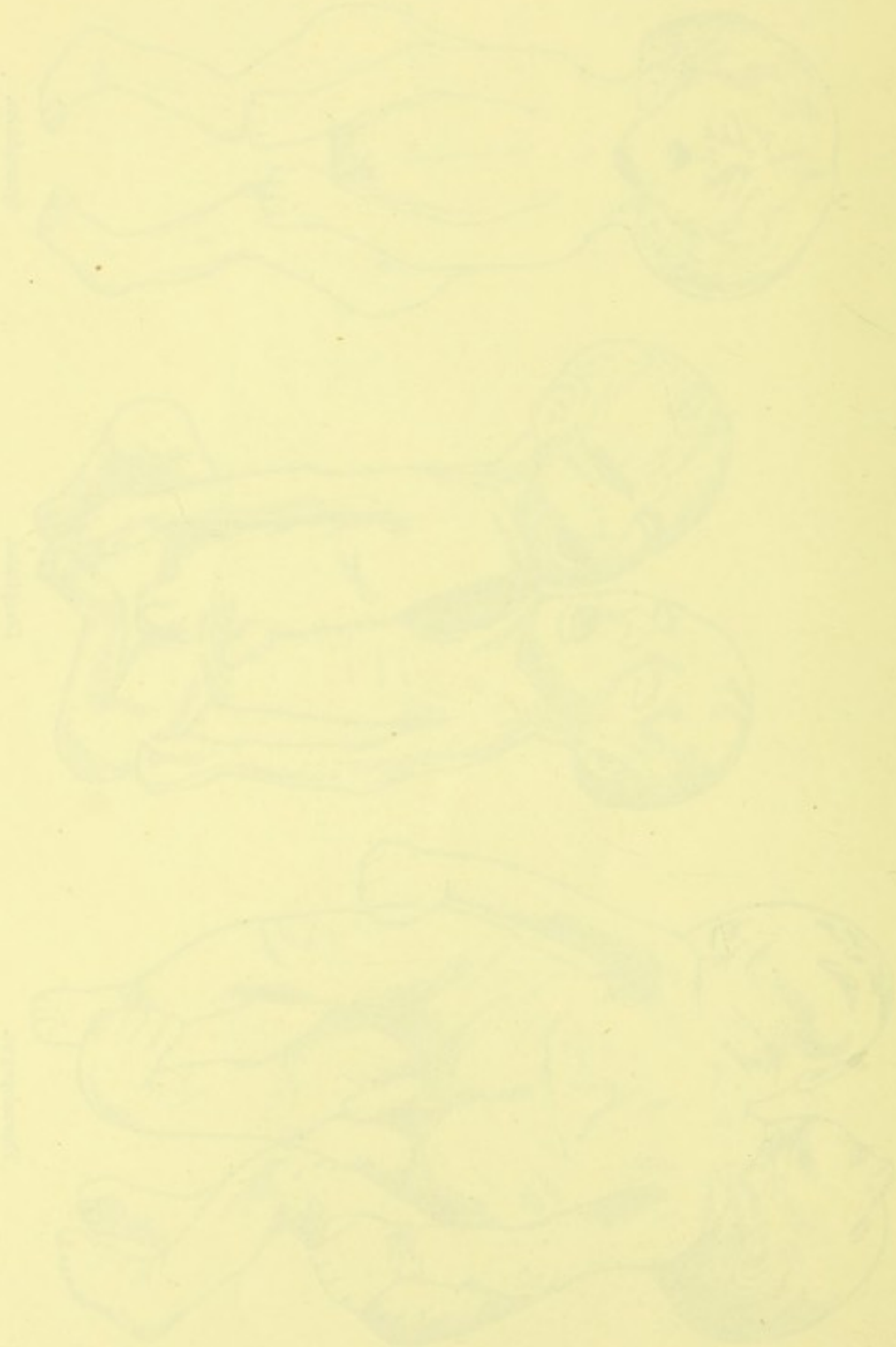
Syncephalus.



Dicephalus.



Thoracopagus.



expelled is "puny" and poorly nourished. A large trochar may be employed, but as child is usually dead or its condition hopeless, perforation of abdominal swelling with perforator or scissors is quite satisfactory. If the distension is not entirely cystic, may be necessary to break up abdominal tumour with fingers (evisceration).

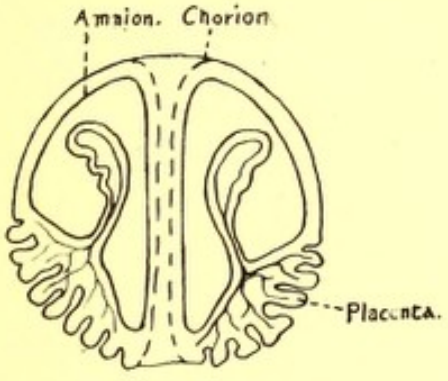
*Tumours of Pelvis.* Sometimes of enormous size; generally teratoma or sarcoma. When breech presentation and tumour presents very difficult to recognise what the state of matters really is. As in all cases of doubt, may be necessary to make very complete examination under an anaesthetic. It has sometimes been necessary to break up tumour before child could be born.

*Double Monsters.* Two groups: *Symmetrical disomata*; when two are united by corresponding parts (head to head, etc.) and are almost equal in size. *Asymmetrical disomata*, where the foetuses are united by unlike parts, and are of very different sizes. In the latter the smaller is simply a parasite. This variety rarely causes much trouble to the obstetrician. Three great subdivisions of *symmetrical disomata*. (1) *Thoracopagus.* When two foetuses have their trunks united, but distinct heads and limbs. (2) *Dicephalus.* When the two foetuses have two heads, four upper limbs, but usually only one set of lower limbs. (3) *Syncephalus.* When heads are fused, and often only one set of upper limbs but four lower limbs.

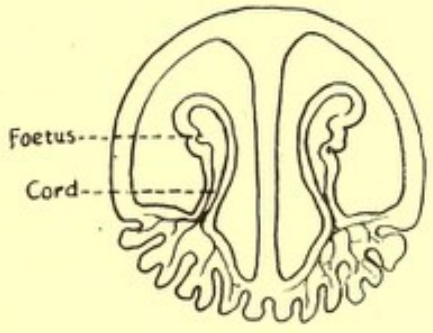
First variety usually gives greatest trouble, especially if they present by the head. For all cases version is the best treatment if condition is recognised early enough. If not recognised early enough, may have to perform craniotomy and evisceration.

## PLURAL PREGNANCY.

*Twins.* Frequency is about 1 in 80. More frequent in Ireland, where it is about 1 in 60. Conditions favouring plural pregnancy are: (1) *Race*; (2) *Family.* Distinct hereditary tendency on maternal side to bear twins. Question if this hereditary tendency can be transmitted through the father. *Varieties.* (1) *Binovular.* Developed from distinct ova. The ova may come from one Graafian follicle or from two follicles (the follicles may have been in one ovary or one may




Binovular.

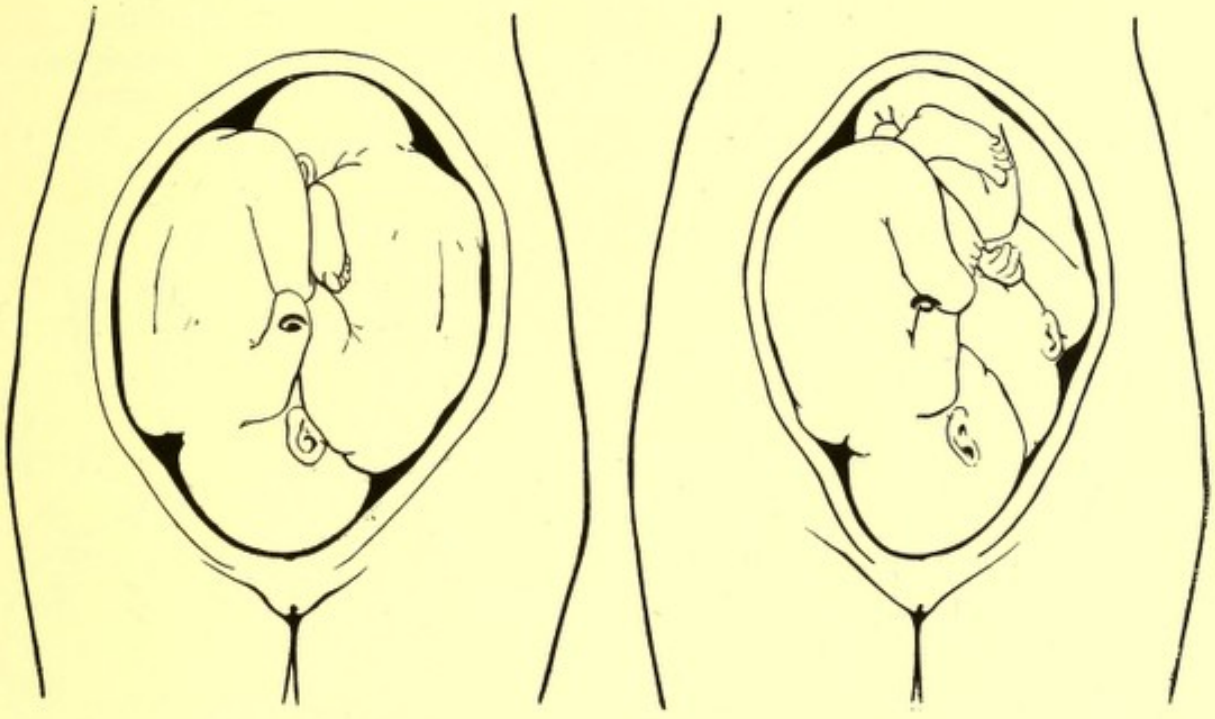



Uniovular.

have been in each ovary). Two ova are generally fertilized at or about same time, but they may have been fertilized at different times, and consequently two foetuses may be of different ages. Two terms are employed in this connection, viz. *superfecundation*, fertilization of two ova at different times during the same inter-menstrual period; *superfoetation*, fertilization of two ova shed at different inter-menstrual periods. The two ova are surrounded originally by a separate decidua reflexa (capsularis), but that disappears. Always two chorions, but sometimes the part between disappears. Of course each foetus has its own amnion. There is

absolutely no communication between the circulations of two placentas, which may be separate or massed together. They are the healthiest twins, and are encountered six times as often as uniovular twins. The sex may be distinct. (2) *Uniovular twins.* Development from single ovum, which may have two blastoderms or one blastoderm which divides. They have one chorion, but usually have two amnionic sacs (sometimes only one amnionic sac). They have one placenta, and the circulation between the two communicates more or less. They are always of same sex, but often of unequal size and strength. If one embryo better situated as regards blood supply (this is generally influenced by insertion of the cord and arrangement of blood vessels), it may be much stronger, and the blood from the stronger may be forced back into the vessels of the weaker. In extreme cases of this kind the *acardiac monster* results. (Heart and upper part are irregular mass of tissue, lower limbs quite distinct and developed.) Hydramnios, as we have seen, is not uncommon with uniovular twins.

*Course of Pregnancy with Twins.* In about 70 per cent. of cases premature labour occurs. Average weight of two children is 10 lbs.; usually one developes rather better than the other, especially in uniovular twins. Occasionally one dies and is expelled, but it may die and be retained and compressed when one gets the "foetus



papyraceous." *Diagnosis* is by no means easy, unless two sacs are placed side by side. Personally, I only diagnose twins if I can palpate two heads. *Foetal heart sounds*, of different rhythm and rate, most valuable theoretically, but difficult to determine in practice (unusual uterine distension and palpating limbs easily not to be relied upon). On vaginal examination (twice in my experience) may feel two foetal sacs, but usually can feel only one sac and one presenting part.

Hydramnios and ovarian cyst with pregnancy may lead to confusion.

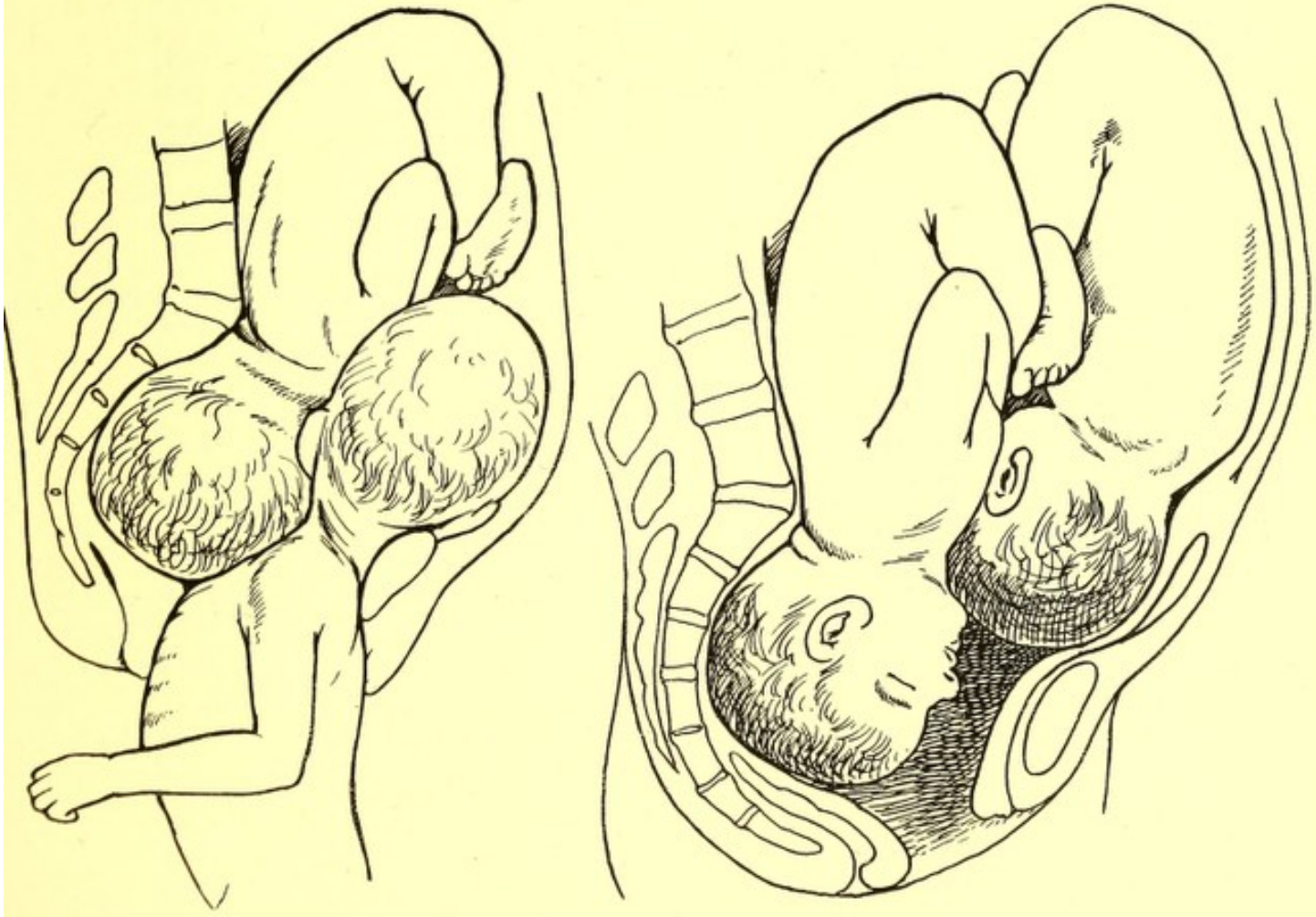
Diagnosis of twin pregnancy not as a rule of much consequence (only of great importance in connection with induction of labour for contracted pelvis). Pregnancy often disturbed, sickness more troublesome, toxaemias especially. Eclampsia more frequent.

*Course of Labour.* Frequency of different presentations.

| | | | |
|---|---|---|---|
| First Head | Second Head | 38·5 | per cent. |
| Head | Breech | 21·1 | |
| Breech | Head | 14·3 | |
| Breech | Breech | 10·7 | |
| Head | Transverse | 8·3 | |
| Transverse | Head | ·8 | |
| Breech | Transverse | 4·2 | |
| Transverse | Breech | ·7 | |
| Transverse | Transverse | ·9 | |

Course of labour little disturbed, for although uterine contractions may be weaker, there is a smaller body to drive through canal. After first child born uterus rests, then uterine contractions begin again. Average time between births is twenty-five minutes, but may be only ten, or even less. Few cases when it has been days or weeks. Generally both placentae follow birth of second child, but very occasionally the placenta of born foetus comes away before second child. Distinct danger to mother in twin parturition. Uterine inertia, abnormal presentations, post-partum haemorrhages, and risks of infection all greater than in usual parturition.

*Management. First child.* Very often twins not recognised until after first child is born. Leave labour to pursue natural course. Only if delay in rupture of



membranes should they be punctured. Only trouble if first child comes by the breech, for may be difficulty in delivering, as cannot exert supra-pubic pressure. If difficulty apply forceps. After delivery, cord should be carefully tied in two places and divided between, in case communication between two circulations. *Second child.* Rupture membranes of second sac if this does not occur in twenty minutes. At same time, presentation of child should be determined. If second child not born within hour, deliver by forceps or traction on the limbs. Make sure that placenta and membranes come away entire. Give full dose of ergotin and ergot, and be prepared with hot intra-uterine douche (118° F.) in case of post-partum bleeding.

*Locked Twins.* Most rare complication. If two heads impacted in pelvis together, no difficulty; second can always be pushed out of the way. When after-coming head of first becomes locked by fore-coming head of second, then if second head cannot be pushed back, first head should be decapitated, second child delivered with forceps, and then the decapitated head of first removed.

## CORD, PLACENTA AND MEMBRANES.

*Cord or Funis. Presentation. Presentation* means the slipping down of cord in front of the presenting part prior to rupture of the membranes. *Prolapse.* A similar condition after rupture of the membranes. Occurs about 1 in 200 cases. *Prolapse of cord* is favoured by anything interfering with proper engagement of head, such as (1) contracted pelvis; (2) unfavourable presentations, especially transverse; (3) low implantation of placenta, undersize of placenta, marginal attachment of cord; (4) undue length of cord; (5) sudden rupture of membranes. Loop of cord slips down generally on side towards which abdomen of child is directed, consequently most common behind and to one side of promontory. Rarely found in front except in dorso posterior position of child.

*Diagnosis.* Easily distinguished from head, foot or small sub-mucous fibroid. Should not only determine if cord but also if pulsation is present, for treatment is based upon presence or absence of pulsation.

*Treatment. Before rupture of membranes.* Everything should be done to keep membranes intact. *Sim's position.* Very useful; just as good as knee-elbow position, for brings fundus of uterus most dependent part, and favours the cord slipping up. *After rupture of the membranes.* Must first determine if cord pulsating or not. *If pulsation ceased* leave case alone, for child is of course dead (must test pulsation both during and in the intervals between the uterine contractions). *If cord pulsating*, forceps if os fully dilated; internal version or manual replacement if os sufficiently dilated to allow hand to pass in; and repositor or Champetier De Ribes bag if os only slightly dilated. Catheter as in illustration most useful repositor. *N.B.*—If pelvis is distinctly contracted, don't trouble about cord; it lies quite safe from injury in the "bays" at side of promontory until os fully dilated and head descends into pelvic cavity; then quickly extract with forceps.

*Prognosis.* High foetal mortality when membranes rupture early, somewhere about 40 per cent. of children being lost.

*Shortness of Cord.* May be actual or the result of cord being wound round child. Very short cord may actually prevent escape of child. This usually occurs only after head is born, and is generally attributed to the shoulders being unduly large; should always be suspected if difficulty with trunk and child seems small. If suspect condition, pass hand into vagina, divide cord, and extract child quickly. *Rupture of cord* may result, but usually this accident occurs after birth of child when labour is

precipitate, with woman in the upright position. Rupture usually occurs some little way from umbilicus. Separation of placenta may also occur.

Other conditions of cord, placenta, and membranes (except retained placenta and membranes) have been referred to in connection with pathology of pregnancy.

## RETAINED PLACENTA AND MEMBRANES.

Retained placenta in the majority of cases is result of wrong management of second stage of labour, especially kneading uterus immediately after child is born and expressing placenta (by Credé method so called) too soon. It is also apt to occur if placenta is forced out of vagina suddenly, and it is always more frequent when the parturient has had an anaesthetic for a considerable time and there has been uterine inertia.

*Treatment of Retained Membranes.* Some advocate introducing sterilized hand into uterus and removing, while others advise leaving them to be expelled. If whole chorion (chorion may be left and yet amnion may come away) left behind, certainly membranes should be removed manually and afterwards uterus douched with very hot antiseptic solution (118°). If, however, only small portion of membranes left better not to introduce hand; rather watch case carefully, and if any rise of pulse or temperature in a day or two, give intra-uterine douche daily. Small portions of membranes almost invariably come away in a day or two.

*As Regards Retained Placenta.* This is most marked when placenta is adherent owing to some old-standing chronic inflammation of the uterus. Adherent placenta is a rare complication, however. The placenta may be simply retained from over-distension of bladder, but often result of spasmodic contraction of Bandl's ring (so-called "hour-glass" contraction of uterus). Full dose of opium relieves this, but usually the hand is introduced into the uterus before it is fully appreciated that the placenta is simply retained, not adherent.

*Method of Removing Placenta and Membranes.* Parts about vulva should be carefully cleansed, sterilized hand should be passed into uterus (preferable that patient is anaesthetised), and fingers passed up between placenta and uterine wall. The whole of placenta and membranes should be separated while other hand is applied externally and steadies the uterus. Internal hand should only be withdrawn when whole placenta and membranes have been removed, and uterus should be made to actively contract and expel hand and placenta and membranes together. The hand should only be introduced once (repeated introductions increase risks of sepsis). After removal of placenta uterus should be douched with hot solution, so as to favour retraction and remove any debris. A full dose of ergotin or ergot should be given. Chief danger from the operation is infection, but very little risk if every precaution taken against it.

## ABNORMALITIES IN THE PASSAGE.

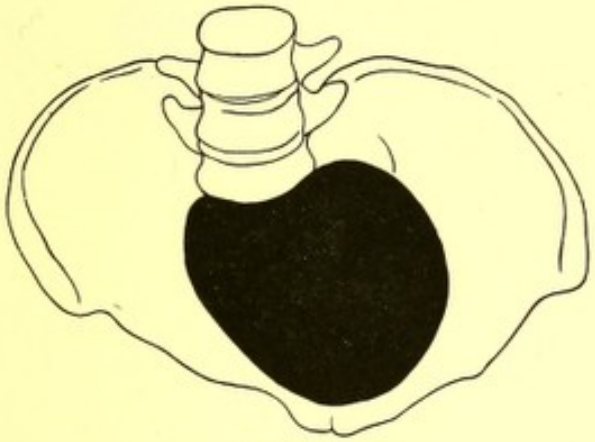
### Abnormalities in Bony Canal. Contracted Pelvis.

*Etiology of Contracted Pelvis.* I. *Deformities from faulty development.* (*a*) Justo-major. (*b*) Justo-minor. (*c*) Simple flat non-rachitic. (*d*) Naegele's pelvis. (*e*) Robert's pelvis. II. *Deformities from disease of pelvic bones and joints.* (*a*) Rickets. (*b*) Osteomalacea. (*c*) New growths. (*d*) Fractures. (*e*) Atrophy, caries, and necrosis. (*f*) Disease of sacro-iliac, pubic and sacro-coccygeal joints. III. *Deformities resulting from disease in spinal column.* (*a*) Kyphosis. (*b*) Scoliosis. (*c*) Spondylolisthesis. IV. *Deformities resulting from disease of the lower extremities.* (*a*) Hip-joint disease. (*b*) Dislocation of one or both femurs. (*c*) Atrophy or loss of one or both limbs.

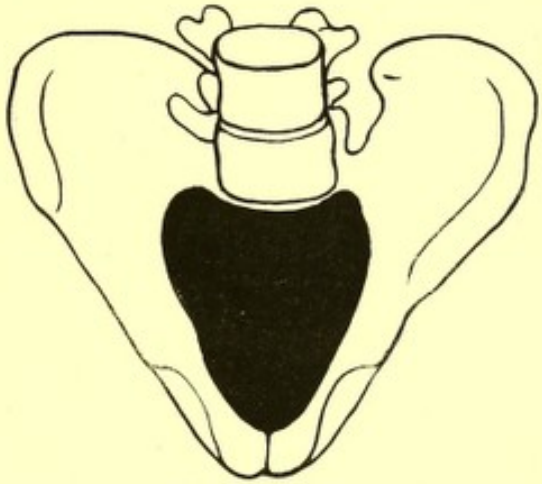
*Justo-major.* Specially marked in giants, occasionally to slight extent in ordinary sized individuals. Labour usually easier.

