Aids to obstetrics / by Samuel Nall.

AIDS TO OBSTETRICS

NALL & LONGRIDGE

ENTH EDITION

2/6 NET

BAILLIÈRE, TINDALL & COX

AIDS

TO

OBSTETRICS

BY

SAMUEL NALL

B.A., M.B. CANTAB., M.R.C.P. LOND.

REVISED BY

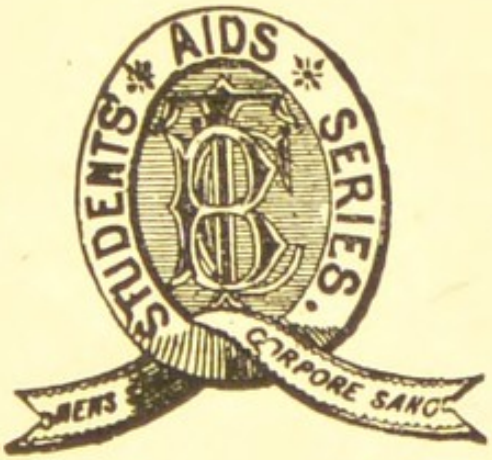
C. J. NEPEAN LONGRIDGE

M.D. VICT., F.R.C.S. ENG., M.R.C.P. LOND.

PATHOLOGIST AND REGISTRAR, LATE RESIDENT MEDICAL OFFICER AT QUEEN CHARLOTTE'S LYING-IN HOSPITAL; REGISTRAR TO THE GROSVENOR HOSPITAL; EXAMINER TO THE CENTRAL MIDWIVES BOARD; LECTURER ON MIDWIFERY FOR THE LONDON COUNTY COUNCIL

Twenty-sixth Thousand

SEVENTH EDITION



LONDON

BAILLIÈRE, TINDALL AND COX

8, HENRIETTA STREET, COVENT GARDEN

1913

(*Reprint*)

INTRODUCTORY NOTE

SOME months ago the publishers applied to me to bring out a new edition of the 'Aids to Obstetrics,' with a request that the book should be thoroughly revised and brought up to date. I was very sorry to have to decline their request, but I felt that, for various reasons, I could not do justice to a revision. I suggested that it would be better for this task to be entrusted to someone who was thoroughly conversant with all the recent changes that had taken place, both in the technique and the pathology of the science of obstetrics.

For this reason the revision, I am glad to say, has been entrusted to Dr. Longridge, whose wide experience at Queen Charlotte's Hospital is a guarantee that the work has been brought well up to date. I trust that the book, under his auspices, will still continue to be of service to those preparing for the various examinations.

SAMUEL NALL.

MARPLE BRIDGE,
December, 1908.

CONTENTS

AIDS TO OBSTETRICS

THE ANATOMY OF THE PELVIS

THE **Pelvis** is the bony basin situated between the spinal column above and the lower extremities below. Its antero-lateral walls are formed by the innominate bones, and the posterior wall by the sacrum and coccyx. It is divided into an upper and a lower part by the ileo-pectineal line; the part above the line is named the **False**, and the part below the line the **True** pelvis.

The **False Pelvis** is chiefly composed of the alæ of the iliac bones at the sides, and the base of the sacrum posteriorly; anteriorly the bony wall is deficient, the space being filled in by the abdominal wall.

The True Pelvis.—When speaking of the pelvis in obstetrics, it is the true pelvis that is generally referred to. Its boundaries are—the sacrum and coccyx posteriorly, the ischia and lower parts of the ilia at the sides, and the pubes anteriorly; the space between the sacrum and ischium is filled in on either side by the sacro-sciatic ligaments and the pyriformis muscle; the thyroid foramen is closed by the obturator membrane.

The Pelvic Floor.—Below, the pelvis is closed in by the following structures from within outwards: the peritoneum, the pelvic fascia, the levator ani and

coccygeus muscles (on the same level), the sphincter ani, sphincter vaginæ and transversus perinei (on the same level), three layers of perineal fascia and skin. Morphologically the muscles may be divided into two groups, the lower group comprising the sphincter muscles and the transversus perinei, which are derived from the primitive sphincter cloacæ. The upper group forms the 'pelvic diaphragm,' and performs important functions in supporting the organs found in the pelvis. This pelvic diaphragm is derived from the muscles which move the caudal extremity in other mammals. Owing to the retrogressive changes undergone by the caudal vertebræ in man, these muscles were set free to perform other functions, and the development of the pelvic diaphragm was the result. The pelvic floor is pierced in front by the urethra, behind by the rectum, and in the centre by the vagina.

Contents of the Pelvis.—In addition to the internal generative organs (ovaries, uterus, etc.), various muscles—the pyriformis behind, and the obturator internus anteriorly—the sacral nerves, the divisions of the iliac vessels, the rectum and bladder, help to fill up the pelvic space. These structures are occasionally subjected to dangerous pressure during labour.

The bony pelvis is essentially a **curved canal**, through which the fœtus passes in labour. The posterior wall of the canal, formed by the sacrum, is curved, and is about 5 inches in length; the anterior wall, formed by the pubes, is straight, and slopes slightly inwards below; its length is about $1\frac{3}{4}$ inches. This canal presents for examination—an inlet or brim, an outlet, and a cavity.

The **Pelvic Brim** or **Inlet** is bounded by the ilio-pectineal line anteriorly and at the sides, by the base of the sacrum posteriorly, and by the symphysis pubis in front; it is of elliptical shape, the sacral promontory projecting slightly inwards behind.

Dimensions of the Brim.—1. The **Antero-Posterior,** or **True Conjugate,** is taken from the promontory of the sacrum to the nearest point on the back of the symphysis pubis, and measures $4\frac{1}{4}$ inches.

2. The **Transverse Diameter** is taken from the centres of the ilio-pectineal lines of opposite sides, and measures 5 inches.

3. The **Oblique Diameters.** These are taken from the sacro-iliac synchondrosis of one side to the ilio-pectineal eminence of the opposite side, and measure $4\frac{1}{2}$ inches. The right oblique diameter is taken from the right sacro-iliac synchondrosis, and the left oblique from the left sacro-iliac synchondrosis.

The **Circumference of the Brim** measures about 16 inches.

The **Inclination of the Plane of the Brim to the Horizon** is an angle of about 60°, the brim looking forwards and upwards.

The **Axis of the Brim** is a line perpendicular to the centre of the plane; it passes through the umbilicus above and the tip of the coccyx below.

Dimensions of the Pelvic Cavity.—These are taken on a level with the lower margin of the second sacral vertebræ.

1. The **Antero-Posterior Diameter** is taken from the lower margin of the second sacral vertebra to the centre of the back of the symphysis pubis, and measures $4\frac{1}{2}$ inches.

2. The **Transverse Diameter** is taken from the centre of the planes of bone which form the base of the acetabula, and measure $4\frac{1}{2}$ inches.

3. The **Oblique Diameter** is taken from the centre of one sacro-sciatic ligament to the centre of the obturator foramen of the opposite side. Since this diameter is not taken from fixed bony points, it is liable to considerable variations, but it usually measures $4\frac{1}{2}$ inches.

The **Axis of the Pelvic Cavity** forms a curve running nearly parallel to the sacral curve, and joining the axis of the brim above and the axis of the outlet below. This curve is named the **Curve of Carus**; strictly speaking, it has more resemblance to a hyperbolic curve than to part of a circle. The pelvic cavity is roughly circular in shape.

Dimensions of the Pelvic Outlet.—1. The **Antero-Posterior Diameter** is taken from the lower border of the symphysis pubis to the tip of the sacrum, and measures 5 inches. If taken to the tip of the coccyx, the measurement is 4 inches; but since the coccyx bends backwards in labour, the former measurement is the correct one from the practical point of view.

2. The **Transverse Diameter** is taken between the two ischial tuberosities, and measures 4 inches.

3. The **Oblique Diameter** is taken from the centre of the lower border of the sacro-sciatic ligament of one side to the ascending ramus of the pubis on the other side, and measures $4\frac{1}{2}$ inches.

Inclination of the Plane of the Outlet to the Horizon is about 11°, the outlet looking downwards, and very slightly backwards. The axis of the outlet on being continued upwards impinges on the sacral promontory.

The **Pelvic Outlet** is lozenge-shaped, and bounded from before backwards by the pubes, the pubic and ischial rami, the ischial tuberosities, the sciatic ligaments, and the coccyx.

Pelvic Articulations.—During pregnancy the ligaments and cartilages become relaxed and swollen from serous infiltration, and allow of a certain degree of movement in the various joints.

Movement in the Sacro-Iliac Joints.—During the first stage of labour the upper part of the sacrum rotates backwards and facilitates the entrance of the head into the brim; as the head reaches the pelvic

floor, the lower part rotates backwards, and thus increases the antero-posterior diameter of the outlet.

Movement in the Symphysis Pubis. — A slight amount of separation may take place in this joint during labour.

Movement in the Sacro-Coccygeal Joint.—Unless this joint is ankylosed, the tip of the coccyx can move backwards an inch, and thus increase the antero-posterior diameter of the outlet.

Differences between the Female and Male Pelvis. —In the female the bones are lighter and smoother, the sacrum wider and more curved, the pelvic inclination greater, and the ischial tuberosities further apart. The brim is elliptical in the female, triangular in the male; the sacral promontory does not project so much in the female. The thyroid foramen is triangular in the female, oval in the male. The pubic arch is wider (95° in the female, 80° in the male); the iliac bones more spread out, and the hips further apart. The pelvic cavity is wider and shallower in the female.

EXTERNAL ORGANS OF GENERATION

The **Mons Veneris** is the cushion of fat covering the pubes; the skin over it is covered with hair.

The **Labia Majora** are two integumentary folds extending backwards from the mons Veneris, on either side of the vulva. They consist of connective, elastic, and fatty tissues, covered externally by skin and a few hairs, and internally by mucous membrane. They contain an erectile venous plexus. In the young and healthy they are firm, but become flaccid in the old and feeble.

The **Clitoris** is a small elongated body seated behind the anterior junction of the labia minora. It closely resembles the penis in structure, having two corpora cavernosa and a glans, but differs from it in not being perforated by the urethra, and in having no corpus spongiosum. The clitoris is erectile and highly sensitive.

The **Labia Minora**, or **Nymphæ**, are two folds of modified skin lying internal to the labia majora. Anteriorly they join in front of the clitoris, forming the preputium clitoridis. Posteriorly they terminate behind the vaginal orifice in the fourchette. In the virgin they are small, and concealed by the labia majora; but in the old and feeble they become lax and may protrude beyond the labia majora, and may become hardened from exposure.

The **Vestibule** is a triangular area with its apex at the clitoris. It is bounded by the labia minora on either side, and by the orifice of the vagina at its base. The orifice of the urethra is situated upon it, and underlying it is a rich plexus of vessels, which, when torn during labour, may give rise to serious hæmorrhage.

The **Urethra** is a very dilatable canal, about $1\frac{1}{2}$ inches long. It can be felt through the anterior vaginal wall, in the substance of which it is firmly embedded. It opens externally upon a small papilla seated about $\frac{3}{4}$ inch behind the clitoris.

Glands of the Vulva.—There are numerous sebaceous glands about the labia majora and minora, which secrete an odorous fatty matter. Several small racemose mucous glands are also found near the meatus. The **Glands of Bartholin** (**Vulvo-vaginal Glands**) are two small compound racemose glands seated on either side the vulva. The ducts open in the furrow between the hymen and the labia minora.

The **Erectile Tissue of the Vulva** consists of two reticulated masses of erectile vessels lying on either

side the vulva, and named the bulbi vestibuli. Anteriorly they join the erectile tissue of the clitoris by means of a small plexus, the pars intermedia. During labour, rupture of the vessels and extravasation of blood into the labia majora may occur.

The **Fourchette** is a thin fold of membrane lying behind the vaginal orifice. It is generally ruptured in the first labour.

The **Perineum** is the space lying between the posterior margin of the vaginal orifice and the anus. It is about $1\frac{1}{2}$ inches in length, and is divided by a median raphé into two lateral halves. The triangular mass of connective tissue, lying between the lower part of the vagina and rectum above and the perineum below, is named the **Perineal Body**. These parts undergo great distension in labour, and by lengthening out they increase the length of the parturient canal and direct the axis of the canal forwards.

The **Vaginal Orifice** is bounded on either side by the labia minora. In the virgin it is partly closed by the hymen.

The **Hymen** consists of a fold of mucous membrane. It is usually of crescentic shape, the concave free edge being directed forwards. Other rarer conditions of the hymen are: (*a*) the imperforate, in which there is no opening; hence the vagina is closed, and retention of the menses results; (*b*) the cribriform, in which are several small openings; (*c*) the annular, in which the hymen entirely surrounds the vaginal orifice, leaving only a small central opening.

The hymen generally ruptures during the first coitus, but it may occasionally persist after coitus, and in very rare cases after parturition.

The **Carunculæ Myrtiformes** are small elevations of the mucous membrane seated at the vaginal orifice. They are the remains of the ruptured hymen.

THE INTERNAL GENERATIVE ORGANS

THE **Vagina** is a canal running parallel to the plane of the pelvic brim, and connecting the uterus with the external generative organs. Its anterior wall is shorter than the posterior, the former measuring $2\frac{1}{2}$ inches, and the latter nearly 4 inches in length. The two walls are in contact. Anteriorly the vagina is closely attached to the base of the bladder and to the urethra; posteriorly the perineal body intervenes between it and the rectum below. It is attached to the rectum about its middle third, and above it is again separated from the rectum by the fold of peritoneum which forms the base of **Douglas's Pouch**. The vagina is most capacious above, where it encircles the cervix uteri, extending higher on its posterior than on its anterior aspect. The top of the vagina is called the vault of the vagina, and is divided into anterior, posterior, and lateral fornices.

In structure the vagina consists of three coats: an external coat of connective tissue, a muscular coat, and a lining membrane. The lining membrane, or so-called mucous coat, is covered by squamous epithelium, and resembles the skin in structure; but as it is kept moist, the horny layer is not developed. It is not a mucous membrane in the true sense of the term, since there are only a few glands to be found on section. It is thrown into transverse rugæ, especially at the lower part of the anterior wall. The rugæ are best marked in the virgin, and become more or less effaced after childbirth. The muscular coat is not very thick, and consists of an outer layer of longitudinal and an inner layer of circular unstriped fibres, somewhat irregularly

arranged. During pregnancy the muscular tissue increases in amount. Surrounding the lower part of it is a sphincter of voluntary striped muscle fibres—the sphincter vaginæ. The external coat consists of connective tissue, which serves to attach the vagina to the rectum and bladder, and to support the blood-vessels. There is a certain amount of erectile tissue in the vaginal walls.

The **Uterus** is of pyriform shape. It is divided into a lower part, the cervix, and an upper part, the body. The **body of the uterus** is roughly triangular in shape, having the Fallopian tubes at the upper angles, and joining the cervix at its lower angle; the anterior surface is flat, the posterior convex. That part of the body above the junction of the Fallopian tubes is named the **fundus**. The cavity of the body is triangular, and communicates above on either side with the Fallopian tubes, and below through the os internum with the cavity of the cervix.

The **Cervix** is of fusiform shape, and has a spindle-shaped cavity communicating with the body above, and with the vagina below through the os externum; the lower portion of the cervix projects into the vagina, forming the portio vaginalis of the cervix.

Differences between the Virgin Uterus and that of a Woman who has borne Children.

Virgin Uterus.	*Uterus after Child-bearing.*
2½ inches long.	3 inches long.
Cervix and body of almost equal length.	Body 2 inches long; cervix 1 inch long.
Sides of the cavity of the body are convex inwards.	Sides of the cavity of the body are convex outwards.
Os externum transverse, with smooth edges.	Os externum irregular, with fissured edges.

Structure of the Uterus.—The uterus has three coats: mucous, muscular, and peritoneal. The

mucous coat of the body is lined by ciliated columnar epithelium, and possesses tubular glands similarly lined; it is closely connected with the underlying muscular tissue. The movement of the cilia is directed upwards towards the Fallopian tubes. The **mucous coat of the cervix** in its lower and outer part is covered with squamous epithelium; above the external os it is lined with ciliated epithelium. The mucous membrane of the cervix is thrown into penniform folds—the arbor vitæ. Numerous mucous glands are found in the cervix, which by blocking of their ducts may give rise to small vesicles—the ovula Nabothi. The **muscular coat** is morphologically the muscularis mucosæ, and is roughly arranged in three layers: an outer longitudinal layer, which sends fibres along the Fallopian tubes, the round and the broad ligaments; a middle layer, consisting of interwoven longitudinal and transverse fibres—in this layer lie the chief vessels of the uterus; an internal layer, consisting of circular fibres, which are most abundant at the orifices of the Fallopian tubes and os internum. The **peritoneal coat** covers the whole of the posterior surface and the upper three-quarters of the anterior surface; it is very closely attached, except at the sides where the vessels enter. Posteriorly the peritoneum passes down over the upper part of the vagina, and is then reflected on to the rectum, forming Douglas's pouch; anteriorly it is reflected on to the bladder, forming the vesico-uterine fold; laterally it is continuous with the broad ligaments.

The **Vessels of the Uterus** are derived from the ovarian and internal iliac arteries; they run a tortuous course through the broad ligaments, and form a capillary meshwork in the mucous membrane. From this meshwork the blood is taken up by the small veins, which end in thin-walled sinuses lying in the middle muscular coat; from these sinuses the blood

is carried off, chiefly to the uterine veins, by the pampiniform plexus, which lies in the broad ligament.

The **Lymphatics of the Uterus** commence in vessels or spaces in the different coats. Those from the body run mainly to the lumbar glands, but a few channels run along the round ligaments, to end in the inguinal glands. The lymphatics from the cervix end in the hypogastric set of glands which lie between the external iliac and the hypogastric arteries.

The **Nerves of the Uterus** are derived from the ovarian and hypogastric plexuses; they consist of cerebro-spinal and sympathetic fibres.

The Position of the Uterus.—Normally it is slightly tilted forwards, and occupies the axis of the pelvic brim; it is, however, very movable, and its position is greatly modified by the degree of distension of the rectum and bladder.

Abnormalities of the Uterus.—The uterus may be one-horned, owing to the non-development of one Fallopian tube; or it may be divided partly or completely by a median septum, which may in some cases extend to the vagina, and thus give rise to a double uterus and vagina.

Ligaments of the Uterus.—The broad ligaments are folds of peritoneum, which pass off from the sides of the uterus to the lateral walls of the pelvis. They contain at their upper border the following structures from before backwards: the round ligaments, the Fallopian tubes, and the ovarian arteries. The **parovarium**, consisting of eight to sixteen convoluted tubes, is also situated in the broad ligament. The broad ligament contains numerous muscular fibres, which may possibly serve to move the Fallopian tube and to contract the peritoneum after parturition. The round ligaments run from the upper angle of the uterus through the inguinal canal, and end in the cellular tissue of the

labia majora; they consist chiefly of unstriped muscular fibres.

In addition to the above ligaments, there are two anterior (utero-vesical) and two posterior (utero-sacral) ligaments, formed by the reflection of the peritoneum from the uterus on to the bladder and rectum.

The **Fallopian Tubes** open internally by small orifices into the uterus at its upper angles; externally they have a much larger opening into the peritoneal cavity. The peritoneal orifice is surrounded by the fimbriated processes, one of which is longer than the rest and attached to the ovary. The tubes run a sinuous course, and are 3 to 4 inches long. In structure they consist of an external longitudinal and an internal circular layer of muscular fibres, and are lined by a folded mucous membrane; the mucous membrane is covered with ciliated epithelium, the cilia of which move towards the uterus.

The **Ovaries** are two flattened ovoid bodies, seated at the back of the broad ligaments. They are connected with the upper angle of the uterus by a small band—the ligament of the ovary—and with the Fallopian tube by means of the long fimbriated process. During menstruation and pregnancy the ovaries enlarge; after the menopause they become atrophied. The surface of the ovary before puberty is smooth, afterwards it becomes puckered owing to cicatricial contraction of the corpora lutea. The ovaries are completely invested by peritoneum, except at the hilum, where the vessels enter.

Structure of the Ovary.—The ovary is chiefly made up of a stroma, consisting of connective tissue and unstriped muscular fibres. At the periphery the stroma is dense, and forms the cortex; at the centre it is loose and vascular, forming the medulla. The surface is covered with cubical epithelium, beneath which there is a very firm fibrous layer—the Tunica albuginea. Scattered through the stroma are found

numerous Graafian follicles in different stages of development. In the cortex these form a distinct layer.

Structure of a Graafian Follicle.—It consists of an outer and an inner coat. The outer coat has a fibro-vascular layer externally—the Tunica fibrosa, or vasculosa—and internally a layer of connective tissue corpuscles. The inner coat consists of several layers of columnar cells—the Membrana granulosa. To one part of the membrana granulosa the ovum is attached; here the cells are heaped up around the ovum, forming the Discus proligerus. The rest of the cavity is filled up with the transparent Liquor folliculi.

The **Ovum** is a vesicle about $\frac{1}{180}$ inch in diameter. It is invested by a structureless hyaline covering—the Vitelline membrane, or Zona pellucida. Within this lies the yolk, a yellow granular viscid fluid. In the yolk is found the Germinal vesicle, a large clear refractive vesicle containing a small dark body—the Germinal spot.

OVULATION AND MENSTRUATION.

After puberty the ovary presents periodical elevations on its surface, due to the projection of mature Graafian follicles. About the time of a menstrual epoch a follicle bursts and discharges its contents, consisting of the ovum and some cells of the discus proligerus. The rupture of the follicle depends chiefly on the increased pressure of the fluid within it, but partly also on increased growth of the membrana granulosa, or hæmorrhage into the sac, and on contraction of the ovarian stroma.

The **Corpus Luteum** is produced by the changes which occur in the Graafian follicle after expulsion of

the ovum. A certain amount of blood is poured out into the empty follicle; around this mass of blood a layer of cells develops. These cells are deeply pigmented with a yellow colouring matter, and are called lutein cells. Their origin is a matter of doubt, some holding that they arise from a proliferation of the membrana granulosa; others that they spring from the connective tissue elements of the ovary. Whatever their origin may be, they proliferate very rapidly, and soon form a thick layer around the extravasated blood. The layer of lutein cells is thrown into folds, and the blood gradually becomes absorbed by leucocytes. In about two months' time contraction has occurred in the outer capsule, and transformed the corpus luteum into a white stellate cicatrix. In young women where the ovaries are more vascular the process of obliteration of the corpus luteum is shorter than in older women. If, however, pregnancy occurs, the growth of the corpus luteum goes on for about four months, and at this period the corpus luteum may measure 1 inch in length and $\frac{1}{2}$ inch in width, forming a marked projection on the surface of the ovary. After the fourth month of gestation gradual contraction begins, but the white stellate cicatrix is not formed till two months after parturition.

The development of the corpus luteum of menstruation is a process which results in the obliteration of the Graafian follicles without the formation of ordinary scar tissue. Were the follicles healed in the ordinary manner the ovaries would, after a few years, become overburdened with fibrous tissue. The corpus luteum of pregnancy appears to fulfil certain definite functions in assisting the embedding of the ovum. The theory that it produces an internal secretion which is necessary for the development of the trophoblast cannot be considered as proved, although there is a considerable amount of evidence in support of it.

The corpus luteum of menstruation is sometimes called the false corpus luteum, the term true corpus luteum being reserved for the growth arising in pregnancy.

Menstruation.—The menstrual discharge first commences about the fifteenth year, and recurs about every four weeks, lasting from three days to a week. The amount generally lost is about 2 to 3 ounces. In females resident in hot climates, or of enervating habits, the first onset is earlier, the flow lasts longer and is more profuse, and the intermenstrual periods are shorter than in those who reside in cold or temperate climates, or who are subject to hard physical work.

During pregnancy and lactation, menstruation and maturation of ova generally cease. Occasionally, however, ova may maturate and become impregnated when the menses are absent during lactation and from other causes; again, in rare cases menstruation occurs during the first three months of pregnancy.

At the onset of the first menstruation (puberty) the breasts enlarge, hair appears on the pubes, and the pelvis gradually assumes the peculiar female shape. Between the ages of forty and fifty the menses become more scanty, and recur at longer intervals, and finally cease. This period of cessation is called the menopause. At this time various nervous disorders are liable to occur, and the ovaries and uterus undergo atrophy.

Characters of the Menstrual Discharge.—It consists of blood mixed with epithelium, mucus, and débris; it has a faint heavy odour. **The Origin of the Discharge.**—It is derived from the uterine mucous membrane, which becomes congested and swollen and then breaks up, leaving the vessels beneath exposed. The changes in the mucous membrane are sympathetic with the maturation of a Graafian follicle, but whether impregnation of the ovum takes place before or after a menstrual epoch is not known.

Vicarious Menstruation.—This is a term applied to cases in which there is a periodical discharge of blood from some other organ—*e.g.*, stomach, nose, lungs—the normal uterine discharge being absent. It is doubtful whether such phenomenon really occurs. A slight loss of blood from the nose at the time of the menstrual periods is fairly commonly met with, and such losses can probably be accounted for by the slight rise of blood-pressure which is found at the menstrual epochs.

DEVELOPMENT OF THE OVUM

IMPREGNATION of the ovum probably takes place near the ovary, or in the outer part of the Fallopian tube, the spermatozoa passing up the tube by their own vibratile movement, though opposed by the ciliary current in the tube. Living spermatozoa can nearly always be found in the tubes of married women. When fertilized the ovum is carried down to the uterus by the ciliary and peristaltic movements of the tube, and lodges in the uterus, where it undergoes development.

Changes in the Ovum after Impregnation.—The germinal vesicle and spot disappear, and the yolk undergoes segmentation (division), producing a layer of cells at the periphery of the yolk, beneath the vitelline membrane. This layer of cells is the blastoderm; it is from this that the embryo develops. The **Blastoderm** divides into three layers—an outer, the epiblast; an inner, the hypoblast; and a middle, the mesoblast. From these three strata all the tissues of the fœtus are formed; thus, the epiblast forms all

epidermal structures, the brain and spinal cord, and organs of special sense ; the mesoblast, muscles, bones, bloodvessels, and connective tissue ; the hypoblast, the epithelial lining of the alimentary canal and its numerous glands.

The Umbilical Vesicle.—By a folding inwards of the lower part of the blastoderm the rudimentary alimentary canal is formed, which communicates with the yolk cavity by a constricted opening, the umbilicus. The yolk lying external to the umbilicus, and enclosed in a prolongation of the blastoderm, is termed the umbilical vesicle ; it is from this that the embryo first derives its nourishment. Afterwards the umbilical vesicle undergoes atrophy, the embryo drawing its nourishment from the mother by means of the placenta.

Formation of the Decidua.—Before the arrival of the ovum in the uterus, and almost immediately after impregnation has taken place, the uterine mucous membrane becomes thickened and more vascular. In this state it is called the **Decidua**. On microscopic section two layers can be distinguished. Nearer to the uterine wall is the **Spongy Layer**, forming the greater part of the thickness of the decidual membrane. The layer nearer to the uterine cavity is more dense in its structure, and is therefore known as the **Compact Layer**. The spongy layer is composed of distended uterine glands, which are separated from each other by a very small amount of connective tissue. The compact layer is almost entirely made up of somewhat large epithelioid cells. These may be round, oval, or polygonal in shape, with round, faintly staining nuclei. These decidual cells, as they are called, are derived from the stroma cells of the endometrium. The connective tissue origin of the decidual cells was demonstrated by the fact that they may sometimes be found in the tubal mucosa in early cases of tubal gestation, and by the fact that small nodules composed of these

cells can be found beneath the peritoneum in many cases of full-time pregnancy.

The decidua which lines the uterine cavity is known as the **Decidua Vera**. That portion of the decidua vera upon which the ovum becomes implanted is known as the **Decidua Basalis**, while the layer of the decidua which covers in the ovum is known as the **Decidua Capsularis**. The decidua capsularis is not the active agent in covering the ovum, but the latter burrows into, and buries itself in, the decidua. The decidua vera is about 0·5 to 1 centimetre in thickness. Till the third month of pregnancy a space exists between the decidua vera and the decidua capsularis, from the lining of which menstrual blood may occasionally flow; after the third month these two layers fuse together, become less vascular, and as pregnancy goes on become considerably thinner. At birth they are partially cast off with the fœtal membranes. After parturition the new mucous membrane is regenerated from the remains of the uterine glands left behind in the uterus.

The Embedding of the Ovum in the Uterus.—The earliest human ovum with which we are acquainted was discovered by Peters in the uterus of a woman who died three days after missing her menstrual period. Other human ova in an early stage of development have been described by Leopold, Spee, and Reichert. From a study of these ova it is apparent that definite changes take place in the ovum before it arrives in the uterus. It is not known how long a period elapses between the impregnation and the arrival of the ovum in the uterus. When it reaches the decidua the ovum is covered by a moderately thick layer of chorionic epithelium, to which the term **Trophoblast** is applied; immediately beneath the trophoblast a thin layer of chorionic connective tissue is found. The trophoblast consists of two elements—(1) **Langhans' cells**, which

are epithelioid cells with round bodies and well-marked nuclei; and (2) the **Syncytium**, which consists of masses of protoplasm, undifferentiated into distinct cells, but containing numerous irregular and darkly staining nuclei. Within the chorion the amnion and embryo are found.

The cells of the trophoblast appear to possess the power of eroding the decidua and eating their way into its substance. During this process the capillary vessels of the decidua are eroded, and spaces are formed in the decidua through which the maternal blood circulates. Coincidently with this process loops of vessels push their way from the connective tissue layer of the chorion out through the trophoblast into the decidual sinuses so formed, but the tufts of vessels always retain a covering derived from the trophoblast. The tufts thus covered are the **Chorionic Villi**. A villus on section shows a central core of loose connective tissue containing bloodvessels surrounded by a layer of cuboidal cells, outside which is a thin layer of undifferentiated nucleated protoplasm. Both these layers are derived from the trophoblast. The outer undifferentiated layer is the syncytium, and the inner cellular layer is the layer of Langhans' cells. By means of this eroding process the ovum burrows its way into the decidua and establishes relations with the maternal blood. The decidua capsularis folds over, and the spot where the ovum penetrated into the decidua is closed by a cap of fibrin.

Formation of the Placenta.—In the early stages of the development of the ovum the whole of the chorion is covered with villi, which find their way, not only into the sinuses of the decidua basalis, but also into those of the decidua capsularis. The decidua basalis, being closely attached to the uterine wall, naturally obtains a very free blood-supply, whereas the blood-supply of the decidua capsularis becomes less and less

the further it is from the uterine wall. Therefore the villi which have penetrated into the decidua capsularis tend to atrophy, and soon the whole chorion loses its villi, excepting only that part where the villi have penetrated into the richly vascular decidua basalis. These favoured villi form the fœtal part of the placenta. At the same time there is some increase in the size and thickness of the decidua basalis, which forms the maternal part of the placenta. Occasionally a patch of villi continue to grow at a little distance from the main mass of villi, and form a miniature placenta, to which the term **Placenta Succenturiata** is applied.

The placenta is fully differentiated from the rest of the chorion at the end of three months, and continues to grow, keeping pace with the development of the fœtus until nearly full term.

Vascular Arrangement of the Placenta.—The maternal blood is poured into the sinuses of the decidua basalis from the uterine arteries ; from these sinuses the blood is conveyed into the large venous channels which are found in the muscular coat of the uterus, and thence to the veins outside the uterus. These large venous channels are called the uterine sinuses, and are distinct from the decidual sinuses. The fœtal blood is conveyed through the umbilical arteries to the vascular loops forming the core of the chorionic villi, which simply dip into the maternal blood contained in the decidual sinuses. After the necessary changes have taken place, the fœtal blood finds its way from the villi into the umbilical vein, and so back to the fœtus. In the placenta there is, therefore, a double circulation of blood, that in the villi carried on by the fœtal heart, and that in the decidual sinuses carried on by the maternal blood.

Functions of the Placenta :

Nutritive.—By its means the fœtus obtains nourishment from the mother.

Excretory.—It serves to transmit waste materials from the fœtus to the mother.

Respiratory.—The impure blood of the fœtus, by being exposed to the pure arterial blood of the mother, loses carbonic acid and takes up oxygen.

The different interchanges which take place in the placenta between maternal and fœtal blood are dependent on the physical processes of filtration and diffusion.

The Placenta and Membranes at Term.—The **Placenta** is a flattened discoid mass about 8 inches in diameter and weighing about $1\frac{1}{4}$ pounds. In the centre it is about $1\frac{1}{2}$ inches in thickness, and about $\frac{1}{2}$ inch at the circumference. The maternal surface is dark red in colour, and is rough. It is cut up into about twelve or fifteen lobules or cotyledons by deep furrows, into which decidual tissue penetrates. Upon the surface of these lobules can generally be seen a thin greyish membrane, which represents the compact layer of the decidua, and on rubbing the finger over the maternal surface rough deposits of lime-salts can usually be detected. When the entire placenta has separated from the wall of the uterus through the spongy layer of the decidua, no villi are exposed on its surface. The fœtal surface of the placenta is purplish in hue, is finely stippled, and shows no division into cotyledons. Upon it ramify the umbilical vessels, the arteries usually being empty and the veins engorged. The cord springs from about the centre of the fœtal surface of the placenta. Around its edge a large vessel known as the circular sinus of the placenta can sometimes be found. The fœtal surface is covered by the amnion.

The **Chorion** is the outer of the two membranes which surround the fœtus. It is entirely a fœtal structure, and it will be clear from the section on the development of the placenta that the placenta is only

a specialized portion of the chorion, and that it is impossible to separate the chorion from the placenta without tearing it. The chorion is slightly thicker than the amnion ; it tears easily, and on holding it up to the light one can sometimes detect the remains of bloodvessels in it.

