been so distended with fluid as to obstruct the passage of the child. Ascites is somewhat more common, and occasionally the child's bladder is so distended with urine as to prevent the birth of the body. The existence of any of these conditions is easily ascertained; for the head or breech, whichever happens to present, is delivered without difficulty, and then the rest of the body is arrested. This will naturally cause the practitioner to make a careful exploration, when the cause of the delay will be detected.

The treatment consists in the evacuation of the fluid by puncture. In the case of ascites, this should always be done, if possible, by a fine trocar or aspirator, so as not to injure the child. This is all the more important since it is impossible to distinguish a distended bladder from ascites, and an opening of any size into that viscus might prove fatal, whereas aspiration would do little or no harm, and would prove quite as efficacious.

**Fœtal Tumors Obstructing Delivery.**—Certain fœtal tumors may occasion dystocia, such as malignant growths, or tumors of the kidney, liver, or spleen. Cases of this kind are recorded in most obstetric works. Hydro encephalocele, or hydro-rhachitis, depending on defective formation of the cranial or spinal bones, with the formation of a large protruding bag of fluid, is not very rare. The diagnosis of all such cases is somewhat obscure, nor is it possible to lay down any definite rules for their management, which must vary according to the particular exigencies. The tumors are rarely of sufficient size to prove formidable obstacles to delivery, and many of them are very compressible. This is specially the case with the spina bifida and similar cystic growths. Puncture—and, in the more solid growths of the abdomen or thorax, evisceration—may be required.

Other deformities, such as the anencephalous fœtus, or defective development of the thorax or abdominal parietes with protrusion of the viscera, are not likely to cause difficulty; but they may much embarrass the diagnosis by the strange and unusual presentation that is felt. If, in any case of doubt, a full and careful examination be undertaken, introducing the whole hand if necessary, no serious mistake is likely to be made.

**Dystocia from Excessive Development of the Fœtus.**—In addition to dystocia from morbid conditions of the fœtus, difficulties may arise from its undue development, and especially from excessive size and advanced ossification of the skull. This last is especially likely to cause delay. Even the slight difference in size between the male and female head was found by Simpson to have an appreciable effect in increasing the difficulty of labor, when the statistics of a large number of cases were taken into account; for he proved, beyond doubt, that the difficulties and casualties of labor occurred in decidedly larger proportion in male than in female births. Other circumstances, besides sex have an important effect on the size of the child. Thus Duncan and Hecker have shown that it increases in proportion to the age of the mother and the frequency of the labors; while the size of the parents has no doubt also an important bearing on the subject.

Although these influences modify the results of labor *en masse*, they



have little or no practical bearing on any particular case, since it is impossible to estimate either the size of the head or the degree of its ossification until labor is advanced.

**Treatment.**—When labor is retarded by undue ossification or large size of the head, the case must be treated on the same general principles which guide us when the want of proportion is caused by pelvic contraction. Hence, if delay arise which the natural powers are insufficient to overcome, it will seldom happen that the disproportion is too great for the forceps to overcome. If we fail to deliver by it, no resource is left but perforation.

Large size of the body of the child is still more rarely a cause of difficulty; for, if the head be born, the compressible trunk will almost always follow. Still, a few authentic cases are on record in which it was found impossible to extract the fœtus on account of the unusual bulk of its shoulders and thorax. Should the body remain firmly impacted after the birth of the head, it is easy to assist its delivery by traction on the axillæ, by gently aiding the rotation of the shoulders into the antero-posterior diameter of the pelvic cavity, and, if necessary, by extracting the arms, so as to lessen the bulk of the part of the body contained in the pelvis. Hicks relates a case in which evisceration was required for no other apparent reason than the enormous size of the body. The necessity for any such extreme measure must, of course, be of the greatest possible rarity; and it is quite exceptional for difficulty from this source to be beyond the powers of Nature to overcome.

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# CHAPTER XII.

## DEFORMITIES OF THE PELVIS.

**Deformities of the Pelvis** form one of the most important subjects of obstetric study, for from them arise some of the gravest difficulties and dangers connected with parturition. A knowledge, therefore, of their causes and effects, and of the best mode of detecting them, either during or before labor, is of paramount necessity; but the subject is far from easy, and it has been rendered more difficult than need be, from over-anxiety on the part of obstetricians to force all varieties of pelvic deformities within the limits of their favorite classification.

**Difficulties of Classification.**—Many attempts in this direction have been made, some of which are based on the causes on which the deformities depend, others on the particular kind of deformity produced. The changes of form, however, are so various and irregular, and similar, or apparently similar, causes so constantly produce dif-

ferent effects, that all such endeavors have been more or less unsuccessful. For example, we find that rickets (of all causes of pelvic deformity the most important) generally produces a narrowing of the conjugate diameter of the brim; while the analogous disease, osteomalacia, occurring in adult life, generally produces contraction of the transverse diameter, with approximation of the pubic bones, and relative or actual elongation of the conjugate diameter. We might, therefore, be tempted to classify the results of these two diseases under separate heads, did we not find that, when rickets affects children who are running about, and subject to mechanical influences similar to those acting upon patients suffering from osteomalacia, a form of pelvis is produced hardly distinguishable from that met with in the latter disease, which by some authors is described as the pseudo-osteomalacic.

On the whole, therefore, the most simple, as well as the most scientific, classification is that which takes as its basis the particular seat and nature of the deformity. Let us first glance at the most common causes.

**Causes of Pelvic Deformity.**—The key to the particular shape assumed by a deformed pelvis will be found in a knowledge of the circumstances which lead to its regular development and normal shape in a state of health. The changes produced may, almost invariably, be traced to the action of the same causes which produce a normal pelvis, but which, under certain diseased conditions of the bones or articulations, induce a more or less serious alteration in form. These have been already described in discussing the normal anatomy of the pelvis, and it will be remembered that they are chiefly the weight of the body, transmitted to the iliac bones through the sacro-iliac joints, and counter-pressure on these, acting through the acetabula. Sometimes they act in excess on bones which are healthy, but possibly smaller than usual, and the result may be the formation of certain abnormalities in the size of the various pelvic diameters. At other times they operate on bones which are softened and altered in texture by disease, and which, therefore, yield to pressure far more than do healthy bones.

**Rickets and Osteomalacia.**—The two diseases which chiefly operate in causing deformity are rickets and osteomalacia. Into the essential nature and symptomatology of these complaints it would be out of place to enter here; it may suffice to remind the reader that they are believed to be pathologically similar diseases, with the important practical distinction that the former occurs in early life, before the bones are completely ossified, and that the latter is a disease of adults, producing a softening in bones that have been hardened and developed. This difference affords a ready explanation of the generally resulting varieties of pelvic deformity.

**Rickets** commences very early in life, sometimes, it is believed, even *in utero*. It rarely produces softening of the entire bones, and only in case of very great severity, of those parts of the bones that have been already ossified. The effects of the disease are principally apparent in the cartilaginous portions of the bones, in which osseous



deposit has not yet taken place. The bones, therefore, are not subject to uniform change, and this fact has an important influence in determining their shape. Rickety children also have imperfect muscular development; they do not run about in the same way as other children, they are often continuously in the recumbent or sitting posture, and thus the weight of the trunk is brought to bear, more than in a state of health, on the softened bones. For the same reason counter-pressure through the acetabula is absent, or comparatively slight. When, however, the disease occurs for the first time in children who are able to run about, the latter comes into operation, and modifies the amount and nature of the deformity. It is to be observed that in rickety children the bones are not only altered in form from pressure, but are also imperfectly developed, and this materially modifies the deformity. When ossific matter is deposited, the bones become hard and cease to bend under external influences, and retain for ever the altered shape they have assumed.

**Osteomalacia.**—In osteomalacia, on the contrary, the already hardened bones become softened uniformly through all their textures, and thus the changes which are impressed upon them are much more regular and more easily predicated. It is, however, an infinitely less common cause of pelvic deformity than rickets, as is evidenced by the fact that in the Paris Maternity, in a period of sixteen years, 402 cases of deformity due to rickets occurred to one due to osteomalacia.[1]

**Their Varying Frequency.**—The frequency of both diseases varies greatly in different countries and under different circumstances. Rickets is much more common amongst the poor of large cities, whose children are ill-fed, badly-clothed, kept in a vitiated atmosphere, and subjected to unfavorable hygienic conditions. Deformities are therefore more common in them than in the more healthy children of the upper classes or of the rural population. The higher degrees of deformity, necessitating the Cæsarean section or craniotomy, are in England of extreme rarity; while in certain districts on the Continent they seem to be so frequent that these ultimate resources of the obstetric art have to be constantly employed.