*Justo-minor*, or generally contracted pelvis. Not uncommon; found sometimes in individuals perfectly normal in size and appearance. (There is a distinct variety of rachitic origin which will be referred to later.) All pelvic measurements diminished. *Mechanism of labour.* Characteristic feature is extreme flexion of head; so much so that the posterior fontanelle comes to be the presenting part. Parturition often delayed and delivery completed with forceps. More serious deformity, if at all marked, than flat pelvis when only antero-posterior pelvic diameter diminished. Subdivisions of this pelvis are: (*a*) *Masculine or funnel-shaped pelvis*, resembles male, diminution in diameters from above downwards; (*b*) *Dwarf pelvis*, development retarded and different component parts of pelvis still separated by cartilage; (*c*) *Infantile*, where the pelvis retains the infantile form and remains small. In dwarf or infantile pelvis, pregnancy very rare.

*Flat Non-rachitic Pelvis.* Antero-posterior diameter is diminished right through the pelvis. Promontory not so marked as in "rachitic-flat" pelvis. Transverse and oblique diameters remain the same. No proof that carrying heavy weight in early childhood is a cause. It is a developmental error (some say that it is rachitic). Individuals look quite healthy in size, appearance of limbs, etc. It is readily recognised, for promontory and whole flattened surface of sacrum is easily felt, and yet there are no manifestations or history of rickets.



Naegele Pelvis.



Robert Pelvis.

*Naegele's Pelvis. Obliquely Contracted Pelvis.* Caused by arrest of development of one sacral ala; there follows an ankylosis of sacro-iliac joint. One side is pushed backwards and inwards, and the pectineal line is much straightened. Comparatively rare, and not easily diagnosed because appearance of individual not characteristic. Measurements between middle line and posterior spines are different. Parturition is usually very disturbed. Caesarean section or craniotomy has generally been necessary.

*Robert's Pelvis or Transversely Contracted Pelvis* is a double Naegele pelvis. It is the rarest of all the pelvic deformities; Caesarean section is the only treatment.

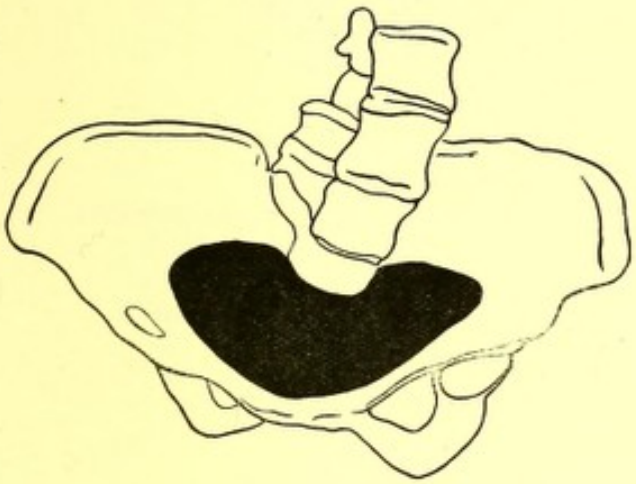
*Split Pelvis.* Comparatively rarely seen in obstetric practice, for usually associated with malformations of bladder and other pelvic organs.

*Assimilation Pelvis.* The sacrum consists of four or six vertebrae instead of five; no obstetric significance.

## DEFORMITIES RESULT OF DISEASE OF PELVIC BONES AND JOINTS.

*Rickets.* Three types found: (*a*) Flat; (*b*) Generally contracted; (*c*) Pseudo-malacosteon.

*Flat.* Deformities produced from pressure through ischial tuberosities when bones are softened by disease and infant cannot walk but sits in bed. Promontory of sacrum is displaced downwards and forwards, the lower part of sacrum and coccyx is prevented from being tilted back by action of sacro-sciatic ligaments so that often sharp bend at lower part of sacrum. With depression of promontory, posterior spinous processes are dragged nearer by sacro-iliac ligaments and this with flattening of anterior pelvic wall causes the interspinous diameter to be equal to or greater than the intercristal. Also as result of flattening of anterior wall acetabula come to look forward. As the tuberosities on which child sits are pushed apart, there is a widening of pelvic outlet. Sometimes anterior pelvic wall is dragged by contractions of recti muscles, then get "figure of eight" pelvis, and if lateral



Flat Pelvis.

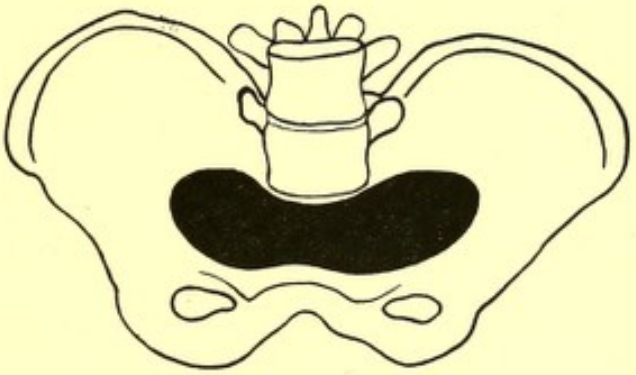


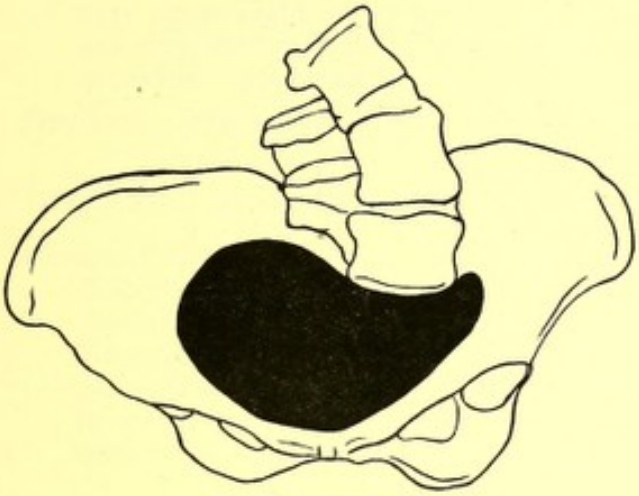
Figure of Eight Pelvis.

curvature and promontory pushed over to one side, get "scolio-rachitic" pelvis (this is a very common variety of rachitic pelvis). As a result of these deformities there is a flattening and diminution of the antero-posterior diameter of brim or conjugata-vera. The effect on the transverse diameter of brim depends as to whether or not any general contraction of pelvis. If disease is slight, transverse diameter little altered (often stated that transverse diameter is increased), but if general contraction, transverse diameter is diminished. Most important to determine this. The cavity is shallow and roomy, and the outlet is increased. As a result, birth of child is often usually rapid after the head has passed the pelvic brim.

*Mechanism of Labour in Flat Pelvis.* (1) Head engages in transverse diameter. (2) Head is less flexed. (3) Biparietal obliquity more marked, when examined vaginally find anterior and posterior fontanelles about same level, and sagittal suture nearer promontory (anterior parietal presentation) or symphysis (posterior parietal presentation), former infinitely more favourable for passage of child's head spontaneously or by means of forceps.

*Generally Contracted Rachitic Pelvis.* Majority of cases of marked pelvic deformity come under this heading, usually flattening is present as well. Explanation of deformity is that disease has arrested pelvic development. Naturally it is a very much more serious condition than flat pelvis.

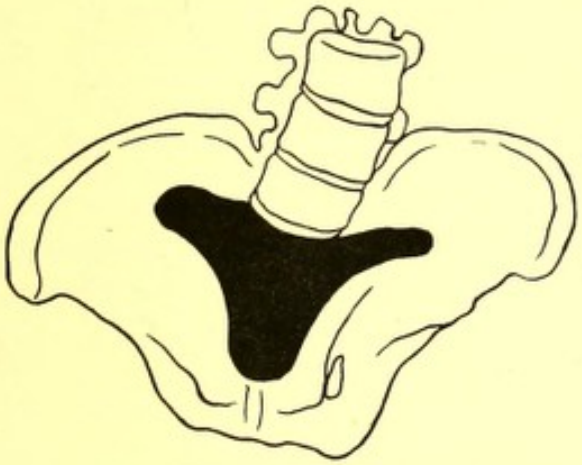
*Pseudo-Malacosteon Rachitic Pelvis.* Very rare variety. It occurs when rickets attacks the walking child. Weight of child being supported by legs the sides of pelvis are pushed in and the anterior wall projects in the form of a beak, hence it resembles the malacosteon pelvis and so is called "pseudo-malacosteon" pelvis.



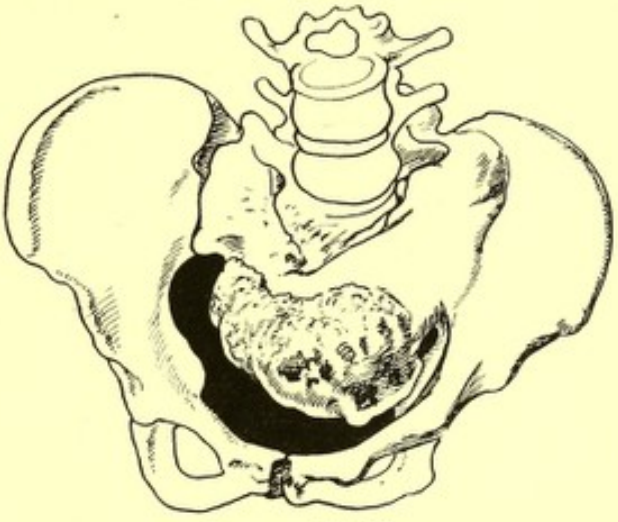
Scolio-rachitic Pelvis.

Pseudo-malacosteon Pelvis.

*Osteomalacic or Malacosteon Pelvis.* The cause of this deformity is mollities ossium, a disease of adult life. Specially active in woman during active reproductive life, and especially during pregnancy and the puerperium. Rarely seen in this country, most commonly in Rhine Valley and North of Italy. Gradual onset. Begins with



Malacosteon Pelvis.



Tumour of Pelvis.

muscular paresis especially of ilio-psoas, contractions of abductors of thigh and increased patellar reflex. Pain complained of in back and limbs, walking becomes irksome; may disappear after parturition to return again during next pregnancy, and so deformities gradually become worse. As a result of disease, bones become very soft; promontory is pushed downwards and forwards, and side pushed in so that front part is pushed out as a kind of beak, hence called "beaked" or rostrate pelvis. Acetabula look forward and so cause a "waddling" gait if woman able to walk. From dragging by the muscles there results a marked curving of the iliac crests and posterior parts of the iliac bones; the ilia look therefore like large

sugar scoops. If deformity at all marked, Caesarean section is necessary. The disease seems to be arrested by removal of the ovaries (Fehling). Phosphorus and calcium salts have little effect.

*New Growths.* Small osteomata (pelvis spinosa) at symphysis and iliac synchondrosis may cause slight injury to child head. Large osteoma, enchondroma, and sarcoma are very rare indeed. Usually situated on posterior wall and arise from region of sacro-iliac synchondrosis.

*Fractures, Caries, and Necrosis of Pelvis.* Sometimes cause slight pelvic deformity.

## DISEASES OF SACRO-ILIAC, PUBIC AND SACRO-COCCYGEAL JOINTS.

*Disease of Sacro-iliac Joint.* Has been referred to in connection with Naegele's and Robert's pelves. The pubic joint is rarely ankylosed as can be judged by the reports of operators who have performed a great number of symphysiotomies. Coccygeal joint is often ankylosed, usually as a result of fracture at a previous parturition, but sometimes found in elderly primagravidae. Removal of the coccyx is much sounder treatment than simply pulling the child by force past the obstruction and refracturing the bone.

## DEFORMATIES FROM DISEASE IN THE SPINAL COLUMN.

*Kyphosis.* Pelvic deformity from this spinal disease depends greatly upon situation of curvature, time of onset, nature of disease. If curvature slight and situated high up, little effect, because compensatory curve forms below. If curvature low down and extreme, then pelvis altered as follows: the promontory is tilted backwards, so that brim of pelvis is enlarged antero-posteriorly, inclination of brim markedly lessened, transverse diameter gradually diminishes from above downwards so that distance between ischial tuberosities may be so great that delivery of child is impossible. When this falls below 3 inches pubiotomy or Caesarean section may be necessary. Caesarean section is often not a suitable operation, for very often labour has to be left to progress, in case child may pass through spontaneously or be delivered with forceps. Owing to the pendulous abdomen, malpresentations are not uncommon. Head, contrary to expectation, will usually be found to engage in the oblique or transverse diameter, not in the antero-posterior one.

*Spondylolisthesis.* Slipping down of last lumbar vertebra in front of the promontory. Results from maldevelopment of the interarticular processes of the last lumbar vertebrae. Accidents, carrying heavy weights nothing to do with it. Rare condition if extreme and very serious obstruction produced. Slighter varieties not so uncommon. Appearance of woman—her trunk seems to be telescoped into her pelvis, and feeling per vaginam, the projecting sacral vertebra make the diagnosis quite obvious. If condition at all marked, Caesarean section is necessary.

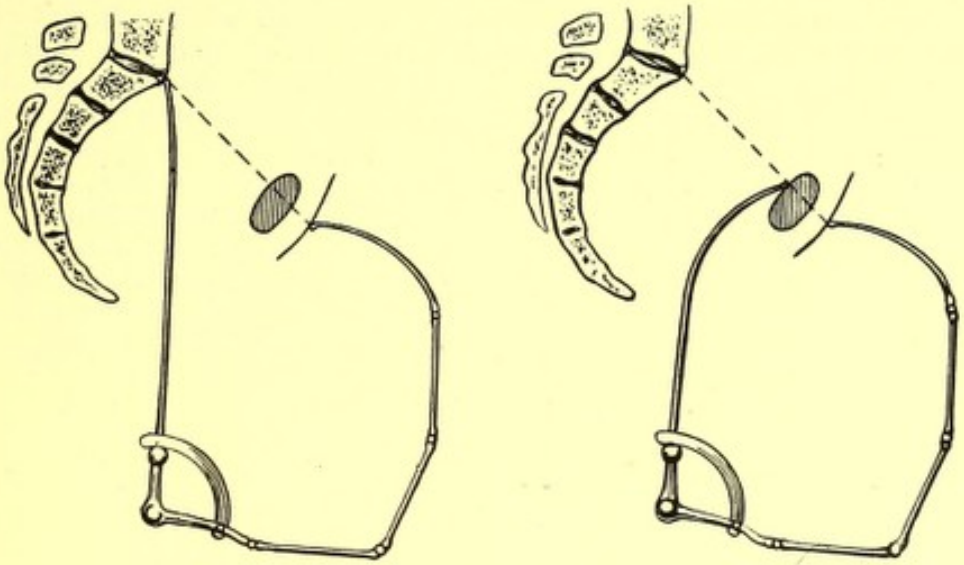
## DEFORMITIES FROM DISEASES OF LOWER LIMBS.

It is obvious that disease and shortening or absence of a leg throw undue weight on sound leg, and if in early years cause flattening of side pressed upon. Congenital dislocation of hip and hip-joint disease may also produce slight deformities.

## DIAGNOSIS OF PELVIC DEFORMITY.

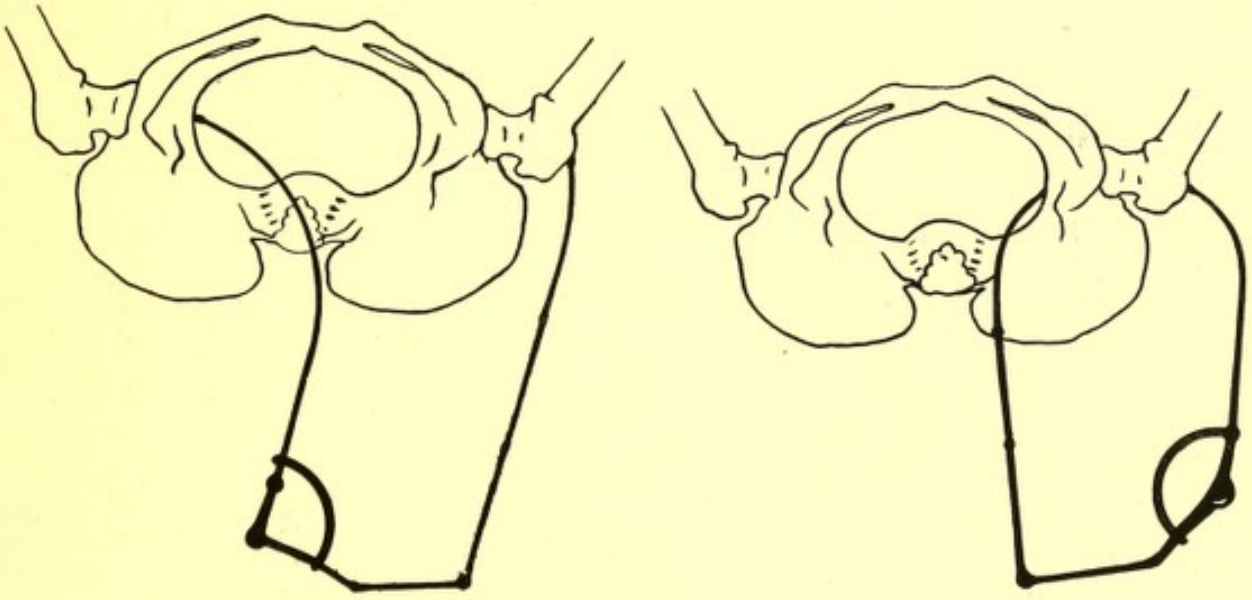
When extreme there are usually smallness of stature, alteration in gait, and in rickets characteristic deformities of the limbs and prominence of frontal eminences.

But in a considerable number of cases the presence or absence of such features are not conclusive for or against pelvic deformity. In a town like Glasgow, therefore, where rickets is so common, one should always be upon the outlook for pelvic deformity, especially amongst the poorer classes. Every primagravida should have her pelvis



Measuring Conjugata Vera.

examined about four weeks before labour is due. I have explained elsewhere the extreme importance of this examination. I would not go the length of saying in every case the pelvis should be measured, for with a little experience one can tell by simple



Measuring Transverse Diameter of Brim.

vaginal examination whether or not there is any deformity of any consequence. If the pelvis is a normal one, should be able to reach the promontory only with considerable difficulty. If one can feel the brim and promontory easily, then almost certainly there is a degree of deformity which will be of importance in influencing the parturition. External pelvic measurements are taken with calipers, and the "intercristal," "interspinous" and

external conjugate, if the pelvis is normal, should measure $10\frac{3}{4}$, 10, and $7\frac{1}{2}$ inches. The only one difficult to measure is the external conjugate. One should take the upper angle of Michaelis rhomboid if the last lumbar spine cannot be determined. Pelvic deformity should be suspected if it measures 7 inches or under. The outlet should also be examined, especially the distance between the tuberosities of ischium and the subpubic angle, and this should be done most carefully in all cases of spinal curvature. The pelvic capacity can only be very roughly estimated from such measurements. No pelvimeters are of much use, but certainly the best is Skutch's, which consists of two arms—one arm is rigid and the other movable. The figures show how the measurements are taken.

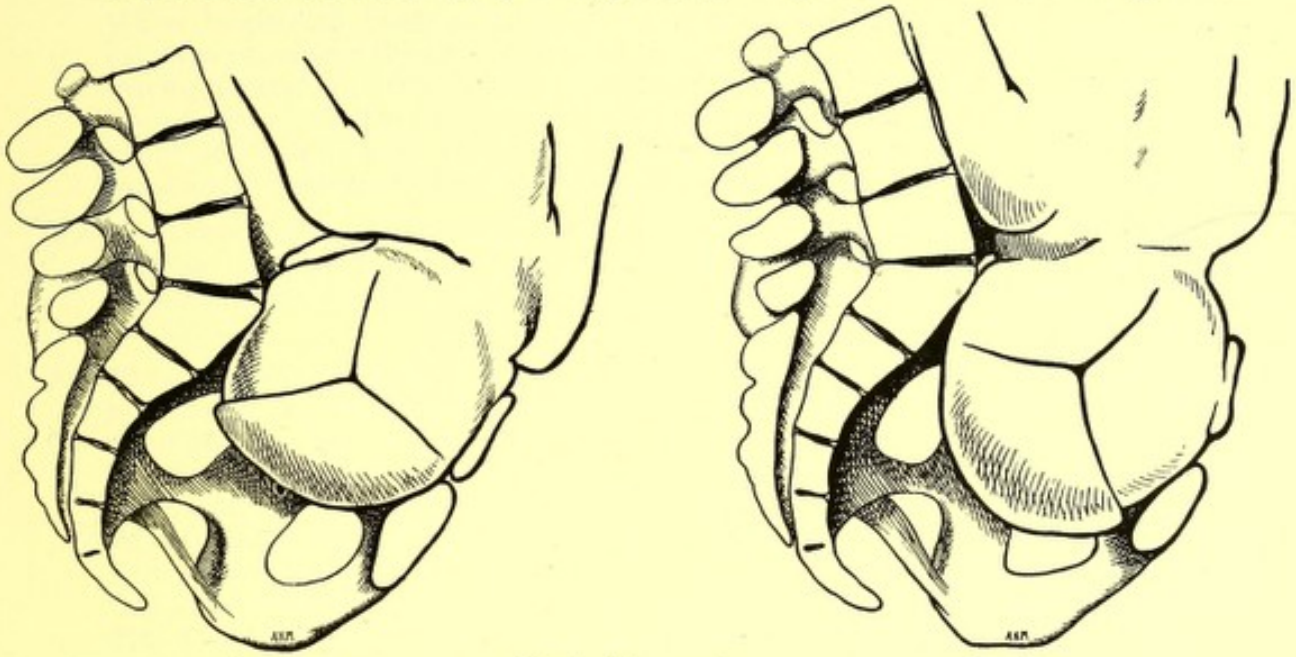
In actual practice the measurement most relied upon is the "diagonal" or "oblique" conjugate—the distance between the lower margin of symphysis and the promontory of the sacrum, and that is taken as shown in the figure. To arrive at the true conjugate, or conjugate of the brim—$\frac{1}{2}$ or $\frac{3}{4}$ is deducted, according to depth and obliquity of symphysis pubis. Other manual methods, such as passing the whole hand into pelvis, give no better results.

Measuring Oblique Conjugate.

But there is another important factor which affects the delivery in contracted pelvis, viz. the size of the foetal head. Attempts have been made with calipers to try and estimate the size of foetal head in utero. They have not proved successful. Size of interior of pelvis therefore cannot be estimated exactly, and foetal head cannot be estimated exactly. Must base treatment therefore on relative size of head and pelvis. "The foetal head is the best pelvimeter." Here is shown my method for doing this (p. 93).

*Prognosis and Treatment.* Reason why prognosis is so bad in contracted pelvis is (1) because so many women are not examined until they go into labour; (2) because medical men do not estimate exactly the relative size of foetal head and pelvis; (3) the failure to appreciate the limitations of forceps.

is the treatment kept in reserve. Very seldom necessary if head and pelvis have been accurately estimated. It does not compete with Caesarean section. *Caesarean section.* Should be able to determine by estimate of head and pelvic brim at end of pregnancy or early in labour if this is necessary, for do not get such good results if delay until labour has been in progress for long time. *Craniotomy* is the operation to perform in a dead or dying child, provided the pelvis is not less than $2\frac{1}{2}$ inches.



Anterior. Parietal Presentation. Posterior.

Also on a living child if there is a probability that the parturient canal is infected. *Induction of labour.* For cases where, at the thirty-sixth week, there is little or no overlapping; about $3\frac{1}{4}$ inches is the smallest degree of pelvic deformity for this operation. Varying results; very good in private practice, but not so good in hospital.

All these operations will be considered later on.

## ABNORMALITIES IN SOFT PARTS, CAUSING DIFFICULTY IN LABOUR.

*Rigidity of Cervix.* Rigidity of cervix is not an uncommon cause of delay in first stage of labour. It is frequently divided into

1. Organic: (*a*) Inflammatory,
   (*b*) New growths.
2. Functional: (*a*) Constitutional,
   (*b*) Spasmodic.

*Inflammatory.* Chronic inflammation and hypertrophy often found in multipara. Easily recognised by large swollen cervix. Almost invariably softens during pregnancy and labour; seldom causes trouble at parturition. If thickened, cervix does not yield and cannot be pushed past presenting part, amputate during labour; mistake to amputate it during pregnancy, for cervix generally softens, and cicatrix of previously amputated cervix may cause dystocia. If hypertrophy and rigidity of cervix extreme, might possibly require to do Caesarean section (vaginal or abdominal). Never seen such a case. *Oedema of anterior lip* may occur if second stage long delayed. Push lip back during "pains." Incise lip if that not sufficient.