The **Amnion** is the inner of the two membranes. It is transparent, thin, and tough. No vessels can be found in it. It can easily be separated from the chorion and from the fœtal surface of the placenta as far as the insertion of the umbilical cord, from which it is impossible to dissociate it. Within the amnion are contained the fœtus, the liquor amnii, and the umbilical cord.

The **Umbilical Cord** passes from the umbilicus to about the centre of the fœtal surface of the placenta. It is usually about 20 inches in length, and of the thickness of the little finger. It is composed of the following structures: (1) An outer sheath, formed by the amnion. (2) Two umbilical arteries and one umbilical vein. (3) The remains of the umbilical vesicle. (4) Wharton's jelly. This last is simply mucoid connective tissue filling the spaces between the other structures.

Its mucoid character is said to be due to the fact that it has no vessels, and is therefore cut off from the internal secretion of the thyroid gland of the fœtus. The umbilical vein has no valves, and the umbilical arteries are twisted round it from right to left. The whole cord is twisted in a marked fashion, a phenomenon which is noticed early in pregnancy, and which is due to the movements of the fœtus in the uterus.

The **Liquor Amnii** ('the Waters') is the fluid contained within the amniotic cavity. In composition it consists of water and salts, with traces of urea and albumin. It is clear, alkaline in reaction, and usually

colourless, unless the fœtus has voided some meconium into it; its specific gravity varies considerably, being higher in the early months of pregnancy than later on, the average being about 1008. The quantity increases as pregnancy advances, and at full time there is generally about $1\frac{1}{2}$ pints of liquor in the uterus. The functions of the liquor amnii are: (1) To serve as a medium in which the fœtus can grow freely and move in all directions. (2) To act as a fluid protective pad between the fœtus and the uterine wall, thus protecting the fœtus from all blows and jars. (3) To form a hydrostatic dilator for the cervix in the first stage of labour. (4) To flush out the genital canal during the second stage of labour.

The liquor amnii is derived mainly from exudation from the amnion. There is no doubt that the kidneys of the fœtus secrete urine, because the fœtal bladder is generally full at the time of birth, and occasionally the fœtus may evacuate the bladder while still *in utero*. The fœtal urine at birth contains a considerable amount of albumin, but very little urea and creatinin.

Common Abnormalities of the Placenta and Cord.—One or more lobes may be present instead of the usual single-lobed placenta. A placenta succenturiata is moderately common, and may be left behind in the uterus. Its presence can be detected by the fact that a leash of torn vessels runs off the edge of the placenta, and that a round hole is left in the chorion. Aberrant vessels are sometimes found running off the edge of the placenta on to the membranes and back again. Fibrous masses are sometimes found involving the fœtal surface of the placenta. They are due to thrombosis of the terminal branches of the umbilical arteries, and are of no special import.

Excessive twisting of the cord sometimes results in the atrophy of Wharton's jelly at the spot where the excessive twisting takes place. Knots in the cord are

found now and then. The insertion of the cord varies considerably. It may be inserted at the edge of the placenta (battledore insertion), or it may be inserted upon the membranes (velamentous insertion).

ANATOMY AND PHYSIOLOGY OF THE FŒTUS

Chief Characters of the Fœtus at Different Stages of Development.

At the **First Month** the embryo measures about $\frac{1}{3}$ inch in length; the limbs make their appearance as small buds upon the surface of the embryo.

After the **Second Month** the fœtus is about 1 inch in length. The extremities are more developed, and the external genitalia appear. The umbilical cord is distinct. Ossification of the clavicle and lower jaw begins.

At the **Third Month** the umbilical vesicle atrophies. The placenta is fully differentiated. The decidua vera and decidua capsularis fuse together. The anus and mouth are closed. The fingers and toes appear. The length is about $2\frac{1}{2}$ inches, and the fœtus is about the size of a mouse.

At the **Fourth Month** the sex is distinguishable. The fœtus is about the size of a rat. The convolutions of the brain begin to develop.

At the **Fifth Month** the hair and nails form. The length is about 10 inches.

At the **Sixth Month** the eyelids are formed, but adherent. The membrana pupillaris is present. Length about 12 inches; weight about 1 pound.

At the **Seventh Month** the eyelids are open. The testes are descending, and the skin is covered with vernix caseosa. The length is about 14 inches, and the weight about $3\frac{1}{2}$ pounds.

At the **Eighth Month** the testes are in the inguinal canal. The length is about 18 inches, and the weight about $4\frac{1}{2}$ pounds.

At full time the child is fully developed, and presents the following features: The length is 20 inches or over, and the weight averages about $7\frac{1}{2}$ pounds. Male children are slightly longer and heavier than female children. The skin is smooth and pink in colour, being thrown into creases and dimples by abundance of subcutaneous fat. The lanugo has almost entirely disappeared, and the head is covered with dark hair. The skin is covered with **vernix caseosa.** In males the testes are in the scrotum, and in female children the labia majora cover the labia minora. The nails are well grown, and project beyond the tips of the fingers.

The Head of the Fœtus at Full Term.

The **Sutures of the cranium** are the lines along which the various bones meet; they are as follows: The **frontal,** separating the two halves of the frontal bone; the **coronal,** separating the frontal from the parietal bones; the **sagittal,** between the two parietal bones; the **lambdoidal,** separating the occipital from the parietal bones.

The **Fontanelles** are membranous spaces separating the contiguous angles of bones; the two chief are: the **anterior** (sometimes called the **bregma**), which is lozenge-shaped, and lies at the junction of the frontal, coronal, and sagittal sutures; and the **posterior,** smaller than the anterior, and triangular in shape, lying at the junction of the sagittal and lambdoidal sutures.

Moulding of the Fœtal Head.—Owing to the presence of the sutures and fontanelles, and also to the flexibility of the cranial bones, the head can undergo considerable change in shape during its passage through the pelvis in labour.

Measurements of the Fœtal Head.

Occipito-frontal, from occiput to root of nose, $4\frac{1}{2}$ inches.

Sub-occipito-frontal, from nape of neck to a point midway between the root of the nose and the anterior fontanelle, 4 inches.

Sub-occipito-bregmatic, from nape of neck to the centre of the anterior fontanelle or bregma, $3\frac{3}{4}$ inches.

Mento-vertical, from the chin to the vertex, $5\frac{1}{4}$ inches.

Mento-frontal, from the chin to the bregma, 4 inches.

Biparietal, between the two parietal eminences, $3\frac{3}{4}$ inches.

Bi-temporal, between the two extremities of the coronal suture, $3\frac{1}{4}$ inches.

The **movements of the fœtal head on the spinal column** are of wider range than in the adult, thus allowing of considerable twisting.

The **Diameters of the Trunk** are—

Bisacromial, widest diameter of shoulders, $4\frac{1}{2}$ inches.

Bitrochanteric, widest diameter of hips, 4 inches.

Nutrition of the Fœtus.—The early embryo is nourished partly by the yolk and partly by absorption through the chorionic villi; after the third month the placenta is the medium through which it is nourished.

The Fœtal Circulation—Peculiarities.—(1) There is a direct communication between the right and left auricles by means of the **Foramen Ovale.** (2) Passing from the pulmonary artery to the aorta is a communicating vessel, the **Ductus Arteriosus**, which joins the

aorta at a point just beyond where the vessels to the head and upper extremities are given off. (3) There is a direct channel of communication between the umbilical vein and the inferior vena cava by means of the **Ductus Venosus.**

Course of the Circulation.—Pure blood is brought back from the placenta by the umbilical vein, and is then passed by the ductus venosus along the under surface of the liver to the inferior vena cava, thus reaching the right auricle with the impure blood from the abdomen and lower extremities.

From the right auricle it is guided by the Eustachian valve through the foramen ovale into the left auricle, and thus into the left ventricle; it is then carried by the aorta to the vessels of the head, neck, and upper extremities. The impure blood from these parts is borne by the superior vena cava into the right auricle, and thence to the right ventricle, which transmits it to the pulmonary artery; the greater part of this impure blood then passes over to the aorta by means of the ductus arteriosus, and is carried away by the aorta, chiefly to the umbilical arteries. The blood thus reaches the placenta, where it is purified and commences the cycle afresh.

Shortly after birth, owing to the commencing activity of the lungs and to the loss of the placental circulation, closure of the umbilical arteries and vein and closure of the **ductus arteriosus** and **ductus venosus** occur. The foramen ovale also becomes partly or wholly closed.

CHANGES IN THE MOTHER CONSEQUENT ON PREGNANCY

Changes in the Size and Weight of the Uterus.—The muscular, vascular, and nervous tissues of the uterus undergo hypertrophy; hence the uterine walls increase greatly in thickness. This increased growth is chiefly confined to the body of the uterus, and is most marked at the placental site. The peritoneal coat of the uterus also becomes stretched and thickened. At the end of pregnancy the uterus measures about 12 inches in length, and weighs about 2 pounds

Changes in the Position of the Uterus.—During the first three months the uterus remains in the pelvis and sinks a little, thus giving rise to the slight flattening of the abdominal wall which can be noticed above the pubes during the first few weeks of pregnancy. About the fourth month it rises above the pelvic brim, growing at a definite rate, so that from its size an estimate of the duration of pregnancy can be obtained. Whilst in the pelvis the uterus is often bent forwards (anteflexed); when above the brim its long axis corresponds with the axis of the brim. When relaxed the uterus lies loosely upon the vertebral column, but when contracted it is straightened out and projects forwards. The pregnant uterus is often bent slightly to the right, and also twisted a little on its long axis to the right, thus bringing the left round ligament forwards into a position where it can easily be felt. This twisting of the uterus is probably due to the presence of the large intestine on the left side of the abdomen.

Changes in the Shape of the Uterus.—During the first three months it is pyriform in shape. From the third to the sixth month its shape is that of a flattened spheroid—*i.e.*, it is broader than it is long. After the sixth month an increase takes place in its longitudinal diameter, so that its length becomes greater than its width.

Changes in the Cervix Uteri.—A slight hypertrophy of the tissues of the cervix takes place. Owing to serous infiltration the cervix becomes softened, and the os externum will admit the tip of the finger (patulous). No real shortening of the cervix occurs during pregnancy, the apparent shortening which is felt being due to the softening; a few days, however, before labour real shortening may take place, as incipient uterine contractions may slightly open up the cervical canal. The cervix often contains a plug of white tenacious mucus, secreted by the overactive cervical glands.

Changes in the Vagina.—The mucous and muscular coats undergo hypertrophy, and there is increased vascularity and secretion. Owing to venous congestion, the mucous membrane assumes a peculiar purple tint.

Changes in Ligaments and Tubes.—The round ligaments increase in length and thickness, and tend to pull the uterus downwards and forwards. The broad ligaments also increase in size. The Fallopian tubes lengthen and become wider.

Changes in the Abdominal Walls.—During the first few weeks, owing to the sinking of the uterus, the abdominal walls become slightly flattened and the umbilicus depressed; after that time the walls become more and more prominent with the gradual increase in size of the uterus, and the depression of the umbilicus gradually disappears, till finally, during the last two months of pregnancy it is flush with the surrounding surface. White or pink streaks, the

lineæ maternæ, or **striæ gravidarum**, form on the lower part of the abdomen, on the outer part of the thighs, and upon the breasts; they are due to stretching and partial atrophy of the skin. Owing to the pressure of the uterus, the recti muscles may separate, epecially in multiparæ, a condition known as diastema rectorum.

Pressure on the Pelvic Contents.—Occasionally irritation of the bladder, constipation, cramps in the legs, œdema, and varicose veins of the legs and vulva may occur from pressure of the enlarged uterus on the bladder, rectum, sacral plexus, and iliac veins respectively.

Changes in the Blood and Circulatory System.—Practically no change takes place in the blood during the early months of pregnancy. Towards the end of it, however, there is a slight increase of red blood corpuscles and of the hæmoglobin, and in the last two months of pregnancy a definite increase in the number of leucocytes is found, constituting one of the most marked of the physiological leucocytoses. There is also a slight but definite increase in the arterial tension, which rises from the normal to about 140 mm. of mercury at full term. To meet this rise of blood-pressure the heart becomes slightly hypertrophied.

Changes in the Respiratory System.—An increased amount of carbonic acid is given off from the lungs. Pressure of the enlarged uterus on the diaphragm may occasionally embarrass respiration.

Changes in the Skin.—Brown pigmentation about the forehead, face, linea alba, umbilicus, and external genital organs is very common. A dark circle around the eyes is of frequent occurrence in early pregnancy.

Changes in the Urinary System.—A slight degree of parenchymatous degeneration is often found in the kidney during normal pregnancy. The amount of

urine secreted is larger than normal. There should be no alteration in the composition of the urine, but traces of albumin are found in about 12 per cent. of all cases. During that period of pregnancy in which the uterus is confined within the pelvis frequency of micturition is commonly noticed, owing to the pressure on the bladder, and when the uterus settles down during the last fortnight before labour this symptom is often noticed.

Changes in the Digestive System.—The appetite is often capricious or depraved. Nausea and vomiting are very common, especially in the morning. They generally disappear after the third month. Owing to the pressure of the growing uterus upon the rectum, constipation is very common during the first three months, and again in the last month of pregnancy. Profuse salivation occasionally occurs, and must be regarded as a manifestation of the toxæmia of pregnancy.

Changes in the Nervous System.—Various functional disturbances may occur in the nervous system, and are probably of reflex origin—*e.g.*, neuralgia of different nerves, local paralysis, anæsthesia of various nerves, attacks of fainting, blindness or deafness, fretfulness, depression of spirits, etc.

Changes in the Weight of the Body.—During the first three months of pregnancy there is a loss of weight, but after that time the body gradually gains in weight, independently of the uterus and its contents.

Changes in the Mammary Glands.—These increase in size, owing to the rapid growth of the glandular, fatty, and connective tissues of the glands. Distended superficial veins and lineæ albicantes (due to stretching of the skin) are seen on the surface. The gland is often tender to the touch, and, owing to the enlarged glandular acini, has a knotty feel at the periphery.

The **Nipple** and its sebaceous follicles increase in size, and after the third month a **dark pigmented areola** forms around the nipple. External to the areola a lighter pigmented area is often seen—the **secondary areola.** The areolæ are most marked in dark women. After the third month milk can be expressed from the nipple.

The **Thyroid Gland** sometimes increases in size to a slight extent, and some exophthalmos may also be noted. The increased activity of the gland is probably due to the physiological demand for increased oxidation.

THE SYMPTOMS AND SIGNS OF PREGNANCY

Symptoms.—1. **Amenorrhœa** is the first symptom of pregnancy, and is of great diagnostic value when in the case of a healthy woman of child-bearing age the periods suddenly stop. A slight monthly discharge may be found during the first three months, but this discharge is not of the same quantity as the regular monthly flow, and therefore in estimating the probable date of delivery it is important to reckon from the last *regular* period. Amenorrhœa is a symptom of no value in cases where pregnancy commences during lactation, or before the onset of menstruation.

2. **Morning Sickness** and **Nausea** generally begin about the time that the menstrual period would have commenced had the patient not become pregnant. It is by no means invariably present, and should be looked upon as a minor manifestation of the toxæmia of pregnancy.

3. **Quickening.**—This is the sensation produced by the movements of the fœtus. The movements are

first felt about the sixteenth week, and at first are feeble and fluttering in character; as pregnancy advances they increase in intensity and become much more perceptible, and may be felt as distinct kicks. Pressure on the uterus, abstinence from food, and any condition threatening the life of the fœtus cause an increase of the movements. Occasionally the movements cease for days or weeks at a time, and in some cases they may be entirely absent.

If the movements of the child are felt and seen by the physician, they constitute a very valuable sign; if only perceived by the mother, the sign is of much less value, as she may be deceived by the sensation caused by flatus, or irregular contractions of the abdominal muscles. It is not to be supposed that the fœtus does not move until the period when its movements can be felt. The movements are only felt by the patient when the uterus comes into contact with the anterior abdominal wall.

4. **Sensations of Fulness and Pricking** in the breasts begin about the second month, and about the third month a little serum may ooze from the nipples and tend to form crusts upon their surface.

5. **Constipation** and **Frequency of Micturition** are common symptoms during the first three months.

6. There are numerous minor symptoms, such as waywardness of the appetite, itching of the vulva, toothache, flatulence, and salivation.

Signs.—These will be described under two headings:

1. While the uterus remains a pelvic organ.
2. Near term.

1. By the abdomen the fundus can be felt behind the pubes, and there is generally some flattening of the anterior abdominal wall.

By the vagina the tip of the cervix is found softened,

the uterus is globular in shape, and the lower uterine-segment is softened, opposing no resistance to the fingers, and thus allowing Hegar's sign to be elicited. The lower uterine segment becomes much more flexible. Bimanually the enlargement of the body can be felt, and sometimes definite contractions can be made out.

2. **Near Term.**—On inspection of the abdomen, the points to be noticed are the enlargement of the abdomen, of a more or less typical ovoid shape, pigmentation of a line running from the symphysis to the umbilicus, the presence of lineæ maternæ, and the flattening of the umbilicus. Another sign which is pathognomonic of pregnancy is to watch the movements of the fœtus, which can easily be seen through a thin abdominal wall. The breasts exhibit certain signs of pregnancy to the eye—viz., enlargement, the appearance of striæ and veins beneath the skin, and the development of the pigmented secondary areola with Montgomery's tubercles upon it. On palpation of the breast, the hypertrophied glandular tissue can easily be felt.

On palpation of the abdomen, the points to notice are:

1. That the uterus contracts and relaxes at intervals.
2. The fœtal parts can be felt.
3. The fœtal movements can be felt.

On auscultation of the abdomen, the following sounds can be heard:

1. **Fœtal Heart-Sounds.**—They are first heard during the fourth or fifth month. Their frequency is about 120 to 160 beats per minute, the number of beats depending on the size of the child; thus, it is greater in small than in large fœtuses, hence the greater frequency in female children. Movements of the mother or the fœtus increase the number of beats. At the commencement of a pain the frequency is increased, but is diminished at the height of a pain,

owing to the interruption of the placental circulation. **Characters of the Sounds.**—There is a double beat like that of a watch. The sounds are often obscure or absent if the abdominal walls are thick or the liquor amnii excessive in amount, or if the back of the child is turned towards the back of the mother. **Position where best heard.**—The sounds are best transmitted through the back of the fœtus; hence in most cases, as the back of the fœtus is turned towards the mother's left, they are best heard on the left side of the abdomen, half-way between the umbilicus and the anterior superior iliac spine. In breech presentations they are most audible above the umbilicus, and to the left or right, according to the position of the back of the fœtus. Tumultuous irregular beating of the heart often signifies approaching death of the fœtus, and absence of the sounds for a long time after they have been previously heard is diagnostic of its death. If the fœtal heart-sounds are heard, the diagnosis of pregnancy is certain.

2. **The Uterine Souffle.**—This is a single blowing or whizzing murmur heard synchronously with the mother's pulse; it is best heard low down at the sides of the uterus, and is probably produced in the uterine arteries. It is of little value as a sign of pregnancy, because it is often present when the uterus is enlarged by fibroids.

3. The **Umbilical Souffle** is very rarely heard; it is a blowing sound synchronous with the fœtal heart-rate, and is probably produced in the umbilical arteries. As a rule, it can only be detected when the cord is lying between the child's back and the abdominal wall.

4. **Sounds due to the Movements of the Fœtus** are commonly heard as dull thuds.

5. **A transmitted Sound from the Aorta** is practically constant.

6. **Sounds produced in the Intestine.**—These are of an unmistakeably gurgling nature.

On inspection of the vulva and the vagina, it is seen that the natural pink colour has deepened into a violet tint. This is due to congestion of the pelvic veins, and is shared by the cervix. There may be some œdema of the vulva and some varicosity. Small varicose cutaneous veins are commonly found on the thighs, and a ring of enlarged veins is found round the anus.

On vaginal examination, the vault of the vagina and the cervix are found softened, the lower uterine segment is distended, and the presenting part can be felt through it. Vessels can be felt pulsating in the lateral vaginal fornices.

Ballottement.—This is the sensation produced by the fœtus falling back on to the tip of the examining finger after a sudden push has been applied to it by the finger placed in front of the cervix. The sensation can only be produced by a body freely movable in the uterus, and when that body is floating freely in a fluid. Therefore it can only be obtained when there is plenty of liquor in proportion to the size of the child, and is best felt from the fourth to the seventh month. To obtain it the patient should be placed in such a position that the uterus is vertical.

1. **Diagnosis of Pregnancy from Ovarian and Fibroid Tumours.**—The presence of the chief signs of pregnancy (the mammary, menstrual, auscultatory, ballottement signs, etc.) in a case of pregnancy, and the absence of these signs in ovarian and fibroid disease, associated in the case of ovarian disease with the presence of a smooth fluctuating tumour, and in the case of fibroid disease with a tumour having a hard and often nodular surface, would readily decide the diagnosis. Occasionally pregnancy complicates a case of ovarian or fibroid tumour, and the diagnosis of

pregnancy then becomes difficult; in such cases the abdominal tumour will often be found to be of unsymmetrical shape—a distinct depression may be found between the tumour and the uterus. The detection of the softened cervix and of the fœtal heart-sounds will clear up the diagnosis.

2. **Diagnosis of Pregnancy from Ascites.**—The absence of all the important signs of pregnancy and of any defined uterine tumour, and the presence of free fluctuation, will serve to distinguish ascites from pregnancy.

3. **Phantom Tumours and Spurious Pregnancy.**—These conditions generally arise in hysterical women, and depend on the presence of flatus and irregular contraction of the abdominal muscles. They are occasionally accompanied by cessation of the menses and movements simulating quickening, and may thus puzzle the physician; such cases are, however, readily distinguished from pregnancy, as the fœtal heart-sounds are absent and the cervix uteri is unchanged, and if chloroform be given the tumour disappears.

4. **Tympanites, Obesity, Abdominal Enlargement due to Hydatids and other Tumours**, are readily distinguished from pregnancy, as all the important signs of the latter condition are absent.

DURATION OF PREGNANCY

THE exact duration of pregnancy is not known, as it is impossible to fix the precise date of conception. From calculations, based partly on statistics regarding the period of time which elapses between the cessation of menstruation and the onset of labour, and partly on cases in which the effect of a single coitus is known,

the duration is found not to be a fixed one, but to vary within certain limits. The average duration obtained in this way is about 278 days.

Estimation of the Day of Confinement.

All methods for calculating the date of confinement take the last menstrual period as their starting-point. Owing to the uncertainty as to when conception takes place, an error of a few days is almost inevitable.

The **Method employed by Dr. Matthews Duncan** consisted in taking 278 days from the day on which the last menses ceased, and is as follows: 'Find the day on which the female ceased to menstruate, or the first day of being what she calls "well." Take that day nine months forward as 275, unless February is included, in which case it is taken as 273 days. To this add three days in the former case, or five if February is in the count, to make up the 278. This 278th day should then be fixed on as the middle of the week, or, to make the prediction more accurate, of the fortnight, in which confinement is likely to occur, by which means allowance is made for the average variation of either excess or deficiency.

Naegele's Method.—Take the date on which the last menses first appeared, and add seven days to it. From the date thus obtained reckon back three months. This will give the probable time of confinement.

An approximate calculation of the probable stage of pregnancy and date of labour can be obtained by noting the time when quickening first occurs (it generally begins during the first fortnight of the fourth month), and also by measuring the height of the uterus above the pubes. These methods are of use when pregnancy commences during the absence of menstruation—*e.g.*, during lactation.

In cases where the patient's menstrual history is

indefinite, attempts have been made to estimate the probable date of delivery by noting the time when quickening first occurs and adding twenty weeks. But this method is very unreliable. Calculations based upon the height of the uterus are more satisfactory. The distance from the top of the symphysis pubis to the top of the fundus should be measured *with a tape ;* each $1\frac{1}{4}$ inch of this measurement represents four weeks of pregnancy. Thus at term or forty weeks the top of the uterus will be found $12\frac{1}{2}$ inches above the symphysis, at thirty-two weeks 10 inches, at twenty-eight weeks $8\frac{3}{4}$ inches, and so on. It must, however, be remembered that often during the last fortnight of pregnancy the uterus drops downwards and forwards, a phenomenon which is known as the lightening of labour.

GENERAL MANAGEMENT OF PREGNANCY

A PREGNANT woman should not be looked upon as an invalid. She should take ordinary exercise until the confinement and an ordinary diet. Primigravidæ should not be encouraged by anxious mothers to overfeed and avoid exercise, since such a course is likely to produce a feeble uterus and an immoderately large child. Plenty of fresh air is needed. Tight stays should be discarded in favour of an abdominal belt, which will not impede the respiratory movements. The weight of the skirts should be upon the shoulders rather than upon the waist. A full bath should be taken daily, but it must not be too hot. Special care should be taken to secure an action of the bowels every day, but strong purgatives should not be employed. In cases where there is any fear of miscarriage taking place, the patient should stay in bed for

a day or two at the menstrual epochs, since miscarriage is most liable to occur at those periods.

If the nipples are not well formed they may be drawn out with the fingers and hardened by glycerine or tannic acid. The mouth should be washed out with a weak alkaline solution always after vomiting, to protect the teeth from erosion by acid, and so prevent decay and toothache. The urine should be examined at intervals during pregnancy.

DISORDERS OF PREGNANCY

THESE may be considered under the following headings:

A. Diseases of the decidua and of the ovum, including premature expulsion of the ovum.

B. Diseases which are only accidental complications of pregnancy.

C. Diseases which are dependent on pregnancy.

A. Diseases of the Decidua and of the Ovum.

Chronic Inflammation of the Decidua—Causation.—It depends on endometritis existing previous to pregnancy or on syphilis. **Morbid Anatomy.**—Hypertrophy and vascular polypoid growths of the decidua. **Termination.**—Abortion (due to hæmorrhage from the decidua, or to death of the fœtus) generally results.

Hydrorrhœa Gravidarum—Symptoms.—Discharge of watery fluid from the uterus at intervals, commencing about the third month and continuing to the end of pregnancy. It is not of serious import. **Diagnosis.**—It is easily distinguished from discharge of liquor amnii,

as it is not accompanied by the signs of commencing labour (uterine pains, dilatation of the os). **Source.**—It is said by some to arise from a chronic catarrhal inflammation of the decidua vera and its glands ; by others, to be derived from the space between the chorion and amnion.

Hydramnios—Definition.—An excessive amount of liquor amnii. **Causation.**—The excessive exudation of liquor amnii generally depends on some morbid condition of the decidua or chorion, which disturbs the placental circulation. In twins it is occasionally seen in one amniotic sac, the other sac being normal. The **Symptoms** chiefly depend on the pressure of the distended uterus ; thus, dyspnœa, displacement of the heart, and palpitation may arise from pressure on the diaphragm ; by pressure on the abdominal veins, œdema of the legs and vulva may occur. Pregnancy is sometimes interrupted before full term, but this is by no means the rule, the infants born in hydramnios cases being usually over the average weight. **Signs.**—The abdomen is greatly distended ; the uterus tense and elastic, and occasionally fluctuating ; the fœtal heart-sounds are very indistinct. On examination *per vaginam*, the lower part of the uterus is found greatly distended. **Diagnosis.**—This condition must be distinguished from distension of the abdomen due to ascites or ovarian cyst, and from twins. The free fluctuation, and the fact that the fluid changes its position when the patient is moved to one or the other side, and the absence of any defined uterine tumour, are the points which serve chiefly to distinguish ascites from hydramnios. From ovarian cyst, the vaginal signs of pregnancy, the palpable uterine contractions, and the history of amenorrhœa will decide the diagnosis. The feeble heart-sounds, the fluctuating tumour, and the difficulty of feeling any part of the fœtus, will distinguish hydramnios from twins. **Effects on**

Labour.—The excessive distension of the uterus is apt to produce uterine inertia, and the first stage is often prolonged. The os may dilate to the size of half a crown, after which no further advance is made ; at this point it is advisable to rupture the membranes. The patient should be lying upon her side and the membranes should be ruptured in the absence of a pain, otherwise the cord may prolapse. After rupture of the membranes labour is usually completed very rapidly. The danger of postpartum hæmorrhage in these cases has been much exaggerated.

Deficiency of the Liquor Amnii.—This condition is occasionally present. By allowing the amnion to come in contact with the fœtus, adhesions may form between the two and produce fœtal deformities.

Intra-Uterine Amputations.—Occasionally amputation of one or more limbs takes place *in utero*. In most cases it is due to constriction of the limb and stoppage of its circulation by bands stretching across the amniotic cavity. It may in some cases be due to constriction by coils of the cord. The limb, if small, disappears ; if large, it is retained and expelled at birth with the child.

In the majority of cases of intra-uterine amputation of limbs so-called, the deformity is due to the non-development of the distal portions of the limbs owing to constriction by amniotic bands higher up the limb.

The following morbid conditions may affect the fœtus and produce obstruction during delivery : **Hydrocephalus, Meningocele, Exomphalos, Spina bifida, Ascites, Distended Bladder, Enlargements of the liver, spleen, kidneys, and other parts**, due to cystic, cancerous, and other growths.

Chorio-Decidual Hæmorrhage.

Carneous Mole.—Hæmorrhage may take place into any of the layers of the ovum. The causes of such

hæmorrhage are not known, but the condition is sometimes associated with obstructive heart or lung disease. The effect of the hæmorrhage is to cause pressure on, and atrophy of, the villi, thus leading to death of the fœtus, which is generally represented by a pea-like nodule attached by an œdematous stalk. The blood, which is generally effused between the chorion and the decidua, does not find its way into the amniotic cavity as a rule, but it collects in rounded knobs lifting up the amnion. Such an ovum when expelled is generally about the size of a duck's egg, and is rough and shaggy outside; on section, an amniotic cavity containing an atrophied fœtus is seen, and outside it are layers of blood-clot.

The clinical history of these cases is fairly distinctive. A woman has grounds for believing she is pregnant, but after about two or three months the early signs of pregnancy disappear. On vaginal examination at this stage, the uterus is found definitely enlarged. As a rule the ovum is expelled by the uterus with slight hæmorrhage, but it may be retained within the uterus for some months. Sooner or later a brownish discharge begins, which may or may not be offensive. In the latter case the ovum has generally become infected, and must be removed without delay. If full doses of ergot and hot vaginal douches do not lead to its expulsion, the cervix should be dilated and the products of conception thoroughly removed.

Uterine Hydatids or Vesicular Mole.

In this the ovum is covered with clusters of semi-transparent vesicles, which are formed by mucoid degeneration and hypertrophy of the chorionic villi. If this change occur before the formation of the placenta, the vesicles cover the entire surface of the ovum; if after its formation, they are limited to the placental site. When the ovum is expelled from the uterus, the embryo

has generally disappeared. **Causation.**—This disease is now looked upon as due to hypertrophy and cystic changes of the trophoblast, and there appear to be cases in which the possibility of pregnancy was excluded. Both the syncytium and Langhans' cells undergo profuse and irregular proliferation, and make their way through the decidua deeply into the uterine muscle. **The Signs of this Condition.**—Rapid growth of the uterus, so that at the third month it may reach to the umbilicus; hence the enlargement does not correspond with the stage of pregnancy. The uterus has a boggy feel; the heart-sounds and ballottement are absent. The chief sign is the discharge at intervals of clear fluid, blood, and the peculiar vesicles. Abortion generally occurs. **Treatment.**—The uterus should be emptied as soon as the condition is diagnosed. The cervix must be dilated and the growth peeled off the uterine surface. Great care must be exercised in removing the growth, since it sometimes penetrates deeply into the muscular wall, and the uterus may easily be perforated. An antiseptic douche should afterwards be given.

In a large proportion of these cases a new growth develops in the uterus some months afterwards, to which the term 'chorion-epithelioma' is applied. Microscopically this growth differs in no essential particular from the sections of hydatid mole, and in cases where chorion-epithelioma develops after the removal of a hydatid mole it is almost certain that portions of the growth were left behind. Whether it will soon be the accepted practice to remove the uterus in cases of hydatid mole is open to question, but in cases where it is not easy to peel the growth off the uterus—that is, in cases where the growth has penetrated into the uterine muscle—the uterus should be removed.

Abnormalities and Diseases of the Placenta.

Abnormalities of the Placenta.—The placenta may be of **crescentic shape**, or it may be spread out over the entire ovum, forming the **Placenta membranacea**. Or, in addition to the ordinary placenta, several small detached pieces of placental tissue may be present—**Placentæ succenturiatæ**. These latter are of importance, as they may be left behind after labour, and give rise to hæmorrhage or septic troubles. **Hypertrophy** of the placenta may occur in the case of a large child, or of hydramnios. The placenta may be small if the child is small, or atrophied in cases where contraction has followed on placental hyperplasia. In the latter case the child often dies, owing to the interference with the placental circulation. The position of the placenta may be abnormal, as in **Placenta prævia**.

Placentitis (it is doubtful if true inflammation of the placenta occurs).—This term is applied to cases where development of new tissue takes place around the vessels of the villi. Afterwards this tissue contracts and obliterates the vessels, and hæmorrhage on the surface of the placenta, or adhesions of the placenta, result. It generally terminates in death of the fœtus and abortion.

Fatty degeneration of the placenta may depend on syphilis, or on fatty changes occurring in blood-clots and products of inflammation. It attacks the chorionic villi and decidua, and is either localized or diffuse. Abortion frequently results.

Calcareous or pigmentary deposits, and occasionally **fibromatous**, **sarcomatous**, or **myxomatous** growths may be found in the placenta.