[*Osteomalacia* is so rare in the United States that very few obstetricians with large experience have ever met with a case; and but one is on record where the disease produced a deformity that required delivery by the abdomen, and this woman was not a native.

*Rickets* is becoming much more common among the poor of our large cities, and especially in the black race, in whom it may be readily recognized by their convex flattened tibiæ and projecting heels; as also by their peculiar gait, which is most marked in running. The peculiar long-flattened head of the African fœtus enables a mother with a slightly deformed pelvis, in many instances, either to deliver herself or to escape abdomino-uterine section by aid of the forceps.—Ed.]

In another class of cases the ordinary shape is modified by weight

[1] Stanesco: Recherches cliniques sur les Rétrécissements du Bassin.

and counter-pressure operating on a pelvis in which one or more of the articulations is ossified. In this way we have produced the *obliquely ovate* pelvis of Naegele, or the still more uncommon *transversely contracted* pelvis of Robert.

**Other Causes of Pelvic Deformity.**—A certain number of deformed pelves cannot be referred to a modification of the ordinary developmental changes of the bones. Amongst these are the deformities resulting from spondylolisthesis, or downward dislocation of the lower lumbar vertebræ; from displacements of the sacrum, caused by curvatures of the spinal column, producing the kyphotic and scoliotic pelves; or from diseases of the pelvic bones themselves, such as tumors, malignant growths, and the like.

The first class of deformed pelves to be considered is that in which the diameters are altered from the usual standard, without any definite distortion of the bones; and such are often mere congenital variations in size, for which no definite explanation can be given. Of this class is the pelvis which is equally enlarged in all its diameters (*pelvis æquabiliter justo major*), which is of no obstetric consequence, except inasmuch as it may lead to precipitate labor, and is not likely to be diagnosed during life.

The corresponding diminution of all the pelvic diameters (*pelvis æquabiliter justo minor*) may be met with in women who are apparently well-formed in every respect, and whose external conformation and previous history give no indication of the abnormality. Sometimes the diminution amounts to half an inch or more, and it can readily be understood that such a lessening in the capacity of the pelvis would give rise to serious difficulty in labor. Thus, in three cases recorded by Naegele a fatal result followed; in two after difficult instrumental delivery, and in the third after rupture of the uterus. The equally lessened pelvis, however, is of great rarity. An unusually small pelvis may be met with in connection with general small size, as in dwarfs. It does not necessarily follow, because a woman is a dwarf, that the pelvis is too small for parturition. On the contrary, many such women have borne children without difficulty.

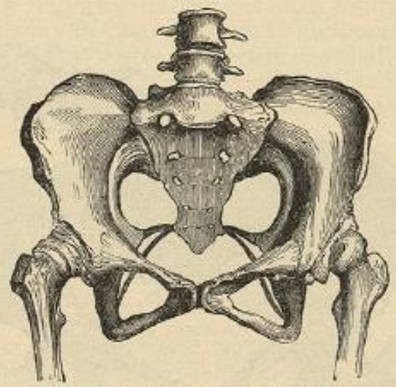
[We may be greatly deceived by the external characteristics of a large and tall woman as to the presumed development of her pelvis, and be led to credit her with diameters far beyond the actual measurements. In a lady above the average height, with large hips and now weighing over two hundred pounds, I found a vagina which the index finger entered with difficulty, and with a pelvis so small that it is doubtful if she could be delivered of a living fœtus much over seven months. She bore one child at maturity, which was delivered after its death with a crushed head, at the end of three days' labor and after long and powerful traction by compressing forceps. She has a true *justo minor* pelvis.—Ed.]

In some cases a pelvis retains its infantile characteristics after puberty (Fig. 134). The normal development of the pelvis has been interfered with, possibly from premature ossification of the different portions of the innominate bones, or from arrest of their growth from a weakly or rhachitic constitution. The measurements of these pelves



are not always below the normal standard; they may continue to grow, although they have not developed. The proportionate measurements of the various diameters will then be as in the infant; and the antero-posterior diameter may be longer, or as long as the transverse, the ischia comparatively near each other, and the pubic arch narrow. Such a form of pelvis will interfere with the mechanism of delivery, and unusual difficulty in labor will be experienced. Difficulties from a similar cause may be expected in very young girls. Here, however, there is reason to hope that, as age advances, the pelvis will develop and subsequent labors be more easy.

Fig. 134.



Adult pelvis retaining its infantile type.

The *masculine*, or funnel-shaped, pelvis owes its name to its approximation to the type of the male pelvis. The bones are thicker and stouter than usual, the conjugate diameter of the brim longer, and the whole cavity rendered deeper and narrower at its lower part by the nearness of the ischial tuberosities. It is generally met with in strong muscular women following laborious occupations, and Dr. Barnes, from his experience in the Royal Maternity charity, says that it chiefly occurs in weavers in the neighborhood of Bethnal Green, who spend most of their time in the sitting posture.

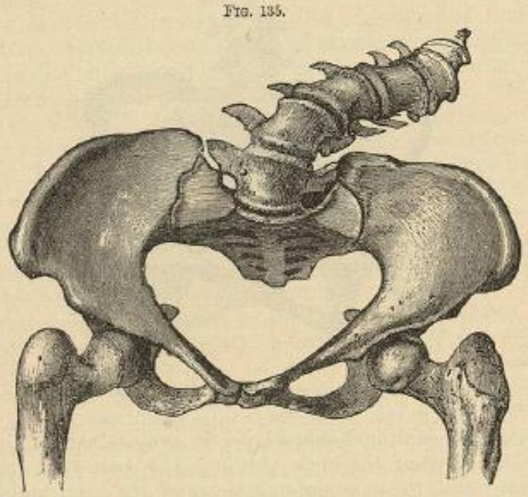
"The cause of this form of pelvis seems to be an advanced condition of ossification in a pelvis which would otherwise have been *infantile*, brought about by the development of unusual muscularity, corresponding to the laborious employment of the individual." The difficulties in labor will naturally be met with toward the outlet, where the funnel shape of the cavity is most apparent.

Diminution of the antero-posterior diameter (*flattened pelvis*) is most frequently limited to the brim, and is by far the most common variety of pelvic deformity. In its slighter degrees it is not necessarily dependent on rickets, although when more marked it almost invariably is so. When unconnected with rickets it probably can be traced to some injurious influence before the bones have ossified, such as increased

pressure of the trunk, from carrying weights in early childhood, and the like. By this means the sacrum is unduly depressed, and projects forward, so as to slightly narrow the conjugate diameter.

**Mode of Production in Rickets.**—When caused by rickets the amount of the contraction varies greatly, sometimes being very slight, sometimes sufficient to prevent the passage of the child altogether, and necessitate craniotomy or the Cæsarean section. The sacrum, softened by the disease, is pressed vertically downward by the weight of the body, its descent being partially resisted by the already ossified portions of the bone, so that the result is a downward and forward movement of the promontory. The upper portion of the sacral cavity is

FIG. 135.



Scolio-rhachitic pelvis. (From a specimen in the Museum of St. Bartholomew's Hospital.)

thus directed more backward; but, as the apex of the bone is drawn forward by the attachment of the perineal muscles to the coccyx, and by the sacro-ischiatic ligaments, a sharp curve of its lower part in a forward direction is established. The horizontal rami of the pubes are also flattened, while the ischia are more widely separated than in a normal pelvis, thus producing a greater width of the pubic arch, while the acetabula are turned forward.

The depression of the sacral promontory would tend to produce strong traction, through the sacro-iliac ligaments, on the posterior end of the sacro-cotyloid beams, and thus induce expansion of the iliac bones, and consequent increase of the transverse diameter of the brim. So an unusual length of the transverse diameter (T) is very often described as accompanying this deformity, but probably it is not so often apparent as might otherwise be expected, on account of the imperfect development of the bones generally accompanying rickets; and Barnes[1]

[1] Lectures on Obst. Operations, p. 280.

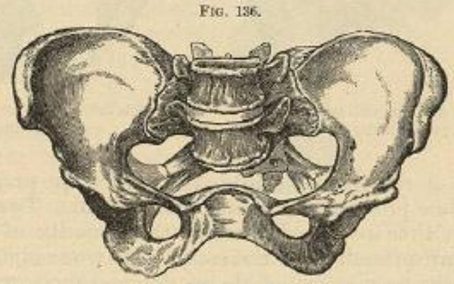


says that in parts of London where deformities are most rife, any enlargement of the transverse diameter is exceedingly rare.