*New Growths.* The most important is *carcinoma of cervix.* This condition in pregnancy is generally associated with vaginal haemorrhage and watery discharge. In a few cases the disease may be considerably advanced before these signs show themselves. Cervix bleeds very readily if touched, and tissues very friable. Tumour favours occurrence of abortion, and if advanced is unfavourable to the occurrence of conception. If recognised during pregnancy, uterus should be removed when that is possible. When inoperable leave pregnancy to continue, and allow child to be born per vaginam or remove it by Caesarean section and perform supra-vaginal hysterectomy, leaving ulcerated cervix behind. Dangers of delivery per vaginam are sepsis and haemorrhage. *When recognised during labour*, perform Caesarean section and complete hysterectomy if it is at all possible to remove the growth. If cancer, inoperable; perform Caesarean section and supra-vaginal amputation of uterus.

*Myoma* of cervix often attains great size. If large, remove child by abdomen, but if small myoma may be removed per vaginam during pregnancy or labour, and child extracted per vias naturales. All cervical myomata of any size cause obstruction to labour.

*Functional Rigidity.* Peculiar to certain individuals, often elderly primiparae, but not necessarily so; seen it in young women; labour may last three or four days as dilatation so slow. Give parturient occasional rests with scopolamine $\frac{1}{200}$ and morphine $\frac{1}{6}$; chloral 20 grs. and liq. opii sedativus 25 m. useful in slighter cases. Cervix often softer after their administration, and patient can stand labour better. At any time, if mother's pulse or temperature rises, may be necessary to hasten delivery by dilatation or incisions. *Spasmodic* is also relieved by above—opium, morphia, or chloral. Cocain, 5 per cent., applied to cervix also beneficial sometimes. Hot douches, keeping bladder and bowels empty, also beneficial.

*Atresia of Cervix.* Occasionally no trace of os externum, but can usually feel dimple of os although latter closed. Allow labour to go on until cervix widely stretched over head of child, and then make a small crucial incision over situation of os. May have to stitch cervix after delivery, but often not necessary. A condition which very closely simulates this is often termed *backward displacement of the os* (os is felt high up behind presenting part). Condition really a bulging or sacculation of anterior lip. Both conditions been mistaken for full dilatation of cervix and forceps applied with disastrous results. In conditions under consideration finger reaches and is stopped by fornices, while with full cervical dilatation finger passes into uterus and edges of os felt.

*Cicatricial Contractions of Vagina.* These may result from injuries done with strong caustics or extensive lacerations at previous confinements and from infective conditions. These cicatrices usually soften during labour. (Douches and applications of glycerine and vaseline, very questionable if have any effect.) If don't relax, should be incised at height of pain when band fully stretched. If extreme, Caesarean section may be necessary. Have twice encountered *diaphragm at junction of middle and upper third* of vagina; usually stretches but may require to be incised. It is a developmental error.

*Perineum.* Management of perineum already described (p. 45). Sometimes unduly rigid; often advised to foment and apply vaseline; doubtful if that does any good; better make clean cut in vulvar orifice (episiotomy) and stitch up afterwards.

*Distension of Bladder and Rectum.* Must not be permitted; bowel should be emptied by large enema, and bladder, if need be, with catheter. Both these conditions cause irregular and ineffective uterine contractions. *Cystocele.* This should be pushed over presenting part. (Has been mistaken for anterior lip of cervix.)

*Vesical Calculus.* Extremely rare; could be crushed quite well during labour.

*Tumours of Vagina and Vulva.* These usually cystic, sometimes solid (myoma). They should be enucleated. The child should not be dragged past them.

*Abscess of Bartholin's Gland* is of considerable danger in parturition. Best treatment is to excise gland completely. Have seen two fatal cases of infection of uterus from this gland.

*Haematoma of Vagina and Vulva.* Especially during labour, but also sometimes in pregnancy. Purple, glistening tumour; very painful tearing feeling. May extend from perineum up to brim of pelvis, and even up behind kidney. *Treatment.* Leave to be absorbed unless great pain or suppuration occurs, when should be incised and packed with gauze.

*Ovarian and Parovarian Tumours.* Often recognised quite unexpectedly in pregnancy or parturition. Pregnancy often undisturbed unless the following complications occur: (1) Pedicle becomes twisted during pregnancy, but especially during the puerperium (symptoms sudden, abdominal pain, sickness, and collapse) in about 15 per cent. of cases. (2) Rupture of cyst; usually abdominal uneasiness, slight rise in temperature. (3) Injury and necrosis of tumour usually results from dragging child past the tumour. (4) Displacement of uterus; unless tumour interferes with growth of uterus, pregnancy usually not disturbed. Special trouble occurs during parturition from mechanical obstruction caused by tumour.

*Treatment. Pregnancy.* Remove when recognised during pregnancy (if causing no discomfort may delay removal until near term when child is viable). Often does not cause abortion. If any complication in tumour, remove it at once. *Labour.* If conditions favourable, abdominal section and remove tumour. If condition unfavourable, push tumour out of pelvis and apply forceps. If cannot push tumour out of pelvis, incise and drain through vagina. Most unscientific to pull child past tumour because of danger of rupture or necrosis to tumour. *In puerperium* remove tumour immediately if any complication arises, otherwise delay operation for few weeks.

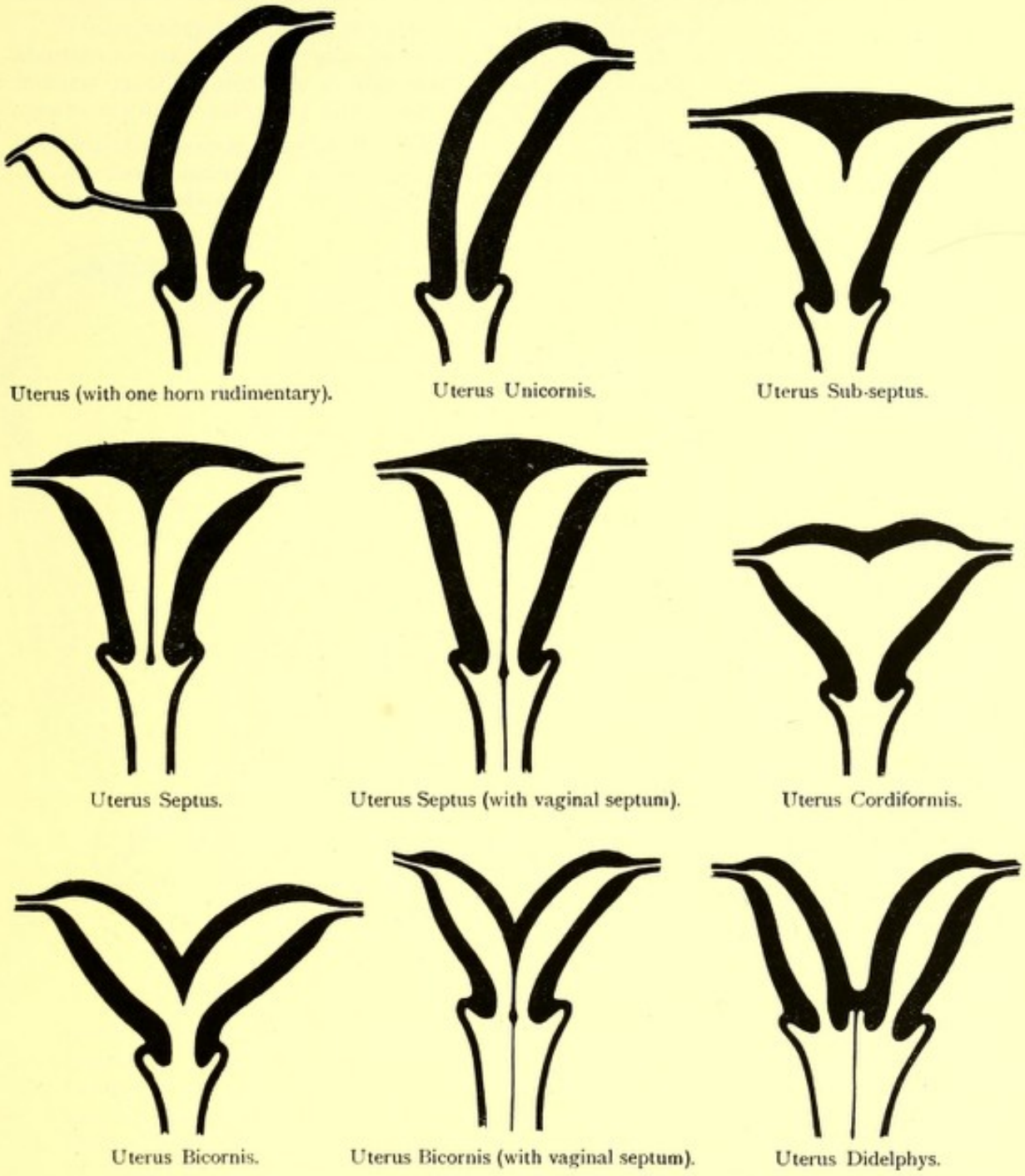
*Myomata.* Very frequently encountered, and cause no trouble if situated on fundus. Favour sterility and abortion if submucous. Grow with growing uterus, and so often cause pressure symptoms if situated in lower part of uterus. Tumours sometimes become very painful ("red hepatization" common). In addition to the difficulty in delivering child, labour may be disturbed from uterine inertia, malpresentations, post-partum haemorrhage, and adherent placenta. *Treatment. Pregnancy.* Only operate if necessary (great benefit can be obtained when pain in tumour from good elimination, consequently regulate diet and give large quantities of fluid between meals). Induction of labour or abortion not practised now. Hysterectomy or myomectomy preferred. (Many cases of myomectomy have done well and pregnancy undisturbed.) *Labour.* Never pull child past tumour. Caesarean section, followed by hysterectomy or myomectomy. *Puerperium.* Remove whole uterus if any complication, especially sepsis, occurs.

*Pyosalpinx.* This condition not often associated with pregnancy as tubes usually both sealed up. May simulate appendicitis during pregnancy. Child in its passage presses upon pyosalpinx, and it is injured and ruptured. Second or third day of puerperium may have symptoms of pelvic peritonitis. Serious condition. Abdomen should be opened and condition dealt with.

## MALFORMATION OF UTERUS.

Due to imperfect fusion of the Müllerian ducts. Figures explain varieties. In all varieties of malformation, should pregnancy occur, the diagnosis of condition may be very difficult, *e.g.* pregnancy in "rudimentary horn" exactly simulates extra-uterine pregnancy,

and usually at one time or another of pregnancy there is pain and haemorrhagic vaginal discharge. Then in uterus bicornis the non-gravid half may simulate a myoma. In the slighter malformations, such as uterus cordiformis or sub-septus, malpresentations are




MALFORMATION OF UTERUS.

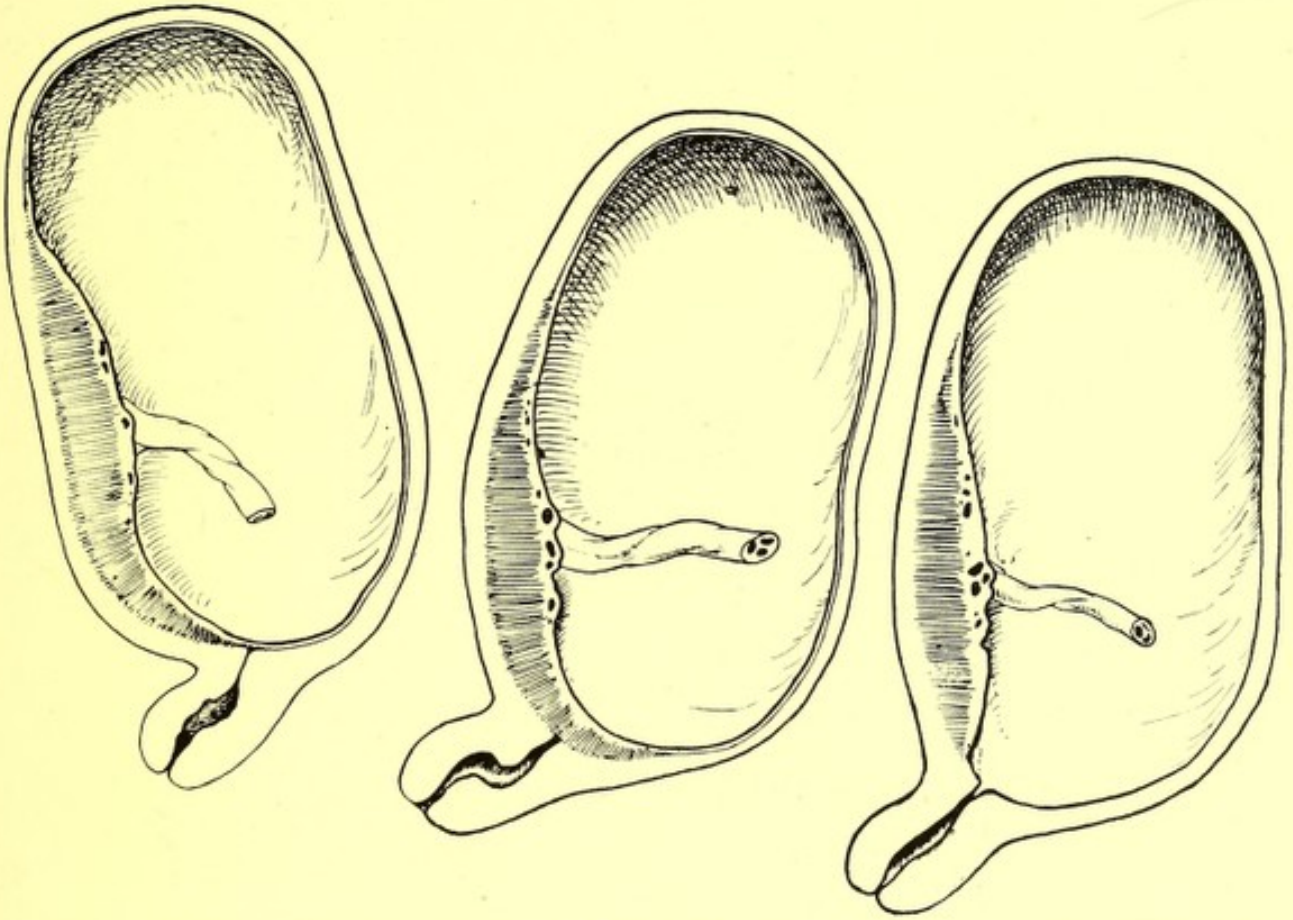
favoured, but in uterus septus or uterus didelphys, presentations are generally longitudinal. Many cases of superfoetation are explained by malformations of uterus. The ova may be of very different ages. In the extreme cases of double uterus parturition usually easy.

## HAEMORRHAGES IN PREGNANCY.

### Unavoidable Haemorrhage (Placenta Praevia) and Accidental Haemorrhage.

Haemorrhage in pregnancy always alarming. In early months may be caused by abortion, extra-uterine pregnancy, ulceration (malignant) of cervix, polypus. In later months usually caused by either unavoidable or accidental haemorrhage, although may also be result of malignant disease of cervix and polypus.

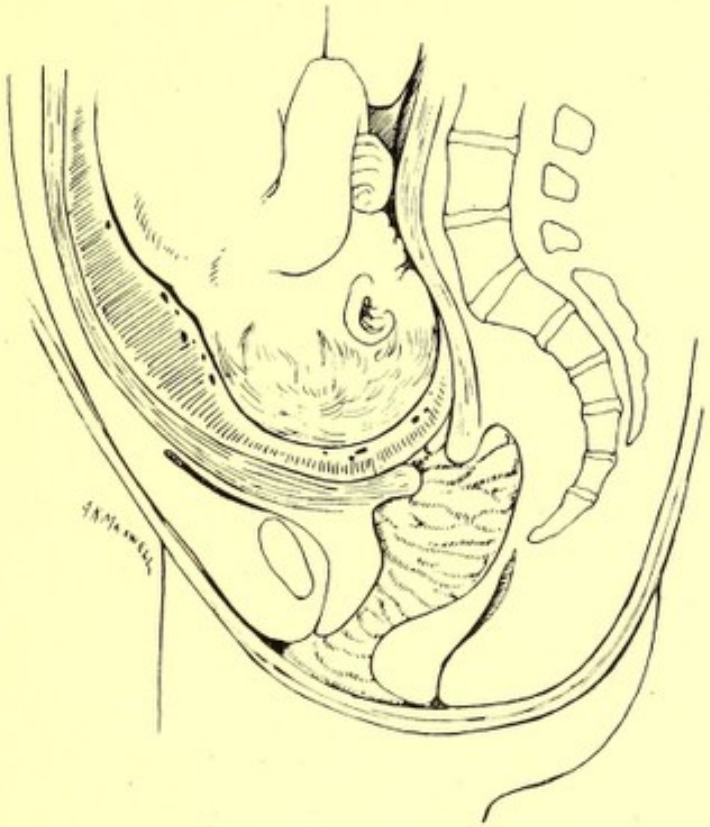
*Unavoidable Haemorrhage or Placenta Praevia.* The haemorrhage called "unavoidable" because placenta must be separated before child can pass. By *placenta praevia* is meant implantation over lower uterine segment so that placenta completely covers os



(central), reaches up to margin of os (partial or marginal), or dips into lower segment (lateral). Figures explain the varieties. *Etiology.* Low implantation of ovum favoured by such conditions as (1) multiparity; (2) subinvolution; (3) chronic metritis and endometritis; (4) in some cases the result of placental development from decidua reflexa (Hofmeir, Webster). *Symptoms.* Many cases of abortion, probably caused by this faulty situation of placenta. Usually manifests itself about the seventh or eighth month with haemorrhage; recurrent haemorrhages is the most important feature. Quantity of haemorrhage varies with each attack. These haemorrhages are preceded by no pain. When labour comes on, haemorrhage always severe. The bleeding occurs from the uterine wall, from which placenta is separated. This separation occurs as lower uterine segment developes. According to degree of bleeding are the symptoms of loss of blood—pallor, small rapid pulse, cold clammy sweats, sighing respirations, convulsions, death.

*Diagnosis.* If os is dilated, and finger passed through cervix, soft boggy placenta is felt. Blood clot is softer and breaks up. When os not dilated, placenta praevia should always be suspected if much bleeding. Sometimes the whole vaginal vault feels soft and boggy and the presenting part difficult to feel; ballottement, too, is obscured. By abdominal palpation, occasionally possible to diagnose placenta. *In lateral* variety, may have difficulty in reaching placenta, because lower margin simply dips down into lower uterine segment. (*N.B.*—After delivery, hole in membrane close to margin of placenta.)

*Treatment. Pregnancy.* Palliative treatment (rest, hot douches, ergot) is very questionable; only if patient can go into hospital or nursing home. If that not possible, the pregnancy should be terminated.



Vaginal Plug in Placenta Praevia.

*Os not Dilated.* Douche and plug vagina firmly, and apply abdominal binder. Long strips of gauze, or plugs of cotton wool covered with gauze, must be packed firmly against cervix and up into vaginal vaults. This must be done under anaesthetic and retractor holding walls of vagina apart. This plugging should be left in for twenty-four hours, unless strong uterine contractions come on or evidence that plugging has not arrested the haemorrhage.

*Os Dilated.* For general practice best procedure is to rupture membrane and bring down a foot (bipolar version). In hospital, under care of specialist, other treatments may be tried, such as *simple rupture of membranes*; may be sufficient if placenta praevia is of lateral variety. Must not extract child until os fully dilated.

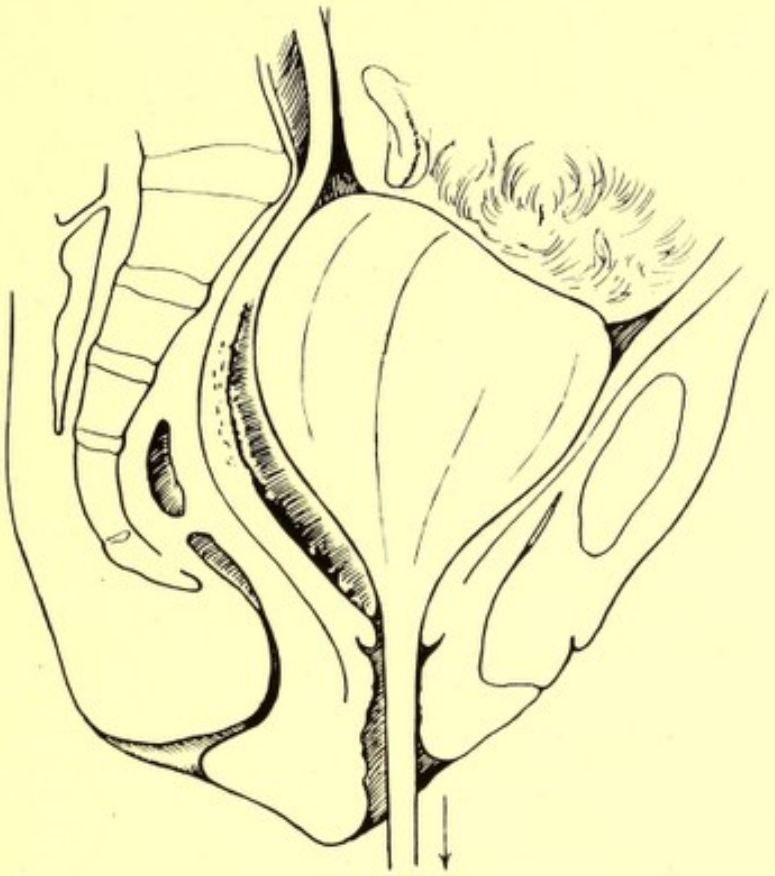
*Metreuryater.* Employed by some; said to give better chance to child (very doubtful). If os fully dilated, not necessary to perform version; *extract with forceps.*

*After Delivery.* Give very hot intra-uterine douche and full dose of ergotine or ergot. Should there be extreme collapse, transfuse into a vein. If collapse not

extreme, rectal or intracellular transfusion sufficient. Raising foot of bed and bandaging lower limbs (autotransfusion) also useful in very grave cases.

Complete separation of placenta (Simpson), and partial separation of placenta (Barnes) not now employed.

*Accidental Haemorrhage.* Separation of a normally situated placenta; often attributed to fall, injury, strain, but usually result of diseased condition of uterus (metritis and endometritis), etc. Most common in multiparae and women the subjects of metritis. *Symptoms.* Haemorrhage in later months of pregnancy, coming on usually quite suddenly. Along with haemorrhage, dull tearing, bursting pain over uterus, variable in degree.



Metreuryater in Placenta Praevia.

*Diagnosis.* Distinguish from placenta praevia by feeling no evidence of placenta on making vaginal examination.

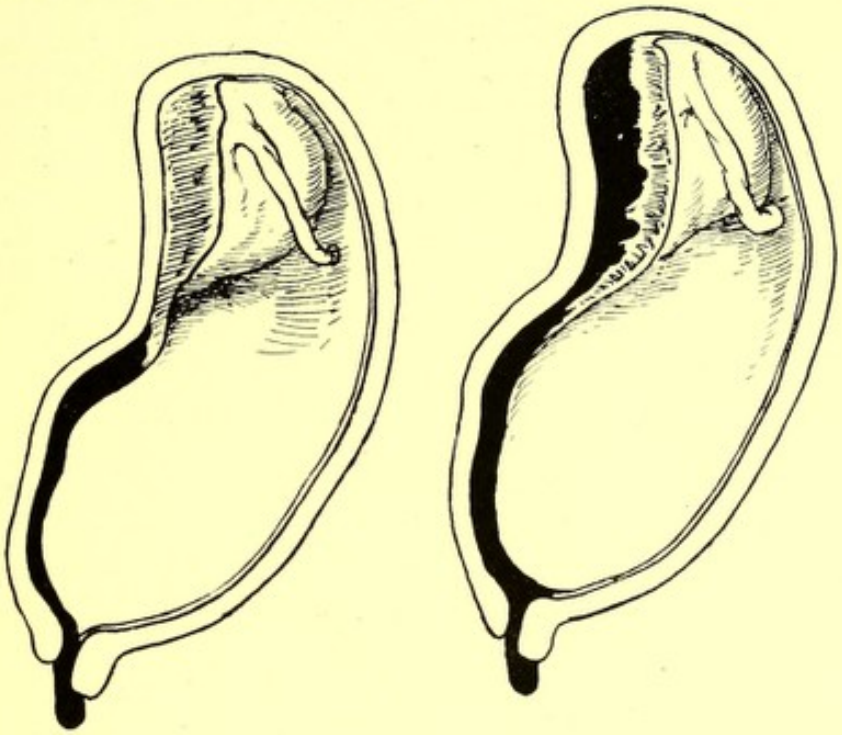
*Varieties.* (1) Apparent. (2) Concealed. (3) Partially concealed and apparent.