Syphilis of the Placenta.—The signs of syphilitic disease of the placenta are notoriously uncertain. Changes have been described, but there is little

agreement among observers. No change has been described which cannot be found in the placentæ of cases where there is no reason to suspect syphilis. A syphilitic placenta is always larger and heavier than normal, and may weigh as much as 2 pounds. The demonstration of the *Spirochæta pallida* is the only definite evidence of syphilis.

Morbid Conditions of the Fœtus.

The fœtus during intra-uterine life may be attacked by various diseases, and may die *in utero*, or it may be born affected with disease.

The Exanthemata.—Small-pox, typhoid fever, and probably measles and scarlet-fever, may be transmitted to the fœtus from the mother. The child often dies, and abortion occurs. In some cases the child is born with the marks of small-pox on it.

Rickets.—The fœtus is occasionally born with all the signs of rickets—enlarged epiphyses, bending of ribs, bending of bones, etc.

Syphilis.—According to the degree to which the fœtus is affected, it may be born dead with marks of the disease upon it, or alive marked by the disease, or the disease may not make its appearance till some time after birth. The child may receive the disease from the father or the mother, or both, and the mother may become affected through the child.

Intermittent Fever. — The fœtus may become affected *in utero* through the mother. When born the child presents the peculiarly enlarged spleen.

Lead-Poisoning.—The fœtus may become affected and die when the mother suffers from lead-poisoning. Abortion often results.

Intra-uterine Fracture of long bones and **Dislocation** of shoulder or hip sometimes occur.

Death of the Fœtus.

Causes of Death of Fœtus :

1. Diseases of placenta and membranes (*vide supra*).
2. Poisons transmitted from mother—*e.g.*, those of the exanthemata and syphilis, mineral poisons, such as lead, etc.
3. Starvation of the mother.
4. Hyperpyrexia of the mother independently of the cause. Temperature of 106° in mother is fatal to the fœtus.
5. Sometimes fœtus dies about the same date in successive pregnancies without any evident reason. In these cases syphilis is very often the cause.
6. Injury to mother.

After death the fœtus may be quickly expelled from the uterus, or it may be retained for some time, owing to the presence of placental adhesions, or to the diminished irritability of the uterus.

Changes in the Retained Fœtus.—If very small, it may be dissolved in the liquor amnii ; if large, it may either undergo **maceration**, the epidermis becoming raised in vesicles and peeling, the subcutaneous tissues red and œdematous, the body flaccid, the brain semi-fluid, and the cranial bones separated ; or **mummification** may take place, the whole body becoming shrunken and dried up.

Missed Labour is a term applied to those cases (very rare) where uterine pains either do not come on at full term, or where they pass off quickly without expelling the fœtus. The fœtus dies, and is retained *in utero* for a longer or shorter time. The membranes generally rupture, and air gains access to the interior of the uterus ; hence decomposition of the fœtus takes

place. In consequence of this, the fœtus is disintegrated and discharged piecemeal for months. In other cases air is not admitted to the uterus; the fœtus then undergoes desiccation and calcification, and forms a **lithopædion.** **Termination.**—Recovery may take place after the fœtus has been expelled, or the patient may die from septicæmia or from ulceration and rupture of the uterine walls. The **Treatment** in such cases would be, either to remove the fœtus entire after dilatation of the os uteri, or to use antiseptic vaginal injections and remove the parts of the fœtus as they come within reach.

Symptoms of Death of the Fœtus.—Death is often preceded by excessive movements of the fœtus, and by irregular beating of the fœtal heart. Death may be inferred to have taken place when the heart-sounds, which have been previously heard, are absent for a long time, and when the fœtal movements cease. After the fœtus is dead, the mother's breasts become flaccid, and she often suffers from depression of spirits, languor, and a feeling of heaviness in the hypogastrium.

Tympanites Uteri.—In some cases, when the liquor amnii has run off, and the air, carrying septic germs, has entered the uterus, septic decomposition is set up in the fœtus, giving rise to the formation of gas. The gas may be produced in such quantities as to render the uterus tympanitic. Such a condition is dangerous for the mother, as septicæmia may result, or some of the gas may enter the uterine veins and cause sudden death. **Treatment.**—The uterus should be emptied as quickly as possible and irrigated with antiseptic solutions.

Premature Expulsion of the Ovum.

Definitions.—By **abortion** is meant the expulsion of the ovum before the placenta is fully formed—*i.e.*,

during the first three months of pregnancy; by **miscarriage**, expulsion between the fourth and seventh month—*i.e.*, before the fœtus is viable; by **premature labour**, expulsion between the seventh and ninth month—*i.e.*, after the fœtus is viable.

A **viable fœtus** is one that will have a fair chance of living after birth. A fœtus expelled before the seventh month will have very little chance of survival.

Causation.—Abortion may be caused by:

1. **Death of the Fœtus from any Cause** (*vide supra*)—inflammation of the decidua, diseases of the placenta (syphilitic, etc.), diseases of chorionic villi, twisting of the cord, various diseases of the fœtus (syphilis, exanthemata, etc.).

2. **Certain Diseases of the Mother**—*e.g.*, the fevers, syphilis, alcoholism, lead-poisoning, albuminuria, cardiac disease, etc. Some of these conditions may give rise to recurrent abortions, and occasionally several abortions may occur without any discoverable cause; in the latter case, the woman is said to have '**the habit of abortion.**'

3. **Uterine Contractions due to Nervous Influence**, such as fright, shock; or produced reflexly by stimulation of the breasts.

4. **Morbid Conditions of the Uterus.**—Fibroids, peritoneal adhesions, and displacements of the uterus, by interfering with the proper development of the uterus.

5. **Certain Mechanical Causes**—*e.g.*, a blow on the uterus, or a fall—may separate the ovum and cause abortion when any of the above predisposing causes are present, but probably not in a healthy woman.

6. **Criminal Abortion.**—This is usually attempted by the administration of certain drugs (ergot, savin, etc.), and by the passage of various instruments through the cervix.

Symptoms.—Slight or profuse hæmorrhage, uterine

pains, and expulsion of the ovum, are the chief symptoms. During the early months the ovum is expelled *en masse*, and may pass unnoticed in the clots; later on in pregnancy, however, the membranes rupture, and the fœtus is expelled first, and is followed after a time by the placenta and membranes. In cases of threatened abortion the symptoms are usually slight in character, and may consist solely in the passage of small quantities of blood. When the abortion becomes inevitable, the amount of blood lost is increased and the pain is more severe. The main test as to the inevitability or otherwise of the abortion is the condition of the cervix. As a rule, if the cervix is open and the ovum is partly protruding, the case is one of inevitable abortion. The term incomplete abortion is used for the cases in which some part of the ovum, usually a portion of the placenta, remains behind in the uterus.

Treatment. — Preventive treatment in cases of abortion depends on the cause; thus, if due to syphilis, mercury and iodide of potassium should be given. Rest at the menstrual epochs should be enjoined in those cases dependent on nervous irritability, or where no definite cause can be discovered. In some cases of habitual abortion at one certain time, it may be advisable to induce premature labour a little before the time at which the fœtus usually dies. The treatment of cases of threatened abortion consists in rest. The patient must remain quietly in bed; morphia should be given if necessary, and it is a good plan to elevate the pelvis. Various sedative drugs may be given, but it is wise to avoid the use of purgatives. When the attack has passed off, the patient must avoid any form of violent exercise or straining, and should lie in bed for a day or two at the next menstrual epoch.

In cases of inevitable abortion no interference may

be necessary, and the cases must be treated exactly in the same way as cases of labour at term. It is important to make sure that the entire ovum has been expelled, and the necessity for maintaining asepsis goes without saying. Interference may be necessary in some cases on account of hæmorrhage. The bleeding will cease as soon as the uterus is empty, and therefore, if the cervix will allow of it, the best thing to do is to insert the fingers through the cervix and remove the ovum. But if the cervix is not sufficiently dilated for this procedure, the vagina should be tightly packed and full doses of ergot given. As a rule, the uterus expels the ovum without much further trouble.

B. Accidental Complications of Pregnancy.

1. Acute Infectious Fevers.

Small-Pox is a very grave complication of pregnancy, especially if confluent. The life of the mother and child are often endangered, owing to the liability to uterine hæmorrhage and abortion. The fœtus often contracts the disease.

Measles and Scarlet Fever, if mild, have no influence on pregnancy; but if severe, they are liable to cause abortion.

Typhoid Fever is a serious complication of pregnancy, and often causes abortion and death of the fœtus. The typhoid bacillus has been demonstrated in the organs of the fœtus of a woman suffering from typhoid fever.

Acute Pneumonia during pregnancy is very fatal to the mother. Abortion is very frequent. The child often dies from the high temperature, or from asphyxia due to the circulation of impure blood in the maternal part of the placenta.

Erysipelas has grave dangers when attacking a pregnant woman, owing to the possibility of general streptococcal infection.

2. Chronic Diseases.

Phthisis does not have any marked effect upon the course of pregnancy. But although pregnancy itself does not exercise a markedly deleterious effect upon the diseased lungs, yet the strain of labour and drain of lactation have a very bad effect upon the disease. Phthisical women often die soon after labour, and should not be allowed to become pregnant. Should pregnancy occur, there is no object in, or indication for, interrupting the pregnancy, since the children born at full time are generally peculiarly strong and healthy. No phthisical woman should be allowed to nurse her child.

Malaria appears to have little influence upon the course of pregnancy, unless it be one of the pernicious forms of the disease. A second attack may be brought on by pregnancy in a woman who has previously had the disease, but its recurrence during pregnancy is not accompanied by any special dangers. Abortion is rare. Quinine may be given to pregnant women suffering from malaria with little fear of its setting up uterine contractions.

Syphilis may be contracted by the mother directly from the father, or indirectly through the ovum. It is a very frequent cause of abortion, but otherwise is of no immediate danger to the mother.

3. Disorders of the Circulatory System.

Heart Disease.—The seriousness of this complication has been much exaggerated. Many women with cardiac lesions pass through labour without any untoward symptoms. If, however, compensation is defi-

cient or broken down, the case immediately becomes dangerous. Women suffering from cardiac disease, with failing compensation, must not be allowed to make any voluntary effort during labour. If seen before labour begins, the usual medical treatment for failing compensation should be employed. When labour begins it must be completed as soon as possible. The patient should be anæsthetized, preferably with ether, and the child extracted with forceps as soon as the condition of the os allows. After labour, digitalis and strychnine may be employed; constant care and watchfulness are needed, because sudden syncope is to be feared during the first week after labour

Varicose veins and **piles** are due to the pressure exerted on the pelvic veins by the growing uterus. **Œdema** of the legs and vulva is due to the same cause. **Treatment.**—The patient should avoid standing and walking as much as possible, and should wear a bandage or elastic stocking on the limb affected; if rupture of the vein occurs, the hæmorrhage should be controlled by application of a compress and by elevation of the limb.

4. Disorders of the Respiratory System.

Nervous Spasmodic Cough occasionally occurs, and is probably of reflex origin. **Treatment.**—Belladonna and bromide of potassium internally.

Dyspnœa is frequent, and in the latter months it depends on pressure of the uterus on the diaphragm; in the earlier months it is probably reflex.

Asthma is sometimes aggravated during pregnancy.

5. Disorders of the Nervous System.

Sleeplessness may be troublesome. It is best treated by gentle outdoor exercise, bromide of potassium, or chloral; opium should be avoided.

Paralysis of various Nerves occasionally occurs—*e..g*, facial paralysis, hemiplegia, paraplegia, etc. These cases are generally dependent on hysteria or Bright's disease ; some cases of paraplegia depend on the pressure of the uterus on the branches of the sacral and lumbar plexuses of nerves. **Treatment.**—When the paralysis is due to Bright's disease it is of grave import, as it is really a symptom of uræmic poisoning ; in such cases premature labour should be induced. When not associated with albuminuria the pregnancy may be allowed to go on to full term, as recovery will probably take place after delivery.

Neuralgia of various nerves is very common—*e.g.*, facial, intercostal, mammary, etc. **Treatment.**—Quinine or chloride of ammonium should be given internally, and belladonna liniment or iodine liniment applied locally. In very severe cases a hypodermic injection of morphia gives relief.

Epilepsy has no effect upon pregnancy, and epileptics generally pass through labour without an attack. Epileptics should not nurse their children.

6. Disorders of the Digestive System.

Constipation is very common, and depends partly on the pressure of the uterus on the rectum, and partly also on atony of the intestine. **Treatment.**—A laxative diet (oatmeal, fruits, etc.) should be ordered, and a mild laxative given occasionally, such as compound rhubarb pill or a little aperient mineral water. When the bowels are much overloaded, enema saponis is the best remedy.

Dyspepsia with anorexia and flatulence. **Treatment.**—The diet should be regulated. Alkalis or the dilute nitro-hydrochloric acid may be of service.

Diarrhœa may occur, and if severe may lead to abortion. **Treatment.**—The diet should be regulated,

and p. cretæ aromat. c̄ opio, or other ordinary remedies, given.

Enteroptosis.—The symptoms which often accompany this condition are much ameliorated during pregnancy, owing to the growth of the uterus ; but they are apt to recur after labour, unless the patient develops much abdominal fat.

Jaundice.—Catarrhal jaundice sometimes occurs, but the symptom should always be looked upon with grave suspicion, as it may be due to the toxæmia of pregnancy. Acute yellow atrophy of the liver will be mentioned in the section on toxæmia.

Vomiting.—The early-morning vomiting of pregnancy is probably a minor manifestation of toxæmia. In treating it the following points must be observed : it is important to secure thorough evacuation of the bowels every day, and the patient should not move in bed until she has had a cup of tea or some warm milk, after which she should lie still for an hour before getting up. Every known stomachic sedative has been given in this condition. There is no specific drug. Cases of pernicious vomiting are discussed in the section on toxæmia.

7. Disorders of the Urinary System.

Chronic Nephritis.—When pregnancy occurs in patients suffering from chronic nephritis, the symptoms of the disease usually become rather more marked until after labour, when the patient may return to her former condition. Eclampsia does not often occur, but in some cases the renal disease may be sufficiently aggravated as to lead to uræmic poisoning. Infarcts of the placenta are commonly found, often being very marked and leading to the death of the fœtus. An expectant treatment must be adopted in these cases. The points to watch are the daily excre-

tion of urine in ounces, the amount of albumin, and the amount of urea. The number of casts in the urine, determination of the blood-pressure, and the fœtal heart-rate are other points which help in forming a prognosis. The treatment of these cases will be considered in the section on toxæmia.

Diabetes.—Physiological glycosuria often occurs during the puerperal state, owing to resorption of lactose ftom the milk. If pregnancy occurs in a diabetic patient, the disease is frequently aggravated, and is of grave import both for mother and child.

Pyelo-nephritis.—Since attention has been drawn to this disease numerous cases have been recorded. The right kidney is usually affected, and the disease is nearly always due to an infection by the *Bacillus coli communis*. Clinically the cases are characterized by pain in the lumbar region, often paroxysmal in character. The temperature is elevated and rigors not uncommon. The kidney of the affected side is found to be enlarged and tender, and there is a copious deposit of pus in the urine. The uterus should be emptied in these cases, since the condition is primarily due to pressure upon the right ureter, which is often dilated by the gravid uterus. When the pressure is removed by emptying the uterus, the disease often improves rapidly; but if the kidney is completely disorganized, nephrectomy must be performed.

Floating Kidney.—The symptoms associated with this condition are alleviated during pregnancy, but tend to return after labour.

8. Disorders of the Genital System.

Leucorrhœa, depending on congestion of the mucous membrane of the vagina, is very common; it disappears after labour. **Treatment.**—Cleanliness,

and the occasional cautious use of an injection of diluted Condy's Fluid.

Pruritus Vulvæ is frequent, and may be very distressing. It is either entirely nervous in origin, or dependent on an irritating vaginal discharge. **Treatment.**—If of nervous origin, bromide of potassium internally is often of service; when secondary to an irritating discharge, cleanliness and the local application of some sedative lotion, such as lead lotion, or lotio acid. carbolici, generally give relief.

Carcinoma Uteri.—Carcinoma in the early stage is no bar to conception. The growth is apt to be hastened by the coexistence of pregnancy, and, unless early abortion is induced, the obstruction may become so great as to necessitate the performance of Cæsarean section.

Gonorrhœa.—The organisms may invade the uterus and give rise to inflammatory changes in the membranes, and thus cause abortion. When gonorrhœal infection is present at the time of labour, serious consequences may arise from infection of the child's eyes and of the upper regions of the genital tract. The gonococcus very rarely gives rise to puerperal septicæmia, but it may attack the appendages, giving rise subsequently to sterility and pyosalpinx.

Ovarian Cysts.—When pregnancy is complicated by an ovarian cyst, abortion frequently takes place. The position and size of the tumour are important points to consider. If the tumour is small and above the brim, it probably will not interfere with either pregnancy or labour. But it is generally recognized that an ovarian tumour ought to be removed as soon as possible after it has been detected, and pregnancy is no bar to this rule. When the tumour is large, or is situated in the pelvis, it should be removed at once. Fatal results may ensue from twisting of the pedicle, from rupture or inflammation of the cyst, or from the

obstruction it may give rise to in labour. When a cyst is found obstructing the passage of the fœtus in labour, attempts should be made to push it out of the way ; but if unsuccessful, the cyst should be removed either by the vagina or the abdomen, and the child afterwards delivered by forceps. Tapping the cyst is generally inadmissible.

Fibroid Tumours are commonly found coexistent with pregnancy. Small fibroids in the uterine wall generally give rise to no trouble, and are usually only detected after the third stage of labour. Fibroids tend to grow during pregnancy and share in the process of involution. They rarely obstruct delivery, since they tend to grow upwards out of the pelvis. In some cases, however, they give rise to malpresentations of the child, and cause obstruction. In these cases Cæsarean section is the best treatment, followed in some cases by hysterectomy. The size and position of the tumours must be the guide to the treatment.

Necrobiosis, or red degeneration, is often found in fibroid tumours growing in the wall of a pregnant uterus. Such a condition is accompanied by pain, and is an indication for the removal of the tumour, which has been carried out without interfering with the course of pregnancy. During labour the fibroids may be subjected to undue pressure, which leads to their degeneration, and in these cases the uterus should be removed.

When submucous a fibroid may lead to abortion if the placenta becomes implanted over it, and post-partum hæmorrhage may also occur in cases of submucous fibroids.

C. Diseases Dependent on Pregnancy.

1. Displacement of the Gravid Uterus.

Anteversion.—The non-pregnant uterus is slightly tilted forwards (anteverted). During the early months of pregnancy this normal anteversion is increased, and, by pressure on the bladder, may cause incontinence of urine; the uterus, however, easily rises out of the pelvis. Occasionally in the later months the anteversion may be very great, and by the yielding of the abdominal walls and separation of the recti muscles pendulous abdomen is produced. **Treatment.**—Dorsal decubitus and the use of an abdominal belt.

Retroversion of the pregnant uterus occasionally occurs suddenly as the result of a fall or blow; generally, however, it depends on pregnancy occurring in a retroverted uterus. **Symptoms.**—As the cervix is directed forwards, it presses on the bladder and causes retention of urine and distension of the bladder, or incontinence of urine; the fundus is directed backwards, and by pressing on the rectum causes constipation and rectal tenesmus. **Signs.**—The absence of the uterine tumour above the pubes and the presence of the fluctuating distended bladder can be made out; a rounded swelling (the fundus) is felt in Douglas's pouch, and the cervix is high up behind the pubes. **Termination.**—It generally rises out of the pelvis at the fourth month, and pregnancy goes on normally; but incarceration of the uterus beneath the sacral promontory may occur, terminating either in abortion, or in death from rupture or sloughing of the bladder, or from retention of urine and uræmia. **Treatment.**—The urine should be drawn off by the catheter if possible; but if the catheter cannot be passed, the bladder should be punctured

above the pubes, and the urine drawn off by the aspirator. The uterus should then be replaced by pressure applied to the fundus by means of the fingers in the vagina or rectum, or by pressure of caoutchouc bags (distended with water) in the vagina; the pressure should be applied upwards and slightly to one side, so as to avoid the sacral promontory. After replacement, a Hodge or ring pessary should be worn up to the end of the fourth month to keep the uterus in position. If replacement is impossible, and pressure symptoms arise, abortion should be induced, either by passing the uterine sound, or, if the os externum cannot be reached, by puncturing the membranes with the aspirator through the posterior wall of the cervix.

Prolapse of the gravid uterus is due to pregnancy occurring in a partially prolapsed uterus. The uterus usually rises out of the pelvis about the fourth month; in some cases, however, it does not rise, and may become incarcerated in the pelvis, and abortion then results, as it is impossible for pregnancy to go to term when the uterus remains outside the body. **Treatment.**—The uterus should be replaced and maintained in position by rest and a suitable pessary. In the later months of pregnancy the cervix may again prolapse and become œdematous and ulcerated on the surface. The ulcers should be cleaned with hydrogen peroxide. During labour the cervix is usually pulled up, and there is no difficulty in parturition. In other cases it is forced down; forceps should then be applied to the head, and the cervix peeled back off the head, after which no further trouble is encountered.

Relaxation of Pelvic Joints may occur to an abnormal extent, and give rise to difficulty in locomotion and rheumatic pains. **Treatment.** — The application of a good binder will be of service.

2. The Toxæmia of Pregnancy.

The manifestations of the toxæmia of pregnancy are of extremely protean nature, and may vary in severity from simple nausea to acute yellow atrophy of the liver and eclampsia. In its more severe forms the toxæmia may give rise to acute yellow atrophy of the liver, pernicious vomiting, pernicious anæmia, toxic albuminuria, eclampsia, and some forms of chorea. In less severe forms the patient may suffer much discomfort from nausea, salivation, itching, and other minor maladies.

The pathology of the disease is not fully understood. The organs which show the most definite changes are the liver and the kidneys, and of these the liver changes are the more constant, and consist in varying degrees of autolytic degradation of the liver parenchyma. In some cases of eclampsia this degradation is curiously confined to the inner zones of the lobules, or is found in minute spots of focal necrosis ; in other cases the degradation is more widespread, reaching its acutest stage in yellow atrophy. Hæmorrhages are commonly found beneath the capsule of the liver and its substance. Lesions of this kind are common to the whole group of toxæmic cases. In the kidneys changes which are indistinguishable from those of acute nephritis have been found; but, on the other hand, in some cases of eclampsia the renal lesions are of a very slight nature.

Efforts to solve the problem of pregnancy toxæmia on bacteriological lines have hitherto proved unavailing, and recently the question has been attacked on the chemical side. Evidence has been brought forward to show that the disease is accompanied by, and may be due to, disordered metabolism. The excretion of ammonia, particularly in cases of toxæmic vomiting, has been found to be considerably increased.

It would be unwise to lay much stress on this point, because the semi-starvation which is the outcome of the constant vomiting may be the cause of the increased excretion of ammonia.

Acute Yellow Atrophy.—The possible connection between this disease and the pernicious vomiting of pregnancy was pointed out by Matthews Duncan in 1879. The signs of the disease are hardly modified by pregnancy. It is an acute autolytic degradation of the liver tissue, which is probably assisted by the greatly reduced alkalinity of the blood found in some cases of pregnancy toxæmia. The fœtus usually dies. The treatment is to induce labour at once, to give alkalis, and employ intravenous infusion of an alkaline saline solution.

Pernicious Vomiting, or Hyperemesis Gravidarum.—This is an exaggeration of the common morning sickness. In some cases it appears to be due to distinct pelvic lesions, such as an incarcerated retroflexed gravid uterus, the replacement of which immediately relieves the symptoms. In other cases it is of purely neurotic origin. But the most severe cases are almost certainly due to toxæmia, and liver lesions similar in character to those found in acute atrophy and eclampsia have been demonstrated in cases dying from pernicious vomiting. It is particularly these cases in which the ammonia excretion has been studied.

The constant vomiting at first gives rise to discomfort only, but soon, owing to the fact that the patient is unable to retain any nutriment, she begins to show signs of starvation, becoming emaciated and drawn. Jaundice is a bad sign in these cases. The patient may suffer from hæmorrhage from the gums. The temperature and pulse rise, and coma may quickly supervene and death result. In cases of less serious character the patient may recover, only to be attacked by eclampsia later on.

The treatment of this disease varies with its severity. In the most severe cases the only thing to be done is to empty the uterus at once, and if this is done in time the patient recovers. If seen early in the disease, the patient should be put to bed and the bowels must be thoroughly emptied. A strict milk diet should be given, and, if necessary, rectal feeding must be employed for a few days. Water should be given freely both by the mouth and rectum. Drugs may be tried, but they are of very little value.

Pernicious Anæmia.—This disease is included under the heading of toxæmia, because there is no other adequate explanation for its occurrence. If of rapid onset, and accompanied by hæmorrhage, the uterus should be emptied at once.

Chorea not uncommonly appears in pregnancy for the first time, or pregnancy may bring on a second attack in a female who has had chorea previously. It often recurs in successive pregnancies. Chorea occasionally brings on abortion, and recovery then takes place, or it may prove fatal by exhausting the patient; hence it is a serious complication both for the mother and child. **Treatment.**—Some preparation of iron along with arsenic or bromide of potassium should be given internally; in the severe forms, induction of abortion may be necessary to save the mother's life.

Toxic Albuminuria and Eclampsia.—The pathogenesis of this disease is unknown. Primigravidæ are more affected often than multiparæ. Numerous theories have been advanced to explain the disease, among which the following may be mentioned:

1. That it is due to dilatation of the uterus, owing to pressure of the gravid uterus.
2. That it is due to anæmia and œdema of the brain.
3. That it is due to increased work thrown on the kidneys by the excretion of fœtal waste products.
4. That it is due to increased abdominal pressure,

causing obstruction to the venous return from the kidney.

There are numerous and obvious objections to these theories. The work of Bouchard upon auto-intoxication gave rise to more promising theories. Although discredited, his work was of value in starting the toxæmic theory. The modern view is that some substance of a poisonous nature is either formed in excess or excreted in smaller quantities than the normal. The origin of this substance and its nature are unknown; many believe that it is to be sought in the fœtus.

Clinically, the cases of toxic albuminuria are unmistakable. The symptoms arise in the later months of pregnancy. There is marked œdema of the body, the legs, vulva, abdomen, face, and hands being involved. Constipation is the rule. The amount of urine passed is small and generally high-coloured. It contains large quantities of albumin and often blood and casts, and the total amount of urea excreted is considerably diminished, although the percentage of urea in the urine may be fairly high on account of its concentration. The blood-pressure is usually high. Headache, vomiting, and eye symptoms are complained of. Examination of the fundus oculi may reveal albuminuric retinitis, retinal hæmorrhage, or acute papillitis. A patient in this stage of toxic albuminuria may develop eclampsia at any moment, the exciting cause of the convulsions being usually the onset of labour pains.

Toxic albuminuria is fairly amenable to treatment. The patient must be put to bed, and steps must be taken to make the excretory organs act. She should be freely purged, the lower bowel being first emptied by enemata. She may drink large quantities of water, and should be put in a hot-air bath to make the skin act. A strict milk diet should be adhered to. Under

this simple treatment the case is likely to improve rapidly; the œdema and blood-pressure diminish, and the urinary excretion increases in quantity, more urea and less albumin, blood and casts being found in the urine. If the patient continues to improve, she may be allowed to go to term, careful watch being kept upon the urea and albumin excretion and upon the blood-pressure.

In cases where improvement does not rapidly take place and where the symptoms are severe, labour should be induced. Two special points which are of importance in arriving at this decision are the occurrence of epigastric pain and fœtal distress, as indicated by the fœtal heart-rate. It has already been pointed out that placental infarcts are fairly common in bad cases of albuminuria.

Eclampsia may supervene in these cases, or in cases where no warning of its possible occurrence has been given. In a few cases of eclampsia no albumin has been found in the urine.

The attacks are usually sudden in their onset, and are very like an epileptic fit, consisting of two stages —(*a*) *that of tonic spasm*; (*b*) *that of clonic spasm.* The convulsions commence in the facial muscles, and the face becomes much distorted; they then gradually spread and involve all the muscles of the body, and the body may be fixed in a state of opisthotonos or pleurosthotonos, etc. The face is at first pale, but afterwards, owing to the tonic spasm of the respiratory muscles and arrest of respiration, it becomes livid; for the same reason the veins of the neck become distended. The pupils are dilated and insensible to light. The tonic spasms now give place to clonic spasms of the limbs, facial muscles, and respiratory muscles, and the tongue is often bitten, owing to the spasms involving the tongue and jaw. Respiration commences, being jerky and noisy at first, and bloody

froth runs from the mouth. The skin becomes bathed with sweat, and the urine and fæces are often passed involuntarily. One attack lasts half a minute to a minute. During the attack the patient is unconscious, and remains more or less stupid for some time after; if the fits recur frequently, she may be perfectly unconscious between the attacks.

Termination.—Recovery may take place after the birth of the child, or the patient may die from asphyxia or exhaustion, hence the prognosis is unfavourable as regards the mother; for the child it is also bad, as it may die asphyxiated from the venous condition of the placental blood.

Treatment.—This must be considered under several headings.

1. **Elimination of Poison.**—The stomach should be washed out with hot saline solution. Two ounces of sulphate of soda and a capsule containing 2 minims of croton oil should be left in the stomach. The lower bowel should be emptied by a turpentine enema, and 2 pints of hot saline solution may be injected. The skin should be induced to act by means of a hot-air bath, or packing with blankets and hot bottles. The patient's head should be turned on the side, so that the danger of aspiration pneumonia may be avoided.

To assist the elimination of the poison it is imperative to supply the body with plenty of fluid, and therefore saline infusion beneath the breasts, into a vein, and into the rectum, should be employed.

2. **Control of Convulsions.**—The poison has a convulsive action upon the central nervous system. To antagonize this, various nerve sedatives are given. Chloral may be given in 20 to 40 grain doses by the rectum. In mild cases $\frac{1}{4}$ grain of morphia may be injected hypodermically, but it is not wise to try to control severe cases by large doses of morphia. Chloro-

form inhalation at intervals is very useful in controlling the fits.

3. **Prevention of Injury during Fits.**—Gags must be used to prevent injury to the tongue, and care should be taken that hot bottles do not come into contact with the patient's skin.

4. **Special Treatment.**—Thyroid extract has been advocated. It probably acts by increasing oxidation. Venesection in full-blooded women is useful, followed by intravenous infusion. In view of the fact that in many cases the alkalinity of the blood is diminished, the fluid should be distinctly alkaline. Inhalations of oxygen will probably be employed in the future.

5. **Obstetrical Treatment.**—The belief that the sooner the uterus is emptied, the better it is for both mother and child, is gradually gaining ground in England. If the cervix is sufficiently dilated the membranes should be ruptured, and the child extracted by forceps. A little post-partum hæmorrhage will be of some use. If the cervix is sufficiently dilated to allow of its introduction, a bag should be put in and pulled upon to dilate the cervix rapidly. In cases where the cervix is closed, Continental authorities are in favour of accouchement forcé, either by means of a mechanical dilator and forceps, or by vaginal or abdominal Cæsarean section. Accouchement forcé has few advocates in England. Special precautions must be taken to prevent infection, since the resistance of eclamptic patients is very low.

6. **After-Treatment.**—Water and alkalis should be freely given; the bowels must be kept open. The patient should not suckle her child, and should not become pregnant again for at least two years. As a rule, the albuminuria disappears very rapidly. Loss of memory and insanity sometimes occur.

EXTRA-UTERINE GESTATION

Definition.—Implantation and development of an ovum at some point external to the uterine cavity.

Varieties :

1. **Tubal.**—Ovum fixed and developed in Fallopian tube.

   (*a*) Ampullary, commonest form of tubal fœtation.
   (*b*) Isthmial, rarer form of tubal fœtation.
   (*c*) Interstitial, rarest form of tubal fœtation.

2. **Abdominal.**—Ovum seated in the abdominal cavity.

   (*a*) Primary : ovum implanted in the abdominal cavity from the commencement of development. It is very doubtful if this ever occurs.
   (*b*) Secondary : fixation of a partially developed ovum, derived from a ruptured tubal pregnancy.

3. **Ovarian.**—Impregnation of the ovum whilst it is in the Graafian follicle, where it remains and undergoes development. This variety is very rare.

4. **Development of an Ovum in the Rudimentary Horn of a Bilobed Uterus.**—This variety, although not strictly extra-uterine, comes to the same thing from the practical point of view.

Etiology.—The older theories which held that the calibre of the tube was diminished by pressure from without, or by some obstructive disease, such as catarrh or polypi within the tube, cannot be made to account for all the cases. The anatomical structure of the tube itself is the most reasonable explanation of the frequency of the disease. The intricate folding of the mucous membrane of the tube probably leads to

the formation of several little cul-de-sacs, into which the ovum passes by accident.

The Tubal Variety—Anatomical Characters.—The ovum burrows its way into the wall of the tube in much the same way as it does in the uterus. No true decidua is formed in the tube, but scattered masses of decidual cells are found. The mucous membrane of the tube being thin in comparison with the uterine decidua, the trophoblast of the young ovum soon eats its way through it, and the villi then penetrate into the muscular layer of the tube wall, which becomes thinned and eroded. Sympathetic changes take place in the uterus, resulting in its enlargement, in softening of the lips of the cervix, and in the formation of a true decidua, which may be cast off completely.