Frequently the sacrum is not only depressed, but displaced more or less to one side, most generally to the left, thus interfering with the regular shape of the deformed brim. This is often the result of a lateral flexion of the spinal column, depending on the rhachitic diathesis, and when well marked is known as the *scolio-rhachitic pelvis* (Fig. 135), in which one side of the pelvis, that corresponding to the direction of the spinal curve, is asymmetrical and contracted, the ilio-pectineal line being sharply curved inward about the site of the sacro-iliac synchondrosis, the symphysis pubis being displaced toward the opposite side. A somewhat similar, but much less marked, unilateral asymmetry may exist in cases of scoliosis unconnected with rickets, but rarely to a sufficient degree to interfere materially with labor.

In most cases of this kind the cavity of the pelvis is not diminished in size, and is often even more than usually wide. The constant

FIG. 136.



Rickety pelvis, with backward depression of symphysis pubis.

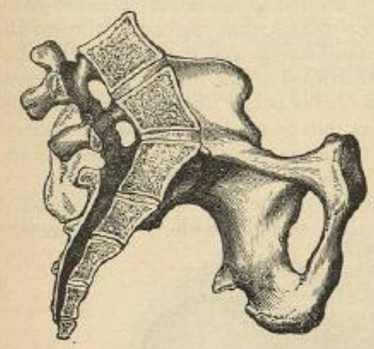
pressure on the ischia, which the sitting posture of the child entails, tends to force them apart, and also to widen the pubic arch. Considerable advantage results from this in cases in which we have to perform obstetric operations, as it gives plenty of room for manipulation.

**Figure-of-eight Deformity.**—In a few exceptional cases the narrowing of the conjugate diameter is increased by a backward depression of the symphysis pubis, which gives the pelvic brim a sort of figure-of-eight shape (Fig. 136). The most reasonable explanation of this peculiarity seems to be that it is the result of the muscular contraction of the recti muscles, at their point of attachment, when the centre of gravity of the body is thrown backward, on account of the projection of the sacral promontory. Sometimes also the antero-posterior diameter of the cavity is unusually lessened by the disappearance of the vertical curvature of the sacrum, which, instead of forming a distinct cavity, is nearly flat (Fig. 137).

**Spondylolisthesis.**—In a few rare cases, to which attention was first called in 1853 by Kilian, of Bonn, a very formidable narrowing of the conjugate diameter of the pelvic brim is produced by a downward displacement of the fourth and fifth lumbar vertebræ, which

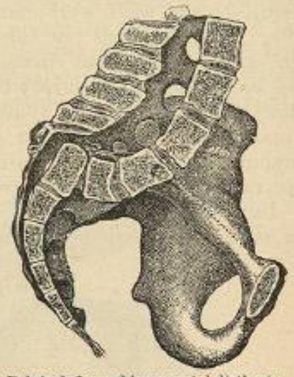
become dislocated forward, or, if not actually dislocated, at least separated from their several articulations to a sufficient extent to encroach very seriously on the dimensions of the pelvic inlet. This condition is known as *spondylolisthesis* (Fig. 138).

FIG. 137.



Flatness of sacrum, with narrowing of pelvic cavity.

FIG. 138.



Pelvis deformed by spondylolisthesis. (After KILIAN.)

The effect of this is sufficiently obvious, for the projection of the lumbar vertebræ prevents the passage of the child. To such an extent is obstruction thus produced, that, in the majority of the recorded cases, the Cæsarean section was necessary. The true conjugate diameter, that between the promontory of the sacrum and the symphysis pubis, is increased rather than diminished; but, for all practical purposes, the condition is similar to extreme narrowing of the conjugate from rickets, for the bodies of the displaced vertebræ project into and obstruct the pelvic brim.

The cause of this deformity seems to be different in different cases. In some it seems to have been congenital, and in others to have depended on some antecedent disease of the bones, such as tuberculosis or scrofula, producing inflammation and softening of the connection between the last lumbar vertebra and the sacrum, thus permitting downward displacement of the bones. Lambl believed that it generally followed spina bifida, which had become partially cured, but which had produced deformity of the vertebræ, and favored their dislocation. Brodhurst,[1] on the other hand, thinks that it most probably depends on rhachitic inflammation and softening of the osseous and ligamentous structures, and that it is not a dislocation in the strict sense of the word. This condition has recently been made the subject of special study by Dr. François Neugebauer,[2] who believes that the forward displacement is never the result of antecedent disease of the bones, but depends either on congenital want of development of the

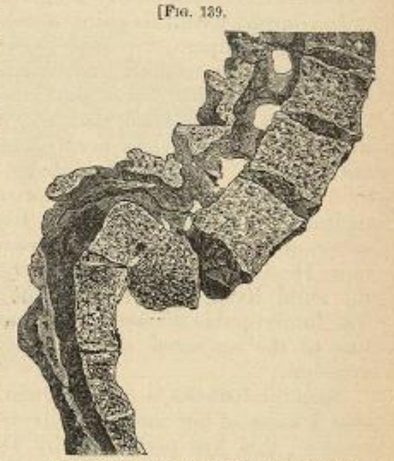
[1] Obst. Trans., 1865, vol. vi. p. 97.
[2] Contribution à la Pathogénie du Bassin vicié par le Glissement Vertébral. Paris, 1884.



vertebral arches, or on traumatism, such as fracture of the articular processes, which allows the weight of the trunk to displace the body of the last lumbar vertebra forward, either partially or entirely.

[We are indebted to Kilian, of Bonn, Germany, for the first careful investigation of the true character of spondylolisthetic deformity, although the credit of initial mention is due to Rokitansky, of Austria, who wrote in 1839, antedating the monograph of the former (1853) by fourteen years. No special mention is made of this peculiar lordosis by Rokitansky in his *Manual of Pathological Anatomy* in 1844, but in his *Lehrbuch* (1855) it is given, with due credit to Kilian. During the thirty-three years that have passed since Kilian prepared his paper from observations made upon three pelves which had been obtained from subjects in whom the Cæsarean section had proved fatal, one of them after a second operation, there have appeared numerous monographs and descriptions of cases, much the most valuable and extensive of which are those by Dr. Franz Ludwig Neugebauer, of Warsaw, and Dr. A. Swedelin, of St. Petersburg, the latter of whom furnishes the bibliography of the subject. These valuable papers cover 223 and 40 pages respectively of the *Archiv für Gynäkologie*, Berlin, vols. xix., xx., xxi., xxii., and xxv., for 1882–85.

[FIG. 139.



Spondylolisthesis. (After NEUGEBAUER.)]

The most frequent origin of spondylolisthetic deformity appears to lie in an incomplete ossification of the last lumbar vertebra, whereby its anterior and posterior portions are rendered liable to separate under the superincumbent weight of the body. Hence the subjects of the *slipping* are frequently stout, heavy women. This was markedly the case in the woman who came under the care of Prof. James Blake, of San Francisco.[1] This patient was married at fifteen years of age, at which time she weighed 101 pounds, but increased to 199 pounds by the time her first child was born. Her first and second labors were tedious, but the children were born alive; she aborted of another fœtus at four months, and later was delivered at maturity of four others, all dead, the conjugate space in the seventh labor being computed at three and a half inches. This labor was so difficult that it was decided, in the event of another pregnancy, to bring on labor prematurely. She became pregnant for the eighth time at the age of twenty-six, when she weighed 220 pounds. Labor was induced in the seventh month, but the fœtus was lost, as it weighed nearly six pounds and the lumbo-

[1] Pac. Med. and Surg. Journ., Feb. 1867.]

pubic space was reduced to three inches. This woman is said to have undergone the change in her vertebræ without pain or sign of ill-health, and to have retained a remarkable activity for her weight. After her eighth delivery she was up in six days and downstairs in ten. The history of this case would indicate that the deforming process must have been slowly progressing during more than ten years.

In contrast with this painless case in a multipara we have the opposite in a nullipara, reported by Dr. Olshausen, formerly of Halle. The disease commenced in his patient when a girl of eighteen, with severe pains in the sacrum and hips, as in malacosteon. She had not had rickets in childhood, had enjoyed good health up to this time, and was quite straight. As her disease progressed she found on awaking one morning that she could not straighten her spine, and was forced to walk with her body bent forward. She was put under medical treatment at the surgical clinic; had no fever, and in time ceased to suffer, and was discharged. Becoming pregnant at the age of twenty-four, Dr. Olshausen delivered her in 1863 by the Cæsarean section; the child lived, but she was lost on the fourth day by peritonitis. The lumbo-pubic diameter was found to measure three inches, and the line of the conjugate struck the lower margin of the third lumbar vertebra.

Spondylolisthesis is of very great rarity in our country—so much so that I know of but one case delivered under the Conservative Cæsarean section; this was performed by Dr. Hal C. Wyman, at Detroit, on January 19, 1891, the woman having been in labor three days. The child was lost, and the mother died in forty-eight hours, of pulmonary œdema and cyanosis.—Ed.]