(1) *Apparent.* In this variety all the blood comes away and there is little abdominal discomfort. This is the variety in which "plugging" is such a suitable treatment.

(2) *Concealed.* In this variety blood is pent up between placenta and uterine wall, and practically none escapes from uterus (sometimes discharge of pale sanguineous fluid). Patient is very restless and much collapsed. She complains of great abdominal pain. Uterus is globular, hard, and tender to the touch. Condition may simulate giving way of some hollow viscus, appendicitis, rupture of uterus, twisted ovarian cyst with twisted pedicle. But history of pregnancy and bimanual examination and tense tender condition of uterus will make matters quite clear. Extremely grave condition.

(3) *Partially concealed and apparent.* The seriousness of this variety is often overlooked, the small amount of external bleeding leads to idea that not much blood being lost. It is serious in proportion to degree of abdominal pain and collapse, and not as regards amount of blood lost.

*Prognosis.* Very grave indeed in concealed variety. Foetal mortality is about 90 per cent. Child need not be considered in this condition.



*Treatment.* Differs according to variety. *If active, uterine contractions* occurring. Rupture of membranes; simplest treatment. *If no attempt at labour,* and the bleeding is apparent or external, then plug vagina very tightly and apply firm abdominal binder, already described for placenta praevia (uterus and vessels compressed). *If haemorrhage concealed* and patient collapsed, perform Caesarean section and hysterectomy. *Alternative treatment. Version* quite suitable in slight cases, instead of simply rupturing membranes. *Metreuryater.* Should only be employed after membranes ruptured. *Accouchement-forcé* has given very bad results so far.

## POST-PARTUM HAEMORRHAGE.

*Post-partum Haemorrhage* is one of the most dreaded complications. It is very rare in properly managed cases, especially if third stage is properly managed. Nature's means of preventing post-partum haemorrhage is "retraction" of uterus (clotting in vessels not much importance).

*What hinders "Retraction" of Uterus and causes Post-partum Haemorrhage.* (1) Unhealthy uterus, chronic metritis, many pregnancies, tumours of uterus (myomata). (2) Over-distension from hydramnios and twins. (3) Extraction with forceps, or version when uterus in a state of extreme inertia. (4) Not following down fundus as child extracted, and leaving woman on side after delivery; blood clot accumulations in uterine cavity. (5) Long administration of chloroform. (6) Partial separation and retension of placenta. (7) Unduly large placental site. (8) Certain states of blood.

These are most important. Bleeding may be like a torrent, the uterus being absolutely soft and flabby like wet leather. More commonly there is period of moderate retraction and contraction followed by atony and free bleeding, during which uterus balloons up with blood, and small and steady stream of blood escapes from the vagina. According to amount of blood lost is the degree of collapse—rapid pulse, cold sweats, fainting, air hunger, convulsions, etc.

*Treatment.* Must be prompt. (1) Massage uterus, but if that has no effect, then employ following: (1) *remove placenta* with hand if cannot at once express it. clear out all the blood clot; (2) *give hypodermic injection of ergotin*; (3) *hot douche*, 118° F.

By properly carrying out these procedures the bleeding is almost invariably arrested, but if it is not, then uterus should be plugged or uterus "doubled" on itself. *Plugging with gauze.* Do not always have quantity of gauze necessary; very rarely necessary. Gauze must be pushed in firmly and binder applied; after twenty-four hours, packing removed. *Compression of aorta* controls bleeding by pressure on aorta and vena cava. *Doubling uterus.* Pass hand into vagina, and seize cervix, while external hand doubles fundus on cervix. (See figure.)

Bimanual Compression of Uterus.

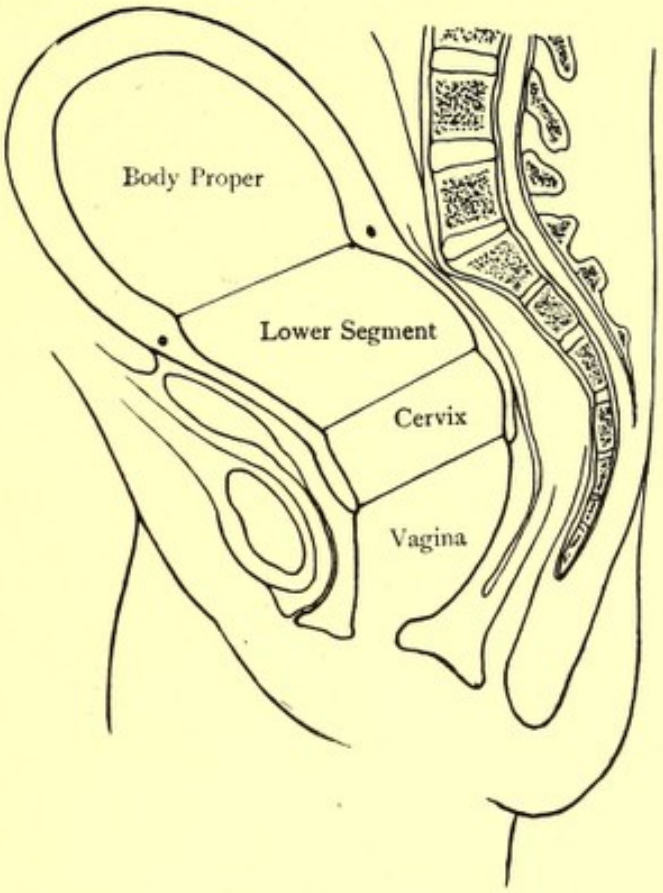
After bleeding is arrested, but not before, give saline intracellularly or by rectum, and raise foot of bed. Bind up limbs (autotransfusion). *N.B.*—Severe haemorrhage may occur from a lacerated cervix. In such a case the uterus is well retracted, and yet the bleeding continues. The treatment for such a condition is to stitch the laceration.

## RUPTURE OF UTERUS.

Usually occurs after prolonged labour. Lower uterine segment gets more and more thinned out, and finally gives way very frequently during attempts at some form of artificial delivery (forceps or version). In this class of case contracted pelvis, impacted transverse position, hydrocephalus are very frequently the predisposing causes; these obstructions bring about thinning of lower segment. (*N.B.*—The rupture, however, is

usually the result of employing the wrong method of delivery and trying to drag child out of canal.)

Sometimes rupture occurs early in labour, or even during pregnancy, from falls, or disease, and degeneration of the uterine muscular tissue. Considerable number of cases now on record where scar of Caesarean section has given way at a subsequent pregnancy.




Diagrammatic Illustration of Different Divisions of Parturient Canal.

*Symptoms.* Sometimes not recognised until after delivery, when patient gradually becomes collapsed (small, rapid, thready pulse, cold extremities, etc.). If occurs during a *protracted labour*, generally have cessation of violent uterine contractions; feeling of something having given way; change in shape of uterus from child escaping in part or entirely through rent in uterus; more or less collapse. If *occurs early in labour or during pregnancy* all the symptoms of rupture of an abdominal viscus; acute abdominal pain and collapse. *Diagnosis* is not difficult if rupture follows a protracted labour; for there is generally distinct collapse. Sometimes, however, the collapse is not extreme, and condition is only discovered accidentally by passing hand into uterus to remove placenta or by a slow and gradual sinking of patient. In cases where rupture occurs during pregnancy or early in labour, condition may simulate or be simulated by "concealed accidental haemorrhage." In the latter, however, there is no alteration in the shape of the abdominal swelling, which is smooth, tense, and tender to touch. *Varieties.* Complete rupture into the peritoneal cavity. *Incomplete* rupture into the cellular tissue of broad ligament.

*Treatment.* If occurs during pregnancy or early in labour, abdominal section should be immediately performed and the child and uterus removed. The same applies to

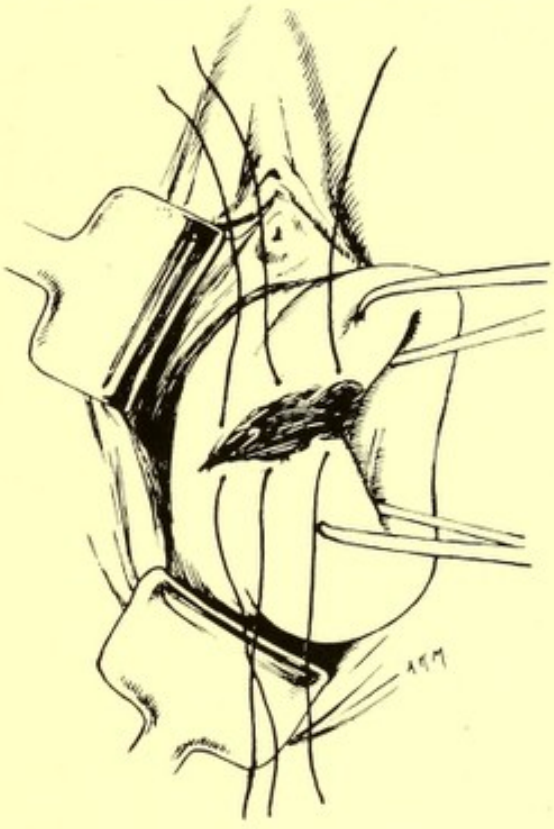
cases occurring after a protracted labour when the child escapes partially or entirely from the uterus. In the case where rupture is recognised after delivery, I think hysterectomy is still the best treatment, but many obstetricians in such cases distinguish between complete and "incomplete" rupture. If rupture incomplete they advise plugging the rent with gauze, and only perform hysterectomy if rupture "complete." If conditions unfavourable for hysterectomy, plug rents in uterus tightly, and apply a pad and abdominal binder. By such treatment, many cases saved.

If patient extremely collapsed, use all means to revive—hot bottles, strychnine, digitalin, saline infusion, etc.

*As regards child.* In cases where rupture recognised before delivery of child the child should be extracted by the vagina only if that can be done easily. When the child is partly inside and partly outside the uterus the extraction per vaginam should not be carried out until everything is prepared for dealing with the rupture, for the child in such cases acts as a plug.

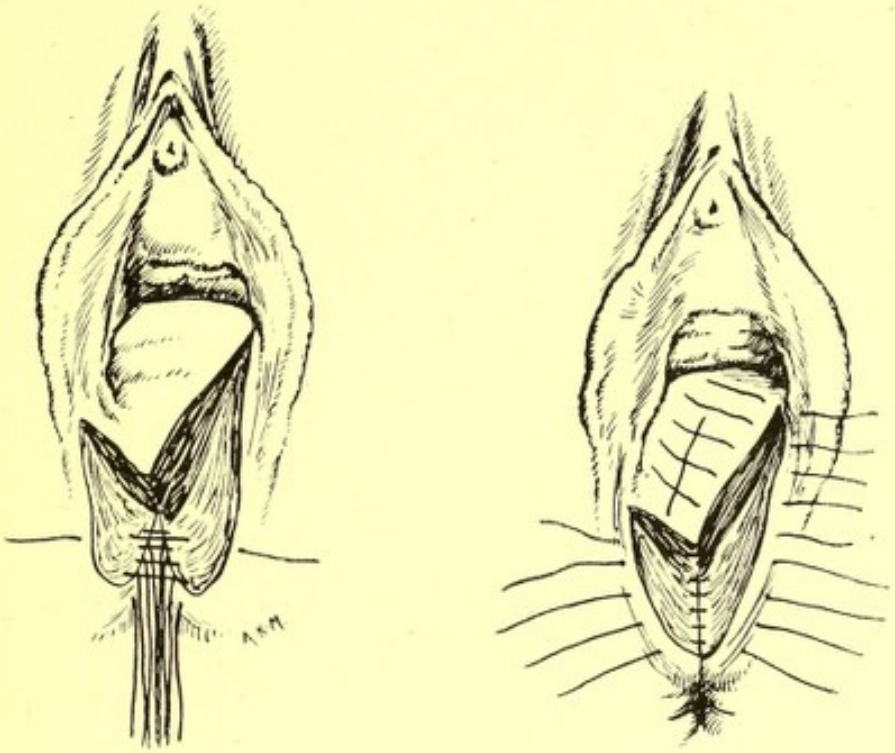
## LACERATION OF CERVIX AND PERINEUM.

After the first parturition the cervix is almost invariably torn, and most commonly the tear is on the right side; this is generally explained by the fact that the occiput is generally directed towards that side. Tearing of the cervix is specially liable to occur if forceps are



applied before the cervix is fully dilated and if ergot is given during labour, but even in spontaneous deliveries there is sometimes fairly extensive laceration. When laceration is extensive, bleeding is profuse, but in slighter tears there may be very little haemorrhage (illustration shows how the laceration should be repaired). Vulcellum forceps are applied to front and back flap of torn cervix, which is pulled down, and sutures are applied as shown.

*Laceration of Perineum.* Slight tearing of the perineum is fairly frequent at the first labour. It is favoured by large head, malposition of head, early operative interference, as dragging the child down on to an unstretched perineum. Three degrees of laceration are frequently described: (1) degree where only a slight tear in the perineum; (2) where the laceration reaches up to the margin of the anus; (3) complete laceration where the tear extends right into the rectum.



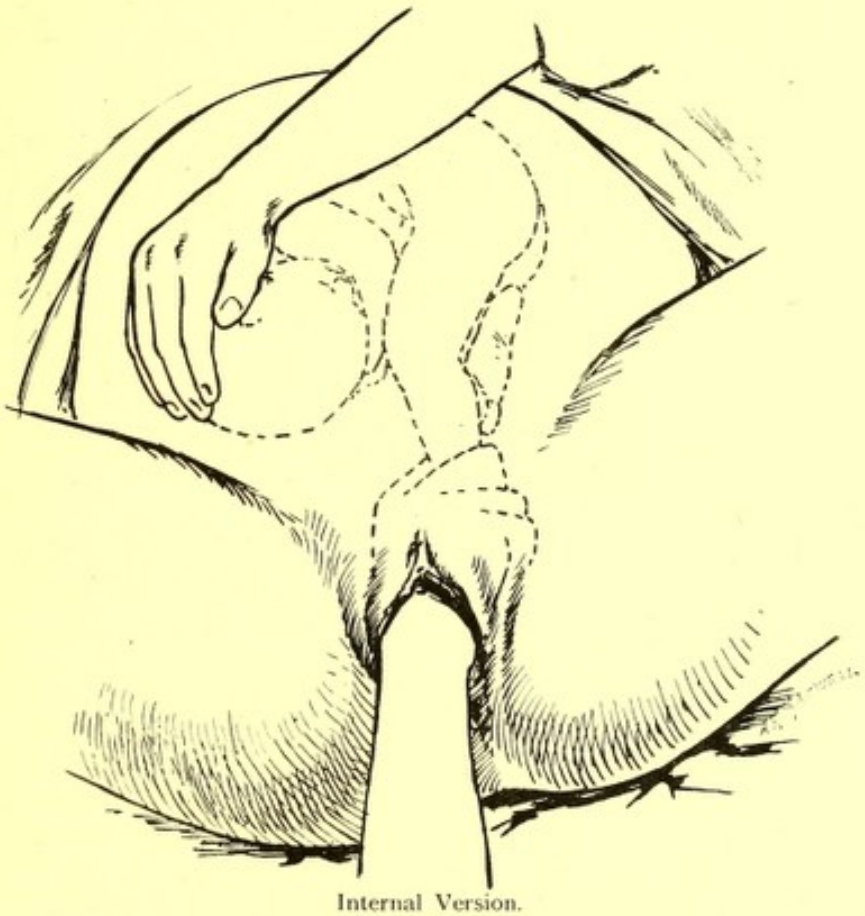
*Treatment.* Preventive treatment is considered (p. 45) in connection with the management of labour. Should a laceration occur, it must be carefully stitched; for slight, one or two through and through stitches of silkworm gut or catgut is all that is necessary; but if the laceration is more extensive, the wound should be stitched both from the vagina and perineal surface—the vagina with catgut and the perineal surface with silkworm gut. Where the laceration is complete, repairing of the wound should be very carefully carried out (the illustration shows the manner in which this is to be done). First of all, the wound in the bowel is closed by bringing the raw edges together with sutures and knotting them in the rectum (as shown in illustration), then the vaginal laceration is repaired, and finally through and through stitches on the skin surface are inserted. It is most important in the after-treatment, in cases where there is laceration, that the part should be kept absolutely clean by frequently swabbing the part by weak antiseptic solution. Not infrequently there is retention of urine; the catheter often requires to be used.

# OBSTETRIC OPERATIONS.

## VERSION OR TURNING.

THE object of this operation is the substitution of the head or foot for some other presenting part. When the head is brought to present, we speak of "Cephalic Version"; if the limbs are brought down, "Podalic Version."

*The Indications for the Operation.* (1) *Mal-positions and mal-presentations* of the child. It is necessary in transverse presentations and under certain conditions, occasionally in brow and face presentations. A few recommend cephalic version if the breech is



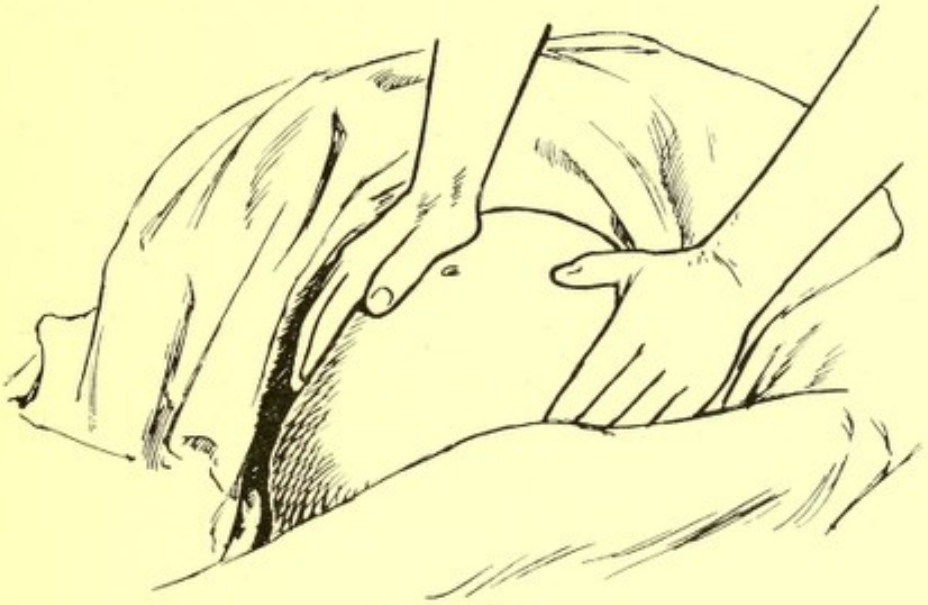
Internal Version.

found presenting in the later weeks of pregnancy. (2) *Flat pelvis.* The operation is not favoured now in contracted pelvis. It used to be claimed that the head passed through the brim more easily because the narrow end of the wedge passed more readily into pelvis and the parietal bones overlapped better; but it has been found

that the foetal mortality is very high with this treatment. (3) *Dangers threatening the mother.* Most important of these are placenta-praevia and accidental haemorrhage. Podalic version is also employed in accouchement-forcé and in the delivery of double monsters. (4) *Dangers threatening the child.* Prolapse of the cord is most important under this head (p. 85).

*Methods of performing Version.* (1) Internal manipulations; internal version. (2) External manipulations; external version. (3) Combined external and internal manipulations; bipolar version or version after the method of Braxton Hicks.

*Internal Version.* This is the oldest method. Vulva, lower abdomen are thoroughly cleansed, bladder and rectum are emptied and patient anaesthetised. Best performed with patient in dorsal decubitus. Exact position of head and limbs should be carefully made out, and the right or the left hand introduced into the uterus accordingly. In this operation the limbs are usually brought down; very seldom indeed does one bring down the head (internal cephalic version). Sterilized hand in form of a cone is introduced into the uterus right through the membranes if they are not already



External Version.

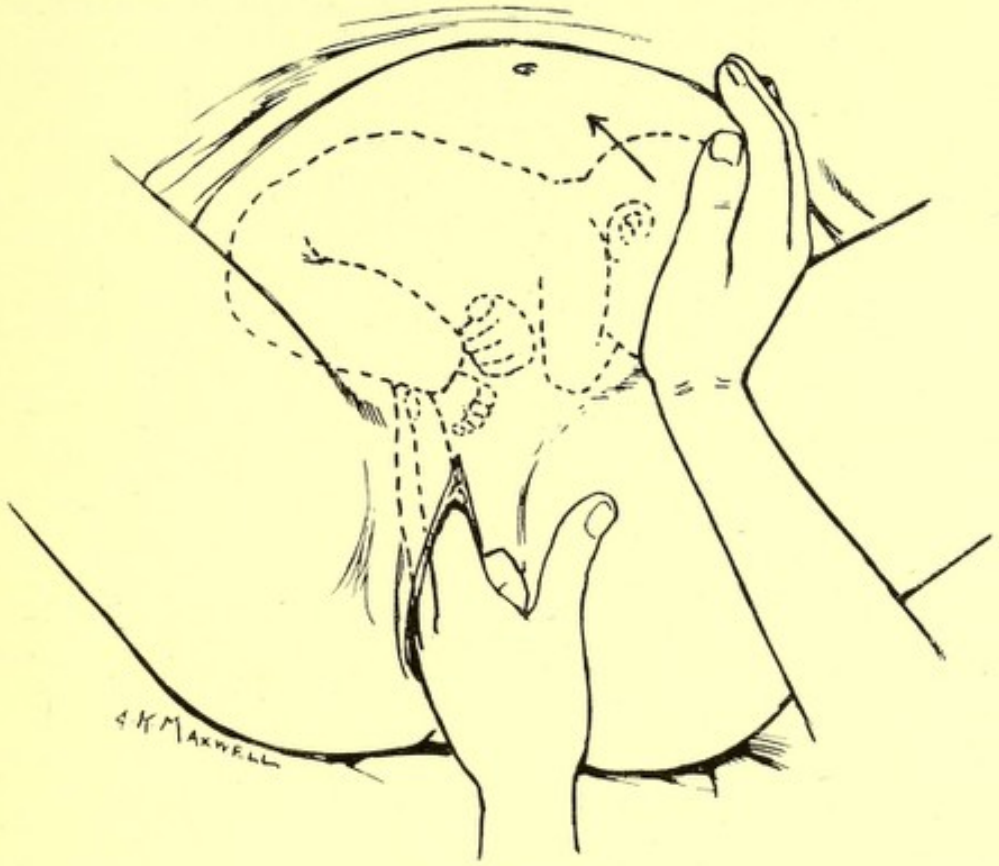
ruptured. (It used to be recommended to pass the hand between the membranes and uterine wall, but greater danger of introducing infection, so has been abandoned.) Operator's arm in vagina prevents escape of liquor amnii. If uterus actively contracts, operator should desist from manipulations, and leave his hand passively resting against child until contraction passes off. Foot should be seized, preferably the one furthest away (the foot is distinguished from the hand by the presence of the heel). Having seized the foot, the leg should be brought down. Sometimes difficulty in getting the head to rise up to fundus, this may be aided by other hand pushing up the head either from the vagina or externally. If arm is prolapsed, a fillet should be applied round arm and the operation carried out as mentioned. (Fillet round arm is to facilitate extraction of after-coming arms.)

The operation is very dangerous if waters have long drained away and the shoulders are fixed in the pelvis (impacted transverse presentation). In such a case decapitation best operation.

*External Version.* Suitable in later weeks of pregnancy and early in labour before membranes have ruptured, very often difficult to accomplish. Exact position of child is carefully determined by palpation. Hand is then applied over each pole of the foetus, and foetus is pushed round until the breech or the head presents. Head

usually brought to present in this form of version. Having brought the head to present, it should be fixed in the pelvis by suprapubic pressure and a binder applied.