Terminations.—Probably the commonest termination is the formation of a tubal mole. Subchorionic hæmorrhage, causing compression of the villi and death of the ovum, takes place, and the mole so formed may be extruded from the fimbriated extremity of the tube, accompanied by more or less hæmorrhage and pain, and constituting a tubal abortion. In cases where a mole is not formed the ovum has been known to go on developing till full term in the tube itself, although this is extremely rare. Usually the ovum continues to increase in size until about the tenth or twelfth week, when the tube ruptures, an occurrence which may lead to fatal intraperitoneal hæmorrhage. In some cases, after rupture of the tube the ovum may engraft itself upon some part of the peritoneal cavity, and continue to develop as the secondary abdominal variety until full term. Intraperitoneal rupture of the tube usually takes place when the ovum is implanted in the ampullary portion of the tube. When situated in the isthmus, rupture of the tube usually results in the ovum passing into the cellular tissue between the layers of the broad ligament, where it

may continue to develop, lifting the peritoneum from the pelvis. Secondary rupture of the sac may take place either in the intraligamentary or in the intraperitoneal variety. Very similar to the tubal variety, both in its anatomical characters and mode of termination, is the pregnancy which occasionally takes place in the rudimentary horn of a bilobed uterus.

Symptoms and Signs.—The patient usually seeks advice on account of some abdominal pain and irregular loss of blood. In nearly all cases she has either missed one or two periods, or has gone over her time by a fortnight or so. The suspicion of tubal pregnancy can only be confirmed by pelvic examination, which reveals an enlarged uterus with a softened cervix, and at the side of the uterus is found an irregular lump, which may be tender. On the other hand, no symptoms may arise until the tube ruptures. The decidua is generally expelled from the uterus at this time with some slight bleeding. The patient experiences a sudden pain, after which she becomes faint and collapsed, with all the signs of severe internal hæmorrhage. Death sometimes occurs without warning.

Treatment.—When diagnosed before rupture, the best treatment is to remove the pregnant tube by laparotomy. Two courses are open in cases which are first seen after rupture. Immediate laparotomy, with removal of the clot and tube from the abdomen, should be performed in cases where there is reason to believe that hæmorrhage is still going on. This is the difficult point to ascertain. On the other hand, numberless cases have recovered from the preliminary collapse, and the pelvic hæmatocele has been gradually absorbed. This fact justifies a conservative line of treatment in many cases. If operation be undertaken, it is much better to operate when the collapse has passed off, if possible. If there is evidence that the

blood-clot in Douglas's pouch is becoming infected, the best thing to do is to open the pouch through the posterior fornix, evacuate its contents, and drain it.

The Abdominal Variety—Anatomical Characters.—In this form the ovum, either primarily or after the escape of a tubal fœtation, becomes fixed to some part of the peritoneal cavity—*e.g.*, the intestines, the iliac fossa, Douglas's pouch, etc. The ovum sets up inflammation, and by the exudation of inflammatory material a more or less complete sac is developed around it. This sac contains maternal vessels, and acts as a decidua, in which the chorionic villi are imbedded. A placenta is formed and the pregnancy often goes on to full term. The empty uterus becomes slightly enlarged, and its mucous membrane forms a true decidua.

Termination.—(*a*) The sac occasionally ruptures either during pregnancy or at full term, and causes death from internal hæmorrhage. (*b*) In rare cases the fœtus dies, owing to stoppage of the placental circulation, and remains innocuous for a longer or shorter time. The tissues of the fœtus may undergo fatty degeneration; or desiccation of the fœtal tissues and mummification may take place, resulting finally in the production of a lithopædion. (*c*) The fœtus may die and putrefy, and by setting up peritonitis or septicæmia, cause death. (*d*) Most commonly after death of the fœtus the sac inflames and suppurates, and then opens, either through the abdominal wall or into the vagina, bladder, or bowel; decomposition of the fœtus takes place, and it is discharged piecemeal through the opening of the sac. Recovery may occur from closure of the sac, more especially if it opens by the abdominal walls, or death may take place from exhaustion caused by the long suppuration.

Symptoms and Diagnosis.—Some of the signs of pregnancy are present, such as the changes in the

breasts, absence of the normal menstrual discharge. Attacks of abdominal pain occur during pregnancy, owing to the peritonitis set up by the ovum, and very often a slight bloody uterine discharge is present.

On examination externally, the tumour is found not to have the natural shape of the uterus, and it does not contract and relax in the manner which is typical of the pregnant uterus. The fœtal parts can generally be felt with great distinctness, as though the fœtus were lying directly beneath the skin of the abdomen. This condition is peculiar to extra-uterine fœtation, and to cases of rupture of the uterus in which the fœtus has escaped into the peritoneal cavity.

By **vaginal examination** the uterus is found displaced by the tumour, its size being definitely increased. At full time uterine pains come on, blood and decidual débris escape from the vagina, and if not treated, one of the terminations above mentioned will take place.

Treatment.—Laparotomy should be performed. The mother has the best chance of survival if the operation be delayed until some weeks after the fœtus has died. A living child may be obtained by operation at term, but since it is nearly always deformed in some way, the mother should not be subjected to the extra risk of early operation with the object of obtaining a living child. By delay the placental circulation becomes obliterated, and hence the risks of hæmorrhage are lessened; further, adhesions between the sac and the abdominal walls are more likely to have formed, and so the risk of blood escaping into the peritoneum is avoided. Primary laparotomy—*i.e.*, laparotomy immediately labour pains come on—is very fatal to the mother, as no apparatus exists in the sac wall for preventing hæmorrhage from the placental site. **The Operation.**—An incision should be made in the middle line, and the sac, having been drawn up

to the incision, should be opened, and the fœtus extracted. The placenta should be left in the sac. The sac and abdominal walls are closed by sutures, except at the lower part; through the opening thus left a drainage-tube should be inserted to allow free exit for the placental débris.

HÆMORRHAGE BEFORE DELIVERY

THE term **Unavoidable Hæmorrhage** is used in reference to that occurring in cases of placenta prævia; the term **Accidental Hæmorrhage** is applied to cases of hæmorrhage arising from the detachment of the normally seated placenta.

A. Placenta Prævia—Unavoidable Hæmorrhage.

Definition.—Attachment of the placenta to the lower segment of the uterus.

Causation.—It occurs more often in multiparæ, and its occurrence is said to be favoured by an abnormally large uterine cavity.

Its production has been attributed to: (*a*) the falling down of an impregnated ovum to the lower part of the uterus; (*b*) incomplete abortion, the partially developed ovum becoming separated from its normal attachments in the upper part of the uterus, and engrafting itself on the lower; (*c*) impregnation and fixation of an ovum in the lower part of the uterus.

There are three varieties:

1. **Placenta prævia centralis**; os internum completely covered by the placenta.
2. **Placenta prævia partialis**; os internum partly covered by the placenta.

3. **Placenta prævia marginalis**; placenta not touching the os internum.

Frequency.—It occurs once in about 500 cases of pregnancy.

Symptoms and Pathology.—The first symptom may be sudden loss of blood, occurring without warning or pain. The bleeding soon stops, and is followed after a time by successive hæmorrhages, which increase in severity as pregnancy advances. When once hæmorrhage has occurred the patient is never safe, as profuse and fatal bleeding may occur at any time. The first hæmorrhage rarely occurs before the sixth month. By examination *per vaginam* during pregnancy, the cervix is found long and soft; the vaginal fornix has a soft and boggy feel; ballottement is obscure, and if the attachment is central the spongy placenta may be felt through the os. The bleeding that occurs during pregnancy arises from the uterine vessels, which are laid bare either by accidents, such as a sudden fall, or by slight dilatation of the lower segment of the uterus caused by uterine contractions, and leading to slight detachment of the placenta. When labour commences, the hæmorrhage becomes excessive owing to successive detachments of portions of the placenta from the lower part of the uterus; the blood escapes from the exposed uterine vessels between the pains, but is expelled from the uterus during the pains. The bleeding arises from that area of the uterus which undergoes dilatation during the first stage of labour—*i.e.*, the part within a radius of 3 inches from the os internum; as soon, therefore, as the placenta is detached over this area the bleeding stops. The hæmorrhage also ceases when the placenta is completely detached; after rupture of the membranes, it also ceases as the presenting part comes down and presses on the open vessels. If the hæmorrhage is profuse during pregnancy or labour, it may give rise to restlessness, pallor,

thready pulse, ending in some cases in convulsions and death; there is also danger of post-partum hæmorrhage, owing to the relaxed atonic condition of the uterus.

Mal-presentations (of the shoulder, breech, etc.) are very common in placenta prævia, because the uterine cavity is large, and labour is often premature, and also because the placenta prevents the head from occupying the lower segment of the uterus.

Diagnosis.—Hæmorrhage occurring during the last three months of pregnancy, coupled with the vaginal signs above mentioned, would be diagnostic of this condition.

Prognosis.—For the mother the prognosis is not unfavourable in skilled hands; in the first two varieties the prognosis is more unfavourable than in the third. Owing to the placental site being low down the danger of sepsis is increased, and if bleeding has been severe the patient's resistance is lowered. For the child the prognosis is particularly unfavourable, because birth is often premature, and owing to the detachment of the placenta necessitated by various methods of treatment, it is liable to be asphyxiated *in utero*.

Treatment.—The text-book rule in these cases is to empty the uterus as soon as the condition has been diagnosed. In cases where the child is not yet viable and the child's life is especially valuable, where the placenta does not touch the os, and the hæmorrhage has been slight, it may be possible to carry on until the child is viable. But the risk inherent in such expectant treatment should not be taken unless the patient is in a position to be watched constantly. Under all other circumstances the uterus should be emptied. There are three recognized methods of treatment—Cæsarean section, De Ribes's bag, and version. Cæsarean section gives the child a much

better chance of living. If the condition has been diagnosed before much separation of the placenta and much hæmorrhage have taken place, Cæsarean section is a good method of treatment, since it is almost certain to result in the production of a living child. When the hæmorrhage is going on, the best way to stop it is to insert a bag. The cervix is usually soft enough to insert a finger or two; if not, it must be dilated by Hegar's dilators. The fingers should feel for the membranes at the edge of the placenta, rupture them, and insert the bag through the hole. If the membranes cannot be felt, a hole must be torn through the placenta itself and the bag inserted. When filled, traction should be exerted on the stalk of the bag, since this presses the placenta on to its bed and checks the bleeding. When the bag comes out the child should be rapidly extracted by version or by forceps if the uterus does not expel it spontaneously. When the assistance of a bag cannot be obtained, version is the best treatment. If the cervix is small, bipolar version is employed to bring down a leg, which is pulled upon so as to cause the half-breech to plug the lower uterine segment. When the cervix is large, the child can be extracted at once. Care must be taken to see that the whole placenta is removed afterwards, since placentæ succenturiatæ are not uncommon. The liability to sepsis must be kept in mind, and collapse, if present, treated on ordinary principles.

B. Accidental Hæmorrhage.

Definition.—Hæmorrhage from premature separation of the normally situated placenta during the last two months of pregnancy, the blood either remaining concealed in the uterus, or escaping from the uterus and vagina.

Causation.—It may be due to accident—*e.g.*, a fall,

or a blow on the uterus, or to strong uterine contractions causing separation of the placenta; again, it may arise from the same causes which bring on abortion (*vide* section on Abortion), such as syphilis, the different fevers, placental disease, etc.

Symptoms.—This complication is more commonly met with in multiparæ. When the blood escapes from the vagina the case is easily made out, and the diagnosis of accidental hæmorrhage can be made if no placental tissue is within reach of the finger. In certain cases the blood is dammed up and concealed inside the uterus. This may be due to the fœtal head acting as a ball-valve in the lower uterine segment, to adhesion of the membranes round the os, or to rupture of the blood into the amniotic sac. The patient is in pain, and shows all the signs of internal hæmorrhage. The uterus is usually tender, tense, and globular in shape; the fœtal parts are difficult to feel, and the fœtal heart cannot as a rule be heard. Uterine contractions are feeble or absent, and the cervix is usually closed.

Prognosis.—A bad case of accidental hæmorrhage is dangerous both to mother and child. The extent of separation of the placenta and the amount of bleeding, the presence or absence of uterine contractions, and the condition of the cervix, are the important points.

When bleeding is severe, pains are absent, and the cervix is closed, the case is as bad as possible. The prognosis for the child is rather better than in cases of placenta prævia, and depends more upon the extent of placental separation than anything else.

Treatment.—If there are good pains, the best thing to do is to rupture the membranes and put on a tight abdominal binder. It is permissible to give ergot if the child is small and in a longitudinal lie. In cases of concealed and external hæmorrhage where

the cervix is closed, bleeding is going on, and there are no pains, the propriety of Cæsarean section should be discussed. Other methods which yield good results are tight plugging of the vagina and an abdominal binder. By this method the uterus is held and pains are stimulated; or a De Ribes's bag may be inserted, and as soon as the os allows of it, the child should be delivered by version or forceps. It is very dangerous to perform internal version in any case where the patient is collapsed. It is better to wait until the collapse passes off before taking active measures, always provided that no profuse hæmorrhage is going on meanwhile.

Rotunda method -

LABOUR

Definition of Terms.—'Lie' means the relation of the long axis of the child to that of the mother. Longitudinal lies are either podalic or cephalic. In the so-called transverse lie the child is nearly always lying obliquely.

'Position' means the relation of some denominating part of the child to the pelvis of the mother.

'Presentation.'—The part of the child which the finger first touches when passed through the cervix is called the 'presenting part.'

'Attitude' is the term employed to designate the relation of the child's head and limbs to its trunk. Flexion is the usual attitude.

The forces concerned in labour are gravity and the contractions of the uterus and abdominal muscles.

The uterine contractions are painful, involuntary, and intermittent. They commence at the fundus, and pass with a quick wave-like movement to the cervix, and are peristaltic in character. During pregnancy painless contractions of the uterus occur, but at the onset of labour they become painful; hence the term 'pain' is synonymous with contraction. When labour begins an additional factor comes into play—namely, the retraction of the uterus. The anatomical basis of retraction is a continuous, gradual, and permanent shortening of the muscle fibres of the uterus, and the result of retraction is the diminution of the capacity

of the uterine cavity. Retraction begins when labour begins, and, conversely, labour begins when retraction of the uterus begins. At first the pains are slight and infrequent; afterwards they increase in intensity and frequency. The average duration of a strong pain is about sixty seconds. The intermittent character of the pains is important, for, if continuous, they would stop the placental circulation and endanger the life of the child, and at the same time would exhaust the mother.

Effect of the Pains on the Uterus.—During a pain the uterus changes shape, becoming more globular; it also projects forwards beneath the abdominal wall, whereas when relaxed it tends to lie passively against the vertebral column. The uterus is divided into two segments—an upper segment, in which the driving power of the uterus is concentrated, and a lower segment, which passively dilates in order to allow the child to pass out. During labour the upper segment becomes thickened and the lower segment thins.

Contraction of the Abdominal Muscles. — The bearing-down efforts of the mother are at first voluntary, but when the head reaches the perineum they become more or less involuntary. The bearing-down efforts reinforce the uterine contractions.

Painful Character of the Contractions. — Some women suffer scarcely any pain; others, especially nervous women, suffer very acutely. The pain, while the os is dilating, is felt chiefly in the back, and shoots forwards across the abdomen; it is sharp and grinding in character. When the head is deeply engaged in the pelvis, the pain is intensified, owing to pressure of the head on the sacral nerves (causing cramp in the legs), vagina, bladder, and other soft parts in the pelvis.

Influence of the Pains on the Mother's Pulse, Temperature, etc.—The pulse-rate and the blood-pressure increase during the pains and diminish in

the intervals. The temperature rises slightly during labour.

Causation of Labour. — The reason why labour comes on at one definite time is not known. The following theories have been advanced to account for the onset of uterine action, but none are satisfactory :— (*a*) That the over-distended condition of the uterus, occurring at full term, induces labour. (*b*) That at full term separation of the placenta takes place, owing to fatty degeneration of the decidua. In consequence of this the ovum acts as a foreign body, and brings on uterine contractions (Simpson). (*c*) That the onset of labour at the tenth month is due to the congestion occurring at a menstrual epoch (Tyler Smith).

CLINICAL PHENOMENA OF LABOUR

Certain premonitory symptoms may occur during the fortnight preceding labour.

(*a*) Sinking of the uterus into the pelvis. Hence the respiratory movements are often relieved; but owing to increased pressure of the uterus on the pelvic contents (veins, nerves, and viscera), œdema of the legs increases, locomotion becomes more difficult, and rectal and bladder troubles often result.

(*b*) False pains are commonly noticed. They are distinguished from true pains by the fact that they are irregular and do not go on increasing regularly in force and frequency. Again, they produce no effect upon the cervix. False pains are felt mostly in the fore part of the abdomen, whilst true pains are felt chiefly in the back, and shoot thence forwards across the abdomen. False pains generally depend upon an overloaded colon, and disappear after a purge and an enema.

(*c*) There is often an increase in the amount of vaginal secretion about a week before labour begins.

(*d*) The condition of the cervix. In multiparæ the internal os always remains closed until the onset of labour. The external os, however, is open, and the finger can pass up the cervical canal as far as the internal os. In primigravidæ, however, the internal os is often stretched open some weeks before labour begins, and it is not uncommon to find the head resting upon the external os two or three weeks before the onset of labour.

Labour is divided into Three Stages :

The **first stage** ends at the full dilatation of the os. It generally lasts about 12 to 18 hours, and is longest in primiparæ.

The **second stage**—the stage of expulsion—terminates at the expulsion of the child, and lasts about 1 to 2 hours. It is longest in primiparæ.

The **third stage** terminates when the afterbirth is expelled.

First Stage of Labour.—Gradual dilatation of the lower uterine segment and cervix occur. The os is felt as a thin circular ring, which gradually increases in size and becomes tense during the pains. Dilatation is brought about by two factors—firstly, the hydrostatic pressure of the bag of membranes upon the edges of the os ; and, secondly, by the pulling up of the lower uterine segment. During the pains the membranes become tense, and the protruding bag can be felt. When the os is fully dilated the membranes usually rupture and the fore-waters escape, the rest of the liquor amnii being retained in the uterus, by the presenting part plugging the lower uterine segment. Occasionally the amnion is very tough and requires artificial rupture, and in rare cases the fœtus is born surrounded by the membranes, 'the caul.' In other cases, especially when the presenting part does not fit

the lower uterine segment closely, the membranes rupture early. This is a disadvantage, because the liquor amnii drains away, which may lead to injurious pressure upon the child. Dilatation must be carried out by the blunt dilating wedge supplied by the fœtus, or by the pulling up of the lower uterine segment, which cause some prolongation and additional painfulness of labour. When the cervix is completely dilated it forms with the vagina a continuous canal. Clinically the first definite sign of the first stage of labour is the show. This consists of a discharge of mucus mixed with streaks of blood from the vagina. The mucus comes from the cervix, and the blood from the separation of the membranes round the internal os. The show may be regarded as the first sign of the onset of labour. The pains are regular, and are painful, being felt mostly in the small of the back. The uterus becomes appreciably harder during the pains. Vomiting frequently occurs during this stage, and there is a frequent desire to pass water.

Second Stage of Labour.—After rupture of the membranes the pains soon return with increased intensity, and are of a bearing-down character. The abdominal muscles now come into play, and the patient favours their action by closing the glottis, fixing the diaphragm, and lying with her body flexed. For the same reason she also fixes her body by pressing her feet against the foot of the bed, and by grasping a towel fixed to the bed-rail. The presenting part gradually advances during the pains and recedes in the intervals, till eventually it reaches the perineum. The perineum is alternately relaxed and distended, and the contents of the rectum often expelled by the intermittent pressure of the presenting part, which finally glides over the perineum and is born, and is quickly followed by the rest of the body. After the body, the remaining part of the liquor amnii is expelled.

Third Stage of Labour.—After the expulsion of the child, the pains cease for a short time, and then return and detach the placenta from the wall of the uterus; further contractions lead to its expulsion into the vagina. The signs that this has occurred are moderately definite—viz., the uterus becomes smaller, harder, and more mobile, and rises higher up in the abdomen. A soft swelling caused by the presence of the placenta in the vagina can be felt above the pubes. More of the cord appears at the vulva, and there may be a small gush of blood. The placenta may be expelled from the vagina by the bearing-down effects of the mother or by artificial assistance. There is generally very little bleeding. Hæmostasis depends mainly upon retraction of the uterus, which causes compression and kinking of the vessels which traverse the uterine wall, so that blood cannot flow through them. After expulsion of the placenta the uterus contracts down to the size of the fœtal head, and is hard. This contraction closes the uterine vessels, and squeezes all the blood out of the uterus. When the contraction passes off, retraction keeps the uterine vessels closed during the period of relaxation, which continues until the next contraction comes on. Another factor in preventing hæmorrhage is the fact that the uterine arteries at the side of the uterus become kinked owing to their sudden shortening, and this kinking reduces the blood-pressure in them.

MECHANISM OF LABOUR

Varieties of Presentations.—(*a*) **Head presentations**: the vertex, brow, or face may present. (*b*) **Pelvic presentations**: the breech, foot, or knee

may present. (*c*) **Transverse presentations**: the shoulder or hand may present.

Vertex Presentations.

Frequency.—Occur in about 95 per cent. of cases.

The vertex is the area of the child's head which is included by a line drawn through the anterior or posterior fontanelles and the two parietal eminences. In vertex presentations the head enters the pelvic brim in or near one of the oblique diameters, with the occiput anterior or posterior. There are, therefore, four positions of the vertex, named according to the position of the occiput.

Positions:

1. **Left Occipito-Anterior.** — The long diameter (occipito-frontal) of the head enters in the right oblique diameter of the pelvis, the occiput being directed towards the left pectineal eminence, and the forehead towards the right sacro-iliac synchondrosis.

2. **Right Occipito-Anterior.**—The head enters in the left oblique diameter, occiput towards right pectineal eminence, forehead at left sacro-iliac synchondrosis.

3. **Right Occipito-Posterior.**—Head lies in right oblique diameter, but its position is the reverse of No. 1.

4. **Left Occipito-Posterior.**—Head in left oblique diameter, but its position is the reverse of No. 2.

The most common position is No. 1—*i.e.*, the position in which the head lies in the right oblique diameter with the occiput forwards. The least common is No. 4. Several causes contribute towards the more general occurrence of position No. 1—viz.:

(*a*) The presence of the sigmoid flexure and rectum in the left oblique diameter of the

pelvis tends to make the head lie in the right oblique.

(*b*) Owing to the latero-flexion and slight twisting of the uterus, its left and anterior part comes to be the most dependent in the erect position. Hence the child's back, because of the greater specific gravity of its spine, naturally tends to gravitate into this part of the uterus, and thus become directed towards the mother's left side.

Position of the Child in Left Occipito-Anterior Position.—The back is directed to the mother's left side, and its right shoulder to the front. The right parietal bone is the part of the head first felt presenting, owing to the inclination of the pelvis. The sagittal suture lies in the right oblique diameter; the posterior fontanelle can be felt, but the anterior is out of reach.

Mechanism in Left Occipito-Anterior Position.—The following movements are undergone by the head during its expulsion: (*a*) descent, (*b*) flexion, (*c*) internal rotation, (*d*) extension, (*e*) external rotation.

(*a*) **Descent** continues throughout the whole mechanism of labour. It is combined with (*b*) flexion at first. By some it is believed that the head is fully flexed at the beginning of labour, but it is probable that flexion increases as the head descends. The effect of flexion is to cause a smaller diameter to engage. Thus if the occipito-frontal diameter lies across the pelvis to commence with and the head then flexes, the suboccipito-frontal diameter engages, which is a distinct advantage. The flexion is brought about by the greater resistance which the posterior part of the pelvis offers to descent of the frontal pole of the head; the occiput can meanwhile slip down easily, owing to the comparatively slight resistance of the anterior part of the pelvis. The

position of the fontanelles offers an easy means of diagnosing the amount of flexion. When the anterior fontanelle can be felt, the head is not well flexed. When, on the other hand, the posterior fontanelle can be easily felt and the anterior fontanelle is out of reach, it is certain that the head is well flexed.

(*c*) **Internal Rotation.**—When the head reaches the pelvic floor, it pushes it down and makes it assume a gutter-like form, opening anteriorly. Owing to the shape of the gutter-like pelvic floor, the head as it presses upon it is rotated forwards. It is an axiom of midwifery that whichever part of the child touches the pelvic floor first rotates forwards beneath the symphysis pubis. By internal rotation the long diameter of the head is brought to lie in the antero-posterior diameter of the pelvic outlet, the occiput lying beneath the symphysis and the forehead in the hollow of the sacrum.

(*d*) **Extension.**—The nape of the neck is fixed beneath the symphysis. Owing to the forward opening of the genital canal, the downward thrust of the uterus, and the resistance of the pelvic floor, the head extends and is born, the vertex, forehead, and face successively passing over the perineum.

(*e*) **External Rotation.**—After its birth, the head rotates through quarter of a circle, the occiput turning towards the mother's left thigh, and the face to the right. This is chiefly owing to the shoulders entering the pelvis in the left oblique diameter, thus carrying the head into a position parallel to the right oblique.

Expulsion of the Trunk.—The shoulders lie in the left oblique diameter at first, and are rotated, by the same mechanism as the head, into the antero-posterior diameter of the outlet. The right shoulder then becomes fixed at the pubes, and the left sweeps over the perineum and is born. The rest of the trunk is quickly expelled.

Mechanism of Position No. 2 (*Right Occipito-Anterior*) is similar to that of Position No. 1.

Mechanism of Positions Nos. 3 and 4 (*Right and Left Occipito-Posterior*).—In the third position the left parietal bone presents; in the fourth, the right. The mechanism is similar in both cases. Complete flexion generally occurs, and the occiput rotates forwards, so that they usually terminate as second and first vertex positions. In some cases complete flexion does not occur, and a persistent occipito-posterior position may result. The most probable reason for incomplete flexion is the fact that there is more resistance to the descent of that part of the head which lies in the posterior half of the pelvis. The frontal pole can slip down, while the occipital pole is delayed, and this brings about extension of the head, and brings the anterior fontanelle within reach of the finger. The frontal pole touches the pelvic floor before any other part of the head, and therefore rotates forwards until it lies beneath the symphysis, the occiput simultaneously moving into the hollow of the sacrum.

The head may be born with the occiput posterior. In the case of a primigravida, such an issue is unlikely unless the child is small, but in multiparæ it happens moderately often. The mechanism in such cases is as follows: After some delay the head begins to flex, and the forehead is jammed behind the symphysis. The head rotates around the forehead as a fixed point, and considerable moulding takes place. The vertex and occiput are successively born, and the perineum slips back to the nape of the neck. The head then extends, and the forehead and face slip out from beneath the symphysis. Such a favourable ending is most likely when the pains are strong and the child is not unduly large.

Changes in the Shape of the Head produced by

Labour.—The head undergoes diminution in size, and change in shape. The diminution in size is brought about by blood being squeezed out of the head, and by some cerebro-spinal fluid being pressed out of the skull cavity into the spinal canal.

In occipito-anterior positions the shape is so altered by moulding that the antero-posterior diameter is increased, and the transverse diminished. In the process of moulding the frontal and occipital bones pass under the edges of the parietal, and the parietal bones overlap, the posterior bone generally passing under the anterior.

In occipito-posterior positions, when rotation does not occur, the moulding takes place in such a way that the vertical diameter of the head is increased and the antero-posterior diminished.

Caput Succedaneum is the swelling, due to venous congestion and œdema, which forms on the presenting part where it is subjected to least pressure—*i.e.*, over the os uteri and vaginal canal. It varies in size with the length of the labour and the resistance of the parts. It varies in situation with the position of the head: thus, in the first and fourth positions it is seated on the right parietal bone; in the second and third, on the left.

The changes in the shape of the head and the caput succedaneum disappear in a few days.

MANAGEMENT OF NATURAL LABOUR

THE most important point to observe in the management of labour is that full and complete antiseptic precautions should be taken. The details of antiseptic ritual are too lengthy to describe in this book, and it will be taken for granted that they are always scrupulously carried out.

There are two questions which require an immediate answer on being summoned to a patient: (*a*) Is she in labour? (*b*) What is the position of the child?

(*a*) **Is she in Labour?**—The points upon which this question is answered are, firstly, the character of the pains, which should be regular, and be felt in the small of the back. During the pains the uterus hardens. The show is also a valuable sign, and finally the condition of the cervix should be ascertained by vaginal examination. If the cervical canal is obliterated and the membranes bulge with the pains through the os, it may be concluded that labour has begun. The larger the os, the further labour has progressed. In multiparæ the head does not engage in the pelvis until labour starts, but in primigravidæ it is generally fixed a few weeks before labour.

(*b*) **What is the Position of the Child?***—This should be made out by abdominal palpation, which should be carried out in a methodical manner.

1. Stand facing the mother's feet, and press the finger-tips down into the brim of the pelvis; they will meet with the hard resistant head, one side of which is apparently at a higher level than the other.

2. Face the mother's head, and grip the lower uterine segment with the extended thumb and fingers of the right hand. The head can be grasped in the hand, and again one side is felt at a higher level than the other. Except in face presentations, the higher pole of the head is always the frontal pole, and the limbs will be found lying upon the same side of the uterus.

3. Run the hands over the front and sides of the uterus. If it feels smooth, the back is towards the

* Practical experience of palpation of the pregnant uterus teaches one that the child as a rule does not lie in the text-book positions. The head is usually lying transversely across the pelvic brim, and the back is directed to the right side nearly as often as it is to the left.

front; if many knobs are to be felt, the back is probably posterior.

4. Press one finger in midway between the symphysis and the umbilicus. If the finger soon meets with resistance, it has come into contact with the anterior shoulder of the child, and the position is an anterior one. If, however, the finger sinks in deeply, the position is a posterior one.

With these simple manipulations the position of the child can be diagnosed with ease and rapidity. The first and second manipulations tell one that the head is lying at the pelvic brim, how deeply it is engaged, and where the frontal pole of the head is lying—in other words, whether the case is one of right or left vertex presentation. The third and fourth manipulations immediately decide the question as to whether it is an anterior or a posterior position.

In order to carry out abdominal palpation, the patient should be lying down, with the shoulders supported in order to relax the abdominal muscles; the bladder should be empty and the hands warm. When the uterus is unduly irritable or distended with liquor, it may be difficult to make out the position.

After these manipulations the diagnosis should be confirmed by listening for the fœtal heart, the position of which varies according to the position of the child. The best stethoscope for hearing the fœtal heart is a wooden one, shaped like a conical wineglass.

Management of the First Stage.—If necessary, the urine should be drawn off and the rectum unloaded by an enema. The patient should walk about during this stage if the case be a normal one, and should be instructed to refrain from bearing down. If the membranes do not rupture spontaneously on full dilatation, they may be punctured artificially. Some light nourishment should be given. In occipito-posterior cases the first stage is usually longer and more painful than in

occipito-anterior cases, and dilatation takes longer. The best way to overcome the obstinacy of the cervix in such cases is to give chloral, a hot enema, or a hot bath. Vaginal examination should be avoided as much as possible during labour, since it is painful and involves a risk of carrying septic organisms from the vulva into the higher parts of the genital canal. An examination should be made when first called to determine the condition of the cervix, and again when the membranes rupture, to make sure that the cord has not prolapsed. No other vaginal examinations are necessary in a normal case.

Management of the Second Stage.—After rupture of the membranes a lull generally occurs in the pains, but they soon return with greater intensity, and become bearing-down in character. To favour the action of the abdominal muscles the patient should be instructed to hold her breath during the pains in order to fix the diaphragm, and she should lie on her left side with her feet supported, and her hand grasping a fixed towel, as mentioned in a previous section. In some cases the anterior half of the lower uterine segment is prolapsed in front of the head, and is pushed down. The os in such cases is found high up and posterior, and it is necessary to hook a finger into it and to pull it forwards, so that the prolapsed portion can slip over the head.

When the head reaches the perineum, precautions must be taken to prevent extensive lacerations. The factors which favour laceration of the vulval outlet are, first, too rapid expulsion of the head, and, secondly, the passage of a larger diameter than the suboccipito-frontal. When the head is expelled rapidly the soft parts have undergone no preparative stretching; therefore it is wise to keep the head on the perineum for two or three pains, and to abolish the bearing-down effects of the patient by chloroform. As regards the

second factor, the point is to keep up the flexion of the head until the occiput is completely born and the nape of the neck is hitched beneath the symphysis. In such a case, when extension of the head takes place it is impossible for a diameter larger than the sub-occipito-frontal to distend the vulva. The perineum itself should not be 'supported' in any way which involves pressure upon it.

As soon as the head is born two things must be done. A finger should be passed between the neck and the symphysis to ascertain if the cord is round the child's neck. If it is, it should be drawn down and passed over the child's head. Secondly, the eyelids should be swabbed over with some antiseptic before the eyes are opened. When the child is completely born, it is a wise precaution to drop a little 1 per cent. silver nitrate solution into each conjunctival sac.

The left hand is kept applied to the fundus uteri, and follows it down as the body of the child is expelled. If there is any delay in the birth of the shoulders, hook a finger into the anterior axilla and draw it down, and then carry the child forwards, so that the posterior shoulder is born first. When the maternal end of the cord has ceased pulsating, the cord should be tied in two places—viz., 3 inches from the child's umbilicus and at the vulva.

Management of the Third Stage.—This is the most important stage of labour. The left hand should guard the uterus, the thumb being in front, and the ulnar border of the hand as much behind the uterus as possible. Alternate periods of contraction and relaxation will be felt, and after a more powerful contraction than the preceding ones, the uterus expels the placenta into the vagina. The signs that this has taken place have already been described. At this stage steps should be taken to express the placenta

from the vagina. The left hand, still grasping the uterus, waits for a contraction. When it comes and the uterus is hard, the left hand presses the uterus downwards and backwards in the axis of the pelvic brim, using the contracted uterus as a piston to express the placenta from the vagina. The placenta appears at the vulva, and should be supported in the right hand and drawn gently out in the axis of the vagina, the pressure being kept up on the uterus until the membranes have all come away.