**Spondylolizema.**—A somewhat analogous deformity has been described by Hergott[1] under the name of *Spondylolizema*. In this the bodies of the lower lumbar vertebræ having been destroyed by caries, the upper lumbar vertebræ sink downward and forward, so as to obstruct the pelvic inlet and prevent the engagement of the fœtus. It thus differs from spondylolisthesis, in which there is dislocation, but not destruction, of the bodies of the lower lumbar vertebræ.

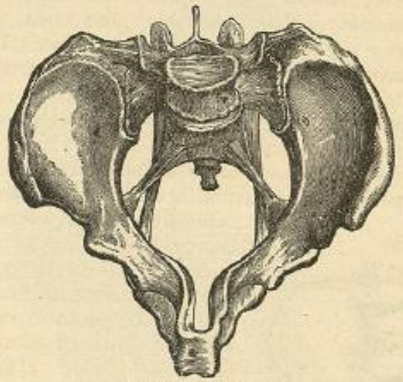
**Deformity from Osteomalacia.**—The most marked examples of narrowing of both oblique diameters depend on osteomalacia. In this disease, as has already been remarked, the bones are uniformly softened, and the alterations in form are further influenced by the fact that the disease commences after union of the separate portions of the ossa innominata has been completely effected. The amount of deformity in the worst cases is very great, and frequently renders delivery impossible without the Cæsarean section. Sometimes the softening of the bones proves of service in delivery by admitting of the dilatation of the contracted pelvic diameter by the pressure of the presenting part, or even by the hand. Some curious cases are on record in which the deformity was so great as to apparently require the Cæsarean section, but in which the softened bones eventually yielded sufficiently to render this unnecessary.

[1] Arch. de Tocologie, 1877, p. 65.



The weight of the body depresses the sacrum in a vertical direction, and at the same time compresses its component parts together, so as to approximate the base and apex of the bone, and narrow the conjugate diameter of the brim, by causing the promontory to encroach upon it.

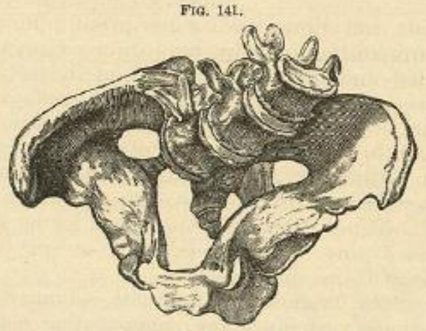
Fig. 140.



Osteomalacic pelvis.

The most characteristic changes are produced by the pushing inward of the walls of the pelvis at the cotyloid cavities, in consequence of pressure exerted at these points through the femora. The effect of this is to diminish both oblique diameters, giving the brim somewhat the shape of a trefoil, or an ace of clubs. The sides of the pubes are at

Fig. 141.



Extreme degree of osteomalacic deformity.

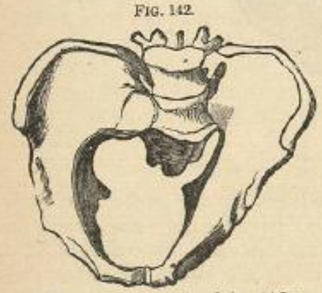
the same time approximated, and may become almost parallel, and the true conjugate may be even lengthened (Fig. 140). The tuberosities of the ischia are also compressed together, with the rest of the lateral pelvic wall, so that the outlet is greatly deformed as well as the brim. (Fig. 141).

**Obliquely Contracted Pelvis.**—That form of deformity in which one oblique diameter only is lessened has received considerable atten-

tion, from having been made the subject of special study by Naegele, and is generally known as the *obliquely contracted pelvis* (Fig. 142). It is a condition that is very rarely met with, although it is interesting from an obstetric point of view, as throwing considerable light on the mode in which the natural development of the pelvis is effected. It is difficult to diagnose, inasmuch as there is no apparent external deformity, and probably it has never, in fact, been detected before delivery. It has a very serious influence on labor; Litzmann found that out of twenty-eight cases of this deformity, twenty-two died in their labors, and five more in subsequent deliveries. The prognosis, therefore, is very formidable, and renders a knowledge of this distortion, rare though it be, of importance.

Its essential characteristic is flattening and want of development of one side of the pelvis, associated with ankylosis of the corresponding sacro-iliac synchondrosis. The latter is probably always present, and it seems to be most generally a congenital malformation. The lateral half of the sacrum on the same side, and the entire innominate bone, are much atrophied. The promontory of the sacrum is directed toward the diseased side, and the symphysis pubis is pushed over toward the healthy side.[1]

FIG. 142.



Obliquely contracted pelvis. (After DUNCAN.)

The main agent in the production of this deformity is the absence of the sacro-iliac joint, which prevents the proper lateral expansion of the pelvic brim on that side, and allows the counter-pressure through the femur to push in the atrophied os innominatum to a much greater extent than usual. The chief diminution in the length of the pelvic diameter is between the ilio-pectineal eminence of the affected side and the healthy sacro-iliac joint; while the oblique diameter between the ankylosed joint and the healthy os innominatum is of normal length.

[Coxalgia in little girls, affecting one joint, not only stunts the growth of the lower extremity, but that of the ilium as well, making the superior strait D-shaped; the *linea ilio-pectinea* having but little curve on the ankylosed side. Such cases have several times required Cæsarean delivery in this country.—ED.]

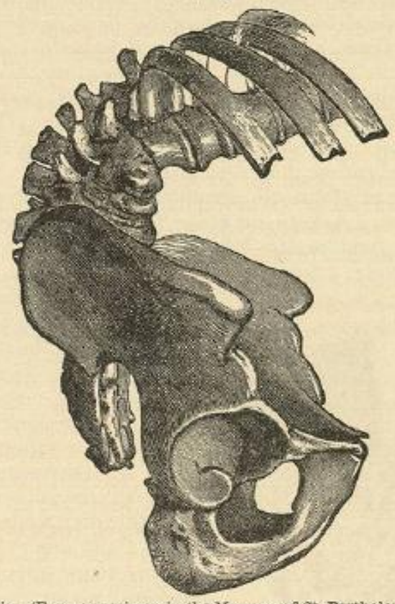
**Narrowing of the Transverse Diameter.**—Transverse contraction of the pelvic brim is very much less common than narrowing of the conjugate diameter. It most frequently depends on backward curvature of the lower parts of the spinal column, in consequence of disease of the vertebræ. This form of deformed pelvis is generally known as the *kyphotic* (Fig. 143). The effect of the spinal curvature is to drag the promontory of the sacrum backward, so that it is high up and out of reach. By this means the antero-posterior diameter of the brim is

[1 It was for this form of pelvis that Pinard, of Paris, performed, with success, the operation of unilateral pubio-ischiotomy.—ED.]



increased, while the transverse is lessened; the relative proportion between the two is thus reversed. While the upper portion of the sacrum is displaced backward, its lower end is projected forward, so

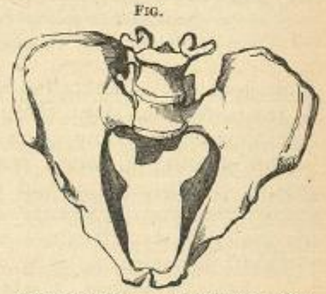
FIG. 143.



Kyphotic pelvis. (From a specimen in the Museum of St. Bartholomew's Hospital.)

that the antero-posterior diameters of the cavity and outlet are considerably diminished. The ischial tuberosities are also nearer to each other, and the pubic arch is narrowed. Obstruction to delivery will be chiefly met with at the lower parts and outlet of the pelvic cavity; for, although the transverse diameter of the brim is narrowed, there is generally sufficient space for the passage of the head.

FIG.



Robert's, or double obliquely contracted pelvis. (After DUNCAN.)

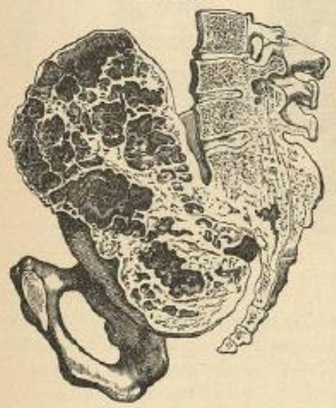
**Robert's Pelvis.**—Another form of transversely contracted pelvis is known as *Robert's* pelvis (Fig. 144), having been first discovered by Robert, of Coblentz. It is in fact a double obliquely contracted pelvis, depending on ankylosis of both sacro-iliac joints, and consequent defective development of the innominate bones. The shape of the pelvic brim is markedly oblong, and the sides of the pelvis are more or less parallel with each other. The

outlet is also much contracted transversely. The amount of obstruction is very great, so that, according to Schroeder, out of seven well-authenticated cases, the Cæsarean section was required in six.