*Bipolar Version.* This method of Braxton Hicks suitable when os is sufficiently dilated to permit two fingers to pass through. Usually impossible if waters have drained away. Two fingers of the one hand are passed into the cervix, and presenting




Bipolar Version.

shoulder or head is pushed out of the way. At the same time the external hand is used to pull down breech or push up head. When the foot comes over the os, the membranes are ruptured and the foot pulled down.

## FORCEPS.

It is generally stated that the forceps has five actions: (1) Tractor, (2) Compressor, (3) Lever, (4) Stimulator of uterine action. (The last action is often called "Dynamic" action and is frequently observed when the forceps is applied to the head at the outlet. Mechanical stimulus causes strong uterine contractions.) (5) Rotator in occipito-posterior or mento-posterior position. It must be employed with great care. The forceps is seldom to be used as a lever. It is quite permissible to employ a slight pendulum movement, but never to the extent of levering down one side and then the other. The forceps acts as a compressor only when it grasps the head antero-posteriorly or obliquely. The blades compress the head only very slightly when they are applied to the sides of the head.

The really important action of the forceps is as a "tractor." The instrument is designed to pull the child's head out of the pelvis. (Rarely of much use in extracting an impacted breech.) The amount of traction which can be exerted by the forceps is

enormous, but, as a rule, the operation is being badly performed or the conditions are unfavourable when extreme force is employed.

*Indications for Forceps.* (1) Faults in the forces. (2) Faults in the passage. (3) Faults on the part of child. (4) Dangers threatening the life of the mother. (5) Dangers threatening the life of the child.

(1) *Faults in the Forces.* The forceps is only to be employed in this condition when the second stage has been allowed to go on for several hours. The forceps should not be used when the uterus is "tired" (secondary uterine inertia). In that condition an opiate should be given, and the patient should have a rest for an hour or so; when active contractions come on, forceps should be applied should the contractions not be sufficient to expel the child.

(2) *Faults in the Passage.* Forceps should never be employed to pull child past a tumour, but may be employed in certain cases of contracted pelvis and if perineum is very rigid and the forces cannot overcome the resistance of the pelvic floor.

*Contracted Pelvis.* Most important to appreciate right position of forceps in contracted pelvis; foetal mortality is 50 per cent. with C.V. of 3 in., 23 per cent. if C.V. $3\frac{1}{4}$ in. and 15 per cent. if C.V. $3\frac{1}{2}$ in. Seldom advisable therefore to apply forceps if C.V. below $3\frac{1}{4}$ in. Final decision is come to by carefully estimating relative size of head and pelvic brim.

(3) *Faults on the side of the Child.* Large size of head (except malformation, such as hydrocephalus). Occipito-posterior and facial presentations where these cannot be rectified manually and difficulty with the after-coming head in breech presentations. Very seldom, indeed, is it wise to use forceps in brow presentation.

(4) *Dangers threatening the life of the Mother.* Such conditions as eclampsia, heart disease, advanced phthisis, a rising temperature or pulse, call for forceps delivery.

(5) *Dangers threatening the life of the Child.* If foetal heart-rate comes down to 100 or rises above 150, child's life is in danger. Expulsion of meconium in head presentation is also an indication, but before that occurs the foetal heart generally affected. If the child is to be saved in this condition extraction must be rapid, as its circulation is already much embarrassed.

*Conditions which must be fulfilled if Forceps is to be applied.* (1) The os must be fully dilated. It is very dangerous to apply forceps before os is fully dilated. (2) Membranes must be ruptured. (3) Presentation must be a suitable one; that is to say, the forceps may be employed in vertex and face presentations, and in delivery of the after-coming head. (Forceps seldom of much service in delivering the forecoming breech.) (4) There must not be too great disproportion between the foetal head and the parturient canal. That is to say, the foetal head must not be too large (as in cases of hydrocephalus) nor the canal too narrow. The test of this is the careful bimanual examination of the relative size of the head and the pelvis. (5) The head must be engaged; that is to say, the forceps must not be employed to a head movable above the brim.

*Preparation of Patient.* Parts thoroughly washed with soap and water and antiseptic lotion. Vagina thoroughly douched. Bladder emptied with catheter; sometimes little difficult if head low in pelvis, in such cases push up head. Better to have patient anaesthetised. Usually left lateral position employed; dorsal position better in contracted pelvis (for weight of trunk with woman on her side drags head out of pelvis). Walcher or "hanging-leg" position useful in flat pelvis (C.V. increased by $\frac{1}{6}$ in.). Forceps should be sterilized and placed in a suitable vessel near accoucheur.

*Position of Blades as regards Child's Head and Maternal Pelvis.* As regards the head, ideal position is along sides of head and face, and as regards pelvis one blade at ends

of the transverse diameter of pelvis. Slight variations from this ideal position not much consequence. Usually recommended now a-days to pass in blades to side of pelvis, and not worry about how blades lie as regards foetal head. (Personally think should also consider position they occupy as regards head.)

*Application of Forceps. Head Low in Cavity.* Patient in left lateral position. Left hand introduced into vagina, and left or lower blade held in left hand guided into side of pelvis over side of child's head (figure 1). Blade must be kept closely applied to

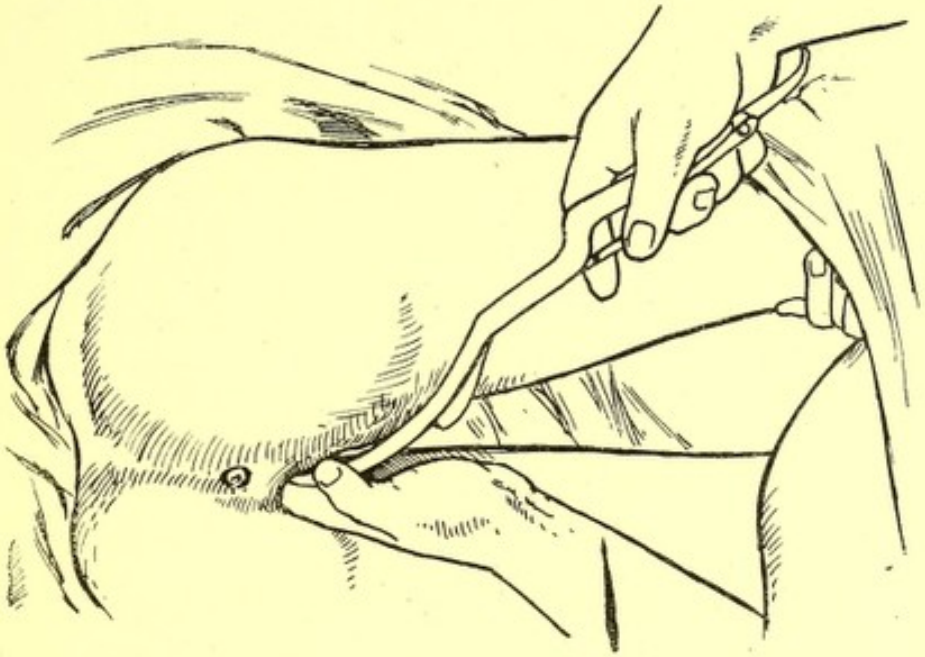


Fig. 1.

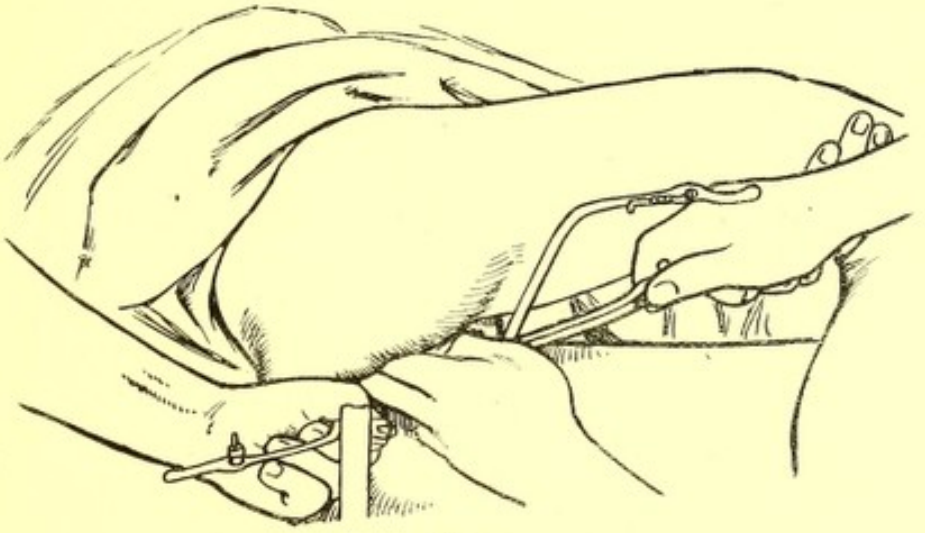


Fig. 2.

child's head and carefully guided inside os uteri. Handle is then depressed and carried back. (Traction rod not in operator's way.) Right or upper blade is now introduced (figure 2). Here again blade is introduced by right hand and guided into position by left hand. Operator grasps blade with his right hand and allows traction rod to rest on the dorsum of his hand. He introduces the blade

into the hollow of the sacrum, and then rotates it round to right side of pelvis. (Traction rod not in way.) (Figure 3.) Handles of two blades are then pressed backwards and easily locked (figure 4). If difficulty in locking, gentle manipulations or withdrawal of blades and reintroducing them, all that is necessary. Traction rod of right blade is now carried back, and traction rods fixed and handle applied.

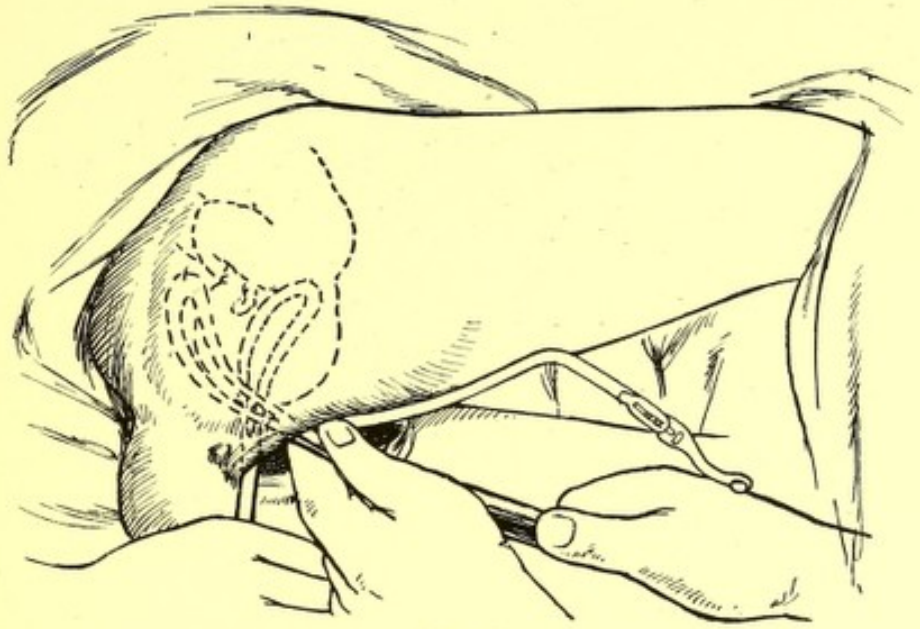


Fig. 3.

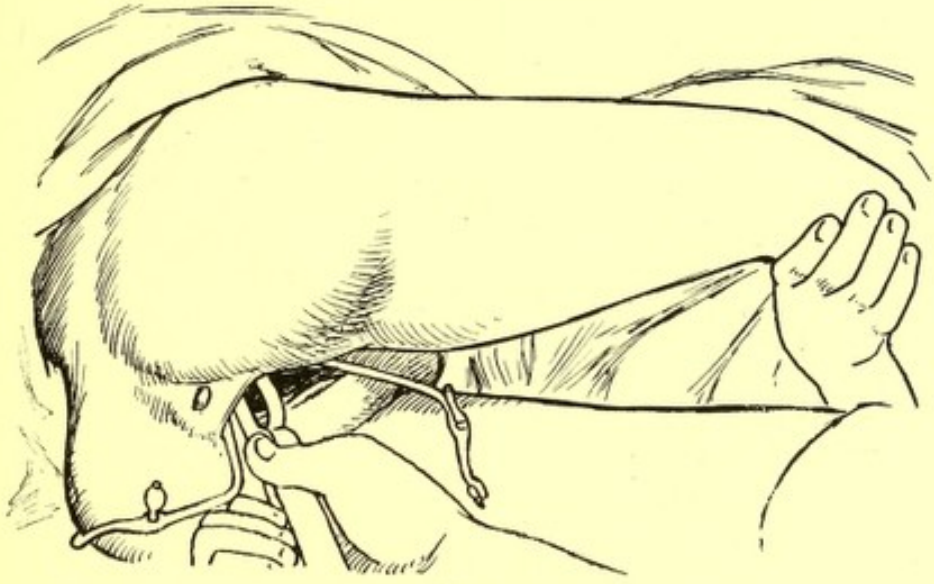


Fig. 4.

Having applied the blades, should proceed with delivery (figure 5). (First examine all round vagina to see blades properly placed, then gently pull to see if holding properly.) Pull downwards and backwards with traction rods; handle is guide as to direction in which should pull (figure 6). Traction should be made during the pains; if no pains, at short intervals. Better not to take handles off the head during its passage through vulva, as have better control over escape of head if blades on.

*Head High in Cavity.* In this position the head is lying more or less in oblique diameter, so that the blades in order to be applied properly to side of the child's head should lie in the opposite oblique diameter (*e.g.* first vertex position, blades in left oblique), they are applied exactly in the same way as already described, but often a little more

Fig. 5.

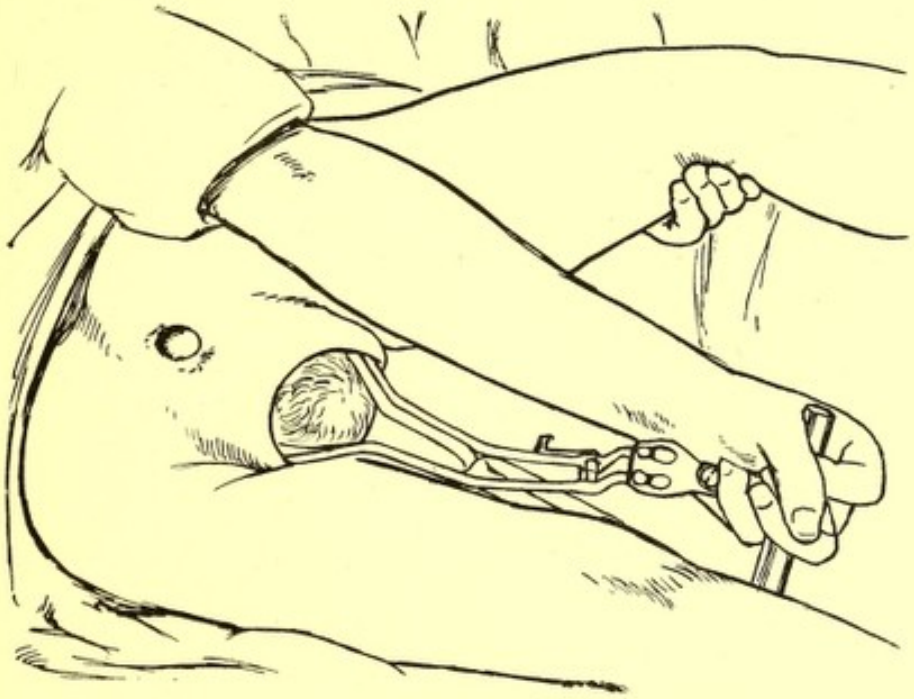
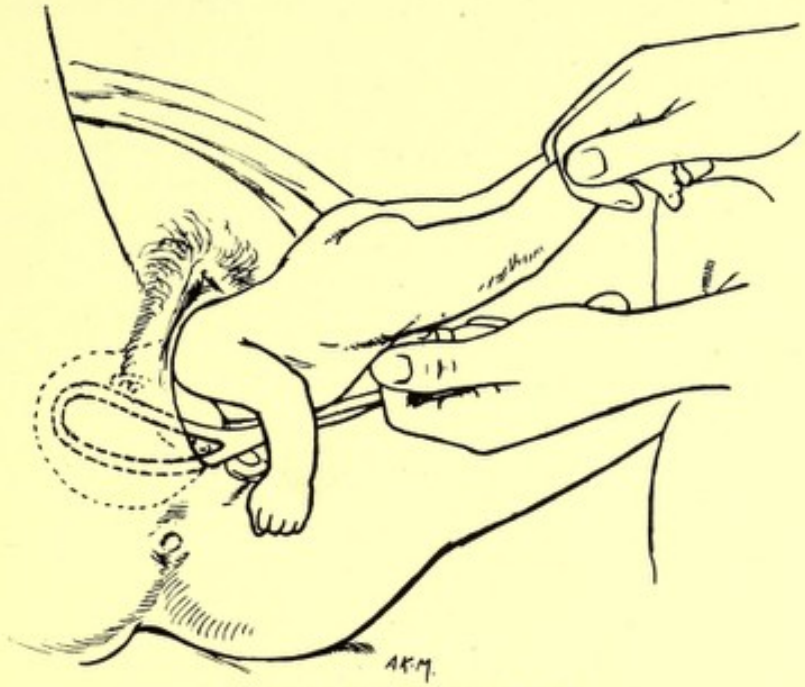


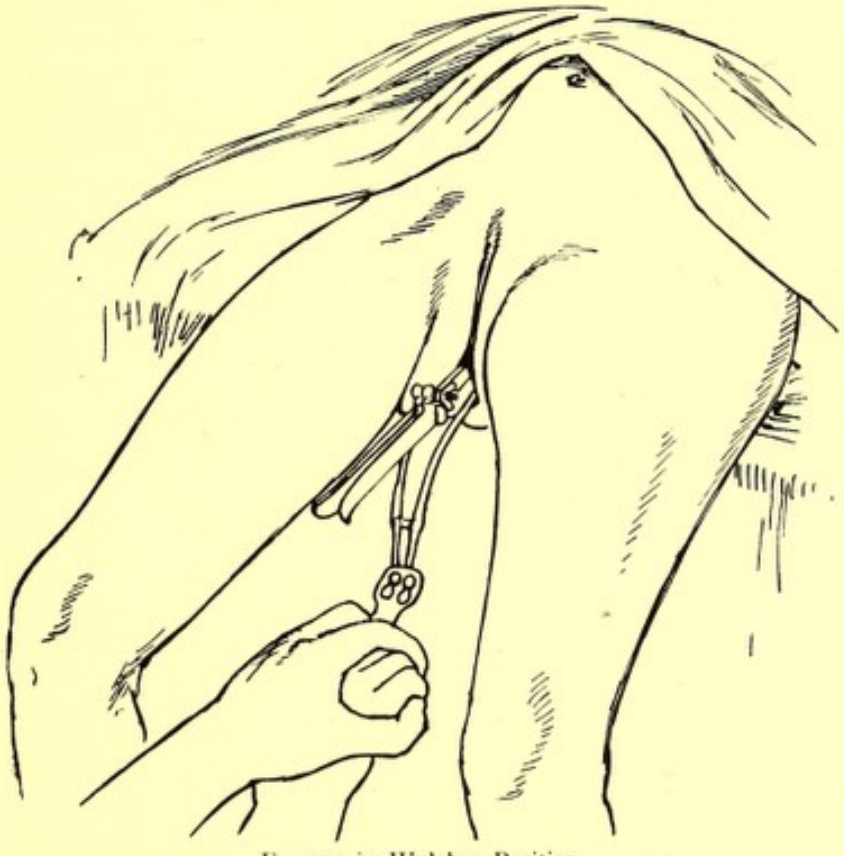
Fig. 6.

difficult in getting the blades to lock. This is secured by manipulations and pressing shanks of blades backwards against perineum. Force required to extract greater. Traction should always be in axis of canal. With axis traction forceps, the guide is the handles.

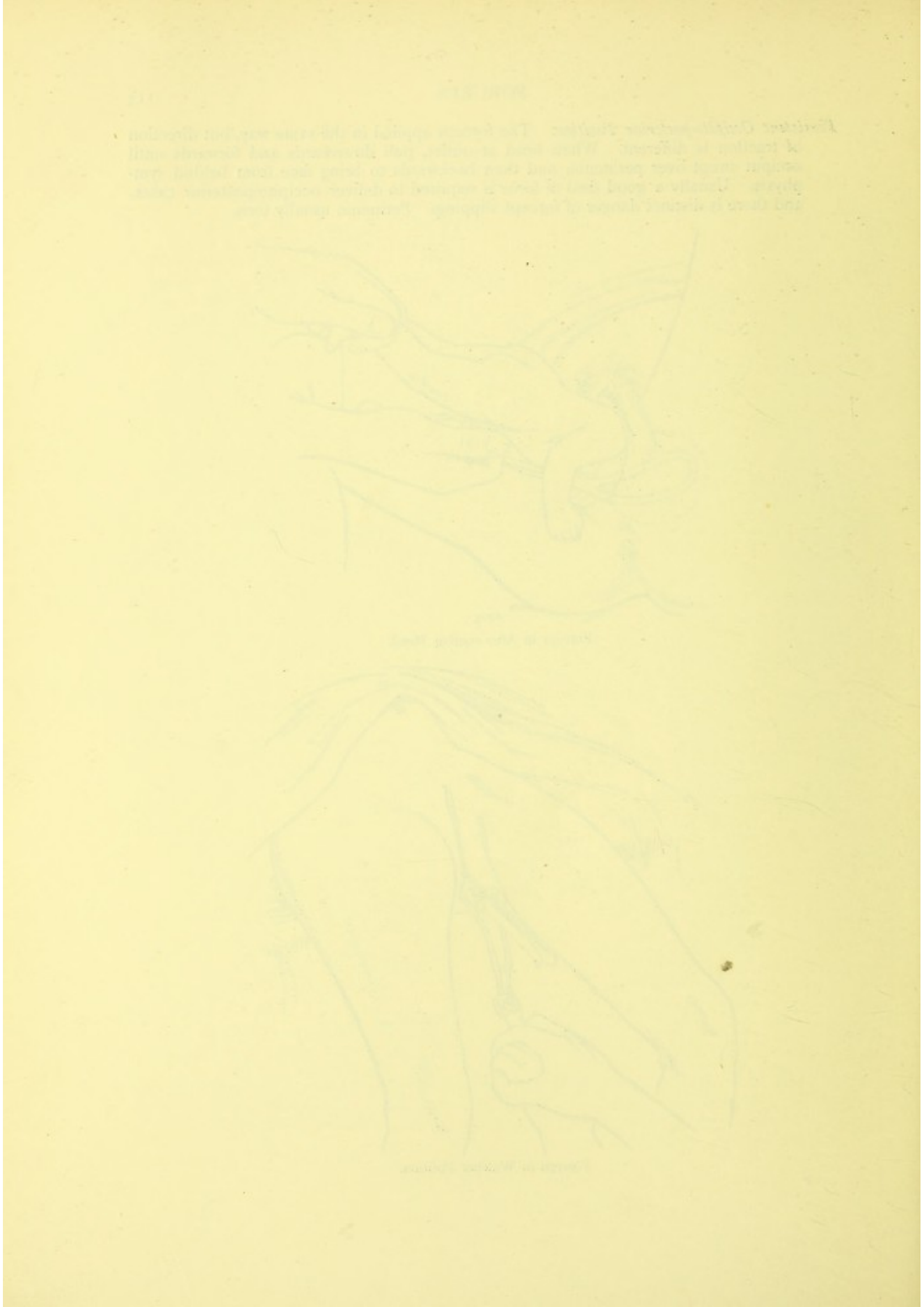
*Persistent Occipito-posterior Position.* The forceps applied in the same way, but direction of traction is different. When head at outlet, pull downwards and forwards until occiput swept over perineum, and then backwards to bring face from behind symphysis. Usually a good deal of force is required to deliver occipito-posterior cases, and there is distinct danger of forceps slipping. Perineum usually torn.



Forceps in After-coming Head.



Forceps in Walcher Position.



*Face Cases.* In face cases the forceps is applied in the usual way to side of face.

*After-coming Head.* Forceps is most useful in delivering the after-coming head as already explained. Trunk of child should be pulled forward by an assistant exerting traction on the legs. Blades are then slipped along ventral aspect of the child to the sides of the head so as to maintain flexion. Traction downwards and backwards, and then forceps and trunk are carried up towards patient's abdomen. (Figure, p. 113.)