After the birth of the placenta, it is wise to give a dose of ergot; no vaginal douche is necessary. The uterus should be held for at least half an hour afterwards. The vulva should then be sponged and inspected for lacerations, which must be sewn up if necessary; a sterilized pad and the binder are applied, and the patient is allowed to go to sleep.

Management of Occipito-Posterior Cases —Rotation of the occiput forwards occurs in most cases. If rotation is delayed or does not occur, the best plan is to insert the hand into the vagina, rotate the occiput forwards, and then to deliver with forceps.

FACE PRESENTATIONS

Frequency.—They occur once in 500 labours.

Causation.—In these cases the head is extended, and the face enters the pelvis in one of the oblique diameters. The presentation is often produced at the commencement of labour by the biparietal diameter catching at the brim. The occiput thus becomes fixed, and the uterus continuing to act, forces down the face. Face presentations are said to be caused by tumours in the child's neck and by a dolichocephalic head.

Diagnosis of Face Presentations.—Abdominally the head can be felt engaged in the pelvis, the higher and more prominent part being the occiput, which is separated from the back by a deep groove. On the opposite side the limbs can be felt very easily, and the fœtal heart-beat is generally very loud, owing to the fact that the child's chest is pressed against the abdominal wall.

By vaginal examination, the forehead, bridge of the nose, margin of the orbit, the mouth and alveolar processes, and the chin can be felt. If the cheeks are swollen, the presentation might be mistaken for the breech and the mouth for the anus, but the alveolar ridges inside the mouth and the above-mentioned marks will readily distinguish between them.

Classification of Positions.—There are four positions, named according to the position of the chin.

1. **Right Mento-Posterior.**—The long diameter of the face (fronto-mental) lies in the right oblique diameter of the pelvis, the chin being directed towards the right sacro-iliac synchondrosis, and the forehead towards the left pectineal eminence. The back of the child lies to the mother's left side.

2. **Left Mento-Posterior.**—Face in the left oblique diameter; chin towards the left sacro-iliac synchondrosis.

3. **Left Mento-Anterior.**—Reverse of No. 1.

4. **Right Mento-Anterior.**—Reverse of No. 2.

The Mechanism of Delivery consists of several distinct acts, and is similar to that of vertex presentations, the chin taking the place of the occiput.

Descent and Extension generally go on together. Owing to the greater resistance experienced by the forehead during descent, extension of the head occurs, and the chin descends. In the first position the right cheek presents.

Internal Rotation.—The chin is rotated forwards

by the same mechanism as the occiput in vertex presentation, so that the face comes to lie in the antero-posterior diameter of the pelvis, with the chin at the pubes and the forehead in the hollow of the sacrum.

Flexion now occurs. The chin is fixed under the pubes, and owing to flexion of the head, the mouth, nose, brow, and vertex gradually glide over the perineum, and so the head is born.

External rotation occurs just as in vertex presentations, and is due to the same cause.

In most cases the head is delivered by the natural forces in the above manner. Sometimes in mento-posterior cases the chin, instead of rotating forward, passes back into the hollow of the sacrum. The head and neck then become jammed in the pelvis, and natural delivery is rarely accomplished, unless the head is very small and the pelvis very large, in which case the chin may pass in front of the perineum, and the head be born by **flexion**.

Changes in the Head in Face Presentations.—The antero-posterior diameter of the head is much increased, and the caput succedaneum seated over the malar bone.

Prognosis.—Labour is usually protracted, especially in mento-posterior cases, but otherwise there is no inherent danger to the mother or the child.

Management of Face Presentations.—If complete extension of the head occurs, and the chin rotates forwards, no interference is needed. In mento-posterior cases, it should be remembered that rotation takes place late; but if it does not occur, there should be no hesitation in introducing the hand into the vagina, rotating the chin forwards, and delivering by forceps. If the child is dead, or the head is immoveably jammed in the pelvis with the chin posterior, craniotomy is the best treatment.

BROW PRESENTATIONS

THE head in these cases lies between flexion and extension, and is often spontaneously converted into a vertex or face presentation.

Causation.—The same as in face presentations.

Diagnostic Marks.—The anterior fontanelle, the forehead and orbits.

Management.—Pressure upwards should be exerted on the forehead or occiput during the pains in order to convert it into a vertex or face presentation. If this change cannot be effected, the forceps should be applied. The head may then be born by flexion, the superior maxilla becoming fixed against the pubes, and the forehead, vertex, and occiput gradually sweeping over the perineum. If the forceps fail, craniotomy becomes necessary.

PELVIC PRESENTATIONS

THE breech, foot, or knee may present.

Frequency.—They occur about once in thirty-three labours.

Knee presentations are the rarest form.

Causation.—Breech presentations occur most often in multiparæ and premature deliveries. Their production is favoured by contraction of the pelvis, excess of liquor amnii, and lax uterine walls. Presentation of the foot may be due to movement of the fœtus, or to the foot slipping down when the liquor amnii is suddenly discharged.

Prognosis.—There is no special danger to the mother, but to the fœtus there is great danger, because

of the tendency to asphyxia produced by pressure of the head on the cord, and by the diminution of the placental circulation brought about by the uterus contracting down. The fœtal mortality in breech cases varies according to the skill of the accoucheur.

Diagnosis.—By abdominal palpation it is easy to make out that the head is not at the brim of the pelvis; it can be felt as a heavy, hard, solid body in the fundus of the uterus, and can be 'ballotted' between the hands. By vaginal examination the presenting part is usually high up, and indefinite before labour begins. When the cervix begins to dilate the parts can be made out easily. The diagnostic marks of the presentation are the buttocks, the genitals, the spinous processes of the sacrum, and the anus. The anus grips the finger when passed into it, and meconium is usually passed, owing to the pressure on the child's abdomen. Flakes of vernix caseosa are also found on the finger. If the foot presents, it is distinguished from the hand by the big toe being parallel to the other toes, and not being capable of opposition, as is the thumb. The inner border of the foot is thicker than the outer; in the hand both borders are of equal thickness. The ankle is less movable than the wrist; and the projection of the os calcis is also peculiar to the foot. If the knee presents, it is distinguished from the elbow by the presence of the movable patella, which contrasts with the immovable olecranon of the elbow.

The **positions of the breech** are four in number, named according to the position of the sacrum:

(*a*) **Dorso-Anterior**
1. **Left Sacro-Anterior**, sacrum directed towards the left pectineal eminence (most common position).
2. **Right Sacro-Anterior**, sacrum directed towards the right pectineal eminence.

(*b*) **Dorso-Posterior**
3. **Right Sacro-Posterior,** sacrum directed towards the right sacro-iliac joint.
4. **Left Sacro-Posterior,** sacrum directed towards the left sacro-iliac joint.

Position of the Child in Dorso-Anterior Positions.—In the left sacro-anterior position the child lies with its back directed towards the mother's left side and forwards; its abdomen is directed backwards, and to the mother's right side. The left buttock, which lies to the front, presents, owing to the inclination of the mother's pelvis.

Mechanism of Delivery in Dorso-Anterior Positions.—**Descent** of the breech takes place, and **rotation** forwards of the anterior hip is produced (by the same mechanism as in vertex presentation), so that the hips are brought into the antero-posterior diameter of the outlet. The anterior hip becomes fixed behind the pubes, and the posterior hip distends, and then sweeps over the perineum and is born; the anterior hip quickly follows. The shoulders pass down in the same oblique diameter as the hips, and rotate in the same way; the anterior shoulder then becomes fixed at the pubes, and the posterior sweeps over the perineum. The arms are generally born before the shoulders, but occasionally, if traction is made on the trunk before they are expelled, they become extended over the head, and may cause difficulty in delivery of the head. The head enters the pelvis in the opposite oblique diameter to the hips, and becomes flexed on the chest; it then rotates, and the occiput is thus brought against the pubes. The nape of the neck is then fixed under the pubes, and the chin, face, and vertex are gradually expelled over the perineum.

Mechanism in Dorso-Posterior Positions.—The

abdomen of the child is directed forwards, and either to the left or right. As descent occurs, rotation forwards of the anterior hip and shoulder takes place, as in dorso-anterior positions, and birth occurs in the same way. The head also generally rotates so as to bring the occiput forwards, and it is then born as in dorso-anterior positions. In other cases the shoulders rotate during the descent of the breech into the opposite oblique diameter to that in which they lie at the commencement of labour. Thus in the right sacro-posterior position the shoulders are lying at the commencement of labour in the left oblique diameter. The hips also lie in the left oblique and descend into the pelvis, rotating forwards; as they rotate the shoulders may rotate into the right oblique, bringing the right shoulder opposite the left ileo-pectineal eminence; later in labour the shoulders rotate again into the antero-posterior, the right shoulder being in front. This mechanism can often be observed in dorso-posterior cases, the breech making a sudden rotation when it is outside the vulva. Occasionally, however, the occiput does not rotate forwards, but passes back into the hollow of the sacrum, and the face turns towards the pubes; in such a case birth may occur in one of two ways: (*a*) the nape of the neck becomes fixed in front of the perineum, and strong flexion occurring, the face, forehead, and vertex are gradually pushed out from under the pubes; (*b*) occasionally the chin hitches above the pubes, and extension of the head occurs, so that the face looks upwards; in such a case, if the head is small, or the pelvis very roomy, the occiput, vertex, and face may gradually sweep over the perineum.

Management of Breech Cases—First Stage.—It is important to avoid early rupture of the membranes. To secure this end, the patient should be kept lying down, and must not be allowed to bear down. It is

better to avoid unnecessary vaginal examinations in these cases.

Second Stage.—The breech should never be pulled upon, as traction may cause extension of the arms and the head. Pressure should be applied to the fundus during the second stage, in order to assist the expulsive action of the uterus, and to keep the head flexed. When the breech is born as far as the umbilicus, the cord should be felt. If it is pulsating well, there is no need to hurry on the delivery ; if, on the other hand, its pulsations are feeble, the child must be delivered rapidly.

In cases where there is no difficulty the arms are found folded on the chest, and may be slipped out of the vulva by hooking a finger into each elbow. The head then comes into the pelvis, and the occiput rotates forward, and its birth may be assisted by applying pressure above the symphysis and by carrying the child forwards over the mother's abdomen. This should not be done until the neck of the child can be seen outside the vulva.

In cases where it is necessary to expedite delivery, or where there is some difficulty, the first thing to be done is to deliver the arms. These may be extended beside the child's head.

Method of Releasing the Arms.—Carry the child's body well forward, then pass two fingers over the posterior shoulder and sweep the arm across the face and chest ; avoid bending the arm at right angles for fear of breaking it. Always deliver the posterior arm first, because there is more room in the hollow of the sacrum. Then carry the body well backwards and release the anterior arm in the same way. If it is difficult to release the anterior arm in this position, the child's body must be rotated, so that the anterior arm comes to lie in the hollow of the sacrum, when it can be brought down with greater ease.

If there is any delay in the delivery of the after-coming head, there are definite rules to follow. There are two stages in the delivery of the after-coming head. In the first stage the head has to pass through the brim of the pelvis. It should pass through the transverse diameter of the brim with the suboccipito-frontal diameter lying transversely. At this stage the shoulders are in the antero-posterior diameter, against the vulva, and the neck cannot be seen. Two fingers should be slipped between the shoulders and vulva, and traction must be made backwards towards the mother's anus and in the direction of the axis of the brim, at the same time applying pressure to the fundus in the same direction. The head then comes through the brim and rotates; the shoulders also rotate outside the vulva, and the neck appears. The second stage then begins, and consists in the delivery of the after-coming head *from the cavity* of the pelvis. This is best accomplished by suprapubic pressure, and by carrying the child forwards over the mother's abdomen. If the head shows any tendency to extend, it is useful to put a finger in the child's mouth to prevent extension. Forceps should always be at hand to deliver the aftercoming head, and it is a wise precaution to have a hot bath ready to revive the child if necessary.

Prolapse of the cord is not uncommon in breech cases. As a rule it is of little moment, because the cord is well protected from pressure by the child's legs. The passage of meconium—a danger signal in head-first cases—generally has no ulterior significance in breech cases, because it is simply due to the expression of meconium from the bowel by pressure on the infant's abdomen.

Management of Breech Cases when arrested from Uterine Inertia or Pelvic Contraction.—If the breech is above the brim, chloroform should be given, and a foot should be brought down by the hand passed into

the uterus, and traction exerted on it. If the breech is arrested in the pelvis, it can often be delivered by traction applied over the groin with the index-finger.

MULTIPLE PREGNANCY

Definition.—Simultaneous development of more than one embryo.

Frequency, etc.—Twins occur once in 89 births, triplets once in 7,000, quadruplets and quintuplets are extremely rare. According to Duncan, multiple births are most common in first pregnancies, but after that the tendency to multiple pregnancy decreases with each successive pregnancy.

In the greatest number of twin cases two boys are born; next most commonly there are a boy and a girl, two girls being the least common.

Etiology (*in twins*):

1. **They may arise from impregnation of two ova** from the same or separate Graafian follicles. In such a case each fœtus has a separate placenta, chorion, and amnion.

2. **Two Embryos may arise from the same Ovum.**—There is a single placenta and chorion common to both embryos, but as a rule each is enveloped by its own amnion; occasionally, however, absorption of the partition wall between the two amniotic sacs occurs, so that both embryos come to lie in the same amniotic cavity. Twins arising from the same ovum are generally of the same sex, those arising from different ova may be of opposite sexes. As regards **Triplets**, they arise generally from two ova, one of which gives rise to two embryos; hence one embryo will have a separate placenta and a complete set of membranes, the other

two having a common placenta and chorion, but separate amnions.

Characters of the Children.—Twins and triplets are small, and are often born prematurely. Twins are frequently unequally developed at birth. Occasionally one of the children dies *in utero*, and may be expelled before the other, or, becoming flattened and mummified, it may be retained and expelled at full time with the other child. This difference in the development of the two children is not dependent on difference in age, but is probably brought about by one fœtus pressing on, and preventing the development of, the other.

The mortality of twins is about 1 in 13. It is very rare for all the children of triplets to survive.

Diagnosis.—Unusual size of the abdomen; irregular shape of the uterus; palpation of two bodies, with a depression between them; presence of double heart sounds, heard at different parts of the abdomen, and separated by an interspace, over which no sound is audible, are the chief signs which characterize the presence of twins. Very often the condition is not recognized till after the birth of the first child.

Labour and its Management in Multiple Pregnancies.—In about 50 per cent. of cases both children present by the head; in 30 per cent. the head of one and the breech of the other child presents; in about 8 per cent. both breeches present. As a rule no difficulty arises in delivery, the first child being born in the ordinary way, and the second following in a quarter to half an hour.

The first and second stages of labour are apt to be prolonged, owing to inertia of the over-distended uterus; during or after the third stage hæmorrhage is liable to occur owing to the inert condition of the uterus, produced by the previous over-distension. After the birth of the first child, its cord

should be tied and its placenta left in the uterus till the second child is born.

The pains generally return in about twenty minutes to half an hour, and quickly expel the second child; if any delay occur, the uterus should be stimulated to contract by pressing and rubbing the fundus and by rupturing the membranes. If delivery of the second child is urgently indicated owing to hæmorrhage, etc., it may be extracted quickly by turning or the forceps.

Difficult Cases of Twins, and their Management.

1. **Both Heads Presenting.**

(*a*) **Occasionally both Heads present, and each prevents the other from entering the Brim.**—In such a case it is best to push up one head and apply the forceps to the other, and cause it to enter the pelvis.

(*b*) **Interlocking of the Two Heads.**—In some cases one head enters the pelvis and is followed by the other head, which becomes jammed against the neck of the first and thus prevents delivery. **Treatment.**—If possible push up the head of the second child while the first is extracted by the forceps; if this is not possible, the head of the second child must be perforated, and the first child extracted by the forceps, and after it is born the second extracted.

2. **Interlocking of the Chins when the First Child is born by the Breech and the Second Presents by the Head.**—**Treatment.**—Attempts should be made to push the head of the second child out of the way and then to deliver the first; if this is not possible, it will be necessary to decapitate the first child and deliver its body, leaving its head behind in the uterus to be extracted after the birth of the second child; or the head of the first child may be perforated and extracted; or the head of the second child may be

perforated and the first child delivered, followed by extraction of the second child.

3. **A Foot or a Hand may descend with the Head.**—**Treatment.**—Endeavour to push the limb out of the way.

4. **All Four Feet may present.**—**Treatment.**—Engage one child by traction as quickly as possible.

SUPERFŒTATION

Definition.—A term applied to a few cases of multiple pregnancy, in which it is supposed that, after partial development of one ovum, a second ovum is fertilized and developed. It is very doubtful if this is possible.

Such cases as the following are brought forward as instances: (*a*) delivery of two fœtuses at different stages of development; (*b*) delivery of a full-term child, and after a time delivery of another child, also fully developed; (*c*) delivery of two children, one being black, the other white (hence having different fathers).

Most of the cases can be explained on the theory that they are twins, one of the children being undeveloped in consequence of the pressure exerted on it by the other child, and either being expelled thus with the fully developed child or remaining behind *in utero* till development is completed. Some of the cases may be due to a second pregnancy occurring in one horn of a bilobed uterus.

PRECIPITATE LABOUR

Definition. — Sudden onset and rapid termination of labour depending on excessive uterine contractions and great laxity of the passages.

As a rule no harm results, but occasionally laceration of the cervix and perineum occurs, or the cord is broken, and the child, being suddenly born when the mother is unprepared, may be injured by falling to the ground. Post-partum hæmorrhage sometimes follows.

Treatment.—The action of the voluntary muscles of labour should be stayed by chloroform or by a hypodermic injection of morphia.

THE PUERPERAL STATE

Condition of the Patient after Labour.—A slight chill generally follows labour, but soon passes off. A slight rise of temperature (of 1 or 2 degrees) is not uncommonly found during the first twenty-four hours after labour. It is generally said to be due to reaction, and possesses no sinister significance. When the reactionary temperature disappears the temperature should remain normal throughout the whole puerperium. The pulse after labour is sometimes slow, falling to 50 beats per minute, but the normal average is between 70 and 80 beats per minute. The skin is moist and active, since all the skin glands share in the activity of the breasts. There is usually some difficulty in passing water during the first day or two after delivery. The difficulty is due to the fact that the patient is lying upon her back, that the tone of the abdominal walls is diminished, and that there may be some bruising and swelling about the urethra. If labour has been normal, a patient may get upon her hands and knees and pass water in this position, or a hot sponge may be placed over the pubes. Should such measures fail, a catheter must be passed. The bowels are usually constipated and the appetite indifferent for a few days. If the abdomen becomes distended with flatus or if there is any colic, a turpentine

enema should be given. Lactation generally commences in about forty-eight hours, and is accompanied by fulness and tenderness of the breasts, and occasionally by some constitutional disturbance, which may be revealed by a slight rise of temperature.

Changes in the Uterus after Labour.—After labour the uterus weighs about two pounds; after an interval of a week it weighs one pound, and at the end of two months it weighs about two ounces. The process by which the diminution in size and weight of the uterus is brought about is called involution, but the uterus always remains a little larger than it is in the virgin. It is said that during involution all the muscular tissue is removed and replaced by newly-developed muscle. The process is not one of fatty degeneration, but of autolytic degradation. The rapidity of the process in the first week depends upon the fact that the uterus is comparatively anæmic during the first stage of involution. The cervix remains soft and patulous, and will admit a finger up to the end of ten days after delivery; the cervix undergoes involution simultaneously with the uterus. Subinvolution is the chronic state of enlargement of the uterus that ensues when the proper course of involution is interfered with by the patient getting about too early after labour, by the retention of the products of conception, or of blood in the cavity or walls of the uterus, and by sepsis.

Changes in the Mucous Membrane of the Uterus.—The internal surface is covered by the shreddy remains of decidua which are thrown off in the lochia. It is not always possible to see the placental site, but sometimes small black clots can be seen in the mouth of the placental sinuses. These little clots bear no share in the mechanism of hæmostasis. The fundi of the uterine glands which are embedded in the uterine muscle form the starting-point for the regeneration of the new mucous membrane, which gradually covers

the surface, the placental site being the last part to be regenerated.

The vagina is smooth and dilated for some days. It quickly undergoes involution, but always remains wider and less rugose in primiparæ than in multiparæ. The vulva is lax and somewhat sore for a few days. There may be numerous small splits upon the labia, which tend to become a little sloughy on the surface. They should be kept clean with hydrogen peroxide solution.

Afterpains are irregular painful contractions of the uterus, which take place during the first four days after delivery. They occur more often in multiparæ than in primiparæ. Sometimes due to the retention and subsequent expulsion of blood-clot or pieces of membranes, they are more often due to cramp-like spasms of the uterus, and in the majority of cases of severe afterpains nothing whatever is either retained or expelled. When something is retained the best treatment is to give ergot, hot douches, and uterine massage. In other cases some antispasmodic drug, such as antipyrin, is the best treatment.

The discharge which comes from the vagina is known as the lochia. For the first three days the lochia are red and consist of almost pure blood, which oozes from the uterus and from lacerations. The amount of blood soon diminishes, and the discharge becomes pink, then brown, and finally colourless, consisting in this stage mainly of mucus derived from the cervix, together with some leucocytes and epithelial cells. At first a few small clots may be passed, but the continued passage of clots, or the fact that the lochia remain red longer than they should do, points to the probability that something is retained inside the uterus. In some cases, especially in primiparæ where the third stage has been well managed and the uterus remains blood-tight for several days after

delivery, the patient may have practically no red lochia at all, and the discharge consists simply of a little mucus. Offensiveness of the lochia will be described later.

The Signs of Recent Delivery are sometimes important from a medico-legal point of view. The signs are only of service during the first eight or ten days following labour. They are as follows: The large, tender breasts; the dark areola round the nipple; the expression of milk and colostrum from the nipples; the flaccid abdominal walls, marked with lineæ albicantes; the enlarged uterus, felt as a round hard mass above the pubes during the first week; the increased length of the uterine cavity as measured by the sound; the cervix patulous; the os externum fissured; the os internum admitting the tip of the finger till the end of the first week; the vagina lax and dilated; the fourchette torn; the lochia red during the first four days, and afterwards changing in character, as mentioned above.

MANAGEMENT OF CHILDBED

THE patient should be kept quiet and all excitement avoided. She should lie upon her back for the first forty-eight hours. The diet should be easily digestible until the bowels have been opened, when ordinary diet may be taken. The bowels should be opened on the third day by a dose of castor oil and an enema. The external parts should be cleansed frequently with lysol. Vaginal douches should never be given unless there is some special indication for their use. The patient should be visited within twelve hours after labour, and every day during the first week, and the pulse, temperature, and amount of lochial discharge must be noted. The patient should lie in bed for a

fortnight, keep to a sofa for another week, and not exert herself much until at least a month after her confinement. Tonics and change of air are often serviceable during convalescence.

CONDITION AND CARE OF THE INFANT AFTER BIRTH

Establishment of Respiration.—As a rule, immediately after birth the child cries aloud—a sign that respiration has begun. With the commencement of respiration certain changes (mentioned in a previous section) follow in the vascular system, consequent on the blood passing to the lungs.

Cause of the First Respiration.—It is partly reflex, depending on the application of cold to the skin, and partly due to direct stimulation of the respiratory centre by the circulation of venous blood through it.

Asphyxia Neonatorum.—Occasionally the child is born apparently dead (in a state of asphyxia), owing to non-oxygenation of its blood. **Causation.**—Any condition which interrupts the placental circulation may produce it—*e.g.*, separation of the placenta before birth, tonic contraction of the uterus (such as is produced by ergot or pelvic obstruction) blocking the circulation in the uterine sinuses, compression or excessive torsion of the umbilical cord ; again, it may arise from compression of the head in cases of contracted pelvis. **Symptoms.**—In the first stage of asphyxia—asphyxia livida—the face is livid and swollen, the child gasps slightly, the limbs are rigid, and the cord beats slowly but forcibly. The treatment of this form of asphyxia is to clear away any mucus which may be blocking the air-passage of the child, and to throw a little cold

water at the child. It generally takes a deep breath and becomes pink. In some cases it may be wise to let a little blood run away from the cord to relieve the congestion of the right side of the heart. When the child remains persistently blue it may have some congenital lesion of the heart.

In the more severe form of asphyxia—asphyxia pallida—the child is in a condition of shock; the limbs are flaccid, the surface cold, and the heart's action scarcely perceptible. **Treatment.**—The cord should be tied immediately and the mucus should be cleared out of the air-passages. The child should be placed in a bath at a temperature of 105° F. While in the bath the heart may be stimulated by massage, and artificial respiration by Sylvester's method should be carried on. Forcible stimuli, applied with a view to induce respiratory movement, should not be indulged in until the heart is acting better. To wave a child about in the air when it is in a condition of shock, as recommended by some authorities, is to court disaster. In cases where the child does not make any respiratory efforts insufflation of the lungs should be employed. The mouth-to-mouth method is the best. After being inflated, the chest is compressed by the hands and the air expelled. As long as the heart-beats are perceptible there is hope for recovery, and artificial respiration should be persevered with till the natural respiratory movements commence, or till the heart has ceased acting. Sometimes a hypodermic injection of ether or of strychnine ($\frac{1}{200}$ grain) is of use, or 2 or 3 ounces of warm saline solution may be infused into the umbilical vein.

Meconium.—During the first few days after birth, and often during birth if the breech presents, the meconium is discharged from the rectum. **Characters.**—The meconium is a dark green fluid consisting of bile mixed with intestinal mucus.

The Vernix Caseosa is the greasy material, consisting of epithelium and sebaceous secretion, which covers the skin of the child at birth.

An abundance of urine of low specific gravity is secreted immediately after birth; it nearly always contains albumin at first, and in some cases grains of uric acid are passed.

Exfoliation of the Epithelium, accompanied with congestion of the skin, commences about the third day and lasts about a week.

The Breasts of the Infant often swell, and yield a milky fluid.

Slight **Jaundice** often occurs during the first week, owing to changes in the blood. It passes off in a day or two.

The Child loses weight during the first three or four days after birth, but quickly regains it.

Care of the Infant.—After birth the child should be washed with soap and warm water, and the vernix caseosa should be softened by olive oil and removed. Gauze, covered with a pad of lint, is used for dressing the cord, which dries up and separates in about a week. The abdomen should be supported with a flannel bandage. The child should be warmly and lightly clothed, and should be washed all over once daily.

LACTATION

As soon as the mother has rested, the child should be put to the breast, so as to favour uterine contraction. Till the secretion is fully established the child should take the breast once or twice daily; after the third day, when lactation is well established, the child

should be nursed regularly every two or three hours. The intervals between the times of suckling should be gradually lengthened, especially at night, so as to give the mother time for sleep. After the sixth month one artificial meal of bread-sop and milk, or chicken broth with bread-crumbs in it, should be given daily, and in a week or two another meal may be added ; but the child should not be completely weaned till six or seven teeth have appeared.

The mother ought to suckle the child, unless disqualified by the following conditions : great debility, lack of milk, syphilis, phthisis, or sore nipples ; in such cases a wet-nurse must be chosen, or artificial feeding resorted to.

Selection of a Wet-Nurse.—She should be strong and healthy, and devoid of all marks of syphilis and tuberculous infection. Her breasts and nipples should be well formed and free from cracks. The milk should flow easily from the breasts, and not be too blue in colour (watery). The nurse's child should be plump and healthy, and show no sign of disease. The nurse's age should be between twenty and thirty-five, and her child nearly the same age as the child to be suckled. The diet of the nurse should be plain, nutritious, and abundant ; rich foods are to be avoided. She should take gentle exercise in the open air daily.

Milk consists of fat globules surrounded by albuminous envelopes, and suspended in a fluid containing casein, lactose, and salts. The fat globules are derived from the cells lining the glandular alveoli of the breasts, the protoplasm of which undergoes fatty transformation. The cells eventually break down and discharge their fatty contents. For a short time after birth the milk contains large granular corpuscles—**Colostrum Corpuscles**—which render the milk first passed slightly laxative.

Chemically, human milk contains 3·5 per cent. of fat, from 6 to 7 per cent. of lactose, and about 2 per cent. of caseinogen and lactalbumin. The solids amount to about 12 per cent., and the salts to 0·2 per cent. In reaction it is alkaline; it is also sterile, and its specific gravity is about 1030.

Artificial Feeding.—Cow's milk should form the basis of all artificial feeding. It differs from human milk in that it is usually infected, and acid in reaction. It contains about the same proportion of fat, but less sugar and more proteid. To prepare it for the infant's consumption it is usual to add 1 part of milk to 2 parts of water, making a mixture containing 1 part of milk in 3. To this mixture cream and sugar are added, and after sterilization it is given to the infant in 2-ounce doses every two hours during the day and every four hours during the night. Variations in the strength and quantity of the mixture may be made to suit individual cases. The main difficulty in the use of cow's milk for infant feeding lies in the fact that the caseinogen of cow's milk forms large tough curds in the stomach. This difficulty is mainly surmounted by the fact that the curd formed is much finer when the milk is diluted. The details of artificial feeding must be sought for in other manuals.*

The old-fashioned bottle fitted with a tube should not be used. The bottles and teats must be regularly sterilized. The child should be fed at regular intervals, and milk ought to be the only food during the first six months; after that time additional meals of bread-sop, broth and bread-crumbs, etc., may be given, but milk should form the chief article of diet till the end of the first year. During the first three months purely starchy food, such as cornflour, and arrowroot, etc., must be avoided, owing to the feeble action of the child's saliva on starch. Between the times of feeding,

* *E.g.*, 'The Puerperium,' by C. Nepean Longridge.

the child, if healthy, sleeps; restlessness generally points to some defect in the milk or lactation.

DISORDERS OF LACTATION AND OF THE BREASTS

To get rid of the milk, in cases where the mother does not nurse, the best thing to do is to bandage the breasts moderately firmly, fixing with a double figure-of-eight domette bandage. At the same time the patient should not be allowed much to drink, and should be given some form of saline purgative to secure two or three watery actions every day. When the breasts swell beneath the bandage they become painful; if the pain is severe, morphia may be given, but the bandage should not be removed until the engorgement of the breasts has subsided.

Deficiency of Milk, either as regards quantity or quality, is due either to malnutrition or ill-health of the mother, or to liability to various kinds of excitement, etc. It may be partly or wholly remedied by giving a more nutritious diet, by lengthening the intervals between suckling, and by avoidance of excitement and fatigue. Somatose, in milk, if taken by the mother, will cause more milk to be secreted, of better quality.

Sore Nipples.—Aphthous ulcers, excoriations, and fissures may affect the nipples, and are generally seated at its base. They occasionally (by spread of the inflammation) lead to the formation of a mammary abscess. **Treatment.**—The nipples should be washed after suckling, and, in simple excoriations, lotio plumbi or a solution of tannic acid applied, or the surface protected by flexible collodion. Any lotion that is used should be washed off before putting the child to

the breast. In aphthous ulcers the use of a lotion of boracic acid or sulphurous acid is of service. Fissures, if rebellious to the above means, are best treated by application of solid lunar caustic. To protect the parts the child may suck through a nipple-shield.

Depressed Nipples are sometimes due to pressure of the stays. **Treatment.**—Attempts should be made to elongate them by pulling on them with the fingers, or by drawing them out by suction through a breast-pump; if incurable, the child should suck through a nipple-shield.

Mammary Inflammation and Abscess.—**Causation.**—The inflammation may arise from infection through a sore nipple, blocking of a milk-duct, exposure to cold, or from a blow. **Pathology.**—The inflammation involves the glandular and interglandular tissues, and may affect the connective tissue beneath the gland. It may terminate in resolution, or in suppuration with the formation of one or more abscesses, which open successively, and may lead to the formation of troublesome chronic fistulæ. **Symptoms.**—Tenderness, swelling, and induration exist at the seat of inflammation. The temperature is raised and the frequency of the pulse increased. When the inflammation involves the tissues beneath the gland, the pain is deep and dull, and the gland is lifted forward, but there is no fixed tender point. Suppuration is generally ushered in with rigors, and the abscess, when formed, generally rises to the surface (unless seated beneath the gland), and the skin becomes red and tense, and eventually the abscess bursts. The suppurating fistulæ, which sometimes remain, may lead to great exhaustion. **Treatment.**—The child should be taken away from the breast, and hot fomentations should be applied hourly. At the same time the patient should be vigorously purged. The inflammation may then subside; if it does not, and there are indications of pus

formation, the abscess must be opened at once, and thoroughly drained; if left, such abscesses tend to burrow in all directions, and to honeycomb the breast with sinuses.

Galactorrhœa.—Excessive formation and dribbling away of watery milk occasionally occur, and may prove exhausting. **Treatment.**—Lactation should be suspended, and the breasts compressed by bandages. Iodide of potassium should be exhibited internally, and abundant nutritious food given.

PROLONGED LABOUR

Causes of Prolonged Labour.—These may be divided into two classes:

1. Cases in which the expelling forces—namely, the uterus and the accessory muscles—are at fault.
2. Cases in which there is some obstruction to delivery.

In the first class of case there is no inherent danger to either the mother or the child. The patient may be tired, but when the uterine contractions are feeble or absent she does not suffer any pain. The only danger is that the contents of the uterus may become infected if the membranes are ruptured.

In the second class of case there is grave danger to both the mother and the child. If the delay occurs in the first stage, it is not so serious, as the liquor amnii serves to protect both mother and child from injurious pressure. If, however, the labour is protracted during the second stage, the mother is in danger, owing to the pressure exerted by the head on the soft parts of the pelvis; the child also is in danger, partly from the pressure exerted on its head, and

partly because stoppage of the placental circulation is liable to occur, owing to the compression of the placenta between the contracted uterus and the child.