**Deformity from Old-standing Hip-joint Disease.**—Another cause of transverse deformity occasionally met with is luxation of the head of the femur, depending on old-standing joint disease. The head of the femur, in this case, presses on the innominate bone at the site of dislocation, and the result is that the iliac fossa on the affected side, or both if the accident happens on both sides, is pushed inward, the transverse diameter of the brim being lessened. The tuberosity of the ischium is, ho ver, projected outward, so that the outlet of the pelvis is increased rather than diminished.

**Deformity from Tumors, Fractures, etc.**—Obstruction of the pelvic cavity from exostoses or other forms of tumors growing from the bones is of great rarity (Fig. 145). It may, however, produce very serious dystocia. Several curious examples are collected in Mr. Wood's article on the pelvis, in some of which the obstruction was so great as to necessitate the Cæsarean section. Some of these growths were true exostoses, and according to Stadfeldt,[1] these are commonly found in pelves that are otherwise contracted; others, osteo-sarcomatous tumors attached to the pelvic bones, most generally the upper part of the sacrum; and others were malignant. In some cases spiculæ of bone have developed about the linea ilio-pectinea or other parts of the pelvis, which may not be sufficient to produce obstruction, but which may injure the uterus, or even the fœtal head, when they are pressed upon them. Irregular projections may also arise from the callus of old fractures of the pelvic bones. All such cases defy classification and differ so greatly in their extent, and in their effect on labor, that no rules can be laid down for them, and each must be treated on its own merits.

FIG. 145.



Bony growth from sacrum obstructing the pelvic cavity.

**The effects of pelvic contractions** on labor vary, of course, greatly with the amount and nature of the deformity; but they must always give rise to anxiety, and in the graver degrees they produce the most serious difficulties we have to contend with in the whole range of obstetrics.

In the lesser degrees, in which the proportion between the presenting part and the pelvis is only slightly altered, we may observe little abnormal beyond a greater intensity of the pains, and some protraction

[1] Obst. Journ., 1879-80, vol. vii. p. 201.



of the labor. It is generally observed that the uterine contractions are strong and forcible in cases of this kind, probably because of the increased resistance they have to contend against; and this is obviously a desirable and conservative occurrence, which may, of itself, suffice to overcome the difficulty. The first stage, however, is not unfrequently prolonged, and the pains are ineffective, for the head does not readily engage in the brim, the uterus is more mobile than in ordinary labors, and it probably acts at a disadvantage.

**Risk to the Mother.**—In the more serious cases, the mother is subjected to many risks, directly proportionate to the amount of obstruction and the length of the labor. The long-continued and excessive uterine action, produced by the vain endeavors to push the child through the contracted pelvic canal, the more or less prolonged contusion and injury to which the maternal soft parts are necessarily subjected (not unfrequently ending in inflammation and sloughing with all its attendant dangers), and the direct injury which may be inflicted by the measures we are compelled to adopt for aiding delivery (such as the forceps, turning, craniotomy, or Cæsarean section), all tend to make the prognosis a matter of grave anxiety. [The Cæsarean operation has been performed ten times in the United States in cases of pelvic exostosis, with five recoveries. One woman was operated upon three times and died from the third operation; five of the ten children were saved. Of the fatal cases, three were in labor three days; one, two days; in one, labor was induced; and one had been in convulsions for twenty-four hours. Of the five that recovered, two were in labor "a few hours;" one, twelve hours; one, twenty-four hours; and one, thirty-eight hours.—ED.]

**Risk to the Child.**—Nor are the dangers less to the child; and a very large proportion of stillbirths will always be met with. The infantile mortality may be traced to a variety of causes, the most important being the protraction of the labor, and the continuous pressure to which the presenting part is subjected. For this reason, even in cases in which the contraction is so slight that the labor is terminated by the natural powers, it has been estimated that one out of every five children is stillborn; and as the deformity increases in amount, so, of course, does the prognosis to the child become more unfavorable.

**Prolapse of the umbilical cord** is of very frequent occurrence in cases of pelvic deformity, the tendency to this accident being traceable to the fact of the head not entering and occupying the upper strait of the pelvis as in ordinary labors, and thus leaving a space through which the cord may descend. So frequently is this complication met with in pelvic deformity that Stanesco found it had happened as often as fifty-nine times in 414 labors; and when the dangers of prolapsed funis are added to those of protracted labors, it is hardly a matter of surprise that the occurrence should, under such circumstances, almost always prove fatal to the child.

The head of the child is also liable to injury of a more or less grave character, from the compression to which it is subjected, especially by the promontory of the sacrum. Independently of the transient effects

of undue pressure (temporary alteration of the shape of the bones and bruising of the scalp), there is often met with a more serious depression of the bones of the skull, produced by the sacral promontory. This is most marked in cases in which the head has been forcibly dragged past the projecting bone by the forceps, or after turning. The amount of depression varies with the degree of contraction; but sometimes, were it not for the yielding of the bones of the fœtal skull in this way, delivery, without lessening the size of the head by perforation, would be impossible. Such depressions are found at the spot immediately opposite the promontory, generally at the side of the skull near the junction of the frontal and parietal bones. Sometimes there is a slight permanent mark, but more often the depression disappears in a few days. The prognosis to the child is, however, grave, when the contraction has been sufficient to indent the skull; for it has been found that 50 per cent. of the children thus marked died either immediately or shortly after labor.[1]

**Course of Labor.**—The means which Nature takes to overcome these difficulties are well worthy of study, and there are certain peculiarities in the mechanism of delivery, when pelvic deformities exist, which it is of importance to understand, as they guide us in determining the proper treatment to adopt.

**Frequency of Malpresentation.**—Malpresentations of the fœtus are of much more frequent occurrence than in ordinary labors; partly because the head does not engage readily in the brim, but, remaining free above it, is apt to be pushed away by the uterine contractions, and partly because of the frequent alteration of the axis of the uterine tumor. The pendulous condition of the abdomen in cases of pelvic deformity is often very obvious, so that the fundus is sometimes almost in a line with the cervix, and thus transverse or other abnormal positions are very frequently met with. It is to be noted, however, that we cannot regard breech presentations as so unfavorable as in ordinary labors, for the pressure from the contracted pelvis is less likely to be injurious when applied to the body than to the head of the child; and, indeed, as we shall presently see, the artificial production of these presentations is often advisable as a matter of choice.

**Mechanism of Delivery in Head Presentations.**—The mode in which the head passes naturally through a contracted pelvis is in some respects different from the ordinary mechanism of delivery in head presentations, and has been carefully worked out by Spiegelberg and other German obstetricians.

The means which Nature adopts to overcome the difficulty are different in cases in which there is a marked narrowing of the conjugate diameter of the brim, and in those in which there is a generally contracted pelvis.

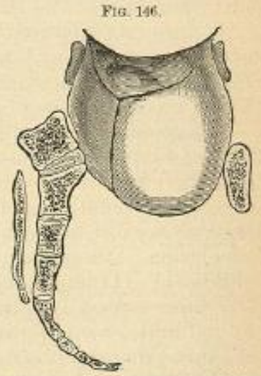
*a.* **In Contracted Brim.**—In the former, and more common, deformity, the head lies at the brim with its long occipito-frontal diameter in the transverse diameter of the pelvis, and, as both parietal bones cannot enter the contracted brim, it lies with one parietal bone on

[1] Schroeder, op. cit., p. 256.



a much lower level than the other; in the large majority of cases that nearest the pubes being most depressed, so that the sagittal suture is felt high up near the promontory of the sacrum (Fig. 146). As labor advances, if the contraction is not too great to be insuperable, the anterior fontanelle comes much more within reach than in ordinary labor, while, at the same time, the occipital portion of the head is shoved to the side of the pelvis, so that its narrow bi-temporal diameter engages in the contracted conjugate. At this stage, on examination, it will be found—supposing we have to do with a case in which the occiput points to the left side of the pelvis—that the anterior fontanelle is lower than the posterior, and to the right, that the bi-temporal diameter of the head is engaged in the conjugate diameter of the brim (as the smallest diameter of the skull, there is manifest advantage in this), and that the bi-parietal diameter and the largest portion of the head points to the left side. The sagittal suture will be felt running across in the transverse diameter of the brim, but nearer to the sacrum, the head being placed obliquely. As the head is forced down by the uterine contractions, the parietal bone, which is resting on the promontory, is pushed against it, so that the sagittal suture is forced more into the true transverse diameter of the pelvic brim, and approaches nearer to the pubes. The next step is the depression of the head, the occiput undergoing a sort of rotation on its transverse axis so that it reaches a plane below the brim. When this is accomplished, the rest of the head readily passes the obstruction. The forehead now meets with the resistance of the pelvic walls, the posterior fontanelle descends to a lower level, and, as the cavity of the pelvis in cases of antero-posterior contraction of the brim is generally of normal dimensions, the rest of the labor is terminated in the usual way.