*Contracted Pelvis.* I have already indicated that forceps is only to be employed in contracted pelvis when head is fixed, and if second stage of labour has been allowed to go on as long as possible. The forceps should never be employed with head movable above brim, and if there is much overlapping of head at brim. Before employing them, therefore, a careful estimate of the relative size of the pelvis and head is essential. *Flat pelvis.* In this condition head lies in transverse diameter so that blades applied to sides of pelvis grasp head obliquely or antero-posteriorly. Blades are introduced as already described, and patient is put in the Walcher or hanging-leg position. Traction is made downwards and backwards. Once head passes brim, difficulty is usually over. Blades should be taken off, head rotated into conjugate, and blades reapplied. *Generally contracted pelvis.* This is the most difficult of all cases, as the obstruction to the passage of the head continues right down through the pelvis. Estimate of relative size of head and pelvis is most important. Any marked disproportion means an extremely difficult and dangerous forceps delivery. Forceps is very apt to slip in this condition, because head extremely flexed. Great force necessary as a rule, Walcher position is of no assistance.

## SYMPHYSIOTOMY AND PUBIOTOMY.

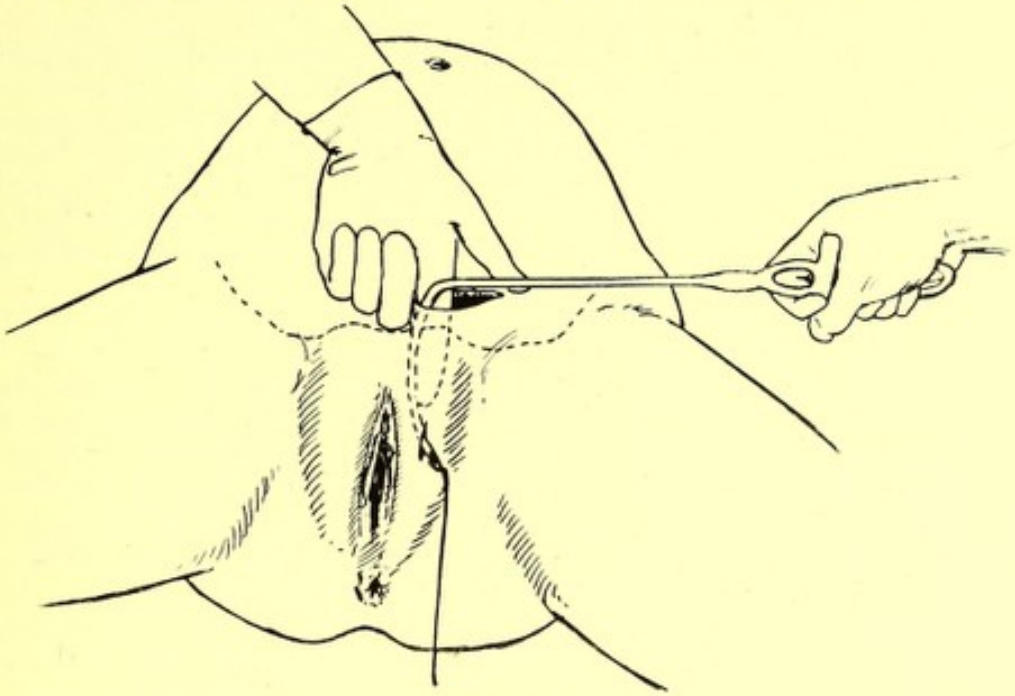
Symphysiotomy was first performed in 1877 by Sigault. He suggested the operation some ten years before while he was a student. It soon fell out of favour, but lingered on in Italy. It was revived again by Morisani and some French obstetricians, notably Pinard. At present it is not so much favoured as pubiotomy (division of pubes). Some still disapprove of the operation, but personally I believe it has a place in carefully selected cases.

*General Considerations.* By both operations the pelvic capacity is increased by about equal amount, roughly speaking $2\frac{1}{2}$ in. separation gives an increase of nearly $\frac{1}{3}$ in. in pelvis. It should only be performed if the following conditions are fulfilled: (1) child alive; (2) must be a multiparae; (3) passage must not be infected, but may be performed if only doubtfully infected; (4) the pelvis must be a sufficient size, there must not be too great a disproportion between pelvis and foetal head. Its place in contracted pelvis may be stated as follows:

A careful estimate of the relative size of the head and the pelvis is made; the operator thinks the head may go through spontaneously, or at least with the assistance of forceps. On applying forceps he finds that the head is just too large for the pelvis; symphysiotomy or pubiotomy should then be performed. It is, therefore, a reserve operation and not an operation of choice to be decided upon early in labour. It should not be performed with the pelvis under 3 in. C.V.

The operation most in favour just now in pubiotomy performed as follows: vulva, vagina, and lower abdomen are thoroughly cleansed, a small incision is made just outside the pubic spine through muscles and fascia, and the finger is pushed down between the bone and bladder, a curved needle (shown in illustration) is passed round the pubic bone guided by the finger and brought out just between the labium majus and labium minus. Either side of the pelvis may be chosen, but the operator most commonly prefers the left. The needle that has been passed round as described is threaded with a fine wire saw and pulled back,. By means of this saw

the bone is divided; the saw is then removed and the child extracted with forceps. During the extraction the assistants keep up pressure over the trocanters to prevent the pelvic bone from becoming too much separated. Having extracted the child, two deep catgut sutures should be introduced and the bony edges coapted; interrupted silk sutures are introduced into skin, wound closed, a dressing applied, and a binder or long strips of adhesive plaster placed round the pelvis. The after-treatment of the operation is somewhat troublesome, as it is advisable to keep the pelvis as much at rest as possible; in about three weeks the patient is allowed to rise.



Pubiotomy.

*Dangers of the Operations.* There has been a great deal of talk about the difficulty in locomotion afterwards. But such talk is only by those who have not performed the operation. Have never seen any trouble in locomotion. If it arises, it has resulted in performing operation in a pelvis too small and when during extraction ends of the divided bones have been too widely separated. The great danger in the operation is injury to the urethra and bladder, this usually occurs during extraction of child and specially liable to occur in primiparae. Should never be done in primiparae. If bladder and urethra injured, should be carefully stitched. But such accidents should not occur if the case carefully chosen. This difficulty in choosing suitable case and necessity of having two assistants besides the anaesthetist renders operation unsuitable for domestic practice.

Maternal mortality in pubiotomy is higher than in Caesarean section performed under the most favourable conditions, but is lower than Caesarean section performed under unfavourable conditions—(such as advanced in labour or "suspect" cases). Foetal mortality is very much higher than in Caesarean section. It is an operation I only rarely perform, but convinced it has its place as already stated.

## CAESAREAN SECTION.

*Chief Indications. Contracted Pelvis.* Absolutely indicated in all cases under $2\frac{1}{2}$ in. whether child alive or dead. Also indicated in all cases where pelvis below 3 in. if child is alive (with the exception of "suspect" cases). Usually also indicated with

pelvis of 3 in. and slightly over that, but final decision in such cases come to by estimating relative size of pelvis and foetal head.

*Other Conditions calling for Caesarean Section.* (1) Been advocated in very severe cases of eclampsia where ordinary treatment does not control convulsions. (2) Grave cases of concealed accidental haemorrhage; in such cases followed by hysterectomy. (3) Placenta praevia, certainly very rarely called for in such cases, but in old primiparae at full time with rigid passage and this complication believe sound treatment.

*Preparation of Patient as for any Abdominal Operation. Time to Operate.* Early in labour in a primipara, may be done just before labour has started in a multipara; in the latter, lochial discharge does not get pent up as in the former. *Instruments necessary.* 1½ dozen pressure forceps, 2 pairs of dissecting forceps, 6 pairs broad ligament clamps, 2 pairs of scissors, 1 blunt-pointed scapel, ½ dozen curved needles. *Ligatures.* Silkworm gut, catgut, silk and catgut; 20 large sterilized swabs, and 30 smaller swabs. All instruments and swabs must be carefully counted before operation, and before abdomen is closed.

## THE OPERATION.

Immediately before operation hypodermic injection of ergotin should be given. Median longitudinal incision about 8 in. in length usually employed; two-thirds of incision should be above umbilicus and one-third below. Abdomen should be carefully opened into in case any loop of bowel (very rare indeed) should be underneath.

*Uterine Incision.* Having opened into the abdomen, swabs should be packed all round the uterus, and the uterus pulled over so that it lies exactly in the middle line. A median longitudinal incision should be made from 1 in. or 2 in. below the upper limit of fundus for 6 in. down the anterior wall. Cutting down carefully one comes upon the membranes which bulge into the incision, but in about 35 per cent. one cuts down upon the placenta (in such cases always more bleeding). Having reached the membranes or placenta, incision should be enlarged upwards and downwards to the length mentioned, namely 6 in., the hand is then plunged through the membranes or placenta, the child seized by the feet, usually found up towards the fundus, and extracted. There is rarely any difficulty in extracting child, unless uterine incision too small or Bandl's ring catches head. Having extracted the child the cord should be clamped and divided, and the child handed over to the care of an assistant. In the meantime the assistant, who is directly assisting the operator, grasps hold of uterus and surrounds it with swabs so as to arrest bleeding. The operator then passes his hand into the uterus and removes very carefully the placenta and membranes, taking care to extract completely the portion of membranes in the lower part of the uterus.

*Stitching of Uterus.* Uterine wound must be now carefully stitched either with silk or catgut. The sutures are passed through the whole thickness of the uterine wall except the mucous membrane; 10 or 12 stitches are usually required; all blood is then squeezed out of the uterus and stitches tied. One or two interrupted sutures are inserted wherever there is not exact coaptation of the edges of the wound.

*Sterilization of the Patient.* If sterilization performed, Fallopian tubes should be divided, two cut ends tied, and uterine end tucked in under peritoneum at the side of the uterus. Many are opposed to sterilization, and repeat operation, two, three, or four times. Chief danger in allowing subsequent pregnancy is rupture of the uterine wound.

*Closing of Abdominal Wound.* Before closing the abdominal wound, all gauze swabs should be removed from the abdomen and any blood clot swabbed out. Any blood

clot is usually found collected in the utero-vesical pouch, seldom much gets into Douglas pouch. Abdominal wall should be closed in layers. (1) Continuous catgut for perineum, then interrupted silkworm sutures to include sheath, muscle, and skin should be introduced. Prior to tying the latter, interrupted or continuous catgut sutures should be inserted to bring together the rectus sheath. Having tied the silkworm gut sutures, the wound should be dabbed over with spirit, and an aseptic dressing placed over the wound, and a binder or bandage applied. A sterilized pad should also be placed over the vulva after the patient has been carefully sponged.

*After treatment.* Seldom much sickness with this operation. Patient should have nothing by the mouth for 24 hours, then sips of hot water; after 36 or 48 hours milk and water or small quantity of chicken tea. If much pain during the first 36 hours, one-sixth grain of morphia may be given hypodermically. If much sickness, milk of magnesia very useful, but if vomiting very persistent, stomach should be washed out. Aperient medicine should be given on third day, stitches removed on the tenth day, and patient allowed up on the eighteenth or twentieth day.

*Hysterectomy. In Certain Cases Advisable.* The following conditions may be mentioned: Myomatous uterus. When deemed inadvisable to enucleate tumour. (2) Carcinoma of cervix. (3) Grave cases of concealed accidental haemorrhage. (4) Rupture of uterus. (5) Uterus probably infected.

*Two Forms of Hysterectomy.* (1) Sub-total hysterectomy. (2) Total hysterectomy (pan-hysterectomy).

*Sub-total Hysterectomy.* The whole of the uterus and part of cervix removed. *Details of the operation.* Uterine wound is closed rapidly by continuous suture. The ovarian vessels are secured on the uterine or pelvic side of the ovary accordingly as it is determined to remove or leave ovary behind. This is done by applying clamps to the upper part of broad ligaments on each side. The ligaments are then divided on the uterine side, and any bleeding from the uterine side controlled by clamps passed down close by the side of the uterus. Next step is making a transverse incision through the peritoneum just above the reflexion of the bladder. Then the bladder pushed down out of the way. The ovarian vessels are now secured with clamps and divided, and the cervix cut across and the uterus removed. The clamped ovarian and uterine vessels are now secured with ligatures, and the edges of the cut cervix are brought together. Finally, the raw surface of the ligaments and cervix are carefully covered by bringing together the peritoneum with a continuous catgut suture.

*Total Hysterectomy* (*Pan-hysterectomy*). In this operation the bladder has to be pushed further down, and the whole cervix with a greater or less part of the vagina removed. In doing this it is generally advisable to clamp across the vagina, then make a small incision immediately below the clamp and push down some gauze into the vaginal canal; the vagina is then cut across below the clamp and the whole uterus removed. In this operation there is often some venous bleeding; this is controlled by stitching the corners of stump. The walls of the vagina are then brought together by interrupted sutures, and raw surface on sides of pelvis and cervix covered over with peritoneum as before.

*Septic and "Suspect" Cases.* Caesarean section in cases frequently examined or where attempts have been made to deliver with forceps (so-called suspect cases) has a very high mortality (30 per cent.), consequently in such cases generally recommended to do craniotomy, even although child is alive. May do Caesarean section and remove uterus, but questionable if that is as good treatment as craniotomy.

## INDUCTION OF PREMATURE LABOUR.

Chief indication—contracted pelvis, but also sometimes necessary in such conditions as (1) valvular disease of the heart, advanced phthisis, pernicious vomiting and other toxaemias, chronic renal disease, chorea, leukaemia, etc.; (2) habitual death of foetus in later months of pregnancy, unusual size of foetus.

*In Habitual Death of the Foetus* the operation should be performed shortly before the child usually dies. As regards *protraction of pregnancy*, often advisable, because in such cases head often of large size, and child frequently does not stand labour well and so is born dead. As regards *unusual size of foetus*, that should be determined by estimating relative size of head and pelvis. *As already stated chief indication contracted pelvis.* Operation for this condition very satisfactory in domestic practice, but not so satisfactory in hospital practice because exact age of foetus difficult to determine, as mothers do not keep exact note of "last period." It is a most satisfactory operation, from the point of view of the mother, as the maternal death rate is under 1 per cent. Simply because foetal mortality high that operation does not meet with favour with certain authorities. To get best results from this operation, induction should be performed not earlier than the thirty-fifth week, nor with a C.V. under $3\frac{1}{4}$ in. At the thirty-fifth or beginning of the thirty-sixth week patient should be anaesthetised, and if the C.V. is $3\frac{1}{4}$ in. to $3\frac{1}{2}$ in. the greatest care should be taken to estimate the relative size of the foetal head and maternal pelvis. Some cases are dismissed as unsuitable because the head is too large for the pelvis; others are allowed to go on in pregnancy because the head can be easily pushed into the pelvis. The cases in which induction is performed are those in which the head, although a little larger than the brim, is considered not too large to pass through (at this age with a foetus at 36 weeks the head is less ossified and moulds better). When at all possible, labour should be allowed to terminate spontaneously, as the premature child bears instrumental delivery badly.

*Methods of Inducing Labour.* (1) *Krause's Method.* This is the method most generally favoured in this country. The operator proceeds as follows: the cervix is dilated with the finger or metal dilator, the finger is then passed through the cervix and the membranes separated from the lower part of uterus. A large gum elastic bougie is then passed up between the membranes and uterine wall; iodoform gauze is packed moderately firmly into the vagina. In most cases labour comes on within forty-eight hours. If that does not occur, cervix should be further dilated and another bougie introduced, or some prefer to introduce a small Champetier de Ribes bag. (2) *Other methods* of inducing labour are rupturing the membranes; dilating and introducing a Champetier de Ribes bag; injection of fluid (glycerine, hot water between membranes and uterine wall). Latter method never employed now. Even with greatest care about 15 per cent. of children are born dead, and 15 per cent. succumb in a few days or weeks following delivery. Many of the latter deaths are the result of children not being carefully looked after, consequently much better results in private practice.

## INDUCTION OF ABORTION.

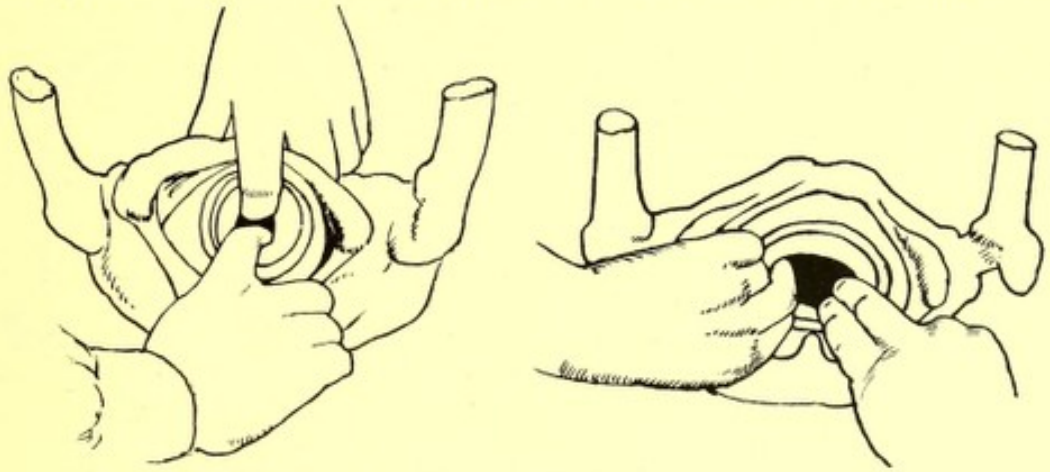
This operation is only performed for grave disease threatening the mother's life. Best method is to introduce expanding tent into the cervix and plug the vagina. Plugging and tent is removed in twenty-four hours. If os sufficiently dilated, ovum removed; if not, more tents introduced or lower part of uterus, cervix, and vagina plugged with gauze. If mother's condition so serious that uterus must be quickly emptied, best

procedure is to separate off bladder from uterus and split up anterior cervical wall with scissors (vaginal Caesarean section). (See p. 120.)

## ACCOUCHEMENT-FORCÉ.

By accouchement-forcé is meant a rapid emptying of the uterus in pregnancy or early in labour. It is performed for grave conditions threatening the life of the mother, such as eclampsia, heart disease, and pernicious vomiting. The operation, however, has not given good results in cases of placenta-praevia, or accidental haemorrhage. (It is seldom of much value where the child's life is in danger, as the operation of rapid extraction of the child is usually of little avail in saving the child whose life is already impaired.)

*Methods of Performing the Operation.* (1) Dilatation of cervix. (2) Incising the cervix.



Bimanual Dilatation.

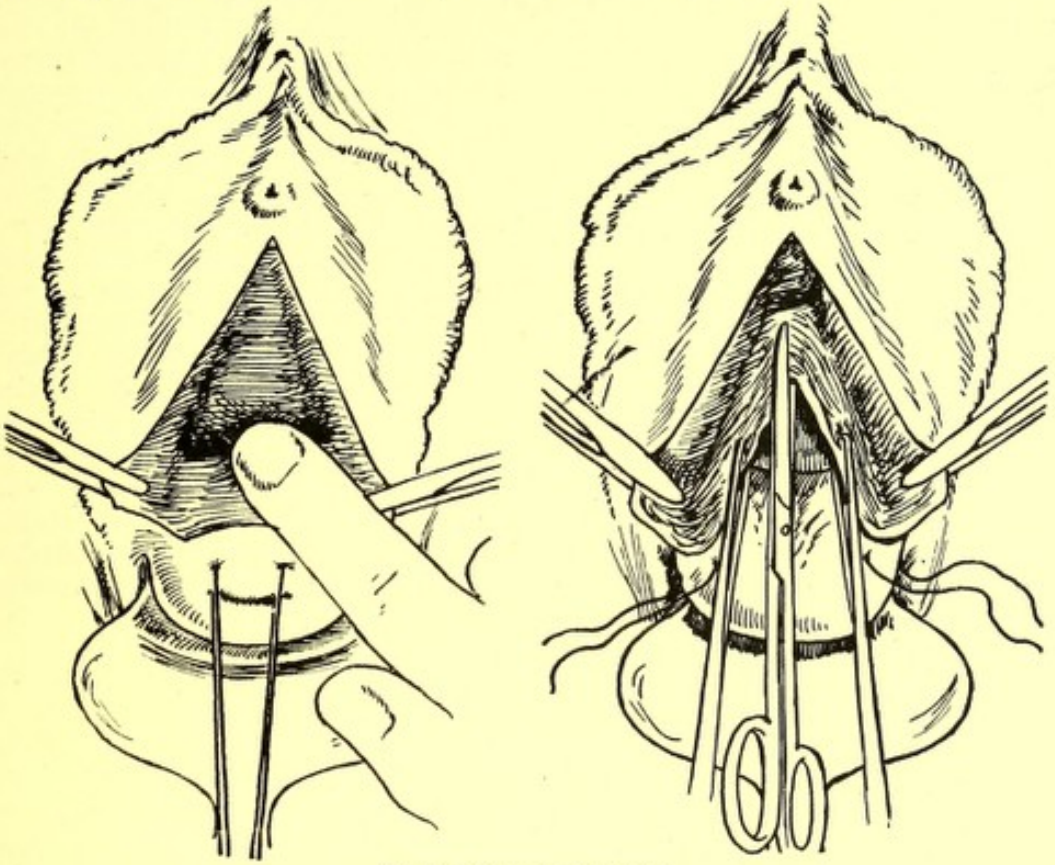
(1) *Dilatation of Cervix.* The cervix may be dilated with (*a*) Fingers, manual; (*b*) metal dilators; (*c*) rubber bags, metreurynter (Champetier de Ribes' bag). *Manual Dilatation* is carried out by inserting one finger then another into the cervix. When cervix sufficiently dilated, one or more fingers of each hand can be passed through, and bimanual dilatation carried out as shown in the illustration. *Expanding metal dilators.* Bossi's four-pronged instrument is most commonly employed. Prongs expanded by screw at end of handle very apt to tear cervix.

*Expanding Bag (Metreurynter).* The bag usually employed here is Champetier de Ribes' bag. Os is first dilated with Hegar's dilators and collapsed bag introduced through cervix. (Should rupture membranes before introducing bag.) The bag is then filled with sterile water and allowed to be expelled spontaneously, or a small weight is attached to end of rubber tubing; this is the safest method of dilating cervix, but, of course, it is the slowest of the three mentioned; specially suitable, therefore, in cases where no immediate hurry to empty uterus.

*Incisions of Cervix.* This is the most rapid method of emptying the uterus from the vagina. If cervix obliterated, operation very simple. Vagina carefully disinfected and cervix divided on each side a little behind the middle line (direction on compass would be south-east south-west) membranes should then be ruptured and child extracted by forceps or version.

*Cervix not Obliterated.* Operation is termed "vaginal Caesarean section." It is an operation that is easily performed in the first half of pregnancy, but difficult in the second half, consequently think abdominal Caesarean section better in the later months. In this operation procedure is as follows: vagina disinfected; vulcellum

forceps applied to cervix, and cervix pulled down; transverse incision made across cervix just below reflexion of bladder. Longitudinal incision now made up anterior vaginal wall and bladder separated from vaginal wall; bladder then separated and pushed off cervix. (Some operators also prefer to separate off posterior vaginal wall from cervix.) A median longitudinal incision is then made through cervix on anterior wall, and if need be through cervix and posterior wall. The bag of membranes now projects through split cervix; membranes now ruptured and child is delivered by forceps or version. Placenta is removed manually, full dose of ergot given and incisions in cervix stitched. Some operators pack uterus with gauze, end of which is brought out through cervix. (That not necessary as a rule.)



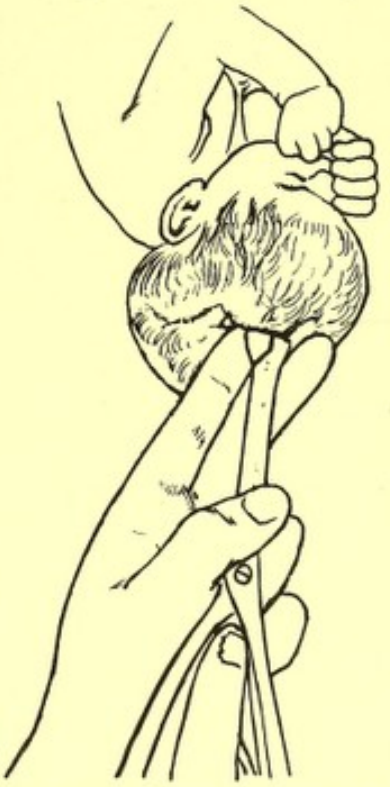
Vaginal Caesarean Section.