The appearance of the following symptoms during a protracted second stage would be of dangerous import, and would indicate the necessity for immediate interference ; quick pulse, increased temperature, hot dry skin, vomiting, vagina hot and dry. If delivery is not quickly brought about, the cervix may become so thinned out by the constant tonic contraction and retraction of the uterus that rupture may take place ; or sloughing of the vagina may occur, and the patient may pass into a typhoid condition, with dry brown tongue, low muttering delirium, and death may eventually result from exhaustion. By early interference these dangers may generally be avoided.

UTERINE INERTIA

Definition.—Uterine inertia is a condition in which the contractions of the uterus are feeble, short in duration, separated by long intervals, and ineffective.

Causation :

(*a*) **Excess of Liquor Amnii,** by overdistending the uterus, interferes more or less with its action.

(*b*) **Malpositions of the Uterus,** such as anteversion or lateroflexion, by causing the uterus to act to a disadvantage, render the pains inefficient.

(*c*) **A Loaded Rectum** or **Distended Bladder** may make the pains ineffective.

(*d*) **Feeble Health, Excitement, Fright, Nervousness, and very Hot Weather** may all impede the action of the uterus to some degree.

Exhaustion of the Uterus.—In some cases of labour

the pains, which may have been perfectly normal in character at the commencement of labour, may disappear altogether, and the same thing may happen in cases of inertia of the uterus. This condition of absence of contractions is known as exhaustion of the uterus. It is important to remember that not only does the uterus not contract on its own initiative, but it cannot be induced to contract by any form of stimulation. Clinically, the condition is recognized by the total absence of contractions, and meanwhile the patient is simply tired and wishes to go to sleep.

The Treatment of Inertia of the Uterus depends on the cause: thus, if due to hydramnios, the membranes should be punctured; if a loaded rectum is the cause, an enema should be given; if a distended bladder, the urine should be drawn off. If the uterus is anteflexed, an abdominal bandage must be applied, and the patient should lie on her back; if lateroflexion exists, she should lie on the side opposite the flexion. During the first stage, if the pains are inefficient and very painful, 20 grains of chloral or 20 drops of laudanum should be given; this will often produce a few hours' sleep, after which the pains will come on more regularly and efficiently. In some cases of delay from inertia, pressure with the palm of the hand on the fundus is often useful in effecting delivery. If there is still no progress, the forceps should be used.

Quinine in 5-grain doses is sometimes useful. Ergot should not be used unless the passages are fully dilated and there is no obstruction. It is generally best to discard its use altogether till after the placenta is expelled, as it may exhaust the mother by the continuous uterine contraction it induces, and may imperil the life of the child by stopping the placental circulation.

The Treatment of Exhaustion of the Uterus.—A patient must never be delivered when in this condi-

tion. The correct treatment is to forestall the onset of this condition by delivering the woman before exhaustion of the uterus sets in. When, however, the uterus is exhausted, a dose of opium or some soporific should be given to secure a good sleep. When the patient wakes up the pains usually return, and delivery is easily accomplished. The danger of delivering a woman when her uterus is exhausted is that severe post-partum hæmorrhage is almost certain to occur.

OBSTRUCTED LABOUR

THE causes of **Obstructed Labour** may be divided into maternal and fœtal :

A. **Maternal** :

(1) Various forms of contracted pelvis.
(2) Tumours of the bony pelvis.
(3) Contractions of the vagina and cervix.
(4) Tumours of the uterus and other soft parts.
(5) Displacements of the uterus.

B. **Fœtal** :

(1) **Abnormal Position.**
  (*a*) Transverse lie.
  (*b*) Locked twins.
  (*c*) Impacted breech.
  (*d*) Persistent mento-posterior and some persistent occipito-posterior cases.
(2) **Abnormal Size.**
  (*a*) Hydrocephalus.
  (*b*) Monsters.
  (*c*) Tumours.

DEFORMED PELVIS

Chief Varieties of Deformed Pelvis:

1. **Flattened Pelvis—Rickety Pelvis.**—This is the most common variety of deformed pelvis, and is generally due to rickets. **Characters.**—The conjugate of the brim is shortened; the sacral promontory projects forwards; the sacrum is more curved than natural; the brim is kidney-shaped, and occasionally, owing to projection backwards of the pubes, its shape resembles the figure eight. The deformity of rickets is chiefly due to the weight of the body pressing the base of the sacrum downwards and forwards; but the rotation backwards of the apex of the sacrum is prevented by the sciatic ligaments, hence the increased curvature of the sacrum. Displacement of the pubes backwards depends on the action of the recti muscles. Occasionally in rickets the brim is further deformed by a lateral curvature of the spine, which throws the sacral promontory forwards and to one side. In rare cases, when rickets is late in its onset and comes on after the child has begun to walk about, the pelvis may assume the shape of that of osteo-malacia.

2. **Uniformly Contracted Pelvis.**—In this variety there is no marked deformity; all the diameters are proportionately diminished, and the pelvis is deep and somewhat funnel-shaped, so that obstruction generally increases towards the outlet. This form of pelvis may be found in large muscular women of the masculine type, but is more often seen in meagre, ill-developed women.

3. **Uniformly Contracted Flat Pelvis.**—This variety is practically a combination of the bad qualities of the two preceding types.

4. **Spondylolisthetic Pelvis.**—In this the last lumbar

vertebra is dislocated forwards in front of the sacral promontory, so as to narrow the conjugate of the brim. The obstruction may be so great as to necessitate Cæsarean section. This deformity may depend on caries, rickets, or congenital dislocation.

5. **Obliquely Contracted Pelvis of Naegele.**—In this there is ankylosis of the sacro-iliac joint on one side, associated with defective development of the lateral half of the sacrum and os innominatum of the same side. The sacrum is displaced towards the ankylosed side and the pubes towards the healthy side. The oblique diameter, measured from the sacro-iliac joint on the healthy side to the acetabulum of the diseased side, is shortened. Great deformity may be produced, and cause corresponding obstruction during labour. The cause of the deformity is ankylosis of the sacro-iliac joint, associated with pressure upwards on the acetabulum through the femur on the same side.

6. **Roberts's Transversely Contracted Pelvis.**—This is a rare deformity, depending on ankylosis of both sacro-iliac joints. The transverse diameter and conjugate of the brim are shortened; the ischia are pressed inwards and narrow the transverse diameter of the outlet. The obstruction is very great, and Cæsarean section is often required.

7. **The Kyphotic Pelvis** has the conjugate of the brim increased, owing to the rotation of the base of the sacrum backwards. The transverse diameter of the brim and all the diameters of the outlet are lessened. The pubic arch is narrow. The obstruction increases towards the outlet.

8. **Pelvis deformed by Osteo-Malacia—Triradiate Pelvis.**—This disease produces softening of the pelvic bones. Owing to the pressure exerted on the softened bones, the following deformities arise: The sacral promontory projects forward; the sacrum is very curved; the lateral walls of the pelvis are pressed

inwards at the acetabula, so as to shorten both oblique diameters ; the tuberosities of the ischia and sides of the pelvis are pressed towards one another, and thus the dimensions of the cavity and outlet are greatly lessened. The pubes often project forwards and become beaked. Great deformity is thus produced, and craniotomy or Cæsarean section may be necessary ; occasionally, however, the bones are plastic, and allow the fœtus to pass.

9. **Deformities depending on Exostoses, Tumours, etc.**—Exostoses, malignant growths of the sacrum and other pelvic bones, may encroach on the pelvic cavity, and cause obstruction and injury to the overlying soft parts during delivery. Cæsarean section may be required.

The Diagnosis of Contracted Pelvis is derived from :

(*a*) **The History and General Examination.**—The history of rickets and of previous protracted labours, and the presence of deformities of the limbs and spine, would lead to the suspicion of contracted pelvis.

(*b*) **Pelvic Measurements.** { 1. External Measurements. 2. Internal Measurements.

1. **External Measurements** are very useful ; they do not supply us with knowledge of the exact internal measurements, but any deviation from their normal relation points to deformity internally. The measurements are obtained by means of Baudelocque's or other calipers, which are simply modifications of carpenter's compasses.

The three most important external measurements are :

i. **The Interspinous.**—The distance between the two anterior superior spines, which normally measures 10 inches.

ii. **The Intercristal.**—The distance between the two most widely separated points of the iliac crests, measuring normally 11 inches.

iii. **The External Conjugate Diameter.**—This is the distance measured from just below the spine of the last lumbar vertebra to the upper margin of the symphysis pubis. The average measurement is $7\frac{1}{2}$ inches, and it is about $3\frac{1}{4}$ inches longer than the internal conjugate. According to Spiegelberg, if the measurements (i) and (ii) are less than normal, but their relation is unchanged, the pelvis is probably uniformly contracted; if the measurement (ii) is normal, but the measurement (i) is increased, the conjugate of the brim is probably contracted; if both (i) and (ii) are diminished, but their relation is abnormal—the measurement (i) being as great as, or even greater than (ii)—the pelvis is probably uniformly contracted, and has a shortened conjugate.

Occasionally in thin women the sacral promontory can be felt by pressure through the abdominal walls above the pubes, and the distance between it and the upper margin of the symphysis pubis (**internal conjugate**) can be measured.

2. **Internal Measurements.**—Various instruments (pelvimeters) are used for obtaining the internal pelvic measurements, but the best is the hand. The chief internal measurement to be obtained is the **diagonal conjugate diameter**—*i.e.*, the distance between the lower margin of the symphysis and the sacral promontory. This measurement, minus $\frac{1}{2}$ inch, will give the conjugate diameter of the brim (**true conjugate**).

Method of Measuring the Diagonal Conjugate.—The index and middle fingers are introduced into the vagina, and the posterior vaginal wall is pressed backwards by the tip of the middle finger till it reaches the sacral promontory, the radial border of the hand resting against the lower margin of the symphysis. The distance between the tip of the middle finger and the point of the hand where it is touched by the symphysis

is the measurement of the diagonal conjugate. As the fingers are introduced in ordinary vaginal examinations it is not often possible to touch the sacral promontory; if the sacral promontory can be felt in this way, some degree of contraction may be inferred.

Influence of Deformed Pelvis on Pregnancy and Labour.

In cases of deformed pelvis, the uterus is often anteverted, and pendulous abdomen is very common; the uterus is also higher and more movable than natural, as it cannot sink into the pelvis. Malpresentations are very common, partly owing to the great mobility of the uterus, and partly because the anteverted condition of the uterus and the pelvic contraction tend to carry the head away from the brim. During labour the difficulty, of course, varies with the degree of contraction; the membranes form a sausage-shaped protrusion; the pains are usually strong, but the mobility and anteversion of the uterus prevent them from acting efficiently. If the deformity is slight the pains may effect delivery.

Influence on the Mother.—Pelvic contraction, especially if at all great, is a serious matter for the mother, as she is exposed to the danger of exhaustion from excessive uterine action, and also to the risk of contusions and sloughing of the uterus, cervix, and vagina, as well as to the danger of the various operations necessary.

Influence on the Child.—Owing to the great pressure to which the head is subjected, and also owing to the liability to prolapse of the cord, the prognosis as regards the child is unfavourable. The caput succedaneum is large. Contusions of the scalp are often present, and generally disappear in a few days.

Occasionally the pressure causes ulceration and suppuration of the scalp.

The cranial bones overlap greatly, and very often a large depression is produced near the coronal suture by pressure against the sacral promontory. The depression generally disappears after labour. Intracranial hæmorrhage occasionally results from the compression of the head.

The Mechanism of Delivery in Contracted Pelvis.—If the degree of contraction is slight, by moulding of the head delivery may occur naturally. The mechanism by which the head passes the obstruction varies with the kind of contraction. In cases of contracted conjugate the head enters the pelvis in the transverse diameter, having the sagittal suture near the sacral promontory, owing to the tilting of the head—"Naegele obliquity." The small bitemporal diameter of the head engages in the narrowed conjugate, and by slight extension the head passes the contraction and brings the anterior fontanelle a little lower than the posterior; strong flexion and descent now occur, and rotation and birth of the head take place in the usual way. In slight cases of uniformly contracted pelvis, strong flexion of the head may occur, and it may be born without help.

If the obliquity of the head is very great, as shown by the sagittal suture lying near or even above the sacral promontory, we may infer that the conjugate is very small, and that operative interference will be needed. Again, if the face presents in a case of contracted pelvis, interference will be necessary.

Management of Labour in Cases of Contracted Pelvis.—In cases of slightly contracted pelvis, with conjugates of 4 inches or a little under, delivery is often effected by natural powers. Spontaneous delivery is most likely to take place when the pains are strong and the child is not unduly large. In cases of

more advanced contraction the treatment must depend upon whether the case is seen during pregnancy or during labour.

1. **Cases seen during Pregnancy.**—In cases of slight contraction it is usually safe to allow labour to take place at term, assisting delivery by forceps if necessary.

In cases with a diagonal conjugate of $3\frac{3}{4}$ inches or over, labour should be induced by bougies. The time for inducing labour should be fixed by estimating the relative size of the pelvis and the child's head. In the ordinary run of cases, however, it may be taken that the best time to induce labour is at the thirty-sixth week of pregnancy. After labour has been induced, it may be necessary to assist with forceps. In cases with a diagonal conjugate of $3\frac{1}{2}$ inches or under, Cæsarean section at term is the best treatment.

2. **Cases seen during Labour—Forceps and Version.**—If the internal conjugate measures from 4 down to $3\frac{1}{4}$ inches, and the head is engaged in the brim, the use of the forceps is indicated; if, however, the head is freely movable above the brim, turning would probably subject the mother to less risk of injury, and should be resorted to in preference to the forceps. When the conjugate measures from $3\frac{1}{2}$ to $2\frac{3}{4}$ inches, version should be performed. The head, when it enters the pelvis with the base of the skull foremost, passes a contraction more readily than it does if it enters with the vertex first. This is partly owing to the fact that the widest diameter of the base is narrower by $\frac{1}{2}$ inch than the biparietal diameter, and partly because the small bitemporal diameter engages in the conjugate. Further, the bulk of the head is more readily diminished by overriding of the bones at the sagittal suture when the head follows the body than when it precedes it; hence the preference given to turning in the greater degrees of contraction.

When the conjugate measures from 2 to 3 inches, Cæsarean section should be performed if the child is alive and the patient has not been more than one or two hours in labour. Cæsarean section is the only possible means of delivery in cases with a conjugate of 2 inches or under. In all other cases where the child is dead craniotomy should be performed.

LABOUR OBSTRUCTED BY ABNORMAL CONDITIONS OF THE MATERNAL SOFT PARTS

THE following conditions may cause obstruction during labour :

A. **Abnormal Conditions of the Cervix.**

1. **Rigidity of the Cervix.**—This condition often delays the first stage. especially if the membranes are ruptured too early, and sometimes after the exhibition of ergot. In such cases the uterine contractions are irregular and very painful, and are often associated with spasmodic contraction of cervix.

2. **Adhesion of the Lips of the Os Externum** dependent on inflammation of the cervix. The os is recognized as a small pit.

3. **Cicatrization of the Cervix**, due to the healing of lacerations produced in former labours.

4. **Hypertrophy of the Cervix**, especially of the anterior lip.

5. **Carcinoma of the Cervix.** If only of slight extent, dilatation may occur; if extensive, the tissues may break down and give rise to much hæmorrhage, or septicæmia may follow from absorption of septic matter from bruised tissues.

Treatment of Cervical Obstruction.—In cases of rigid cervix, the painful contractions are relieved by chloral, and dilatation often progresses steadily after

its use. If the membranes rupture early, dilatation may be assisted by bags or by manipulations with the fingers. After complete dilatation labour may be finished with forceps. In cases of great obstruction of the cervix depending on cancer or cicatrization, Cæsarean section should be performed.

B. **Abnormal Conditions of the Vagina.**

1. **Cicatricial Contraction**, depending on previous syphilitic, traumatic, or other ulcerations.

2. **Various Abnormal Conditions at the Vaginal Orifice.**—Rigid perineum, œdema of the vulva, thrombus of the vulva and vagina, are the most important. In the first case rupture is liable to occur, and in the two last sloughing may take place from pressure. Other less important conditions are adhesions of the labia, vaginismus, rigid hymen; they rarely, however, occasion much delay.

C. **Various Tumours, etc., encroaching on the Pelvic Space.**

1. **Fibroids**, if seated in the upper part of the uterus, may give rise to inefficient pains and post-partum hæmorrhage. If, however, they are seated in the lower segment, they may, by occupying part of the pelvic cavity, cause obstruction.

2. **Ovarian Tumours**, if of large size, rise out of the pelvis, and only cause delay by producing uterine inertia; but if small, they may remain in the pelvis and cause obstruction. In consequence of the pressure to which they are subjected they may rupture, or strangulation and necrosis of the cyst may ensue.

3. **Prolapse of the anterior vaginal wall and anterior half of the lower uterine segment** may cause some obstruction to delivery.

4. **Prolapse of the distended rectum** (rectocele) may protract labour.

Treatment of the above Conditions:

In cicatricial narrowing of the vagina, if the obstruc-

tion does not yield naturally, it may be aided by tents and dilating bags; occasionally incisions are necessary. The treatment for rigid perineum is given in a previous section. In œdema of the vulva make several punctures to let out the serum. In thrombus of the vulva and vagina, if small, deliver quickly by the forceps; if large, incise the swelling and turn out the clots, controlling the bleeding by pressure. If the obstruction is due to a fibroid, attempts should be made to push it above the pelvic brim, so as to remove it from pressure. If it cannot be pushed out of the way, Cæsarean section, with or without hysterectomy, should be performed. As a general rule, fibroids very seldom obstruct labour. Large ovarian cysts do not, as a rule, obstruct labour, and may be dealt with after labour; smaller ovarian tumours in the pelvis may often be pushed up out of the way. Much force should never be employed in doing this, because the tumour may be a dermoid, and may be ruptured, with serious consequences. If the tumour cannot be pushed up, the abdomen should be opened and the tumour removed, after which labour may be completed by forceps. In cases of prolapse of the lower uterine segment a finger should be hooked into the os and the uterine wall drawn over the presenting part.

D. **Displacements of the Uterus causing Obstruction.**

1. **Pendulous Abdomen.**—In these cases the patient is usually a multipara with a contracted pelvis. If the obstruction depends only on the position of the uterus, it may be overcome by the application of a firm abdominal binder. If contraction of the pelvis is causing obstruction, it must be dealt with according to the principles already laid down.

2. **Retroversion of the Gravid Uterus.**—In a few cases term is reached with the uterus still retroverted. In these cases the anterior wall of the uterus develops

and the head lies in Douglas's pouch, behind the cervix. Version or Cæsarean section is recommended for this condition.

ABNORMAL CONDITIONS OF THE FŒTUS OBSTRUCTING DELIVERY

A. Transverse Lies.

In these cases the shoulder, elbow, or hand may present. The child lies obliquely across the uterine cavity. Natural delivery is very rare, as the shoulder forms the apex of a wedge (the base being formed by the head and chest), which becomes jammed and fixed in the pelvis. Interference is therefore necessary in all cases.

Frequency.—Transverse presentations occur once in about 260 cases of labour.

Causation :

1. Any condition which prevents the head from engaging in the brim, or occupying the lower segment of the uterus, may cause the head to pass to one side and the shoulder to slip into its place—*e.g.*, contracted pelvis, placenta prævia.

2. Undue obliquity of the uterus may cause the head to hitch above the pelvic brim, and the shoulder to sink into its place.

3. Excess of liquor amnii and laxity of uterine walls, by allowing too great mobility of the fœtus, favour its production.

4. In some cases it may be due to the transverse diameter of the uterus being relatively too long. This is said to account for the successive recurrence of transverse presentations in the same woman.

5. The second, of twins, often lies transversely.

Diagnosis :

By **External Examination** the long axis of the uterus is found lying obliquely. The hard resisting head may be felt in one iliac fossa and the breech at the opposite pole. By **Vaginal Examination** the membranes are found in the form of a narrow pouch ; the presenting part is often high up, but, if within reach, the shoulder, elbow, or hand may be made out.

Diagnostic Marks of the Shoulder.—The ribs can be felt in the axilla, and are the only marks by which the shoulder can be definitely recognized.

Diagnostic Marks of the Elbow.—The olecranon, with the two condyles on either side.

Diagnostic Marks of the Hand.—The fingers are more easily separated than the toes, and the thumb can be carried across the palm.

Prognosis.—As regards the mother, it is fair if the case is treated at an early stage, before the shoulder has become jammed in the pelvis and the uterus has become moulded upon the child. The prognosis for the child is also moderately good when the condition is recognized early. Prolapse of the cord is very common.

Positions :

1. **Dorso-Anterior** (*child's back directed forward*).	1. **Head in right iliac fossa.** 2. **Head in left iliac fossa.**
2. **Dorso-Posterior** (*child's back directed backward*).	3. **Head in right iliac fossa.** 4. **Head in left iliac fossa.**

Mechanism of Delivery.—Four methods of spontaneous delivery are described :

1. **Spontaneous Rectification.**—The head is forced over the brim, and is born as a vertex presentation.

2. **Spontaneous Version** is the term applied to cases where the breech is spontaneously substituted for a transverse presentation. Such a change can

only occur when the fœtus is freely movable in the uterus, either before the escape of the liquor amnii or immediately after. It is said to depend on partial or irregular contractions of the uterus.

3. **Spontaneous Evolution.**—If this occur, the child is born with its shoulder presenting. The child is subjected to great pressure, and the shoulder is forced down and fixed against the lower border of the pubes. Round the shoulder, as a fixed point, the rest of the body rotates, the thorax, breech, and legs following in succession, and finally the opposite shoulder and head. Spontaneous evolution can only occur when the fœtus is small, premature, and dead.

4. **Spontaneous Expulsion.**—The child is expelled in a doubled-up attitude, the back usually coming first. It can only occur when the child is small and very plastic.

Management of Transverse Lies.—None of the above methods of delivery can be relied upon to occur in practice, particularly if the pelvis is contracted. Immediately the case is recognized, version should be attempted by external manipulations or the bipolar method; if these fail, the hand should be passed into the uterus and podalic version performed. If, owing to the condition of the uterus, version is dangerous or impossible, decapitation or embryotomy must be resorted to.

Complicated Presentations.

These are rare cases where more than one part of the body presents; there are two chief kinds:

1. **When a hand or foot presents with the head,** there is rarely any difficulty, as the head generally enters the brim alone; and even if both enter, the head is generally born without much difficulty when the pelvis is roomy. Occasionally the head is pushed

into the iliac fossa and the shoulder descends. If, however, the pelvis is narrow and both enter, the head may become fast. **Causation.**—Excess of liquor amnii, immaturity of fœtus, and contracted pelvis. **Management.**—Attempts should be made to push the hand or foot upwards between the pains, and to favour engagement of the head in the brim by pressure on the fundus ; if this fail, place the limb where there is most room—*i.e.*, on one side the sacral promontory—and apply forceps.

2. **When a foot and hand present together,** the foot should be retained, and traction made on it, so as to prevent the possibility of a shoulder presentation arising.

Presentation and Prolapse of the Cord.—Although not a cause of obstructed labour, cord complications so often accompany obstructed labour that this section is inserted here for convenience.

Definition.—In cases where the cord can be felt through the unruptured membranes it is said to present ; after the membranes rupture, if the cord lies in front, or at the side, of the presenting part, it is prolapsed.

Causation.—The production of prolapse is favoured by excess of liquor amnii, by too long a cord, and by sudden escape of the liquor amnii. Again, any condition which prevents the presenting part from engaging in and accurately filling the pelvic brim or the lower part of the uterus, such as pelvic contraction, placenta prævia, malpresentations (especially transverse), conduces to prolapse of the cord.

Diagnosis.—The cord forms a soft movable mass, in which pulsations are felt. The coils of the cord can be felt after rupture of the membranes. During a pain the pulsations often stop.

Prognosis.—There is no danger to the mother, but there is great danger of the child dying from asphyxia,

owing to compression of the cord by the presenting part. Half the children die.

Treatment.—The great indication in treatment is to relieve the cord from pressure. The membranes should be left intact as long as possible, in order to get complete dilatation of the os and to lessen the pressure on the cord. Attempts may be made to replace the cord by one of the following methods:

1. **Knee-Chest Position.**—The patient is placed on her knees and chest so that the cord can slip down into the fundus of the uterus; the cord is then taken in the hand and pushed beyond the presenting part during the intervals of the pains. After replacement of the cord, engagement of the head in the brim should be brought about by pressure on the uterus, and in order to prevent a return of the cord, the patient should lie on her side, with her hips raised by pillows.

2. **Another method** consists in pushing the cord up with the fingers past the presenting part between the pains, and in trying to produce engagement of the head by pressure on the uterus during the pains.

Methods which aim at replacing the cord by means of instruments designed for the purpose are generally useless. In cases of breech presentation prolapse of the cord is not always a serious complication, because the cord is well protected by the legs of the child. In head-first cases no interference is called for if the pulsations in the cord have ceased. On the other hand, if the cord is pulsating when the prolapse is discovered, the child should be delivered as soon as possible—by forceps if the head is fixed in the pelvis, and by version if it is floating above the brim.

B. **Abnormal Size of Head.**

Hydrocephalus.—Owing to the increased size of the head serious obstruction may arise, and if not treated early the soft parts of the pelvis may be injured, and

the child's life endangered. The children are generally still-born. **Diagnosis.**—Refusal of the head to enter the pelvis, although the pains are good and there is no pelvic contraction, would lead to the suspicion of hydrocephalus. By a careful examination the large size of the head, the abnormal width of the sutures, and the large size of the fontanelles, may be made out. **Treatment.**—The cranium should be punctured with a trocar, and the fluid drawn off; the size of the head is thus lessened, and it may then be born naturally, or by the help of the forceps or version. If this fail, craniotomy becomes necessary.

Meningocele.—In this the meninges are protruded by fluid, in the occipital or frontal region. If obstruction arise, puncture with the aspirator.

C. **Obstruction Caused by Other Parts.**

1. **Hydrothorax, ascites, distension of the urinary bladder, spina-bifida,** may occasionally lead to obstruction after birth of the head. **Treatment.**—The fluid should be drawn off by the aspirator.

2. **Tumours** (cystic, malignant, etc.) of the liver, kidney, and other parts; protrusion of enlarged viscera through congenital deficiencies of the abdominal walls may cause obstruction. **Treatment.**—Evisceration, if necessary.

3. **Other Congenital Deformities,** such as acardiac and anencephalic monsters, rarely cause any obstruction, though they may make the diagnosis difficult.

D. **Obstruction due to Double Monsters:**

According to Playfair, there are four principal varieties of double monsters:

1. Two bodies united in front by the thorax or abdomen; this is the most common variety.

2. Two bodies placed back to back and united by the lower part of the spine.

3. Dicephalous monsters, having two separate heads on a single body.

4. Two separate bodies having the heads partly or wholly united.

Mechanism of Birth and Management.—In most cases, as the children are small, delivery is effected by the natural forces. If, however, they become arrested, craniotomy or embryotomy may be necessary.

E. **Other Conditions, such as Difficult Cases of Twins and Malpresentations**, may obstruct labour, and are treated of under their respective sections.

POST-PARTUM HÆMORRHAGE

Definition. — Hæmorrhage during or shortly after the third stage of labour. The blood may come from lacerations of the genital canal, in which case the bleeding is traumatic; but more often it flows from the relaxed placental site, and is atonic.

Causation.—The chief natural agent preventing post-partum hæmorrhage is the muscular contraction of the uterus, which closes the uterine sinuses. Any condition which interferes with the normal action of the uterus is liable to cause hæmorrhage.

(*a*) Conditions producing atony and leading to imperfect contraction of the uterus, and therefore predisposing to hæmorrhage, are protracted labour, overdistension of the uterus from hydramnios or twins, ante-partum hæmorrhage, exhaustion.

(*b*) Conditions interfering with the proper contraction of the uterus are retained placenta, clots in the uterus, peritoneal adhesions, tumours of the uterus.

Symptoms —The bleeding may commence immediately, or some hours after the placenta is expelled. It may be gradual or sudden in its onset, and may be slight and easily arrested, or copious and producing

faintness, feeble pulse, pallor and coldness of the skin, restlessness, and in some cases convulsions and death. Recovery generally occurs.

Treatment.—Prophylactic treatment consists in the proper management of the three stages of labour. In all cases efficient contractions of the uterus should be ensured by giving ext. ergot. liq. ℥j after expulsion of the placenta, and by manual control of the uterus, after which a well-fitting binder should be applied. If the pulse rises after labour, and if the uterus does not contract firmly, hæmorrhage is likely to occur.

Curative Treatment.—When hæmorrhage is occurring there are two main principles of treatment to bear in mind. In the first place, the uterine cavity must be emptied, and then the uterus must be made to contract.

If the hæmorrhage takes place before the birth of the placenta, the uterus should be massaged by the hand. This may make it contract and stop the bleeding. Should it not do so, the placenta must be removed from the uterus either by expression, or by introducing the hand into the uterus and removing the placenta, giving an intra-uterine douche of some antiseptic solution afterwards. After removal of the placenta the bleeding usually stops.

If the bleeding begins or continues after the birth of the placenta, the first thing to do is to grasp and knead the uterus with the hand, and when the uterus is contracted, it should be squeezed to express clots from its cavity. When the uterus does not react readily to the stimulation of kneading, an intra-uterine douche at a temperature of about 120° F. should be given. This makes the uterus contract in nearly every case. Ergot should also be given in the form of an injection intramuscularly.

In cases where these methods fail, the best thing to

do is to compress the uterus between the two hands. Bimanual compression is carried out by placing one hand, doubled up, in the vagina, and pressing the uterus down upon it with the other hand on the abdomen. The uterus should be held in this way until it can be felt to contract. Bleeding from the uterus can always be arrested by these means. Other methods are sometimes employed, such as plugging the uterine cavity and compression of the abdominal aorta. The injection of perchloride of iron into the uterus is an entirely obsolete method of treatment.

In cases of traumatic hæmorrhage the cervix or the vestibule is usually torn. A hot douche may stop bleeding from the cervix if the tear is not deep ; if it does not do so, it should be sewn up or plugged. Tears in the vestibule often bleed freely, and can be stitched up at once.

After the bleeding has been stopped, steps should be taken to treat the consequent collapse. The patient's head should be lowered and the foot of the bed raised. Hot saline solution should be injected into the rectum, under the breasts, or into a vein. Strychnine and brandy may be given. The patient must be kept quiet and warm until reaction sets in. Opium may then be given to produce sleep. A patient should not nurse her infant after a severe hæmorrhage. Thrombosis is not uncommon in these cases.

Puerperal Hæmorrhage, or Secondary Post-partum Hæmorrhage.

This term is applied to cases in which bleeding takes place several hours or days after labour. The bleeding may be slight or copious ; there may be one attack only or several recurrent attacks.

The cause of the bleeding is generally due to a piece of placenta or membrane being left behind in

the uterus. It is also likely to occur in cases where the uterine wall is soft, as in a case of sapræmia. Any sudden movement or straining at stool may then excite hæmorrhage.

Treatment.—In all cases of secondary post-partum hæmorrhage the uterine cavity should be explored with the finger, and clots, pieces of membrane or placenta should be carefully removed. The uterine cavity should then be washed out with an antiseptic solution. Any displacement of the uterus should be rectified. Full doses of ergot, either by the mouth or hypodermically, should be ordered, and if any loss continues after the exploration, hot vaginal douches and uterine massage should be employed. In some cases where the uterus is very soft and flabby it may be necessary to plug the cavity with gauze.

RETENTION OF THE PLACENTA

Causation. — (*a*) **Hour-glass contraction** of the uterus—*i.e.*, spasmodic contraction about its centre, the uterus being relaxed above and below this point —may lead to retention of the placenta above the contraction. Complete inertia may produce the same result.

(*b*) **Disease of the Decidua** may give rise to tough adhesions, which retain the placenta *in utero*.

Treatment.—In cases of hour-glass contraction of the uterus the best thing to do is to anæsthetize the patient with chloroform, and so relax the spasm. The placenta may often be expressed with ease afterwards. In other cases the fingers must be introduced into the uterus in a cone-shaped fashion, and gradually dilate the spasmodically contracted part of the uterus until they can reach the placenta.

In cases where the placenta is retained on account of morbid adhesion to the uterine walls, the patient may or may not be losing blood. In the latter case it is probable that the placenta is adherent over the whole of its surface. The correct treatment in these cases is to introduce the hand into the uterus and peel the placenta off the uterine walls, after which it may be removed. A glove should be worn for this purpose, and an intra-uterine douche of some antiseptic solution should be given afterwards.

INVERSION OF THE UTERUS

Definition. — Partial or complete turning of the uterus inside out.

Varieties—(*a*) **Partial.**—The fundus having a cup-like depression on its outer surface, with a corresponding projection on its inner surface. (*b*) **Complete.**—The uterus turned inside out as far as the cervix.

Causation.—It is due either to pressure from above, acting on the relaxed uterus—*e.g.*, undue manual pressure in expelling the placenta, pressure produced by straining—or to traction acting on the inner surface, as in drawing on the cord. It is especially liable to occur when the placenta is attached centrally to the fundus uteri. In some cases it may be due to irregular and unequal contraction of the uterus. **Frequency.**—It is a very rare and dangerous complication.

Symptoms and Signs.—Uterine hæmorrhage, bearing-down pains, and shock (fainting, weak pulse, etc.) are the chief symptoms. *Per vaginam* in the complete form, a globular mass is felt to which the placenta is often attached; in the incomplete form a round swelling is felt protruding down to or through the os uteri,

and *per abdomen*, instead of the rounded fundus uteri a cup-like depression may be felt in its place.

Diagnosis.—The passage of the uterine sound will distinguish it from a polypus; in the latter the sound passes the whole length of the uterine cavity, whilst in inversion it either cannot be passed at all or can only be passed a short distance.