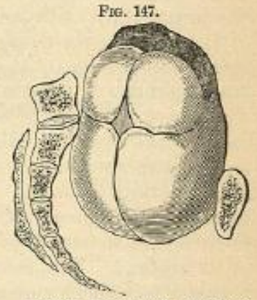
Fig. 146.



Head passing through the inlet in a flat pelvis. (After Parvin.)

*b.* **In Generally Contracted Pelvis.**—In the generally contracted pelvis the head enters the brim with the posterior fontanelle lowest, and it is after it has engaged in it that the resistance to its progress becomes manifest. The result is, therefore, an exaggeration of what is met with in ordinary cases. The resistance to the anterior or longer arm of the lever is greater than that to the occipital or shorter; and, therefore, the flexion of the head becomes very marked (Fig. 147). The posterior fontanelle is consequently unusually depressed, and the anterior quite out of reach. So the head is forced down as a wedge,

Fig. 147.



Marked flexion of the head entering a generally contracted pelvis. (After Parvin.)

and its further progress must depend upon the amount of contraction. If this be not too great the anterior fontanelle eventually descends, and delivery is completed in the usual way. Should the contraction be too much to permit of this, the head becomes jammed in the pelvis, and diminution of its size may be essential.

In cases of deformity of the conjugate diameter combined with general contraction of the pelvis, the mechanism partakes of the peculiarities of both these classes, to a greater or less extent, in proportion to the preponderance of one or other species of deformity.

**Diagnosis.**—It rarely happens that deformities of the pelvis, except of the gravest kind, are suspected before labor has actually commenced, and therefore we are not often called upon to give an opinion as to the condition of the pelvis before delivery. Should we be so, there are various circumstances which may aid us in arriving at a correct conclusion. Prominent among them is the history of the patient in childhood. If she is known to have suffered from rickets in early life, more especially if the disease has left evident traces in deformities of the limbs, or in a dwarfed and stunted growth, or in curvature of the spine, there will be strong presumptive evidence of pelvic deformity; a markedly pendulous state of the abdomen may also tend to confirm the suspicion. Nothing short of a careful examination of the pelvis itself will, however, clear up the point with certainty; and even by this means, to estimate the precise degree of deformity with accuracy requires considerable skill and practice. The ingenuity of practitioners has been much exercised—it might perhaps be justly said wasted—in the invention of various more or less complicated pelvimeters for aiding us in obtaining the desired object. It is, however, pretty generally admitted by all accoucheurs that the hand forms the best and most reliable instrument for this purpose, at any rate as regards the interior of the pelvis; although a pair of callipers, such as Baudelocque's well-known instrument, is essential for accurately determining the external measurements. The objections to all internal pelvimeters, even those most simple in their construction, are their cost and complexity, and the impossibility of using them without pain or injury to the patient.

It was formerly thought that by measuring the distance between the spinous processes of the sacrum and the symphysis pubis, and subtracting from it what we judge to be the thickness of the bones and soft parts, we might arrive at an approximate estimate of the measurement of the conjugate diameter of the pelvic brim. It is now admitted that this method can never be depended on, and that, taken by itself, it is practically useless. A change in the relative length of other external measurements of the pelvis is, however, often of great value in showing the existence of deformity internally, although not in judging of its amount. The measurements which are used for this purpose are between the anterior superior spines of the ilia, and between the centres of their crests, averaging respectively ten and one-quarter and eleven and one-quarter inches in the covered pelvis. According to Spiegelberg, these measurements may give one of three results.

1. Both may be less than they ought to be, but the relation of one to the other remains unchanged.



2. That between the crests is not, or is at most very little, diminished, but that between the spines is increased.

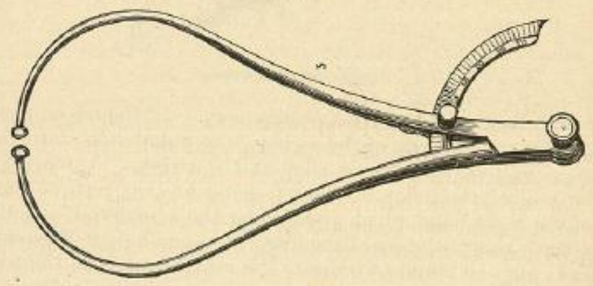
3. Both are diminished, but at the same time their mutual relation is not normal, the distance between the spines being as long, if not longer, than that between the crests.

No. 1 denotes a uniformly contracted pelvis; No. 2, a pelvis simply contracted in the conjugate diameter of the brim, and not otherwise deformed; No. 3, a pelvis with narrowed conjugate and also uniformly contracted, as in the severe type of rhachitic deformity. If, however, both these measurements are of average length, and the distance between the crests is about one inch greater than between the spines, the pelvis is normal.

Besides the above, useful information may be obtained by the measurement of the external conjugate diameter, which averages seven and three-quarters inches, varying somewhat with the amount of adipose tissue present. This may be taken by placing one point of the callipers in the depression below the spine of the last lumbar vertebra, the other at the centre of the upper edge of the symphysis pubis. If the measurement be distinctly below the average, not more, for example, than six and one-quarter inches, we may conclude that there is a considerable narrowing of the antero-posterior diameter of the brim, the extent of which we must endeavor to ascertain by other means. If, on the other hand, the measurement equals or exceeds the average (seven and one-half to eight and one-half inches), such contraction may be excluded. If we find all these external measurements to be normal both as to length and relation, then we may safely conclude that the pelvis also is normal, and no further examination is required.

For the purpose of making these measurements, Baudelocque's *compas d'épaisseur* can be used (Fig. 148), or Dr. Lazarewitch's elegant

Fig. 148.



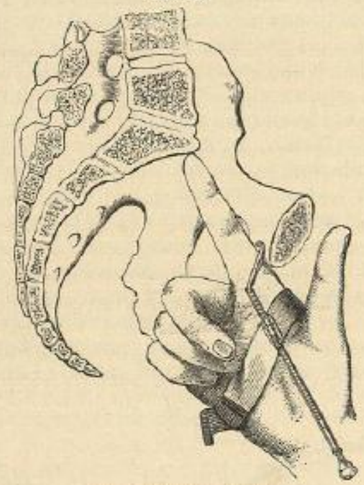
Pelvimeter.

universal pelvimeter, which can be adopted also for internal pelvimetry; but, in the absence of these special contrivances, an ordinary pair of callipers, such as are used by carpenters, can be made to answer the desired object.

These external measurements must be corroborated, when abnormal, by internal, chiefly of the antero-posterior diameter, by which alone

we can estimate the amount of the deformity. We endeavor to find, in the first place, the length of the inclined conjugate, between the lower edge of the symphysis pubis and the promontory of the sacrum, which averages about half an inch more than the true conjugate. This is best done by placing the patient on her back, with the hips well raised. The index and middle fingers of the right hand are then introduced into the vagina, and the perineum is pressed steadily backward, so as to overcome the resistance it offers. The tip of the middle finger is passed steadily upward until it reaches the promontory of the sacrum, which is recognized by the breadth of the cartilage between it and the last lumbar vertebra. Care must be taken not to mistake the junction between the first and second lumbar vertebræ, occasionally

FIG. 149.



Greenhalgh's pelvimeter.

unduly prominent, for the true promontory. If the tip of the finger can reach the promontory of the sacrum, the radial side of the hand is raised so as to touch the lower edge of the pubes. A mark is made with the nail of the index of the left hand on that part of the index finger of the right hand which rests under the symphysis, and then the distance from this to the tip of the finger, less one-half to three-quarters of an inch, may be taken to indicate the measurement of the true conjugate of the brim. Various pelvimeters have been devised to make the same measurements, such as Lumley Earle's, Lazarewitch's, which is similar in principle, and Van Huevel's; the best and simplest, I think, is that invented by Dr. Greenhalgh (Fig. 149). It consists of a movable rod, attached to a flexible band of metal which passes around the palm of the examining hand. At the distal end of the rod is a curved portion, which passes over the radial edge of the index finger. The examination is made in the usual way, and when the



point of the finger is resting on the promontory of the sacrum, the rod is withdrawn until it is arrested by the posterior surface of the symphysis, the exact measurement of the inclined conjugate being then read off the scale.

It is to be remembered that this procedure is useless in the slighter degrees of contraction, in which the promontory of the sacrum cannot be easily reached. Dr. Ramsbotham proposed to measure the conjugate by spreading out the index and middle fingers internally, the tip of one resting on the promontory, the other behind the symphysis pubis; and then withdrawing them, in the same position, and measuring the distance between them. This manœuvre I believe to be impracticable.