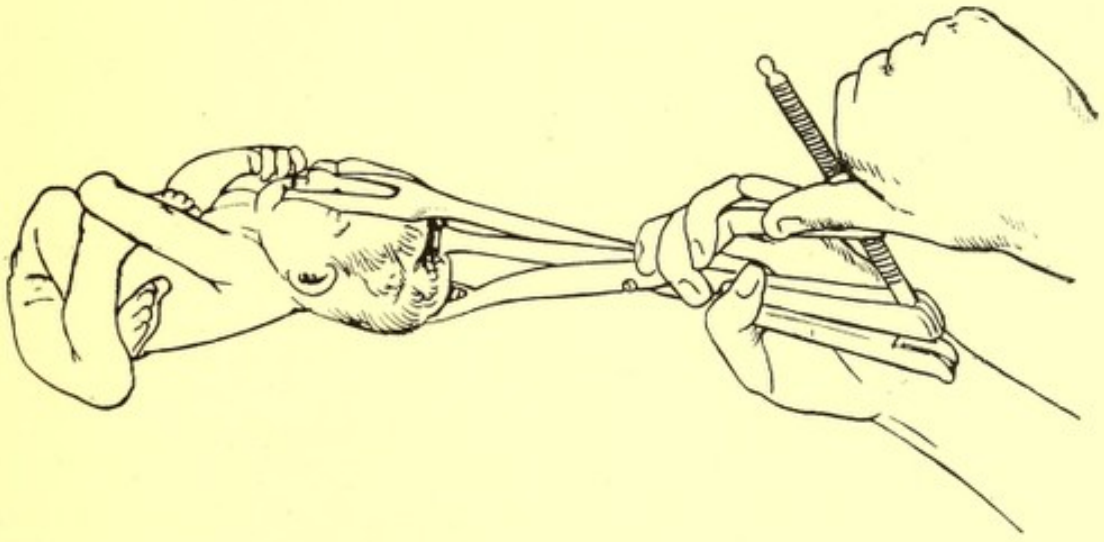
As stated, difficult operation in later weeks of pregnancy, and bladder is apt to be injured especially during extraction of child; not suitable for domestic practice, as three assistants, good light, suitable table, etc., necessary.

## CRANIOTOMY—DECAPITATION—EVISCERATION—CLEIDOTOMY.

*Craniotomy.* Chief indication for this operation is deformed pelvis with a dead child; but even if child is living it should be performed if attempts have been made at delivery and vaginal canal is probably infected, for Caesarean section in such cases has a maternal mortality of 30 per cent. The operation should not be performed if the pelvis is extremely deformed; taking a rickety pelvis it should not be undertaken if C.V. is less than $2\frac{1}{4}$ in. (even at $2\frac{1}{4}$ in. often difficult). The operation is also performed where child's head is unusually large, as for example in hydrocephalus, or is in a peculiarly unfavourable position that cannot be corrected (mento-posterior of face or brow presentation). Operation may be performed on fore- or after-coming head.

*Fore-coming head.* Vagina carefully disinfected, assistant steadies head from the abdomen with his two hands. Operator passes perforator, protected by his right hand, up against the head; pushes point of perforator through head, then opens blades widely; then allows blades to come together, and turns perforator at right angles to its former position; again opens blades widely so that there is a large opening made in the skull. It is advisable where a choice can be made to perforate as near the anterior fontanelle as possible, because the three-pronged cephalotribe can get a better hold of the skull. Having made an opening into the skull the perforator should be pushed further into the skull, and the brain material broken up, especially about the base of the brain. The operator can now, if he desires it, wash out with a douche tube the broken up brain material. The extraction of the head is best done with three pronged cephalotribe. Middle blade is pushed into opening, and two outer blades applied in the same way as one applies forceps over the face and occiput of the child. It is better to apply the first outer blade over the face and tighten the screw at the end of the instrument, the second blade is then applied over the occiput, and also tightened with the screw; head is then extracted by traction, and if the blades have been well applied they should never slip. During extraction head rotates and blades come to lie antero-posteriorly as regards the pelvis. If does not occur spontaneously should be rotated as head passes through more readily.





Other instruments employed for extraction are the *crotchet* or sharp hook, the *cranioclast*, a two-bladed instrument; one of the blades is passed into the skull and the other outside; if much traction is made on this instrument it always slips off the skull; the old *cephalotribe* of Hicks, etc., had only two blades, which were applied like forceps, head often slipped from between them (modern three-pronged instrument with the middle blade inside the skull prevents this).

*After-coming Head.* Perforation of after-coming head is best made in the region of the postero-lateral fontanelle. An assistant should steady the child by slight traction on the limbs, and the operator should carefully pass the perforator and push it through the head in the region mentioned. The head can often be very easily extracted by

Perforation of After-coming Head.

the crochet which gets a good hold of the base of the skull; it is seldom necessary to apply the three-pronged instrument; indeed it is often very difficult to get the three-pronged instrument applied. The fore-coming head in face presentations and the after-coming head may be perforated through the palate.

## DECAPITATION.

The operation consists in severing the head from the trunk through the neck, removing the trunk and then removing the head. It is performed in cases of impacted shoulder presentation when it is impossible or too dangerous to perform version.

The operation is performed as follows: the prolapsed arm is held by an assistant so as to steady the child in the uterus; the operator then passes a decapitating hook protected by the fingers of his left hand up the vagina into the uterus and round the neck of the child. With this decapitating hook he severs the head close by the trunk. Having completely separated the head from the trunk, the trunk is extracted by making traction on

the prolapsed arm. The after-coming head is then steadied by an assistant, and perforated and extracted as already described in connection with the operation of craniotomy. After

Decapitation.

delivery placenta should be expressed, and a hot intra-uterine douche given to stimulate the uterus to retract properly as there is a distinct danger of post-partum haemorrhage.

## EVISCERATION.

This operation consists in opening the abdomen and thoracic cavities, removing their contents, and then delivering collapsed foetus. When the spinal column is divided, the operation is referred to as spondylotomy. It is performed in cases of impacted shoulder presentation when the neck cannot be reached, but the neck can almost always be reached if the prolapsed arm is pulled down. It is not such a satisfactory operation as decapitation. In some cases of abdominal tumours of the foetus the operation is also necessary, but in these cases it is very easily performed, either after the shoulders are born or in breach presentation when the leg has been brought down.

*Details of the Operation.* A large opening is made through the abdomen either with scissors or a perforator, the hand is introduced into the abdomen, and the liver and bowels and kidneys removed. It is unnecessary to go through the diaphragm to remove the lungs, as they are so small. The spinal column should then be divided in two parts and the severed trunk extracted.

## CLEIDOTOMY.

Cleidotomy or division of the clavicles is often performed as an adjunct to craniotomy in cases where the shoulder girdle is very large. When the clavicles are divided, the shoulder girdle collapses. The clavicles may be divided with scissors or a probe pointed knife. After the head is delivered the knife or scissors is carried up under protection of the other hand and the bones divided.

## MANUAL REMOVAL OF PLACENTA AND MEMBRANES.

This operation is sometimes necessary when the placenta is simply retained, and is always necessary if the placenta is adherent.

*Retained Placenta.* If the third stage of labour is properly managed the placenta is very seldom retained, but should there be much bleeding in the third stage, and should it be found impossible to get the uterus to retract properly, then the hand must be immediately introduced and the placenta removed. *Adherent placenta.* Adherent placenta is most commonly the result of a chronic inflammatory condition of the endometrium.

*Details of the Operation.* The vulva of the patient and the hand of the accoucheur should be very thoroughly cleansed. With the patient in the dorsal position the accoucheur steadies the fundus with his external hand and passes his right hand into the uterus up between the membranes and the placenta, slips his fingers between the placenta and uterine wall, and strips off the placenta completely; he then grasps the placenta in his hand and removes the placenta and membranes; an intra-uterine douche should then be given to favour good retraction of uterus.

## PATHOLOGY OF PUERPERIUM.

*Puerperal Infection.* After a delivery conditions are very favourable for the occurrence of infection, for there is present the large raw uterine surface, especially the placental site, numerous small tears and lacerations in cervix, vagina and perineum, decidual debris and blood clot, and the septic rectal canal in the immediate vicinity.

*Natural Protection against Infection.* (1) During pregnancy the cervical canal is closed by mucus plug (operculum), which prevents the passage of organisms from the vagina into the uterus. (2) From the vaginal surface there is an acid secretion which inhibits the growth of pyogenic organisms. (3) During the third stage of labour there occurs another preventative to infection, namely, the sponging over of the surface by the placenta as it is expelled through the cervix into the vagina.

In the majority of cases infection is conveyed to the patient by the individual who attends the confinement. I say in the majority of cases, because sometimes the pyogenic organisms are actually in the vaginal canal, as, for example, in cases of old standing leucorrhoea, or where the infection has been conveyed to the patient from the husband (generally gonorrhoeal). In order that the attendant may prevent infection, the following points must be strictly attended to: (1) The hands must be surgically clean; (2) the vulva of the patient must be thoroughly cleansed; (3) all instruments used must be sterilised; (4) as few examinations as possible should be made—(every vaginal examination is a danger to the patient); (5) the third stage of labour must be properly managed and the placenta and membranes completely removed; (6) good retraction of the uterus after delivery must be secured; (7) the vulval toilet in puerperium must be most careful. If all these points were attended to, there would be very seldom indeed any infection.

### Varieties of Infection.

*Sapraemia.* From the decomposition of the retained membranes or blood clot. This is the least serious of the infective processes that may occur; it is caused by the invasion of saprophytic organisms, it is associated often with a sudden and very high rise of temperature, a rapid pulse, great headache, and sickness; it is often ushered in on the third and fourth day by a rigor. The lochia becomes scanty and very foul smelling, often very markedly so, while the involution of the uterus is retarded. There is sometimes much tenderness of the uterus or abdomen generally, but there is often only a feeling of uneasiness over the uterus increased by pressure. Not infrequently the abdomen is distended owing to a certain inhibition of peristalsis. The treatment of the condition is very simple and invariably satisfactory.

If there is the slightest doubt about the membranes being retained, the hand

should be passed into the uterus and the uterine cavity swabbed out with gauze. Whether the hand is passed into the uterus or not, the uterus should always be washed out by an antiseptic solution—1 in 3000 biniodide of Mercury, or lysol 1 per cent. The douching may often have to be repeated morning and evening for a day or two. Whenever the temperature rises, the patient should be propped up (or the head of the bed raised) so as to allow better drainage (in mild cases this is often sufficient without any other treatment).

*Infection by Pyogenic Organisms.* The organisms may be of many varieties, but the most common are Streptococcus, Bacillus-colli, Staphylococcus, Gonnococcus, Pneumococcus—these organisms may be found in pure or mixed cultures. When these pyogenic organisms gain entrance into the uterus they set up an acute endometritis, such a condition being established the course of the disease may be very variable. The most acute and serious condition is peritonitis, fortunately it is the rarest, but it may be so acute that death may occur by the fourth or fifth day. It is attended with all the symptoms of acute peritonitis—small, thready, rapid pulse, high fever, great abdominal tenderness and distension. More generally the disease runs a less acute course and spreads to the lymphatics, blood-vessels and tubes; while in not a few cases it remains almost entirely confined to the uterus. In these less acute cases the course of the disease is very variable. Usually a marked daily rise and fall of the temperature—sometimes very high and other times remaining low for a day or two. In the pyaemic form there are rigors at intervals, with sudden rises of temperature and localised pain in lung, joints, etc., wherever the septic foci develope. At any time there may be extension to the tubes and a peritonitis may develope; later the tubes may become closed and pyo-salpinx result (it is usually bilateral). In other cases the ovaries become infected and an abscess of the ovary developes. Less serious and often later in making its manifestation is the pelvic cellulitis with great effusion in the cellular tissue of the pelvis, which may ultimately resolve entirely or proceed to formation of pelvic abscess (in the most of these cases the tubes are infected). Still milder, as a rule, are the cases of mild infection in the pelvic veins, which leads to phlegmasia alba dolens or white leg. With these varieties of infection there is usually not only varying high temperature and pulse, but also a varying degree of abdominal discomfort, it may amount to pain, but more often it is a feeling of uneasiness with a varying degree of tympanitis. At first there may be constipation, but in more serious cases there usually soon developes diarrhoea. The two secretions, the lochia and milk, are lessened by all septic processes, indeed the milk secretion may entirely disappear; the lochia may be foul smelling, but in many cases it is by no means so but continues muco-purulent and tinged with blood. The general health of the patient suffers, but it is often surprising how well they take their nourishment even during a prolonged illness.

*Treatment.* The points of primary importance are the following: (1) make perfectly sure that the uterus is clear of placental and membranous debris—if there is any doubt of that the hand should be introduced into uterus, the uterus swabbed out or carefully curetted; (2) frequent douchings; the first two or three days these should be antiseptic, as already indicated—later, as douching is continued, normal saline solution only should be employed; (3) the head of the bed should be raised to favour drainage; (4) sulphate of quinine should be given to lower the temperature and to favour the involution; (5) the diet should be simple, and stimulants should only be given if really necessary; (6) restlessness and sleeplessness should be controlled by sedatives; (7) if diarrhoea extreme, it should be controlled by opium. Besides these measures two others call for consideration: (1) administration of serum; (2) hysterectomy. Doubtful how far ordinary anti-streptococcus serum does good, but in chronic cases suitable serum prepared from

the particular infective organisms present often beneficial. *Hysterectomy* very suitable if one knew what the course of the disease is going to be, but so many cases recover that there is great difficulty in deciding when to operate. Naturally any collections of pus either in pelvis or other part of the body must be evacuated.

## PHLEGMASIA ALBA DOLENS.

Phlegmasia Alba Dolens, or White Leg, is probably the least serious of the infective conditions that occur in the puerperium. Its course is as follows: for fourteen or fifteen days patient's condition is not quite satisfactory; there is just a little rise in temperature and pulse, and attendant is uncertain what is going to develope. Towards the middle or end of third week temperature rises sometimes with a rigor, and the pulse rate increases; pain is then complained of in the thigh, or more often in the calf of the leg, and most commonly the left leg. The leg then becomes swollen, and this swelling may be extreme, when the leg presents a white glistening appearance, hence the name White Leg. For nearly a week, as a rule, the temperature remains high, then it gradually subsides almost to the normal, and one may think the patient's illness is at an end, but very often there is a second rise of temperature, and the other leg becomes affected. Often, of course, there is only one leg affected. Recovery is very slow, the patient often being for weeks in bed; recovery usually occurs, but leg is very generally permanently damaged (becomes swollen on exertion at odd times).

*Treatment.* Leg should be swathed in cotton wool and slightly raised; application of belladonna and glycerine often gives relief. Patient should be kept in bed until swelling in the leg has disappeared (mistake often made of allowing patient up too soon). Several tonics useful, diet and bowels should be carefully regulated. Chronic thickening of the leg so often troublesome during the remainder of patient's life; periodic massage is most helpful for this condition.

## EMBOLISM AND THROMBOSIS.

*Embolism.* Embolism of a systemic artery is rare except in chronic valvular disease of the heart or a septic endocarditis. The symptoms are those usually encountered apart from the puerperium. Embolism of the pulmonary arteries is much more serious, in these cases the clot has passed from the iliac veins through the right heart. Onset is sudden with great dyspnoea and precordial pain. It usually occurs without any warning, and most commonly after the tenth day of puerperium; it is usually fatal.

*Air Embolus.* Air embolus is a condition which occurs shortly after delivery of the placenta. It takes place from the suction of air into the uterus, and is specially liable to occur if the patient lies on her side during the delivery of the placenta. It is associated with severe dyspnoea and cardiac pain, and is very generally fatal.

*Thrombosis.* Thrombosis in the veins of the leg is common, especially if the veins are varicose. After parturition, thrombosis in the iliac veins gives place to phlegmasia alba dolens. Pulmonary thrombosis is a very grave condition, which comes on suddenly often after exertion, for example, when the patient sits up. It is associated with a sudden attack of dyspnoea, great pain over the front of the chest; it is very generally fatal (personally I believe these cases are not examples of thrombosis but of embolism). Treatment is purely palliative; absolute rest in bed, and sedatives, such as small doses of morphia, hypodermically, I believe, are the best. If there is great collapse, one must give stimulant such as alcohol and ether. Intravenous,

intracellular, and rectal infusion may sometimes be beneficial. Carbonate of ammonia has been recommended.

*Shock.* It is only permissible to attribute death to shock when every other condition which may cause shock can be excluded. There are very few cases indeed of death from shock.

## INVERSION OF UTERUS.

By this is meant a turning of the uterus inside out. It is frequently the result of dragging upon the cord while placenta is still attached to the uterus; it may, however, occur spontaneously if there is atony of the uterus, and if there is a fibroid tumour on the fundus. It may be produced artificially by attempting to expel the placenta by Credé method when the uterus is in a state of atony. The condition may be partial or complete, but when partial the uterus contracts on the inverted portion, and inversion readily becomes complete, for the inverted parts act as a foreign body and stimulates the uterus to contract. It is stated that there is another mechanism in which the interversion occurs from below upwards—the active contractile portion of the uterus is driven through the lower segment, the fundus being the last part to become inverted. Interversion may occur with the placenta still attached. The symptoms are violent tearing pain, haemorrhage, especially if the placenta is already attached, and shock. Palpating the abdomen there is an absence of fundus; sometimes fingers can be pushed into a cup-shaped depression in the uterus. On vaginal examination a large, soft, bulky swelling is felt; it sometimes protrudes down as far as the vulva, and is visible; naturally it similates a fibroid (more than once the uterine body has been removed with the idea that the condition was a fibroid). With a fibroid the hand can be passed up the side of the tumour into the uterus, and the large uterus is felt above the symphysis; but with an inverted uterus the fingers cannot be passed up beyond the vaginal vault, and there is no fundus to be felt above the symphysis.

*Treatment.* If placenta attached, replace uterus by pressing upon placenta, remove placenta, give a hot intra-uterine douche and ergot to cause firm retraction of the fundus; if retraction does not occur, plug the uterus with gauze as inversion liable to recur. If cannot get fundus replaced with placenta attached, remove placenta. In all cases where the placenta attached, replacement should be carried out by steadily pressing up the fundus and pushing back the inverted uterus from the cervix upwards, very much in the same way as a hernia is reduced. If inversion not observed, may become chronic. This condition belongs to gynaecology.

## SECONDARY POST-PARTUM HAEMORRHAGE.

By secondary post-partum haemorrhage, one means bleeding twenty-four hours after delivery. It generally results from retention of portions of membranes or placenta, although it may also occur through defective involution and clotting of blood in the interior of the uterus. Not infrequently it is associated with displacement of the uterus, such as anteversion, inversion, but especially retroversion. Other conditions, such as tumours of the uterus (myoma and carcinoma) may cause this secondary bleeding. If the condition has occurred after the birth of a mole, chorion-epithelioma must always be suspected, and only excluded after the debris removed from the uterus is carefully examined, if need be microscopically.

## PUERPERAL INSANITY.

*Insanity in Pregnancy* usually occurs in the second half of pregnancy. This is a rare condition apart from toxaemia. In the non-toxaemic varieties the individuals are

usually unstaple, and usually have distinct hereditary tendency to insanity. Toxaemic variety is also rare without previous manifestation of toxaemia. Very frequently eclamptic patients manifest mania or melancholia after they recover from the acute eclamptic seizures. The treatment is to improve elimination and secure rest. If need be, isolation should be insisted on.

*Insanity of Puerperium.* This condition may manifest itself either by mania or melancholia. In a large proportion of cases the condition is a septic manifestation. In other cases such conditions as mental emotion, the fact that the child is illegitimate, prolonged anxiety, all favour the occurrence of puerperal insanity.

*Insanity during Lactation.* This condition and complication is usually preceded by a steady decline of health of the individual, it most commonly takes the form of melancholia, and is the most serious variety from the point of view of ultimate recovery. Predisposition to insanity makes condition grave at this time.

The prognosis in all these varieties is very good except where there is a distinct hereditary tendency to insanity. Apart from heredity, prognosis is least unfavourable when insanity occurs late in lactation.

In insanity of toxaemic origin the onset of the complication is generally more or less gradual. It is usually preceded by sickness and vomiting, headache, restlessness, insomnia, disturbance of bowel, hysterical manifestations, suicidal tendency, suspicious delusions, dislike of child and husband. In septic variety there is generally some febrile disturbance. Toxaemic variety should be treated in the ordinary way, and strong means employed to improve elimination, while the septic variety should be treated by uterine douches and curettage of the uterus if need be. In all cases the patient should be very carefully watched, the nurse should never leave her side, sedatives and plenty of simple nourishing diet should be administered.

## MAMMARY DISTURBANCES.

*Malformation of Nipples.* Little can be done in these cases if nipple so deformed that it cannot be pulled out, but slight depression of nipple may be improved by using a breast exhauster once or twice a week during the later months of pregnancy. If nipple cannot be pulled out, child may be nourished on milk exhausted from breast, and this may be done on one breast alone. *Fissures and excoriations* of nipple seldom encountered now, as women prepare the nipples for nursing as described (p. 27). They are very apt to inhibit secretion of milk and predispose to mastitis. If they occur, nipple should be carefully washed after each time the child is fed, and a single application of nitrate of silver, or better still, occasional application of tannin and glycerine applied. Child should be made to suckle through a nipple shield for a few days.

*Engorgement of Breast.* A rush of milk to the breasts often occurs on the third or fourth day, when breasts occasionally become engorged and knotted. If the child cannot keep them sufficiently empty, breasts should be exhausted. Mistake to give too sharp purgatives, as this may cause disappearance of and permanent diminution of quantities secreted. When much engorged, the breasts should be supported with a bandage or sling.

*Mastitis or Suppuration* of the breast occurs from the invasion of septic organisms into breast along the milk ducts or through injury from fissures, etc. Begins usually in one lobe which becomes very tender, engorged and red on the surface. This is often preceded by a rigor, patient has headache and is often sick. At this stage gentle massage and manual exhaustion of the breasts, and especially of the lobe affected, may prevent suppuration; so also may the application of ice and hot fomentations. If going to improve and stop short of suppuration, it will

occur within two days. If suppuration occurs, an incision should be made in the breast radiating from the nipple, and a drainage tube be inserted. Once abscess forms, very liable to spread to other lobes. May have *sub-mammary abscess* and only secondary involvement of the lobes. There are the same general symptoms—headache, rise of temperature, rigor, etc., but whole breast is tender.

## ACCIDENTS TO THE CHILD.

*Asphyxia Neonatorum.* May result from various causes interfering with circulation in placenta or cord, or from injuries to head and neck of child. As regards placenta, most important conditions are direct pressure of child on placenta in long continued second stage, tonic contraction of uterus, placenta praevia, separation of placenta. As regards cord—prolapse of cord, knots, twistings of cord round body and neck of foetus. As regards injuries to head and neck—these may result from difficult forceps delivery, owing to malposition of child or malformation of pelvis. Child specially apt to be born asphyxiated in breech presentations.

*Symptoms—Prior to Birth.* Child heart sounds become more rapid and then slow down to 100 or lower, and become intermittent and irregular. Child also becomes restless, and not infrequently meconium escapes from its bowels. This interference with circulation causes cerebral congestion, and respiratory efforts are made in utero, with result that mucus, etc., is drawn into respiratory passages. Later on, the extreme congestion of respiratory and cardiac centres causes absolute poisoning of these and child slowly dies.

*Symptoms—After Birth.* Child in slighter form simply in a state of apnoea—the cold air or a little cold water cause it to inspire. Asphyxia is divided into two forms. (*a*) *Asphyxia Livida.* Foetal heart beating strongly, child is blue from congestion, its limbs are rigid and it may make attempt at respiration. (*b*) *Asphyxia Pallida.* Child's heart is beating very slowly and feebly, its colour is pale, its limbs are limp and it may be making no attempt at respiration, or only a feeble attempt at long intervals. Naturally latter condition much more serious than former.