Treatment.—Replace the uterus as quickly as possible by pressing the fundus upwards with the hand in the direction of the pelvic axis, applying counter-pressure in the hypogastrium; to avoid the sacral promontory the pressure should be directed a little to one side. Chloroform should be given. Another method sometimes of use is to first re-invert the uterus near one of the Fallopian tubes. If the placenta is attached it is best to endeavour to reduce the uterus without detaching it, so as to avoid additional hæmorrhage; if, however, this is impossible, the placenta must be removed before reduction.

RUPTURE OF THE UTERUS

Anatomy.—Rupture may take place at any part of the uterus, but is most common at the junction of the cervix with the body, as this is the part which is most stretched and pressed upon during labour. Slight lacerations of the vaginal portion of the cervix are very common in labour and are of little import, but rupture above this part is much less common and is a very grave accident. The rupture may be **complete**, involving both uterus and peritoneum, or **incomplete**, involving uterus alone or peritoneum alone. It is generally seated on the anterior or posterior surface, and is usually vertical in direction; it may be merely

a slight tear, but by extending upwards and downwards it may involve the body of the uterus and vagina, and become large enough to allow the passage of the fœtus. The borders of the rupture are ragged, and blood is generally effused into the peritoneum.

Causation.—Predisposing Causes.—(*a*) Any condition which produces undue compression or stretching of the uterus at the junction of the body and cervix will predispose to rupture—*e.g.*, deformed pelvis, very large fœtal head, malpresentations, etc.

(*b*) Alteration of the uterine tissue—such as is produced by the presence of fibroids, cancer, premature degeneration of the muscular fibres—may favour its production. It is most common in multiparæ.

Exciting Causes.—Blows on the uterus, falls, injury by instruments, excessive contractions of the uterus, such as occur in contracted pelvis and after the use of ergot, may produce it.

Symptoms and Signs.—Rupture may be preceded by crampy pain in the lower part of the abdomen, but as a rule it occurs suddenly, and is accompanied by great pain in the abdomen, and there is often a feeling of something having given way. Blood flows from the vagina, and the uterine contractions cease. Symptoms of collapse (cold clammy skin, pallor, thready pulse, vomiting) soon follow. By examination *per vaginam* the presenting part will be felt to have receded from the os, owing to partial or complete escape of the child through the rupture; occasionally a loop of intestine descends into the vagina through the rent. In some cases the uterus may be made out to be empty and the rent can be felt, and it will be possible to trace the outline of the child through the abdominal wall. When rupture is incomplete, the symptoms are not so evident, as the presenting part may not recede, and there are only the symptoms of hæmorrhage, pain, and collapse present.

Prognosis.—As regards the mother it is very grave; recovery rarely occurs, death generally taking place from shock, hæmorrhage, or peritonitis. The child is generally born dead.

Treatment—Preventive.—In cases where pressure and stretching of the uterus are likely to occur, as in contracted pelvis, timely interference may prevent the possible occurrence of rupture. **After rupture has occurred,** if the fœtus remains entirely *in utero*, deliver as quickly as possible by turning or the forceps. If the head only has passed through the rent, it may be possible to seize the feet and extract the fœtus *per vaginam*, the placenta being afterwards carefully removed by the hand passed into the uterus. When the entire fœtus, or a greater part of it, passes into the peritoneal cavity, it is best to perform laparotomy, and through the opening thus made extract the fœtus and placenta; the rent in the uterus should be united as in the Cæsarean section, and the blood in the peritoneum carefully sponged out. Laparotomy gives the mother a better chance than passage of the hand through the rent and attempts to extract the fœtus and placenta in this way. In cases where the patient is in a profound state of shock and the child has been extracted, it is better to plug the tear than to open the abdomen and sew it up. As a rule, there is very little bleeding from tears of the uterus.

Laceration of Vaginal Portion of the Cervix.

Extent.—Slight tears are very common, but occasionally the entire cervix is involved. The tears are generally vertical; sometimes, however, they are transverse, and in rare cases an entire ring of cervical tissue may be detached.

Causation.—Lacerations occur most commonly in cases where the cervix is rigid and unyielding, as in

old primiparæ; they may be produced in obstetrical operations, and may result from pressure of the anterior lip of the cervix between the head and pubes.

Consequences.—Post-partum hæmorrhage and pelvic inflammation may follow tears of the cervix.

Treatment.—If the rent is only slight and there is no hæmorrhage, cleanliness by means of antiseptic injections will suffice. When more extensive and accompanied by hæmorrhage, the bleeding should be arrested by hot-water injections. If very extensive, sutures or plugging should be used.

Lacerations of the Vagina.

Extent.—They may be mere abrasions of the surface, or may be more extensive, and result in vesico-vaginal or recto-vaginal fistula.

Causation.—Pressure produced by the head and injury by the forceps are the commonest causes.

Treatment.—Slight cases simply require cleanliness; if a fistula is produced, it will require surgical treatment afterwards. In more extensive cases the vaginal walls should be immediately sutured.

Lacerations of the Perineum.

Extent.—In the complete form the laceration extends through the anal sphincter into the anterior wall of the rectum.

In the incomplete form the laceration may extend up to the anal sphincter, but not through it.

Treatment.—All but the very slightest tears of the perineum should be sewn up. In cases of complete rupture the patient should be anæsthetized and placed in the lithotomy position for the operation. Silkworm gut is the best suture material to use, and the stitches are most easily inserted with the help of a half-circle needle held in an ordinary artery clip. The

main point in inserting the stitches is to make sure that they completely encircle the tear.

THROMBUS OF THE VAGINA AND VULVA

Definition.—Effusion of blood into the cellular tissue of the vulva and vagina during or immediately after labour.

The hæmorrhage may be arterial or venous. The effusion may occasionally extend along the vagina to the cellular tissue in the iliac fossa, or upwards beneath the peritoneum to the kidneys posteriorly. The result of the hæmorrhage is the formation of a tumour in the vagina or vulva, varying from the size of a hen's egg to that of the fœtal head.

Causation.—This condition depends on rupture of the vessels consequent on pressure of the presenting part of the fœtus ; it is also partly due to the straining efforts of the mother.

Symptoms and Signs.—A swelling appears at the vulva, over which the skin is blue and tense. Rupture of the swelling may take place and fatal hæmorrhage ensue. If the blood contained in the tumour be fluid, fluctuation may be felt ; if coagulated, it presents a boggy feel. The tumour may obstruct labour, and by pressing on the rectum and neck of the bladder may cause obstruction of the bowel and retention of the urine.

Termination.—If of small size, absorption of the blood and recovery may take place. Recovery occasionally occurs after rupture. Death may result from hæmorrhage with or without rupture, or it may result from septicæmia owing to infection of the sac contents.

Treatment.—If it occurs during labour, the labour should be concluded as quickly as possible by application of the forceps; if, however, the tumour obstructs delivery, it should be incised and the clots turned out, the hæmorrhage being controlled by digital pressure and the application of a gauze plug. If rupture occurs after labour, the hæmorrhage should be controlled by the same means. After delivery, if the thrombus is small it should be left alone, as absorption may occur; if suppuration takes place, the abscess thus formed should be opened and treated antiseptically.

RUPTURE OF THE PELVIC ARTICULATIONS

OCCASIONALLY ensues from the use of the forceps in contracted pelvis. The symphysis pubis is the joint most often injured. It is generally accompanied by laceration of the soft tissues (bladder, rectum).

Treatment.—Rest in bed and application of a binder.

OBSTETRIC OPERATIONS

INDUCTION OF PREMATURE LABOUR

Objects of the Operation.—Delivery at full term often subjects the mother or the child, or both, to danger, which may be avoided by inducing labour at an earlier stage of pregnancy. If it is desirable to obtain a viable child, the operation should not be performed earlier than the seventh month, as there is little chance of a child born before that date surviving. The operation may be indicated in the interest of the mother, or of the child, or of both.

1. **It is indicated for the sake of both mother and child** in some cases of pelvic contraction and tumours when delivery at full term would be injurious.

2. **It is indicated for the child** in cases where the child has died in previous pregnancies at some particular time from placental or other disease. If labour is induced a little before the time at which death has usually occurred, a living child may be obtained. It is not easy to decide when to bring on the labour, but careful auscultation of the fœtal heart, the beat of which becomes more rapid before death, will guide us.

3. **It is indicated for the mother**, as a last resource, when all other means have failed and the

mother's life is endangered—in cases of excessive vomiting, chorea, convulsions, great dyspnœa placenta prævia, albuminuria, severe cardiac or pulmonary disease.

Methods of Inducing Labour :

1. **By Bougies.**—This is by far the safest and most satisfactory method to employ. One or two solid gum-elastic bougies should be passed between the uterine wall and the membranes and left inside the uterus. The membranes should not be ruptured. The bougies should be sterilized previously by soaking them in a 1 in 500 solution of perchloride of mercury. Labour usually comes on about three days after the insertion of the bougies, but in some cases pains start a few hours after their introduction, while in other cases no pains come on for a week. In the author's experience it is unwise to attempt to hurry matters by the insertion of bags, and the cases which are not interfered with do well.

2. **Other Methods :**

(*a*) **By Bags.**—Practically the only form of bag at present in use is that of Champetier de Ribes, or one of its modifications. This is a cone-shaped bag made of inelastic material, which can be folded up and inserted with a special pair of forceps through a cervix which will admit two fingers. When in position it is distended with sterile water. The bag is made in varying sizes, the largest size being 4 inches in diameter at the base, and holding 17 ounces of fluid. The advantage of this appliance is that it excites pain quickly, and when expelled dilates the cervix. Its great disadvantage lies in the fact that it displaces the presenting part and is liable to cause prolapse of the cord. It has many uses in midwifery.

(*b*) **Rupture of the membranes** by means of a catheter or sound. This is a certain method, but it

is apt to be slow, because the fluid-dilating wedge formed by the bag of membranes is lost. As the fœtus is exposed to the direct pressure of the uterus, it is often still-born. The method is very useful in producing early abortion, but is not adapted for inducing premature labour unless combined with other methods.

(*c*) **Sea-tangle tents** may be inserted into the cervix. This is a good method for producing abortion.

(*d*) **Vaginal douches of hot and cold water** are very uncertain in their action, and are never employed for the purposes of inducing labour at the present day.

(*e*) **Injection of glycerine** between the uterine walls and the membranes has been tried with some success. It probably acts by mechanically separating the membranes from the uterine wall, and therefore should be injected in some bulk.

(*f*) **External Stimulation of the Uterus** by friction, galvanism, etc., is uncertain in its action and cannot be relied upon.

VERSION

Definition.—By version (turning) is understood the conversion of a transverse presentation into one of the head or breech, or the substitution of one pole of the fœtus for the other.

Indications for the Operation.—The operation may be required for the mother alone, for the child alone, or for both. The following are the chief conditions in which it is required: Transverse presentations; certain cases of deformed pelvis (with conjugate between $3\frac{1}{2}$ inches and $2\frac{3}{4}$ inches); various conditions endangering the life of the mother or child, such as

prolapse of the cord, placenta prævia, accidental hæmorrhage.

Prognosis.—For the operation to be easily performed a certain degree of mobility of the child in the uterus must be present; this is only the case when the liquor amnii is present or has only recently escaped. When the uterus is tightly contracted on the fœtus there is great danger in trying to move it, and attempts at version may be followed by rupture of the uterus and shock, which may prove fatal Hence the prognosis as regards the mother varies with the time at which the operation is undertaken, being more grave the later it is performed. The maternal mortality is about one in sixteen; the mortality of the children is generally high.

Classification of Methods.

1. **External Version.**—In this the change in position of the fœtus is effected by both hands manipulating externally on the abdominal wall.

2. **Combined or Bipolar Method.**—The change is effected by manipulation with one hand externally, two or more fingers of the other hand manipulating through the os uteri.

3. **Internal Version.**—The change is effected by means of the entire hand passed into the uterus.

By any of these methods the head (*cephalic version*) or the feet (*podalic version*) may be made to present

1. **External Version** can only be performed while the fœtus is very movable—*i.e.*, before or soon after rupture of the membranes; hence it may be attempted when a transverse presentation is discovered before or shortly after the commencement of labour. It is not suitable in cases where rapid delivery is indicated, or where the liquor amnii has drained away.

Method.—The positions of the head and breech

should be ascertained by abdominal and vaginal examination. The patient should lie on her back, whilst the operator with one hand pushes the head towards the brim, the breech being pushed in the opposite direction with the other hand. As the head would readily slip back to its old position, it should be retained over the brim till it is engaged, either by the hand or by means of pads placed at the breech and head. In some cases where it is found to be difficult to turn the child, the patient may be placed in the Trendelenburg position.

2. **Combined or Bipolar Method** (of Braxton-Hicks) is applicable to the same class of cases as external version. The presentation may be converted into a vertex or foot presentation. Before commencing, the exact positions of the head and breech should be ascertained.

(*a*) **Cephalic Version by the Bipolar Method.**—One or two fingers of the left hand are passed through the cervix, and the shoulder is pushed gradually in the direction of the feet ; at the same time the right hand is used externally and presses the head towards the brim. When in position over the brim, the head should be retained there by the right hand, while the left is withdrawn from the vagina, and presses the breech upwards if necessary.

(*b*) **Podalic Version by the Bipolar Method.**—By this means a head or shoulder presentation is converted into a foot presentation. **If the head presents,** its exact position should be made out from the position of the fontanelles. Two or three fingers of the right hand are passed through the cervix, and if the head lies in the first or fourth position, it should be gradually moved on the tips of the fingers to the left, the breech being depressed by the left hand in an opposite direction ; when the shoulder arrives at the os it should be pushed in the same direction as the

head ; as soon as a knee or foot comes in contact with the fingers, it should be seized and the membranes ruptured. If the head lies in the second or third position, it should be pushed to the right ; when the exact position of the head cannot be made out, it should be pushed to the left, as it generally lies in the first position. **If the shoulder presents,** it should be pushed in the direction of the head. The manipulations should be done in the intervals between the pains.

3. **Internal Version.**—(*a*) **Cephalic Version** is never done by this method, owing to the difficulty of seizing the head and retaining it in position.

(*b*) **Podalic Version** is easy by this method, if attempted before the liquor amnii has run off. The longer the time that elapses after rupture of the membranes, the greater the difficulty in performing the operation, as the uterus becomes tightly contracted on the fœtus, and prevents manipulation by the hand. Before turning, the bladder and rectum should be emptied, and chloroform given to do away with uterine contraction as much as possible. **Method.**—After the fingers, hand, and forearm have been well oiled on their dorsal aspect, the hand should be passed in the form of a cone through the vagina and os uteri along the axis of the pelvis ; when in the uterus the hand should be flattened out, and passed along the child's abdomen. All movements of the hand in the vagina and uterus should be performed in the intervals between the pains. A foot or knee should be seized and traction exerted on it between the pains ; in consequence of this traction the breech will descend, and ascent of the head should be helped by the external hand. As soon as the leg is brought through the os the labour may, if necessary, be finished by traction.

There are two questions of importance in turning,

viz.: (*a*) What part of the fœtus ought to be seized? (*b*) Which hand ought the operator to use in the uterus?

(*a*) What part of the fœtus ought to be seized? If the parts are not fully dilated a foot or knee should be seized, the other limb being left behind to form with the breech a better dilating wedge. If the cervix is well dilated both may be seized. If an arm presents it is best to seize (as advised by Dr. Galabin) the opposite foot, as the force applied to this limb will act with greater advantage in causing the arm to rise up out of the os.

(*b*) Which hand ought the operator to use in the uterus? As a rule the left hand should be used, partly because it passes more readily along the pelvic axis, and partly also because the abdomen of the child is generally directed posteriorly, and hence the palm of the hand passing along the child's abdomen will be more ready to seize the knee or foot. For the same reason, if the child's abdomen be directed to the front the right hand should be used.

Internal Version in Difficult Cases.—In cases where the liquor amnii has long run off, and the uterus is tightly contracted on the fœtus, and the shoulder jammed down into the pelvis, version becomes extremely difficult and sometimes impossible. This is owing to the difficulty of introducing the hand and of turning the fœtus when the hand is introduced; the cramped position of the hand when in the uterus also increases the difficulty. In these cases there is danger of rupture of the uterus occurring. **Method.**—Chloroform should be given to its full extent, and the hand gradually insinuated by the presenting part and passed along the child's abdomen in the intervals of the pains. The foot or knee opposite the presenting part should be seized, and version of the child may be assisted by pushing up the head by means of the external hand; or a tape may be passed round the limb that has been

brought down, so as to retain it, whilst the hand is used to push up the presenting part from the os. If version fail, decapitation or evisceration will be necessary.

THE FORCEPS

Description of the Instruments.—There are two varieties of forceps, the short and the long, but there are endless modifications of each variety. **Essential Features of the Short Forceps.**—The blades are attached to the handles without the intervention of any shank, and only present one curve (cranial), by means of which they can be adapted to the surface of the head. The short forceps is only of use when the head is low down in the pelvis, and was employed in the rotation of occipito-posterior positions, when the use of the long forceps might be injurious. The short forceps is very rarely used now, as its place, in nearly all cases, can be taken by the long forceps. **Essential Features of the Long Forceps.**—The blades are attached to the handles by means of a shank ; in addition to the cranial curve, they present a pelvic curve, by means of which the blades, when inserted high up in the pelvis, can lie in the axis of the cavity without injuriously pressing on the perineum. Owing to the pelvic curvature, each blade will only pass with the concavity of the curve directed anteriorly ; hence the division into upper and lower blades, one blade being passed so as to occupy the left extremity of the transverse diameter of the pelvis, the other to occupy the right extremity.

Axis Traction Forceps. –In difficult cases of high forceps operation, it is almost impossible with the ordinary long forceps to make the line of traction in the direct axis of the pelvis. To overcome this diffi-

culty, special kinds of forceps (Tarnier's, Simpson's) have been devised with curved traction-rods jointed on to the blades of the forceps. By means of a handle attached to the distal end of the rods, traction can be made in the direct axis of the pelvic brim.

The Use of the Forceps is indicated—

(1) In certain cases where delivery cannot be effected by the ordinary uterine pains—*e.g.*, certain cases of narrowing of the passages from pelvic deformities (with conjugate of 4 to $3\frac{1}{4}$ inches) or tumours, rigid perineum, uterine inertia, large fœtal head, etc.

(2) In certain cases where the life of the mother or child is in danger—*e.g.*, in eclampsia, exhaustion, prolapse of the cord, some cases of placenta prævia.

Generally speaking, if the head is engaged in the pelvis and there is no advance for some time, the forceps should be applied; in cases where the head is freely movable above the brim, version is preferable to the forceps.

Difficulties and Dangers of the Operation.—When used for the head low down (*low operation*) in the pelvis, the operation is easy and safe; when the head is situated at or above the brim (*high operation*), the operation becomes more difficult and serious. The dangers that occasionally follow forceps operations are, as a rule, not so much due to the action of the forceps as to the fact that interference has been put off too long, and hence the maternal parts have suffered from pressure. Lacerations of the uterus, vagina, or perineum, thrombosis of the vagina and vulva, may, however, sometimes result from the use of the forceps, and as secondary consequences, pelvic cellulitis and peritonitis may occur.

Action of the Forceps.

(*a*) **As a Tractor.**—Direct traction in the axis of the pelvis is the chief use of the forceps.

(*b*) **As a Compressor.**—By the close apposition of the handles the head may undergo a certain amount of compression; this action, however, is very slight, as it is doubtful if the bulk of the already moulded head can undergo much compression without injuring the child, and, moreover, compression exerted in one diameter of the head will cause an increase in the size of the opposite diameter.

Method — Preliminary Preparations.—The urine should be drawn off by the catheter, and the rectum emptied by an enema. The membranes should be ruptured and the cervix well dilated. The exact position of the child should be ascertained by abdominal palpation. The position of the ear is a useful guide in confirming the diagnosis of position, the sutures and fontanelles being usually obscured by moulding and the development of the caput. The patient should lie on her left side, with her body at right angles to the edge of the bed, having her buttocks well over the side and her thighs drawn up towards the abdomen. Chloroform should always be given. The forceps should be boiled before use, and placed in warm lysol solution, and the vulva should be thoroughly washed with soap and water and then swabbed over with lysol.

Introduction of the Blades.—The lower blade is introduced first. The handle is grasped like a pen, and is at first held vertically upwards; two or more fingers of the left hand are introduced into the vagina, and the blade is passed along their palmar surface backward in the axis of the outlet. The fingers in the vagina, by being interposed between the cervix and the head, are able to guide the blade into position on the head; meanwhile the direction of the blade is gradually changed from the axis of the outlet to that of the inlet, and the handle is gradually depressed till it becomes horizontal. When in position on the head, the handle is carried back to the perineum and held

there by an assistant. The upper blade is next introduced, the handle being held vertically downwards, and it is gradually raised as the blade passes along the pelvic axis to the side of the head; the two fingers of the left hand serve to guide it into position. The movements of the blades during introduction should be performed in the intervals of the pains. In some cases, when the patient cannot be brought up to the side of the bed, and hence the upper handle cannot be depressed, the blade should be passed along the sacral curve from the front and then gradually brought round into the transverse diameter. **Locking.**—The blades are now to be locked; if they do not fit accurately together they should be withdrawn and again inserted. During locking care should be taken not to injure the soft parts about the vulva. **Traction.**—If the head is high up, traction must be applied in the axis of the brim—*i.e.*, downwards and backwards; traction should only be performed during the pains, and, if the pains are absent, at intervals of two or three minutes; the uterus should be stimulated to contraction by external friction. As regards rotation of the head, it occurs as a rule independently of the forceps, and it is best not to attempt it by the forceps. As the head reaches the lower part of the pelvis the traction should at first be applied directly downwards and afterwards forwards, till finally, as the head is about to emerge, the handles should be raised towards the mother's abdomen. When the head reaches the perineum, and there is some danger of rupture occurring, the forceps may be removed and the case left to nature.

It will be seen from the above that the blades of the forceps are passed at each extremity of the transverse diameter of the pelvis, without any regard to the position of the head. This is the best method, for if passed in any other way they generally slip into the same position, and the marks on the head are seen,

one over the frontal bone, and the other over the occiput on the opposite side of the head.

CRANIOTOMY AND CEPHALOTRIPSY

CRANIOTOMY involves perforation of the skull, evacuation of the cranial contents, and breaking up and extraction of the cranial bones if necessary.

Description of Instruments.—(*a*) **The Perforator** possesses a pair of pointed blades, which are used for perforating the skull. The external edges of the blades present a small cutting edge near the base, and beyond this a projecting shoulder, which prevents the instrument from running too far into the cranium. The blades are separated by approximating the handles. (*b*) **The Crotchet** is a curved or straight sharp hook, which can be fixed on some part of the fœtus. It is rarely used now for extraction, as it is liable to slip and injure the soft parts of the mother. (*c*) **The Craniotomy Forceps** consists of two blades, which are generally serrated or grooved in order to give them a better hold. The blades are inserted like the forceps, one being placed outside the skull, the other inside; they are locked by a button, or other means. This instrument is chiefly used for traction, but it may be of service in breaking up and extracting portions of the skull. A very useful form of craniotomy forceps is the **cranioclast** of Simpson. (*d*) **The Cephalotribe** possesses two strong blades, which are applied outside the skull after perforation. The blades can be approximated by means of a screw attached to the handles, so as to crush the cranial bones at the base of the skull. The instrument possesses a slight pelvic curve, hence it is inserted in the same way as the forceps, and may be used to extract after crushing

The cephalotribe therefore acts as a **crusher** and a **tractor**. The operation of crushing and extraction by the cephalotribe is termed **cephalotripsy**. (*e*) **A wire écraseur** and a **small chain saw** are occasionally used to remove portions of the cranial bones.

Indications for Craniotomy:

1. **Considerable Deformity of the Pelvis.**—By craniotomy a child can be extracted through a pelvis with a conjugate of 3 to 2 inches. Cephalotripsy is perferable to craniotomy when the obstruction is not very great, because by it the base of the skull can be crushed, and the scalp protects the mother's parts from the exposed cranial bones. In craniotomy it is often necessary to remove portions of the bones, which may, during extraction, injure the mother.

2. **In some cases of contraction of the soft parts** it may be required—*e.g.*, in rigidity of the cervix occasionally, in cicatricial contractions of the vagina, etc.

3. **Large size of the fœtal head** — *e.g.*, hydrocephalus.

4. **When the child is dead** it is often best to perforate in order to expedite delivery.

The Operation.—The bladder and rectum should first be emptied. (*a*) **Perforation.**—The points of the perforator are passed up to the head guarded by two or three fingers of the left hand; they are then applied over one of the cranial bones (not over a suture), and with a boring movement made to pass through the scalp and bone up to the 'rests.' By closing the handles a cut is then made through the bone. The instrument is now closed and turned, and a similar cut is made at right angles to the first; the instrument is then passed into the brain and moved freely about, after which it is carefully withdrawn. The cranial bones then collapse, as the brain matter escapes from the opening; and, if perforation has been performed while the forceps is in position, it may

be possible now to extract the head by the forceps. (*b*) **Extraction by the Craniotomy Forceps.**—One blade is applied outside the scalp and the other inside the cranium, and traction is exerted during the pains. It may be necessary, in order to lessen the bulk of the head, to break up and tear away some of the cranial bones by applying the outer blade between the scalp and the bone, and the other blade internally. In extracting the pieces of bone the mother's parts should be protected by the fingers, and the scalp preserved as much as possible. The forceps is then reapplied, the outer blade being placed over the face so as to draw it down first. After the head is delivered the body soon follows, either naturally, or it may be aided by traction on the head, or by the finger or blunt-hook in the axilla. In some cases, when difficulty arises in expulsion of the trunk, it may be necessary to perforate the thorax and extract it with the craniotomy forceps.

(*c*) **Cephalotripsy.**—After perforating, the blades of the cephalotribe are introduced in the same way as the forceps. They should be deeply inserted, so as to reach the base of the skull. When in position, the blades are screwed together and the head crushed. Any protruding spiculæ of bone should now be removed, and extraction performed during the pains. In some cases, when the head will not readily pass, the instrument may be taken off, and after allowing the crushed head to mould itself to the passages, the blades may be again applied.

EMBRYOTOMY

UNDER this heading two measures are included—viz., **Decapitation** and **Evisceration.**

The operation is indicated in cases where delivery

of the body is prevented by pelvic deformity, by malformations and visceral tumours of the fœtus; also in neglected shoulder presentations when turning cannot be performed.

1. **Decapitation.**—There are several methods of dividing the neck.

(*a*) By Ramsbotham's hook, the concave edge of which is sharp and cutting. The hook is passed round the neck, and by means of a sawing movement, combined with traction, the neck is cut through. Its action must be guided by the left hand.

(*b*) Division of the neck by a pair of blunt-pointed scissors.

(*c*) Division of the neck by a piece of whipcord. The cord is passed over the neck by means of a flexible catheter, and is worked in a saw-like manner round the neck. To protect the soft parts of the mother the ends of the cord should be passed and worked through specula.

(*d*) Division of the neck by a wire écraseur, which is drawn into position round the neck by an instrument resembling that used for plugging the posterior nares.

After decapitation the body is easily delivered by traction on the arm, and the head is afterwards perforated, and delivered by the craniotomy forceps.

2. **Evisceration** is only indicated in cases when it is impossible to reach the neck and decapitate. **Method.**—The chest is perforated, and the contents of the chest and abdomen are broken up by the perforator and removed through the opening. The spine is then divided internally by the scissors, and the breech is drawn down by traction with the blunt hook externally, or by the crotchet applied internally to the lower part of the spine.

3. **Cleidotomy.**—This operation consists in dividing the clavicles. By it the width of the shoulders is much reduced, and it is of use in the extraction of very large children. The clavicles may be divided by scissors, or they may be broken by firm pressure of the fingers. The clavicle is completely ossified at birth, and when broken the fracture is not, as a rule, of the green-stick nature.

CÆSAREAN SECTION

Definition.—This operation involves the removal of the child through an incision made in the uterine walls. Ordinarily such an incision is carried through the anterior wall of the fundus. An operation known as vaginal Cæsarean section is practised on the Continent. In this operation the cervix and the lower uterine segment are slit up in the middle line in front, and the child extracted through the incision thus made.

The indications for the operation are much wider than formerly, when it was indicated almost as a counsel of despair. The low mortality of the operation has led to this widening of its field of utility. The main indication for the operation is found in cases of contracted pelvis. It is now generally recognized that in any case of contracted pelvis with a conjugate of 3 inches or less, the best treatment is Cæsarean section at term. In cases with a conjugate of under 2 inches, Cæsarean section must be performed. Cæsarean section has been performed in some cases of placenta prævia and accidental hæmorrhage with good results. In cases of eclampsia the operation is one of doubtful benefit. Finally, when the mother dies in labour, it is indicated to save the life of the child.

Prognosis.—As regards the mother, it is good when the operation is performed at the time selected. In cases where the membranes are ruptured and the patient is in labour, the prognosis is not so good, and varies directly with the length of time the patient has been in labour. As regards the child, the prognosis is also good.

Time and Preparation for the Operation.—There is no need to wait until labour commences. It was thought that it was dangerous to perform the operation before the cervix was dilated, on account of the possibility of the lochia not being able to escape. This idea, however, is fallacious. The date for the operation should be decided on beforehand, partly by the patient's dates and partly by measuring the uterus. The preparations need not then be unduly hurried and incomplete. The preparations should be those common to any abdominal section case. In addition, a hot bath should always be at hand to revive the infant, since it is not uncommonly partially anæsthetized in these cases. Ether or chloroform may be given.

The Operation.—An incision 4 inches long is made in the middle line of the abdomen, commencing just below the umbilicus. The abdominal wall at this stage of pregnancy is exceedingly thin, and it is easy to wound the uterus prematurely. The left hand is then passed into the abdomen to feel round the uterus, and to make certain that it is not adherent to any other abdominal viscus. If it is, the adhesions should be divided before proceeding. The assistant then hooks his finger into the upper angle of the abdominal wound, thus exposing the upper part of the uterus, which should be in the middle line. The incision in the uterus should be 4 inches long, and should be made in the upper uterine segment. If it should be found necessary to prolong the incision,

the prolongation should always be upwards, and not downwards into the lower uterine segment. In cases where the placenta is not in front, there is practically no bleeding from the incision. When the placenta is in front, the uterine sinuses bleed considerably as they are divided. In these cases the incision must be carried out rapidly, and the right hand is then thrust into the uterus between its wall and the placenta, separating it on either side, and pulling it out of the uterus. A leg is then grasped, and the child is delivered. As soon as the child is delivered the assistant hooks his finger into the upper angle of the uterine wound, and draws the uterus out of the abdomen, and lays it upon a hot towel, which serves also to prevent the intestines from coming out of the abdomen. As soon as the child is delivered, the uterus contracts down and no serious bleeding takes place. A clip should be placed upon the child's cord, which is divided, and the child is handed to a second assistant. The placenta and membranes should now be removed from the uterine cavity completely. The uterine wound is now sutured. The best material for this purpose is silkworm gut; about ten sutures are usually needed, and they should pass deeply through the uterine muscle, but avoid penetrating into the cavity of the uterus. After these have been inserted a few superficial Lembert's sutures may be put in, especially at the extremities of the wound. It is now important to make the uterus contract firmly, and to express any blood-clot which may have collected in it. It is, therefore, grasped and gently kneaded between the hands. Before it is dropped back into the abdomen, any blood-clot which may have found its way into the peritoneal cavity should be removed. The abdominal wall should be sutured in the ordinary way. In cases where it has been determined to sterilize the patient, the best way to

carry out this procedure is to remove about an inch of each Fallopian tube.

After-treatment.—If bleeding is somewhat free, ergot may be given. As a rule, the puerperium pursues an absolutely normal course, with the exception that the uterus remains rather high. This may be due to the fact that as the pelvis is usually contracted the uterus cannot sink well down into it. The stitches may be removed about the tenth day, and the mother may nurse her infant.

Porro's Operation.

This operation involves the performance of a supra-vaginal hysterectomy after the child has been extracted from the uterus by Cæsarean section. It was formerly employed largely, and is useful at the present day when there is reason to fear that the uterus is infected —that is, in cases where the patient has been in labour for several hours.

Operations which aim at Widening the Pelvis.

Symphysiotomy, or division of the symphysis pubis, was performed with this object; it was done either subcutaneously or by the open method. This operation gave place to the more modern operation of hebotomy, or division of the pubic ramus. The latter operation is usually carried out subcutaneously. A special curved needle in a handle is passed behind the pubic bone about 1 inch outside the symphysis, either from above downwards or from below upwards. Its point is made to emerge through the skin, and a Gigli's wire-saw is threaded through it and drawn behind the pubic bone, which is cut through by means of the saw. The child is then delivered by forceps, and after delivery a tight binder is placed around the patient's hips.

The advocates for these and similar operations claim that their performance is easy and successful, and that living children may be obtained without the risk involved by Cæsarean section. But there are numerous dangers. Owing to the vascularity of the parts, hæmorrhage is a grave danger, and is not easily controlled. Lacerations of the bladder and urethra have not infrequently occurred, and septic processes in connection with the bones have been set up. Added to these disadvantages is the fact that the bones do not always unite, and the patient has not always been able to walk afterwards. There is no doubt that the operation may add as much as ½ inch to the length of the true conjugate, but the claims that this lengthening persists can only be based on the fact that the bones do not firmly unite. In some cases a prominent boss of callus has been known to form and project into the brim of the pelvis. In view of these facts, this type of operation has not found general favour in England, where the ordinary Cæsarean operation is firmly established.