Whenever, in actual labor, we wish to ascertain the condition of the pelvis accurately, the patient should be anæsthetized, and the whole hand introduced into the vagina (which could not otherwise be done without causing great pain), and the proportions of the pelvis, and the relations of the head to it, thoroughly explored; and, if what has been said as to the mechanism of delivery in these cases be borne in mind, this may aid us in determining the kind of deformity existing. In this way contractions about the outlet of the pelvis can also be pretty generally made out.

The obliquely contracted pelvis cannot be determined by any of these methods, but certain external measurements, as Naegele has pointed out, will readily enable us to recognize its existence. It will be found that measurements which in the healthy pelvis ought to be equal are unequal in the obliquely distorted pelvis. The points of measurement are chiefly: 1. From the tuberosity of the ischium on one side to the posterior superior spine of the ilium on the other. 2. From the anterior superior iliac spine on the one side to the posterior superior on the opposite. 3. From the trochanter major of one side to the posterior superior iliac spine on the other. 4. From the lower edge of the symphysis pubis to the posterior superior iliac spine on either side. 5. From the spinous process of the last lumbar vertebra to the anterior superior spine of the ilium on either side.

If these measurements differ from each other by half an inch to an inch, the existence of an obliquely deformed pelvis may be safely diagnosed. The diagnosis can be corroborated by placing the patient in the erect position, and letting fall two plumb-lines, one from the spines of the sacrum, the other from the symphysis pubis. In a healthy pelvis these will fall in the same plane, but in the oblique pelvis the anterior line will deviate considerably toward the unaffected side.

**Treatment.**—The proper management of labor in contracted pelvis is, even up to this time, one of the most vexed questions in midwifery, notwithstanding the immense amount of discussion to which it has given rise; and the varying opinions of accoucheurs of equal experience afford a strong proof of the difficulties surrounding the subject. This remark applies, of course, only to the lesser degree of deformity, in which the birth of a living child is not hopeless. When the antero-posterior diameter of the brim measures from two and three-quarters

to three inches, it is universally admitted that the destruction of the child is inevitable, unless the pelvis be so small as to necessitate the performance of the Cæsarean section. But when it is between three inches and the normal measurement, the comparative merits of the forceps, turning, and the induction of premature labor form a fruitful theme for discussion. With one class of accoucheurs the forceps is chiefly advocated, and turning admitted as an occasional resource when it has failed; and this, indeed, speaking broadly, may be said to have been the general view held in England. More recently we find German authorities of eminence, such as Schroeder and Spiegelberg, giving turning the chief place, and condemning the forceps altogether in contracted pelves, or at least restricting its use within very narrow limits. More strangely still we find, of late, that the induction of premature labor, on the origination and extension of which British accoucheurs have always prided themselves, is placed without the pale, and spoken of as injurious and useless in reference to pelvic deformities. To see our way clearly amongst so many conflicting opinions is by no means an easy task, and perhaps we may best aid in its accomplishment by considering separately the three operations in so far as they bear on this subject, and pointing out briefly what can be said for and against each of them.

**The Forceps.**—In England and in France it is pretty generally admitted that in the slighter degrees of contraction the most reliable means of aiding the patient is by the forceps. It should be remembered that the operation, under such circumstances, is always much more serious than in ordinary labors simply delayed from uterine inertia, when there is ample room, and the head is in the cavity of the pelvis; for the blades have to be passed up very high, often when the head is more or less movable above the brim, and much more traction is likely to be required. For these reasons artificial assistance, when pelvic deformity is suspected, is not to be lightly or hurriedly resorted to. Nor, fortunately, is it always necessary, for if the pains be sufficiently strong, and the contraction not too great to prevent the head engaging at all, after a lapse of time it will become so moulded in the brim as to pass even a considerable obstruction. In all cases, therefore, sufficient time must be given for this; and if no suspicious symptoms exist on the part of the mother—no elevation of temperature, dryness of the vagina, rapid pulse, and the like, and the fœtal heart sounds continue to be normal—labor may be allowed to go on for some hours after the rupture of the membranes, so as to give Nature a chance of completing the delivery. When this seems hopeless, the intervention of art is called for.

The forceps is generally considered to be applicable in all degrees of contraction, from the standard measurement down to about three and a quarter inches in the conjugate of the brim. There can be no doubt that in such cases traction with the forceps often enables us to effect delivery, when the natural efforts have proved insufficient, and holds out a very fair hope of saving the child. Out of seventeen cases in which the high forceps operation was resorted to for pelvic deformity, reported by Stanesco, in thirteen living children were born.



If the length of the labor, and the long-continued compression to which the child has been subjected, be borne in mind, this result must be considered very favorable.

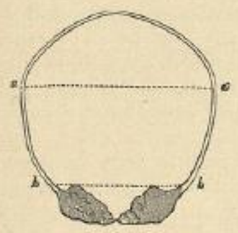
What are the objections which have been brought against the operation? These have been principally made by Schroeder and other German writers. They are, chiefly, the difficulty of passing the instrument; the risk of injuring the maternal structures; and the supposition that, as the blades must seize the head by the forehead and occiput, their compressive action will diminish its longitudinal and increase its transverse diameter (which is opposed to the contracted part of the brim), and so enlarge the head just where it ought to be smallest. There is little doubt that these writers much exaggerate the compressive power of the forceps. Certainly, with those generally used in this country, any disadvantage likely to accrue from this is more than counterbalanced by the traction on the head; and the fact that minor degrees of obstruction can be thus overcome, with safety both to the mother and child, is abundantly proved by the numberless cases in which the forceps has been used.

It is very likely that the forceps does not act equally well in all cases. When the head is loose above the brim; when the contraction is chiefly limited to the antero-posterior diameter, and there is abundance of room at the sides of the pelvis for the occiput to occupy after version; and when, as is usual in these cases, the anterior fontanelle is depressed and the head lies transversely across the brim, turning is certainly the safer operation for the mother, and the easier performed. When, on the other hand, the head has engaged in the brim, and has become more or less impacted, it is obvious that version could not be performed without pushing it back, which may be neither easy nor safe. In the generally contracted pelvis, in which the head enters in an exaggerated state of flexion and lies obliquely, the posterior fontanelle being much depressed, the forceps is more suitable.

**Mechanical Advantage of Turning in Certain Cases.**—The special reasons why version sometimes succeeds when the forceps fails, or why it may be elected from the first as a matter of choice, have been by no one better pointed out than by Sir James Simpson. Although the operation was performed by many of the older obstetricians, its revival in modern times, and the clear enunciation of its principles, can undoubtedly be traced to his writings. He points out that the head of the child is shaped like a cone, its narrowest portion the base of the cranium (Fig. 150, *b b*), measuring, on an average, from one-half to three-quarters of an inch less than the broadest portion (Fig. 150. *a a*), viz., the bi-parietal diameter. In ordinary head presentations the latter part of the head has to pass first; but if the feet are brought down, the narrow apex of the cranial cone is brought first into apposition with the contracted brim, and can be more easily *drawn* through than the broader base can be *pushed* through by the uterine contractions. Nor is this the only advantage, for, after turning, the narrower bi-temporal diameter (Fig. 151, *b b*)—which measures, on an average, half an inch less than the bi-parietal (Fig. 151, *a a*)—is brought into contact with the contracted conjugate, while the broader bi-parietal

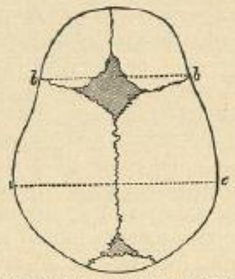
lies in the comparatively wide space at the side of the pelvis (Fig. 152). These mechanical considerations are sufficiently obvious, and fully explain the success which has often attended the performance of the operation.

FIG. 150.



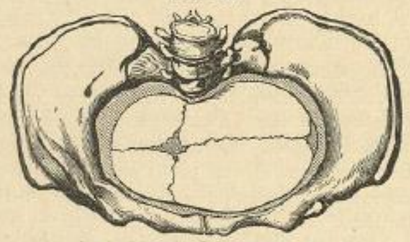

Section of fœtal cranium, showing its conical form.

FIG. 151.




Showing the greater breadth of the bi-parietal diameter of the fœtal cranium. (After SIMPSON.)

FIG. 152.



Showing the greater space for the bi-parietal diameter at the side of the pelvis in certain cases of deformity. (After SIMPSON.)