*Treatment.* First thing to do is to remove quickly with catheter or insufflator any mucous from back of throat and trachea in case this is drawn in when child makes inspiratory efforts. *If child livid*, some blood should be allowed to escape from cord, and skin should be stimulated by slapping, rubbing and plunging child alternately into warm and cold water. If child more deeply asphyxiated, should be placed in warm water about temperature of 104°. Tongue should be pulled forward, and child's chest while it is lying in water should be compressed and allowed to expand (Howard's method). This quiet method of dealing with child the best, I believe. Others prefer Sylvester's method or Schultze's method. Latter is carried out by placing thumbs over clavicles in front and forefingers into armpits from behind. The middle ring and small fingers of both hands are placed over back of head and neck of child. By swinging the trunk over, the chest is compressed (expiration); and then by swinging the child back, chest can expand (inspiration). These movements should be carried out for two minutes at about the rate of fifteen times a minute. Believe this method injures the child, but many obstetricians approve of it. *Insufflation*, either by mouth to mouth method or by insufflators, dangerous, as may rupture air vesicles.

*Injuries to Head.* Cephalhaematoma consists of effusion of blood beneath the pericranium, and is to be distinguished from the ordinary caput succedaneum by the fact that the swelling is limited to the one bone. Usual situation is on one parietal bone, sometimes both. May not appear for day or two, but often seen shortly after

birth. Often occurs in cases of precipitate labour. No treatment necessary; often very slow in disappearing. Bony rim forms round margin of effusion.

*Fracture and Indentation.* Usually result of difficult deliveries in contracted pelvis, but may occur in spontaneous deliveries. Promontory of sacrum usually causes them, but may result from direct injury by blades of forceps. Parietal and frontal boses most commonly injured. Simple indentations may be relieved by compressing the head. Depressed fractures should be treated by raising bone by operation.

*Cerebral Haemorrhage.* Usually in cases of great dystocia, but sometimes occurs in quite easy labours. Occasionally occurs in cases of eclampsia. Often not appreciated until second or third day.

*Facial Paralysis.* Occurs in forceps deliveries and results from pressure on facial nerve at the point of its exit from stylo-mastoid foramen. Condition at once recognised when child cries, as whole side of face is quite paralysed. Disappears in a few days.

*Birth Paralysis.* Duchenne's paralysis. This form of paralysis of arm results from injury to brachial plexus; muscles most commonly affected are those supplied by fifth and sixth cervical nerves. May occur both in head front and head in last cases; most usually from dragging on head or trunk.

*Fractures of Limbs.* Result generally from unskilful delivery of limbs in breech presentations.

*Ophthalmia Neonatorum.* Most commonly results from infection of conjunctival sacs during passage of child along vagina. Sometimes has occurred while child still in utero. In nearly 70 per cent. of cases gonococci are the infecting organisms. Disease manifests itself on second day after delivery by purulent discharge from eyes; conjunctivae become very swollen and red. If not attended to properly, eyes may be destroyed.

*Treatment—Prophylactic.* Wash eyes immediately after birth with boracic lotion and then drop in solution of nitrate of silver (2 grs. to 1 oz.). Protargol, etc., not so good. *Disease present.* Wash out very frequently (every two or three hours) the conjunctival sac with bland fluid, and drop in morning and evening 1 per cent. solution of nitrate of silver.

# INFANT FEEDING.

By David Shannon, M.B., Ch.B.

## THE CONSTITUENTS OF FOOD AND THEIR USES.

1. *Proteids* replace the nitrogenous waste of the cells of the body. Contain nitrogen, carbon, hydrogen, oxygen and sulphur. Alone they can sustain life for a limited period. An infant requires more proteid in proportion to its weight than an adult. Development of the body depends to a great extent on the amount of proteid taken as food.

   The chief proteids are the myosin of meat, casein and lactalbumen of milk and egg albumen. In addition to these there are the vegetable proteids such as gluten, vegetable myosin, etc., but these cannot permanently take the place of animal proteid in the food of young infants. The most digestible proteid and therefore the most suitable for the infant, are those found in mother's milk. When this constituent of food is deficient, the child becomes anaemic, languid and debilitated, and when given in too great quantities it suffers from colic, constipation and indigestion.

2. *Fats* are essential for the bodily heat, their caloric value being a little more than twice as great as that of proteid or carbohydrate. Fat increases the weight of the body, and the amount of fat in the subcutaneous tissues of an infant is one of the best evidence of health. It is necessary for the development of the child's nervous system and plays an important rôle in the growth of the bony skeleton. A child requires more fat in proportion to its weight than an adult. The unabsorbed fat acts as a gentle laxative.

   Deficiency of fat causes constipation, indigestion, mal-nutrition, and in some children, rickets. Excess of fat in the infant's dietary gives rise to diarrhoea, vomiting and intestinal catarrh.

   Fats should be reduced in quantity when the child suffers from any acute disorder of stomach or bowel, all wasting conditions due to digestive disturbances or where there is disease of liver, stomach, intestine or pancreas, and also in all acute febrile states. When fats are reduced then carbohydrates should be given in increased quantities.

3. *Carbohydrates* are of value in producing heat and as a source of muscular energy. Carbohydrates are converted into fats and therefore increase the body weight. They are the most abundant of the solid elements of food. Milk sugar, cane sugar and maltose are the most important.

   Milk sugar is the carbohydrate found in mother's milk, and ferments in the child's stomach less easily than the others. An infant cannot digest starch to any great extent, and it is on this account that the proprietary foods are so harmful.

An excess of carbohydrate causes the child to become fat, flabby and rachitic; it also induces fermentation in the intestine which produces flatulence and an offensive diarrhoea.

4. *Salts* are very important to the young infant because of the rapid development of the skeleton. Principal salts are phosphate of lime and magnesium, chloride of sodium and a small percentage of iron.

5. *Water.* The food of an infant contains from 80 to 90 per cent. of water. It is useful as a solvent for certain constituents of the food and for the rapid elimination of the waste of the body.

## MOTHER'S MILK

Is a secretion of the mammary glands. It is not usually present till after delivery. Before delivery colostrum can be squeezed from the nipple. It appears usually about the third or fourth day, and gradually increases in quality and quantity. It is of a bluish-white colour, alkaline in reaction, and has a peculiar sweet taste and odour. Its specific gravity varies a little with the temperature, but it is usually about 1031. Fat decreases the specific gravity; an excess of proteid sugar or salts raises it. On the addition of acetic acid only a slight coagulation is seen, this being in the form of small flocculi, and never in large masses as is seen after the addition of the acid to cow's milk. Microscopically there are seen great numbers of fat globules, and epithelial cells form the milk-ducts.

COMPOSITION OF MOTHER'S MILK.

| | |
|---|---|
| Proteid | 1·5–2·0 per cent. |
| Fat | 3·0–4·0 ,, |
| Sugar | 6·0–7·0 ,, |
| Salts | 0·2 ,, |

The average daily quantity of milk secreted

| | |
|---|---|
| at end of first week | 10–16 ounces. |
| at end of third week | 14–24 ,, |
| from fifth to thirteenth week | 20–34 ,, |
| from six to nine months | 30–40 ,, |

The amount rapidly increases up to eighth week, and after this much more slowly.

*Colostrum* is the secretion found in the breasts before the milk is formed. It is of a yellow colour, chiefly due to the colostrum corpuscles. It is not so sweet as milk. Sometimes coagulates spontaneously, always by heat. Specific gravity, 1030–1040. Colostrum corpuscles are very abundant during first few days. Seldom seen after tenth day.

*Composition.*

| | |
|---|---|
| Proteids | 5·71 per cent. |
| Fats | 2·04 ,, |
| Carbohydrates | 3·74 ,, |
| Salts | 0·28 ,, |
| Water | 88·23 ,, |

It acts as a laxative when taken by the infant, and so the bowel is emptied of meconium.

THE ALTERATIONS IN MOTHER'S MILK.

*In Quantity.* The normal amount secreted daily averages about 24–28 ounces. Quantity increased by the ingestion of increased amount of fluids, by the moderate use of alcohol, such as ale, porter, wines, etc. The best fluids are milk, cocoa, animal

broths and gruels. The quantity is also increased by extra foods, by galactagogues as pilocarpin and thyroid extract; by electricity, massage of breasts, and frequent suckling. It is diminished by reduction of fluids, by the administration of saline purgatives, by atropine, belladonna, etc., and sometimes a great reduction in quantity follows fright or shock.

*The Effect of Menstruation* is very variable. Most authorities agree that the child is not affected to any appreciable extent.

*The Effect of Pregnancy* on milk is sometimes marked. It is generally diminished in quantity and poor in quality. Fats are diminished. Weaning should be advised. There is a risk of miscarriage when the infant suckles at the breast.

*The Effect of Acute Illness.* If illness, though acute, is of short duration, then the milk is not much affected; but if illness is very severe and protracted, the quantity is reduced, the fat is diminished, and the proteid is increased. In septic conditions bacteria may appear in the milk.

*The Effect of Diet is Important.* Fats are increased by a diet of nitrogenous foods as eggs, meats, broths, etc.; diminished by lessening amount of these and substituting vegetables and carbohydrates. Proteids are increased by overfeeding and too little exercise. Alcohol increases quantity and also amount of fat. The nursing mother must therefore have a mixed diet of simple, easily digestible food and plenty of fluids.

*The Effect of Drugs.* Salicylate of soda given to mothers is found in infant's urine in about an hour after nursing. Potassium iodide passes readily into the milk and remains for a considerable time. Iodoform applied externally to mother is found in child's urine. Iodine is also found in the milk. Mercury, only after long administration to mother, is found in body of child; so also is lead, arsenic, and bismuth. Quinine, taken on an empty stomach, may affect the child. Rhubarb, senna, and the saline cathartics may purge the infant when these drugs have been administered to the mother. Morphia is eliminated as apomorphine in the breast milk. Atropine and chloral hydrate pass readily into the milk.

*The Effect of Nervous Impressions* of a woman on her milk is very striking. Quantity and composition are affected. Worry, fright, or nervous strain may affect the milk so much that the infant may become acutely ill. The nervous factor has more to do with nursing than diet. To nurse successfully a mother must have plenty of rest and sleep, must keep her mind free from worries, and lead a simple, natural life.

## COW'S MILK.

Cow's milk resembles human milk. It contains the same food constituents, but in different quantities. Besides this difference there are other considerations to be borne in mind in regard to cow's milk which indicate that it may not only be unsuitable but even dangerous for the infant. Cow's milk always contains organisms. It is contaminated in the handling. It is an excellent medium for growth of bacteria. It is also acid when the child receives it; mother's milk is always alkaline. This acidity is due to lactic acid. Cow's milk is more opaque than mother's, and this is due to the large proportion of phosphate of calcium in combination with the casein. Specific gravity and total amount of solid are about same in both. The sugar found in both is same in composition but differs in quantity. Cow's milk contains 4·5 per cent., mother's 6–7 per cent. The fatty acids are present in greater proportion in the milk of the cow. Proteids are $2\frac{1}{2}$ times more abundant in cow's milk and differ in character. The soluble proteids are in excess of casein in mother's milk, but in cow's milk it is otherwise. It is this difference in the proteids which presents the greatest difficulty in the use of cow's milk for infant feeding.

*Cream.* The difference between milk and cream is a difference in the percentage of fat. There are two kinds of cream. Gravity cream is obtained by skimming milk that has stood for twenty-four hours. Centrifugalised cream is that obtained by a separator. The latter is a rapid process, and the cream is fresher. Centrifugal cream may contain as much as 40 per cent. fat, while gravity cream contains from 12–16 per cent. In both forms the proteid and sugar are diminished in quantity.

The Sterilisation of Milk. By sterilisation we mean the heating of milk sufficiently to destroy all germs contained in it. One must remember that none of the methods commonly employed render milk sterile in the bacteriological sense of the word. What is really done is the destruction of such pathogenic germs that are present, and from 95 to 99 per cent. of the other bacteria so as to retard for a considerable time the ordinary fermentative changes. Sterilisation does not destroy the spores of these bacteria. Some bacteria act upon the proteid of the milk and not upon the sugar. Such milk may not be sour, and hence its danger may not be recognised.

*The Disadvantages of Sterilising Milk* are as follows:

The taste of the milk is changed.
It causes constipation in infants.
The lactose is changed into caramel, causing a change in the colour.
The albumen is coagulated to some extent.
Casein is changed in such a way that it is acted upon more slowly by the pepsin and trypsin.
Children fed on sterilised milk are apt to develope rickets.

Pasteurisation of Milk. By pasteurising milk we mean raising it to a temperature of 150–155° F. and maintaining this heat for about thirty minutes and then cooling it quickly. This is sufficient to kill the Bac. Typhosis, Bac. Diphtheria, and practically all the others. As in sterilising most germs are destroyed, but the sugar and proteids are not affected. After pasteurisation is complete, the milk should be kept in a cool place or on ice. Never keep it for more than twenty-four hours. Amongst the poor, sterilisation, if that is deemed necessary, is better, for in pasteurising milk a special apparatus is necessary, and much care is required.

*Method of Pasteurising Milk.* The best apparatus is Soxhlet's. It consists of a large enamel pan. A stand to hold ten bottles, each bottle with a capacity of ten ounces. Each bottle is furnished with a rubber cover and a shield to keep cover in position. With this apparatus is also supplied a wooden stand for holding the bottles, a cleansing brush, and a little pan to heat each feed separately before giving it to the infant. The feed is made up according to prescription. The bottles are placed in the stand, which is immersed in the water in the enamel bath. It is then put on to the fire and the water allowed to boil for about thirty minutes. After process is complete the bottles should be cooled rapidly and kept cold till required by the infant.

To Peptonise Milk.

i. *Partially.* One pint of fresh cow's milk with four ounces of cold water are put into a bottle. Add a powder containing 15 grains of Extract of Pancreas, and 15 grains of Sod. Bicarb. The bottle is kept from six to twenty minutes in water having a temperature of 105–115° F.

ii. *Complete.* Same method, but keep in hot water for two hours.

Peptonising milk causes it to become bitter. In older children sugar may have to be added. Peptonised milk is very valuable when proteids are not well

borne, especially when child is the subject of dyspepsia. Don't continue with peptonised milk for too long a period, and as infant improves lessen amount of peptonising powder and shorten periods of peptonisation.

## PREPARATION OF VARIOUS ARTICLES OF DIET.

*Condensed Milk* is prepared by heating fresh cow's milk to 212° F., and then evaporating in vacuo at a low temperature to ¼ of its volume. It is preserved in tin can with the addition of sugar—six ounces to the pint. In feeding infants dilute it twelve to eighteen times with water.

Only of use as a temporary food. Useful because it is sterile, and because proteids and fats are reduced. Suitable for children with weak digestion. If fed for too long a period on condensed milk, an infant will develope rickets. As a permanent food it fails because it contains too little fat and proteid and too much carbohydrate. For the poor it is one of the best foods for artificially-fed infants.

*Whey.* To one pint of fresh cow's milk add two teaspoonfuls of essence of rennet. Stir and allow to stand till coagulation is complete. Strain through muslin. The clot contains the casein of the milk. Whey is valuable in the treatment of acute indigestion, and is only useful as a temporary food.

*Beef* preparations are useful only as temporary foods.

*Beef Juice.* Take pound of good lean steak. Broil it slightly. Press out juice by meat press or lemon squeezer; usually get about two to three ounces from pound of meat. Season with salt, etc. In giving it to an infant it must be heated sufficiently to coagulate the albumen.

*Another Method.* One pound of steak, mince it very fine. Put into jar with eight ounces of water, allow to stand for 6–12 hours. Squeeze out juice. Amongst the best preparations of meat is Valentine's Beef Extract. Others like panopetone liquid peptonoids contain from 15 to 20 per cent. alcohol, and if given to infants, they must be well diluted. Beef preparations are not foods, they are stimulants.

*Composition.*

| | | |
|---|---|---|
| Proteids | 2·90 | per cent. |
| Fats | 0·60 | ,, |
| Extractives | 3·40 | ,, |
| Salts | 0·20 | ,, |
| Water | 92·90 | ,, |

*Meat Broths* have much the same composition as beef juices, containing, however, less proteids and less extractives. Made from mutton, veal, chicken or beef. Useful in those cases where milk is withheld.

*To Prepare.* One pound lean meat, one pint water; stand for two hours and cook over slow fire for two hours. Amount usually reduced to half a pint. Skim off fat and strain.

*Barley Water.* Very useful in the feeding of infants. Given along with milk, or alone, when milk is contra-indicated. Composition: starch, 1·63 per cent.; fat, ·05 per cent.; proteids, 0·09 per cent.; salts, ·03 per cent.; water, 98·20 per cent.

*To Prepare.* Soak barley over-night. To two tablespoonfuls of pearl barley add one quart of cold water. Boil for six hours, keeping quantity up to quart by the addition of water. Strain through muslin.

*Infant Foods.* As a rule they contain too much carbohydrate. This is the great disadvantage. Undigested starch is liable to fermentation, and these products cause

indigestion and catarrh of mucus membrane of intestine. The amylolytic functions are not sufficiently developed in the infant for the entire digestion of such an amount of carbohydrate. The mortality among infants fed on these foods is enormous At odd times these foods are beneficial, but only as temporary foods in certain pathological conditions. Here they should be prescribed like drugs.

THE COMPOSITION OF INFANT FOOD.

| | Nestle's Food. | Mellin's. | Malted Milk. | Ridge's Food. | Imperial Granum. |
|---|---|---|---|---|---|
| | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. |
| Fat | 5·50 | 0·24 | 8·78 | 1·11 | 1·04 |
| Proteids | 14·34 | 11·50 | 16·35 | 11·81 | 14·00 |
| Cane Sugar | 25·00 | — | — | — | — |
| Dextrose | — | — | — | 0·52 | 0·42 |
| Lactose | 6·57 | — | 49·15 | — | — |
| Maltose | 27·36 | 60·80 | 18·80 | 1·28 | 1·38 |
| Total Soluble Carbohydrate | 58·93 | 80·00 | 67·81 | 1·80 | 1·80 |
| Insoluble Carbohydrates (Starch) | 15·39 | — | — | 76·21 | 73·54 |

## THE MANAGEMENT OF BREAST FEEDING.

After labour, when the mother has rested, the child should be put to the breast, because,

1. The excitation of the nipple, reflexly, induces uterine contractions, and so diminishes to some extent the liability of a post-partum haemorrhage.
2. Child draws out the nipple. This cannot be done when the breast is full.
3. Colostrum acts as a laxative to the infant.
4. Hastens the secretion of milk.

Between birth and third day, when secretion of milk is established, child requires nothing. If it gets anything, the act of suckling is not so energetically pursued. Sometimes some boiled water with 5 per cent. lactose is given.

*Frequency of Nursing.* During first few days put child to breast every two hours. If child is feeble and premature, as often as every one and a half hours.

1st month: every two hours from 5 a.m. till 11 p.m.
2nd „ : every two and a half hours from 5 a.m. till 10.30 p.m.
3rd „ : every three hours from 5 a.m. till 11 p.m., and keep this up till child is weaned.

Child must not get the breast every time it cries. This is a frequent cause of indigestion.

*Regularity in Feeding* is of great importance. If the duration of intervals is irregular, both quantity and quality of milk change—the amount of proteids is increased. Allow child to sleep without being fed from 11 p.m.–5 a.m. When child is asleep, and when the feed is due, waken it rather than allow the interval to be too prolonged. If the child cannot be kept awake, care must be taken not to allow it to remain at the breast too long at subsequent feeding.

*Duration of Breast Feeding.* Mother in good condition and child thriving, suckling should be continued for eight months at least. Breast feeding must not be persisted in more than twelve months, as it is too great a drain on mother. Anaemia and debility may develope. Child also suffers, as quality of milk deteriorates.

*Cases in which Breast Feeding is contra-indicated.* If mother is the subject of active or latent tuberculosis, or is highly neurotic, or the subject of epilepsy, hereditary tendency to insanity. Also, if she is suffering from general debility, severe post-partum haemorrhage, septicaemia, eclampsia and nephritis. If mother's milk does not agree with child (irregular and disturbed sleep, fretfulness, crying and abnormal stools) then child should be weaned.

WEANING. When child is nine months old it should be weaned. There are two methods. 1. Sudden. 2. Gradual.

1. Child is suddenly taken from the breast and put on to artificial food. In sudden weaning child may refuse food, but it will give into the cravings of hunger very soon if nothing else is given. Sudden weaning is the rule where mother becomes acutely ill, *e.g.* from pneumonia, typhoid, tuberculosis, nephritis. In acute illnesses of short duration, child is weaned but secretion of gland may be kept up by means of breast pump, and when mother is well, child may be put back to breast. In sudden weaning, the food at the beginning should be much weaker than for an artificially fed child of the same age.
2. Gradual weaning is the better method and the one usually employed. Usually takes about five weeks.

*Diet after Weaning.*

| | During 10th Month. | During 11th Month. | During 12th Month. |
|---|---|---|---|
| Cream - - | 1–2 Tablespoonfuls | 1–2 Tablespoonfuls | 1–2 Tablespoonfuls |
| Milk - - | 4–6 Tablespoonfuls | 6–7 Tablespoonfuls | 8–9 Tablespoonfuls |
| Barley Water - | 4–6 Tablespoonfuls | 6 Tablespoonfuls | 6 Tablespoonfuls |
| Sugar - - - | —— | —— | —— |

During 10th month give one feed every three hours - - - 7 feeds.
During 11th month give one feed every three and a half hours - 6 feeds.
During 12th month give one feed every four hours - - - 5 feeds.

Always test milk, and if acid add ℥ss lime water or bicarbonate of soda.

*Indications for Delaying Weaning.* In debilitated conditions or when child is ill or recovering from an illness.

Hot weather. Milk in hot weather is very liable to ferment.
Dentition. Choose an interdental period.

A small quantity of Horlick's malted milk or Mellin's food may be added to the feed if the child is constipated. Half to one teaspoonful may be given thrice daily.

May also give raw beef juice, yolk of egg, etc. These tend to lessen the risk of scurvy and rickets.

MANAGEMENT OF ARTIFICIAL FEEDING. Many things must be taken into account when child is artificially fed from its birth.

*Size of Child's Stomach is Variable.* At birth it contains 1 ounce, at four weeks 2½ ounces, at eight weeks 3¼ ounces, at sixteen weeks 3½ ounces, etc. Knowing the capacity of the stomach, one has an idea of how much fluid an infant should get at each feed.

Age is not a good guide, for a weakly infant of six or seven months, who only weighs 7 or 8 lbs., cannot take the same amount as a healthy child of the same age.

If a child is getting sufficient its weight will steadily increase, and it will be content and go to sleep after each feed.

Overfeeding is indicated by an irritable, restless and wakeful condition, with crying, vomiting and diarrhoea.

The passage of normal stools is the best indications that the child is digesting its food properly.

*Number of Feeds should be the same as for a child that is breast fed.* When a child is born and you make up your mind it must be artificially fed, start at once.

*Regularity of Feeding.* Same as in breast-fed infants (which see).

*The Methods of Preparing Feeds.* In cold weather prepare feeds for twenty-four hours at one time. In hot weather prepare feeds twice daily. Feeds should be kept in a cool place, and heated to 98° or 100° F. before giving to child.

*Bottles made of Glass* with no corners should contain 8–10 ounces. Allen and Hanbury's boat-shaped bottle is best.

*Rubber Teats* must be boiled and kept in weak boric acid solution. Before use they should be well washed to remove acid.

*Method of Administering Food.* Child should be half reclining on nurse's lap, with head and back supported. Bottle put in child's mouth and held so that child won't suck in air. Take away bottle frequently to allow child to breathe and prevent it feeding too quickly. Allow 10–20 minutes for each feed. Child's mouth should be washed after each feed.

The Care of Premature Infants. Those infants born in a weakly state or premature require special care. If treated in the same way as one would treat a full time or healthy child, they will die.

A premature child is one weighing less than four pounds, or measuring less than 19 inches.

Must maintain bodily heat and attend carefully to their feeding. Immediately child is born it should be washed and its body covered with olive oil. It is then clothed in a suit of gamgee. It is then put into its crib, covered with blankets, and a hot-water bottle—well protected—put in beside it. It should be kept in a very warm room. The room should be kept about 80° F. Disturb child as little as possible. Feed it regularly without removing it from its cot. Remove diapers when they are soiled. Incubators have been used, but results are not so good. Always have cylinder of oxygen at hand, as these children are liable to attacks of cyanosis.

Take temperature often, as the heat of child's body may rise very high, and in a very short time.

*Feeding.* If child can suck the breast allow it to do so, usually can do so when eight months. If not, use spoon, medicine dropper or gavage.

*Gavage.* Small catheter with funnel. Pass catheter into child's stomach and fill funnel with milk. Don't allow funnel to become empty.

Give child breast milk if possible. If child is very premature, it is better to dilute mother's milk at first with 5 per cent. solution of lactose. If breast milk is not procurable, then cow's milk, well diluted, is best.