ANÆSTHESIA IN LABOUR

DURING the **first stage of labour** anæsthetics should be avoided, as they tend to weaken uterine contractions; in cases, however, where the cervix is rigid and great pain occurs during its dilatation, chloral is often of service. Chloral, like chloroform, lessens the pain; but, unlike chloroform, it does not enfeeble the action of the uterus.

In the **second stage** chloroform is of great value in lessening the suffering, and it should be given during the pains—not, however, to complete anæsthesia.

During the intervals it should not be administered. When the head is on the perineum it is wise to push the chloroform rather more, as the suffering is most intense at this stage, and also it is desirable to abolish the bearing-down efforts of the mother. Chloroform should not be given during the third stage of labour. In most obstetric operations it is desirable to have the patient completely relaxed by giving the anæsthetic to a surgical extent; but in the ordinary forceps operation it is unnecessary and undesirable, because when given to this extent chloroform practically abolishes uterine pains.

Although chloroform is the customary anæsthetic in labour cases, there is no reason why ether should not be used.

PUERPERAL INFECTION

UNDER this heading are included the various diseases which are due to the entrance of micro-organisms into the genital tract during labour or in the lying-in period. 'Puerperal fever,' so called, is not a disease *sui generis*. The morbid conditions which result from infection may be classified into general and local diseases; the local are the more numerous and frequent.

The micro-organisms which give rise to puerperal infection may be divided into two groups. There are numerous saprophytic organisms which play a part in the production of the sapræmic type of case. The more important group is composed of pathogenic organisms, but it must be remembered that many pathogenic organisms are facultative saprophytes, and it has been shown that in numerous cases of typical sapræmia the infecting organism has been a streptococcus. In such cases the streptococci are probably in

a low state of virulence ; cultivation in the body raises their virulence, and this fact explains the clinical observation that many cases of puerperal infection are sapræmic in character to commence with, and develop later on all the features of acute septicæmia. It must therefore be remembered that sapræmia and septicæmia are not separate and distinct diseases.

The micro-organisms most commonly found are :

1. The *Streptococcus pyogenes.*
2. The *Bacillus coli communis.*
3. The *Staphylococcus pyogenes aureus.*

The gonococcus, diphtheria bacillus, and typhoid bacillus have also been found to be the cause of puerperal infections. Finally, there is a class of putrefactive organisms which give rise to sapræmia without any tendency to invade the tissues.

The organisms may be carried to the patient in various ways. Infection most commonly takes place by the hands or instruments of the doctor or midwife. When either of the attendants has been attending a case of puerperal septicæmia, erysipelas, scarlet fever, or other disease caused by virulent organisms, it is probable that his or her hands are contaminated, and unless the most rigorous and careful precautions are taken to sterilize the hands they may easily infect another patient. One of the most frequent sources of mild infection is the patient's own vulva, which it is impossible to sterilize. The attendant's hands and instruments may be thoroughly sterilized, but they may easily carry organisms from the vulva into the higher aseptic regions of the genital tract. The danger of sewer-gas infection has no bacteriological foundation, since sewer-gas itself is not an infecting organism. It may, however, by lowering the patient's resistance, play some part in the causation of puerperal fever. Air-borne infection may take place sometimes. For instance, if a woman be confined in a room into which

dust from a busy thoroughfare is continuously entering, it is possible that some of the dust, swarming with *Bacillus coli communis* and other organisms, may settle upon the vulva.

Pathological Anatomy.—All stages of inflammatory lesions may be found of varying extent, involving merely superficial abrasions of the vulva or the whole generative tract, and spreading thence to surrounding parts. In a few fortunately rare cases of septicæmia the organisms appear to enter the body without giving rise to local lesions, and being of a very high degree of virulence, may kill the patient within a few days. In the majority of cases, however, some local reaction takes place.

Vulva and Vagina.—Lacerations of these parts tend to become sloughy on the surface, and may give rise to some of the symptoms of sapræmia. When the perineum has been neglected after labour an extensive ulcer may result, with a dirty grey slough upon the surface. These 'puerperal ulcers' were formerly of common occurrence. In cases where the vagina has been injured during labour some sloughing may take place; but, as a rule, the vagina heals kindly, and without contraction. In a few cases true diphtheritic infection of the vagina has taken place, with the formation of a false membrane.

Uterus.—The endometrium is the part most commonly affected. In cases of acute streptococcal infection there may be but little inflammatory reaction, but in cases of less acute infection the interior of the uterus usually presents a sloughy appearance. When pieces of placenta membrane and blood-clot have been allowed to remain in the uterus, putrefaction takes place if organisms are introduced. The putrefying material breaks down, and gives rise to an offensive smell, particularly if the *Bacillus coli communis* is the infecting agent; in the putrefying mass poisons are

produced, which may be absorbed by the uterine lymphatics and set up the symptoms of sapræmia. In a case of this sort the infecting organism may be a streptococcus of a low degree of virulence, and there is no difficulty in imagining that the organism may increase in virulence and penetrate the uterine wall, afterwards converting the case, which clinically started as a typical case of sapræmia, into one of septicæmia. In all cases of puerperal endometritis a layer of necrotic material lines the uterine cavity. This layer is generally thick in cases of the sapræmic type, and tends to be considerably thinner in cases of the septicæmic type; but there is no essential difference between these two classes of case. As on all other occasions where a denuded surface is infected with organisms, an inflammatory reaction on the part of the tissues is set up, if the general and local resistance of the parts be equal to it. If the organisms are weak, this inflammatory reaction opposes a more or less effective bar to their further progress into the tissues; if, however, they are virulent and active, they pass through it.

The uterine wall itself may become inflamed by a direct extension of organisms into it. In some cases where the third stage of labour has been mismanaged, the sinuses in the uterine wall may be left full of blood-clot. If organisms gain access to this blood-clot they may set up sinuous tracks of inflammation, abscesses in the uterine wall, and pyæmia. Lacerations of the cervix may slough upon the surface, just as other lacerations do, when deep cervical lacerations may open up the cellular tissue at the base of the broad ligaments and provide an easy channel for infecting organisms to enter.

Parametritis, or inflammation of the pelvic cellular tissue, is caused by the entrance of organisms into the pelvic cellular tissue. Such infection generally results at first in the production of marked inflammatory

œdema, which in mild cases subsides. When severe, the trouble may spread widely beneath the peritoneum and go on to abscess formation.

Inflammation of the Adnexa may result by a direct extension of the infecting organism along the tubes.

Peritonitis.—In most of the fatal cases of puerperal infection there is generally some degree of peritonitis, either local or general. The organisms usually reach the peritoneum by extension through the uterine wall, and occasionally by way of the tubes. Local inflammation confined to the peritoneum extending over the uterus is termed perimetritis.

Phlegmasia Alba Dolens.—This disease is caused by blocking of the veins and lymphatics of one leg owing to inflammatory exudation in the pelvis.

Septicæmia.—In the most acute cases there may be no local lesions. Generally, however, after death the blood is found in a dark fluid state, and there are ecchymoses on the surface of various viscera. In addition, some of the following signs may be found after death: congestion and inflammation (serous or purulent) of the pleuræ, pericardium, peritoneum, and joints; congestion and ulceration of the mucous membrane of the intestine and of other organs; and acute vegetative endocarditis.

Pyæmia. — Abscesses may be found in various organs, and depend upon the detachment of the septic emboli from uterine and pelvic veins, which are found clotted.

Clinical Aspects of Puerperal Infection.

1. **Sapræmia, or Septic Intoxication,** is the term applied to the condition brought about by the absorption of chemical poisons resulting from the decomposition of coagula, remains of placenta or other material in the uterus. The symptoms usually begin on the

first or second day after labour with a gradual rise of the temperature and the pulse-rate, which seldom rise above 102° and 120 respectively. The patient complains of a headache in the frontal region, is heavy and drowsy, but does not sleep well. The uterus is generally tender over some part of its surface, and involution is delayed. In addition to this, the lochia as a rule become offensive. Rigors do not occur in typical cases of sapræmia.

Treatment.—A considerable number of cases are so mild that they do not require active treatment. In all cases the vulva and vagina should be inspected to make sure that the poison is not being absorbed from the sloughing surfaces of lacerations. In many of the milder cases ergot, hot vaginal douches, and abdominal massage of the uterus lead to a satisfactory result. In the more severe cases the uterus should be explored with the finger. The patient should be anæsthetized, and it is more convenient to have her lying upon her back, with the knees drawn up, and the buttocks placed on a bed-bath. A vaginal douche is then given, and two fingers are passed up to the cervix, which does not need any instrumental dilatation during the first fortnight after labour. One or two fingers are inserted into the uterus, which is pressed down upon the fingers by the other hand placed on the abdomen. The fingers then remove any piece of placenta, blood-clot, or membrane that can be felt, and afterwards a copious intra-uterine douche must be given. If there is somewhat free bleeding after the exploration, the uterus may be compressed bimanually for a time, or may be plugged with iodoform gauze. A patient commonly has a rigor about six hours after the exploration, and subsequently does very well.

2. **Septicæmia.**—In the fulminating cases the temperature and pulse rise immediately after delivery, and rigors are frequent. The patient is prostrated by

the poison, becomes anæmic, collapsed, and may die on the second or third day. Such cases are fortunately very rare. In the more ordinary case the temperature is a little irregular for the first two days, and the pulse-rate rises steadily. On the third day, or thereabouts, the temperature shoots up to 104° or more, and rigors begin. The patient at first may appear to be quite well, feeling bright, and having a good appetite, and there may be absolutely no local signs of infection. It is now a struggle between the patient's resistance and the infecting organism. When the former is the stronger, the pulse and temperature gradually sink to normal, and the patient recovers after a more or less protracted illness. On the other hand, after a few days the patient may lose her appetite, and become suddenly anæmic, with a pale face and bright, sunken eyes. The respirations are quick, and the breath has often a peculiar sweet odour; the tongue is at first furred, and is afterwards covered with sordes, and at this stage diarrhœa may set in. A rash may be present, which is in some cases scarlatiniform or erythematous, in others petechial or papular. It can be at once distinguished from true scarlet fever by the fact that there is no ulceration of the throat. Complications may occur, such as general peritonitis (which is known by the onset of abdominal pain, tympanites, thoracic respiration, vomiting, etc.), pleurisy, pneumonia, pericarditis, and endocarditis, which are recognized by their usual symptoms and signs. The patient either dies from one of these complications, or she may pass into a typhoid condition, with low, muttering delirium, rapid, thready pulse, dry, brown tongue, and die within a week or ten days without any local complication.

In the pyæmic form of the disease the course is more chronic, and secondary inflammations occur, which result in the formation of abscesses in various

parts—*e.g.*, joints, muscles, serous cavities, and various viscera. Rigors and exacerbations of temperature occur, and jaundice is moderately common.

Treatment.—Whilst attending a case of puerperal fever or infectious disease, the practitioner should not, if possible, take charge of any case of labour; if, however, this is impossible, the most rigorous precautions must be observed in all antiseptic details. In a lying-in hospital patients with puerperal fever should be isolated. When the disease is present the first thing to be done is to prevent further absorption of septic matter by removing decomposing clots, sloughs, and pieces of placenta from the uterus and vagina. If perchloride of mercury is used for douching it should be followed by a douche of saline, since mercurial poisoning is apt to occur when mercurial douches are used in enfeebled and anæmic patients, such as those suffering from septicæmia. The main indication in these cases is to support the patient's strength by giving her as much food as she can digest. Stimulants are often of great benefit, and brandy was formerly given in enormous doses. The drug which appears to have more influence on the course of the disease than any other is the tincture of the perchloride of iron, which should be given in large doses. Strychnine and digitalin are also useful. The high temperature is of itself injurious, and measures should be taken to reduce it; sulphate of quinine or salicylate of soda may be given for this purpose, but cold sponging and an ice-cap to the head are more efficacious. In some cases a successful result has been obtained by vaccinating the patient with organisms grown from the blood, and this will probably be the most successful line of treatment in the future. Saline infusion is useful in most cases. If complications occur they must be treated on general principles.

Obstetrical authorities in England are almost

universally opposed to the operation of curetting the uterus in cases of puerperal septicæmia. This opinion is partly based upon experience of the curette in these cases, and partly on work of Bumm, who described a zone of leucocytic infiltration round the uterine cavity. It was supposed that the curette removed this so-called protective layer of leucocytes, and opened up fresh surfaces through which further infection could take place.

The recent work of Knyvett Gordon of Manchester has shown that this theory is not based upon correct knowledge of uterine pathology. Not only is the zone of leucocytes not present with any degree of completeness in the average case, but when present the leucocytes composing it are mostly dead and useless, and afford protection to nothing but hosts of the infecting organisms. Moreover, in the majority of cases of puerperal septicæmia, there are numberless organisms in the uterine wall itself.

Knyvett Gordon is in favour of thoroughly curetting the uterus in cases of puerperal septicæmia, and makes a strong point of scrubbing the denuded surface with a powerful antiseptic, such as undiluted izal, afterwards. His published results are the best evidence of the efficacy of this treatment.

PELVIC CELLULITIS AND PELVIC PERITONITIS

Definition.—Inflammation of the cellular and peritoneal tissue of the pelvis.

Causation and Pathology.—These diseases generally arise after labour, and are usually secondary to injury or inflammation of the uterus. The two diseases are

often associated, and may or may not be accompanied by general septicæmia. In cellulitis the inflammation attacks the connective tissue surrounding the uterus and vagina, and that lying in the broad ligaments and iliac fossæ, leading to exudation and swelling in any of these parts. In peritonitis any part of the peritoneum of the pelvis may be attacked, but especially that lining Douglas's pouch and the broad ligaments.

Symptoms.—The onset is generally ushered in by a chill or rigor; pain is felt in the lower abdomen; micturition and defæcation are usually painful; vomiting frequently occurs. The pulse is increased in frequency, and the temperature raised to 102° to 104°. On examination *per vaginam*, the vagina is found hot and swollen; tender induration and swelling exist on one side of or behind the uterus; the uterus is more or less fixed and displaced by the exudation.

Termination.—The inflammation may end in resolution or suppuration. If resolution takes place, the febrile symptoms disappear, and the swelling contracts and becomes less tender, and is generally absorbed; this process may take weeks or months, and in some cases permanent adhesions, with fixation and displacement of the uterus, result. If suppuration occur, the fever continues, and is accompanied with rigors and exacerbations of temperature. A pelvic abscess eventually forms. It may point and open through the abdominal wall, or into the bladder, vagina, or rectum; occasionally it opens into the peritoneum, and general peritonitis results. Suppuration is more common in cellulitis.

Prognosis.—Recovery is the rule, but death occasionally results from exhausting suppuration or general peritonitis.

Treatment.—Absolute rest in bed should be enjoined. To lessen the pain, poultices should be applied to the hypogastrium, and opium given internally, or

morphia subcutaneously. If the temperature runs high, quinine is useful. Constipation, if present, should be relieved by castor oil or enemata. **To Favour Absorption.**—After the acute symptoms have subsided the patient should be kept to her bed, and blisters may be applied locally. When pelvic abscess results and points in any direction, it should be emptied by the aspirator, or opened by the knife and dressed antiseptically. Whilst suppuration is going on plenty of nutritious food should be given, and stimulants if necessary ; tonics and cod-liver oil are often of service.

THROMBOSIS AND PHLEGMASIA ALBA DOLENS—WHITE LEG

Two forms of thrombosis are met with in the puerperium, an aseptic and a septic form. The former is the more uncommon, and occurs generally in cases where there are tortuous varicose veins in the vulva or legs. The septic form is not uncommon, and as a rule affects the femoral vein of one side, usually the left. It depends upon the spread of thrombosis from the pelvic veins. When the venous thrombosis is accompanied by an inflammatory condition of the pelvic cellular tissue, sufficiently intense to block the lymphatics as well, phlegmasia alba dolens is the result. True phlegmasia is a very rare condition, but thrombosis of the femoral vein is not at all uncommon.

Symptoms.—Acute pain near or along the vein, accompanied by febrile symptoms (pulse 120, temperature 101°, thirst, anorexia, etc.), precedes the swelling. The swelling generally begins in the groin, and by spreading downwards may involve the thigh or

the entire limb ; occasionally it commences in the calf and extends upwards. The left leg is most often affected, and it may be followed by swelling of the opposite limb. The limb is swollen, white, and painful, and at first so tense that it will not pit on pressure. The vein may be felt as a hard, tender cord. The fever and pain pass away in about a week or a fortnight, and absorption and disappearance of the swelling commence; months, however, may elapse before the swelling has entirely disappeared, and the limb regains its former strength.

Terminations :

(*a*) Gradual absorption of the thrombus and restoration of the circulation generally occur.

(*b*) Organization of the thrombus and obliteration of the vessel sometimes result

(*c*) Occasionally localized suppuration takes place , or diffused suppuration, with extensive sloughing of the skin, and death from exhaustion or septicæmia may occur.

(*d*) The thrombus may break up and infected emboli become detached and produce pyæmia ; or an embolus may become detached and lodge in the pulmonary artery and cause death.

Treatment—To Relieve the Pain.—The patient should rest in bed ; the bedclothes should be kept off the limb by means of a cradle ; poultices or opium fomentations should be applied ; and if the pain keeps the patient awake a hypodermic injection of morphia may be given. Bleeding and other active measures are to be avoided.

It is a good plan to give citric acid at the commencement of the trouble, with a view to lessening the coagulability of the blood, and so the chances of further deposition of clot. The leg should be elevated, fixed between sand-bags, and kept warm. On account of the danger of embolism, the limb should not be moved

for a considerable time; when the vein is free from tenderness on pressure, it is, humanly speaking, safe to allow the patient to get up. The leg should always be bandaged, because there is a marked tendency for the œdema to recur for some time after.

OBSTRUCTION OF THE PULMONARY ARTERY PRODUCED BY THROMBOSIS OR EMBOLISM

Definition.—Partial or complete blocking of the pulmonary artery, produced either by spontaneous coagulation (thrombosis) or by the impaction of an embolus brought from some part of the systemic venous system.

Etiology and Pathology.—In the case of thrombosis the coagulation depends probably on the excess of fibrin in the blood. In embolism the clot is detached from some vein—*e.g.*, the femoral—and is carried to the right side of the heart, and is sent thence to the pulmonary artery and there lodged.

The clots in thrombosis are white, firm, and laminated. The coagulation generally commences in the small arteries and spreads backwards to the heart. In cases of embolism a well-defined embolus, consisting of old fibrin, may be found after death, contrasting with the more recently formed fibrin around it.

Symptoms.—The onset is generally sudden, and is attended with intense dyspnœa; the throat and respiratory muscles act convulsively; the face is pale or livid; the heart beats tumultuously at first, afterwards its action becomes weak and irregular; the pulse is irregular and almost imperceptible. A harsh systolic murmur can be heard over the pulmonary artery.

Termination.—Death generally occurs from asphyxia or syncope, either immediately or after repeated attacks of dyspnœa. Recovery is possible if the obstruction be incomplete.

Treatment.—Absolute rest in bed must be enjoined and no movement whatever allowed. The patient may be propped up if she finds it easier to breathe when sitting up. Stimulants should be freely given when necessary. Bleeding sometimes gives relief, and morphia may be given when pain and restlessness are marked symptoms.

PUERPERAL INSANITY

THIS term includes (*a*) Insanity coming on during pregnancy; (*b*) Insanity coming on after labour—*i.e.*, during the puerperal state (puerperal insanity proper), and during the period of lactation (insanity of lactation).

1. **Insanity of pregnancy** is the least common of the three forms.

Causation.—It generally depends on some hereditary predisposition to insanity or nerve disease; or it may be brought on by fright, or by great dread of pregnancy and labour. It is most common in old primiparæ.

The symptoms are usually of melancholic type, with great mental depression. There is a great tendency to suicide. The disorder appears about the third month, and persists generally till after labour, when, as a rule, recovery takes place.

2. **Insanity coming on after labour** (puerperal insanity and insanity of lactation) is the most common variety.

Causation.—It is induced by the same causes as the

insanity occurring during pregnancy, and it is also predisposed to by conditions producing great exhaustion, such as hæmorrhage, albuminuria, prolonged lactation, eclampsia, and sepsis.

Symptoms.—When occurring during the first fortnight after delivery they are more often those of acute mania; after that time and during the period of lactation melancholia is more common.

The maniacal variety is characterized by great restlessness, incoherent rambling, religious delusions, sleeplessness, and outbreaks of excitement, in which the patient may do herself or the child harm. The patient often refuses food; the bowels are constipated, and the fæces and urine may be voided involuntarily. The lochia and milk are generally arrested. This variety is usually of short duration.

In the melancholic variety, sleeplessness, a suspicious demeanour, great depression, delusions, generally of a religious character, and a tendency to suicide, are the leading symptoms. This variety is apt to pass into chronic dementia.

Occasionally during labour a temporary outbreak of mania develops, in which the patient may injure herself or the child; the attack passes off after birth of the child.

Treatment.—The patient should be kept in a darkened and quiet room. Sympathizing friends should be excluded, and an experienced nurse always left in charge. The patient should be persuaded to take plenty of nutritious food, but if she persistently refuses, a large soft catheter should be passed through the nose down into the œsophagus, and fluid nourishment administered through this. Stimulants are to be given if there is much exhaustion. For the sleeplessness, chloral with bromide of potassium, āā gr. xx., may be given by the mouth or rectum. In cases of mania, a warm bath or the wet-pack is sometimes

serviceable in quelling excitement and procuring sleep. The bowels should be regulated by an occasional aperient. Gentle exercise, country air, and avoidance of excitement are useful during convalescence.

Some cases, especially those of melancholia, are best treated in an asylum.

INDEX

Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden

BAILLIÈRE, TINDALL & COX'S

'UNIVERSITY SERIES'

OF MANUALS FOR STUDENTS.

BUCHANAN'S ANATOMY. (Systematic and Practical.) **Price 21s. net.**

Pp. xxvi+1562. Complete in One Volume.
With 621 Illustrations, mostly original and in several colours.
Or in 2 Parts, price **10s. 6d.** each, net.

CASTELLANI & CHALMERS' TROPICAL MEDICINE. **Price 21s. net.**

Second Edition. Pp. xxxii+1748. With 15 coloured Plates and 630 Illustrations, mostly original.

GREEN'S PATHOLOGY AND MORBID ANATOMY. **Price 15s. net.**

Eleventh Edition. Pp. x+642. With 350 Illustrations.

JELLETT'S MIDWIFERY. **Price 21s. net.**

Second Edition. Pp. xii+1210.
Revised throughout, with 17 Plates and 557 Illustrations, plain and coloured, of which nearly 300 are new.

MACNAUGHTON-JONES' DISEASES OF WOMEN. **Price 21s. net.**

Ninth Edition. Pp. xl+1044.
With 122 Plates and 637 Illustrations.

MONRO'S MEDICINE. **Price 15s. net.**

Third Edition. Pp. xxii+1024.
With 42 Illustrations, plain and coloured.

MOOR & HEWLETT'S APPLIED BACTERIOLOGY. **Price 12s. 6d. net.**

Third Edition. Pp. x+476. 102 Figures, plain and coloured.

ROSE & CARLESS' SURGERY. **Price 21s. net.**

Eighth Edition. Pp. xii+1406.
With 12 Coloured Plates and 581 Illustrations.

STEWART'S PHYSIOLOGY. **Price 18s. net.**

Sixth Edition. Pp. xx+1064.
With 2 Coloured Plates and 449 Illustrations.

TURNER'S MEDICAL ELECTRICITY. **Price 10s. 6d. net.**

Fourth Edition. Pp. xxiv+434. With 205 Illustrations.

BOOKS FOR STUDENTS.

Aarons' Gynæcological Therapeutics. Pp. xiv+178, with 46 illustrations. Price 5s. net.

Bayly's Clinical Pathology of Syphilis and Para-Syphilis. Fcap. 8vo. Pp. xiv+194, with 3 plates and 20 illustrations in the text. Limp leather, gilt top. Price 5s. net.

Clarke's Refraction of the Eye. Third Edition. Pp. x+230, with 88 illustrations. Price 5s. net.

Cross and Cole's Modern Microscopy. Fourth Edition. Pp. xvi+320, with 100 plates and figures. Price 6s. net.

Dieulafoy's Textbook of Medicine. Second Edition. Pp. xxiv+2082, with 7 plates and 105 illustrations. In two volumes. Price 25s. net.

Fitzwilliams' Operative Surgery, with Surgical Anatomy and Surface Markings. Pp. viii+450, with 284 illustrations. Price 10s. 6d. net.

French's Medical Laboratory Methods and Tests. Third Edition. Pp. viii+190, illustrated. Price 5s. net.

Gardner's Surgical Anæsthesia. Pp. xii+240, with 12 plates, and 35 illustrations in the text. Price 5s. net.

Gemmell's Chemical Notes and Equations, Inorganic and Organic. Second Edition. Pp. xiv+266. Price 5s. net.

Gray's Diseases of the Ear. Pp. xii+388, with 53 plates, of which 37 are stereoscopic, and 70 other illustrations. Price, with Stereoscope, 12s. 6d. net.

Ince's Latin Grammar of Pharmacy, including the reading of Latin Prescriptions. Eighth Edition. Price 5s. net.

Lake's Handbook of Diseases of the Ear. Fourth Edition. Pp. x+242, with 3 plates and 70 figures. Price 7s. 6d. net.

Lamb's Practical Guide to the Diseases of the Throat, Nose and Ear. Third Edition. Pp. xvi+352, with 57 illustrations. Price 7s. 6d. net.

Macewen's Surgical Anatomy. Pp. xii + 452, with 61 illustrations, plain and coloured. Price 7s. 6d. net.

May & Worth's Manual of the Diseases of the Eye. Third Edition. Pp. viii+418, with 336 illustrations, including 22 coloured plates. Price 10s. 6d. net.

McCaw's Diseases of Children. Pp. xii+524, with 9 plates. Price 10s. 6d. net.

Richards' Practical Chemistry, including Simple Volumetric Analysis and Toxicology. Second Edition. Pp. x+150. Price 3s. net.

Schmieden's The Course of Operative Surgery. Pp. xx+350, with 435 illustrations, many coloured. Price 12s. 6d. net.

Wheeler's Student's Handbook of Operative Surgery. Second Edition. Pp. xiv+296, with 157 figures. Price 7s. 6d. net.

Whitla's Pharmacy, Materia Medica, and Therapeutics. Ninth Edition. Pp. xiv+674, with 23 figures. Price 9s. net.

Whitla's Dictionary of Treatment. Fifth Edition. Pp. x+1204. Price 16s. net.

Williams' Minor Maladies and their Treatment. Third Edition. Pp. viii+396. Price 5s. net.

BAILLIÈRE, TINDALL & COX,
8, Henrietta Street, Covent Garden, London.

THE STUDENTS' AIDS SERIES

Specially designed to assist Students in grouping and committing to memory the subjects upon which they are to be examined.

'As aids, not substitutes, these little books afford the means of refreshing the memory, and of economizing time.'—*Edinburgh Med. Journal.*

Aids to the Analysis and Assay of Ores, Metals, Fuels, etc. By J. J. MORGAN, F.I.C., F.C.S. With 8 Illustrations. Price, cloth, 2s. 6d., paper 2s.

Aids to the Analysis of Food and Drugs. By C. G. MOOR, M.A., F.I.C., and W. PARTRIDGE, F.I.C. Third Edition. Price, cloth, 3s. 6d. net, paper 3s. net.

Aids to Anatomy (Pocket Anatomy). By C. H. FAGGE, M.B., M.S., F.R.C.S Seventh Edition. (Thirty-Seventh Thousand.) Price 3s. 6d. net.

Aids to Bacteriology. By C. G. MOOR, M.A., F.I.C., and W. PARTRIDGE, F.I.C. Second Edition. Price 3s. 6d. net and 3s. net.

Aids to Chemistry. By T. A. HENRY, D.Sc. Eighth Edition. Price 4s. 6d. and 4s.

Aids to the Diagnosis and Treatment of the Diseases of Children. By J. MCCAW, M.D., L.R.C.P. Edin. Fourth Edition. Price 4s. net and 3s. 6d. net.

Aids to the Feeding and Hygiene of Infants and Children. By the same Author Price 2s. 6d. and 2s.

Aids to Dental Anatomy and Physiology. By ARTHUR S. UNDERWOOD, M.R.C.S., L.D.S. Eng. Second Edition. Price 2s. 6d. and 2s.

Aids to Dental Surgery. By ARTHUR S. UNDERWOOD, M.R.C.S., L.D.S. Eng., and DOUGLAS GABELL, M.R.C.S., L.R.C.P. Lond. L.D.S. Eng. Second Edition. Price 2s. 6d. and 2s.

Aids to Medical Diagnosis. By A. J. WHITING, M.D., C.M. Edin., M.R.C.S. Lond. Price 2s. 6d. and 2s.

Aids to Microscopic Diagnosis (Bacterial and Parasitic Diseases). By E. BLAKE KNOX, B.A., M.D., B.Ch., D.P.H. Dub., Capt., R.A.M.C. Price 2s. 6d. net and 2s. net.

Aids to Surgical Diagnosis. By H. W. CARSON, F.R.C.S. Eng. Price 3s. 6d. and 3s.

Aids to Practical Dispensing. By C. J. S. THOMPSON. Price 2s. 6d. and 2s.

Aids to Examinations; being Questions and Answers on Materia Medica, Medicine, Midwifery, Pathology, and Forensic Medicine. By DAVID WALSH, M.B., M.Ch. Edin. Price 2s. 6d. & 2s.

Aids to Examinations. Part II. Medicine and the Allied Sciences. By T. REUELL ATKINSON, M.D. Durham. Price 2s. 6d. and 2s.

Aids to Examinations: Replies to Questions in Therapeutics. By J. BRINDLEY JAMES, M.R.C.S. Price 1s. 6d. and 1s.

Aids to Forensic Medicine and Toxicology. By WILLIAM MURRELL, M.D., F.R.C.P. Seventh Edition. Price 2s. 6d. net and 2s. net.

Aids to Analytical Geometry.

I.—THE STRAIGHT LINE AND CIRCLE. By A. LE SUEUR, B.A. Cantab. Second Edition. Price 2s.

II.—THE CONIC SECTIONS. By GEORGE HEPPEL, M.A. Cantab. Price 2s.

Aids to Gynæcology. Fifth Edition. By S. JERVOIS AARONS, M.D. Edin., M.R.C.P. Lond. Price 2s. 6d. net and 2s. net.

Aids to Histology. By A. GOODALL, M.D., F.R.C.P. Edin. With 20 Illustrations. Price 2s. 6d. net and 2s. net.

Aids to the Mathematics of Hygiene. By R. BRUCE FERGUSON, M.A., M.D., B.C. Cantab., D.P.H., M.R.C.S. Fourth Edition. Price 2s. 6d. net and 2s. net.

Aids to Materia Medica and Therapeutics. By W. MURRELL, M.D., F.R.C.P.
Part I.—Introduction and Inorganic Materia Medica. 2s. 6d. and 2s.
Part II.—Drugs of Vegetable Origin. Price 2s. 6d. and 2s.
Part III.—Synthetical Products; Drugs of Animal Origin; Glandular and Serum Therapeutics. Price 2s. 6d. and 2s.

Aids to Medicine. By B. HUDSON, M.D. Cantab., M.R.C.P. Lond. Second Edition. Price 3s. 6d. net and 3s. net.

Aids to Obstetrics. By SAMUEL NALL, B.A., M.B. Cantab., M.R.C.P. Lond. Seventh Edition. Revised by C. J. NEPEAN LONGRIDGE, M.D., F.R.C.S. Eng. Price 2s. 6d. net and 2s. net.

Aids to Ophthalmology. By N. BISHOP HARMAN, M.A., M.B. Cantab., F.R.C.S. Eng. Fifth Edition. Price 2s. 6d. net and 2s. net.

Aids to Osteology (Pocket Osteology). By P. TURNER, M.B., B.Sc. Lond., F.R.C.S. Eng. Price 3s. net.

Aids to Pathology. By HARRY CAMPBELL, M.D. Lond., B.S., F.R.C.P. Second Edition. Price 3s. 6d. net and 3s. net.

Aids to Practical Pharmacy. By A. CAMPBELL STARK, M.B., L.S.A. Second Edition. Price 2s. 6d. net and 2s. net.

Aids to Physiology. By PEYTON BEALE, F.R.C.S. Eng. Price 3s. 6d. and 3s.

Aids to Practical Physiology. By J. BRINDLEY JAMES, M.R.C.S., L.R.C.P. Price 1s. 6d. and 1s.

Aids to Public Health. By DAVID SOMMERVILLE, B.A., M.D., D.P.H., M.R.C.P., F.C.S. Price 2s. 6d. net and 2s. net.

Aids to Sanitary Law. By HARRY CRITCHLEY, M.A., M.D., D.P.H. Price 2s. 6d. and 2s.

Aids to Sanitary Science. By FRANCIS J. ALLAN, M.D., and R. A. FARRAR, M.A., M.D., D.P.H. Second Edition. Price 4s. 6d. and 4s.

Aids to Surgery. By JOSEPH CUNNING, M.B., B.S., F.R.C.S. Eng. Third Edition. Price 4s. net and 3s. 6d. net.

Aids to Rational Therapeutics. By J. MILNER FOTHERGILL, M.D., M.R.C.P. Lond. Price 2s. 6d. and 2s.

Aids to Tropical Medicine. By GILBERT E. BROOKE, M.A. Cantab., D.P.H., F.R.G.S. Price 2s. 6d. net and 2s. net.

Aids to Tropical Hygiene. By R. J. BLACKHAM, D.P.H. Lond., Major R.A.M.C. Price 3s. net and 2s. 6d. net.

BAILLIÈRE, TINDALL & COX,

8, HENRIETTA STREET, COVENT GARDEN, LONDON.

formation of