It is generally admitted that it may be possible, for the reasons just mentioned, to deliver a living child by turning through a pelvis contracted beyond the point which would permit of a living child being extracted by the forceps. Many obstetricians believe that it is possible to deliver a living child by turning in a pelvis contracted even to the extent of two and three-quarters inches in the conjugate diameter. Barnes maintains that, although an unusually compressible head may be drawn through a pelvis contracted to three inches, the chance of the child being born alive under such circumstances must necessarily be small, and that from three and a quarter inches to the normal size must be taken as the proper limits of the operation.

That delivery is often possible by turning, after the forceps and the natural powers have failed, and when no other resource is left but the destruction of the child, must, I think, be admitted by all; for the records of obstetrics are full of such cases. To take one example only, Dr. Braxton Hicks[1] records four cases in which the forceps was

[1] Guy's Hospital Reports, 1869-70, vol. xv. 3d ser. p. 501.



tried unsuccessfully, in all of which version was used, three of the children being born alive. Here are the lives of three children rescued from destruction, within a short period, in the practice of one man; and a fact like this would of itself be ample justification of the attempt to deliver by turning, when the child was known to be alive, and other means had failed. The possibility that craniotomy may still be required is no argument against the operation; for although perforation of the after-coming head is certainly not so easy as perforation of a presenting head, it is not so much more difficult as to justify the neglect of an experiment by which it may possibly be altogether avoided.

The original choice of turning is a more difficult question to decide. The most generally received opinion in the present day among scientific obstetricians is that in the simply flattened pelvis, with an antero-posterior diameter of not less than two and three-quarters inches, turning is the preferable operation.[*] In every case of doubt it is desirable thoroughly to anæsthetize the patient and make a careful examination with the whole hand in the vagina. If we find the sagittal suture lying transversely, one parietal bone on a lower line than the other, and if both fontanelles are easily within reach, and some space exists at the sides of the pelvis beside the forehead and occiput, then turning is the procedure most likely to succeed, and the descent of the head after version can be very materially assisted by strong pressure applied from above by an assistant, as has been well pointed out by Goodell.[2] If, on the other hand, the anterior fontanelle is high up, and out of reach, the head being distinctly flexed, we have to do with a generally contracted pelvis, and the forceps is the preferable operation.

When the contraction is below three inches in the conjugate, or when the forceps or turning has failed, no resource is left but the destruction of the fœtus, or the Cæsarean section [or symphyseotomy. —ED.].

**The Induction of Premature Labor.**—The induction of premature labor as a means of avoiding the risk of delivery at term, and of possibly saving the life of the child, must now be studied. The established rule in England is, that in all cases of pelvic deformity the existence of which has been ascertained either by the experience of former labors or by accurate examination of the pelvis, labor should be induced previous to the full period, so that the smaller and more compressible head of the premature fœtus may pass where that of the fœtus at term could not. The gain is a double one, partly the lessened risk to the mother, and partly the chance of saving the child's life.

The practice is so thoroughly recognized as a conservative and judicious one that it might be deemed unnecessary to argue in its favor, were it not that some eminent authorities have of late years tried to show that it is better and safer to the mother to leave the labor to come on at term; and that the risk to the child is so great in artificially induced labor as to lead to the conclusion that the opera-

[*] At two and three-quarters C.V., symphyseotomy avails to deliver a living fœtus, and is becoming a favorite operation in our country.—ED.]

[2] Amer. Journ. of Obstet., 1875-76, vol. viii. p. 193.

tion should be altogether abandoned, except, perhaps, in the extreme distortion in which the Cæsarean section might otherwise be necessary. Prominent amongst those who hold these views are Spiegelberg and Litzmann, and they have been supported, in a modified form, by Matthews Duncan. Spiegelberg[1] tries to show, by a collection of cases from various sources, that the results of induced labor in contracted pelves are much more unfavorable than when the cases are left to Nature; that in the latter the mortality of the mothers is 6.6 per cent., and of the children 28.7 per cent., whereas in the former the maternal deaths are 15 per cent. and the infantile 66.9 per cent. Litzmann[2] arrives at not very dissimilar results—namely, 6.9 per cent. of the mothers and 20.3 per cent. of the children in contracted pelvis at term, and 14.7 per cent. of the mothers and 55.8 per cent. of the children, in artificially induced premature labor.

If these statistics were reliable, inasmuch as they show a very decided risk to the mother, there might be great force in the argument that it would be better to leave the cases to run the chance of delivery at term. It is, however, very questionable whether they can be taken, in themselves, as being sufficient to settle the question. The fallacy of determining such points by a mass of heterogeneous cases, collected together without a careful sifting of their histories, has over and over again been pointed out; and it would be easy enough to meet them by an equal catalogue of cases in which the maternal mortality is almost *nil*. The results of the practice of many authorities are given in Churchill's work, where we find, for example, that out of forty-six cases of Merriman's, not one proved fatal. The same fortunate result happened in sixty-two cases of Ramsbotham's. His conclusion is that "there is undoubtedly some risk incurred by the mother, but not more than by accidental premature labor," and this conclusion, as regards the mother, is that which has long ago been arrived at by the majority of British obstetricians, who undoubtedly have more experience of the operation than those of any other nation. With regard to the child, even if the German statistics be taken as reliable, they would hardly be accepted as contra-indicating the operation, inasmuch as it is intended to save the mother from the dangers of the more serious labor at term, and, in many cases, to give at least a chance to the child, whose life would otherwise be certainly sacrificed. The result, moreover, must depend to a great extent on the method of operation adopted, for many of the plans of inducing labor recommended are certainly, in themselves, not devoid of danger both to the mother and the child. It may, I think, be admitted, as Duncan contends, that the operation has been more often performed than is absolutely necessary, and that the higher degrees of pelvic contraction are much more uncommon than has been supposed to be the case. That is a very valid reason for insisting on a careful and accurate diagnosis, but not for rejecting an operation which has so long been an established and favorite resource.

When the induction of labor has been determined on, the precise

[1] Arch. f. Gyn., 1870, Bd. i. S. 1. "Ueber den Werth der künstlichen Frühgebart.
[2] Arch. f. Gyn., 1873, Bd. iii. S. 169.



period at which it should be resorted to becomes a question for anxious consideration, since the longer it is delayed the greater, of course, are the dangers for the child. Many tables have been constructed to guide us on this point, which are not, on the whole, of so much service as they might appear to be, on account of the difficulty of determining with minute accuracy the amount of contraction. The following, however, which is drawn up by Kiwisch, may serve for a guide in settling this question:

| | Inches. | Lines. | | |
|---|---|---|---|---|
| When the sacro-pubic diameter is | 2 and | 6 or 7 | induce labor at | 30th week. |
| " " | 2 " | 8 " 9 | " " | 31st " |
| " " | 2 " | 10 " 11 | " " | 32d " |
| " " | 3 " | — | " " | 33d " |
| " " | 3 " | 1 | " " | 33d " |
| " " | 3 " | 2 or 3 | " " | 34th " |
| " " | 3 " | 4 " 5 | " " | 35th " |
| " " | 3 " | 5 " 6 | " " | 36th " |

In cases of moderate deformity, when labor pains have been induced, the further progress of the case may be left to Nature; but in more marked cases, as in those below three inches, it will often be found necessary to assist delivery by turning or by the forceps, the former being here specially useful, on account of the extreme pliability of the head, and the facility with which it may be drawn through the contracted brim. By thus combining the two operations it may be quite possible to secure the birth of a living child even in pelves very considerably deformed.

**Production of Abortion in Extreme Deformity.**—When the contraction is so great as to necessitate the induction of the labor before the sixth month, or, in other words, before the child has reached a viable age, it would be preferable to resort to a very early production of abortion. The operation is then indicated, not for the sake of the child, but to save the mother from the deadly risk to which she would otherwise be subjected. As in these cases the mother alone is concerned, the operation should be performed as soon as we have positively determined the existence of pregnancy. No object can be gained by waiting until the development of the child is advanced to any extent, and the less the fœtus is developed, the less will be the pain and the risk the mother has to undergo. There is no amount of deformity, however great, in which we could not succeed in bringing on miscarriage by some of the numerous means at our disposal; and, in spite of Dr. Radford's objections, who maintains that the obstetrician is not justified in sacrificing the life of a human being more than once, when the mother knows that she cannot give birth to a viable child, there are few practitioners who would not deem it their duty to spare the mother the terrible dangers of the Cæsarean section.

[We no longer on this side of the Atlantic regard this operation as *terribly dangerous*, neither is it thus feared in Glasgow, Leipzig, Dresden, and Vienna, where it has had a mortality of 7 to 10 per cent. in the last decade. In our own country, but two women died out of the last twenty, covering three years, and but three children were lost, one being a six months fœtus. One woman that died, did so after twelve hours, having been in labor seven days with a placenta prævia and a rigid cervix.—Ed.]