

**The behaviour of the pelvic articulations in the mechanism of parturition /
by J. Matthews Duncan.**

Contributors

Duncan, J. Matthews 1826-1890.

Publication/Creation

Dublin : Hodges and Smith, 1854.

Persistent URL

<https://wellcomecollection.org/works/jwjkm3q>

License and attribution

This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>

THE BEHAVIOUR
OF THE
PELVIC ARTICULATIONS
IN THE
MECHANISM OF PARTURITION.

BY
J. MATTHEWS DUNCAN, A.M., M.D., F.R.C.P.E.,
LECTURER ON MIDWIFERY;
PHYSICIAN ACCOUCHEUR TO THE ROYAL DISPENSARY, EDINBURGH;
ETC. ETC.

From the Dublin Quarterly Journal of Medical Science, August, 1854.

DUBLIN :
HODGES AND SMITH, GRAFTON-STREET,
BOOKSELLERS TO THE UNIVERSITY.

1854.

DUBLIN :
Printed at the University Press,
BY M. H. GILL.

ON THE

PELVIC ARTICULATIONS IN PARTURITION,

&c. &c.

IN the lower animals we find beautiful examples of the changes taking place in the pelvic joints in the end of pregnancy. And the intimate nature of these changes is most satisfactorily studied in these animals, because in them it is comparatively easy to procure specimens of the altered tissues at any period, and still more so, because in many of them the changes are to an extent far exceeding what is even found in the human female. In illustration I may, at present, cite the changed condition of the pelvis of the Guinea pig, and of the cow. In the former, there takes place, at the time of parturition, a very considerable separation of the pubic bones; the ligamentous tissue stretching, in this small quadruped, to the extent of an inch, or even more. This enlargement of the pelvic circle, by separation of the pubic bones, necessarily implies great relaxation of the tissues on the anterior or inferior part of the sacro-iliac joint, and freedom of motion in it. After parturition the pubic bones again become closely united.

In the cow, the changes in the pelvic joints differ in some important respects from those just described as occurring in the Guinea pig. In the latter, it has been stated that the most notable change is the elongation of the ligaments of the symphysis pubis (nature in this way foreshadowing the operation of symphyseotomy), and the separation of these bones giving rise to corresponding motions in the iliac bones, analogous to the abduction of the limbs. In the cow, on the other hand, these movements are completely absent. The symphysis pubis is consolidated by bony union, and thus incapable of distention, and consequently the abduction of the iliac bones is impossible. But, nevertheless, the changes in the cow's pelvis are

of great importance. They have lately been described by Professor Barlow, of the Veterinary College^a, and I had an opportunity of demonstrating them upon Mr. Barlow's preparation to the members of the Edinburgh Obstetrical Society. They consist in an increased development of the large sacro-sciatic ligaments, which, from being of moderate thickness, and in a state of tension in the non-pregnant cow, become much increased not only in thickness, but also in length, and are thus made slack and yielding. The tension of these ligaments tends to fix the sacrum and consolidate it with the ilia, and their relaxation leaves it freer to move. Further to facilitate this motion, the sacro-iliac joints, which in the non-pregnant cow are described by Mr. Barlow as secured by a material closely resembling intervertebral substance, now have the opposing bony surfaces smooth and lubricated, and the surrounding fibrous ligaments relaxed. By these changes the ilia become extensively movable upon the sacrum (or *vice versâ*), in an antero-posterior direction, the motions being analogous to those of flexion and extension in the limbs. The final result of these changes and motions is to enlarge the genital passages in this animal.

It has hitherto been customary to regard the articulations of the pelvis in man as virtually immovable, and to describe in the female at the time of parturition cases where motion evidently takes place as morbid in their character. But Mr. Zaglas^b has lately pointed out that in man there is distinct motion of the ossa innominata in an antero-posterior direction, or upon an imaginary line passing transversely through the second sacral vertebra from one side to the other. In other words, the sacrum may be described as having a nutatory motion upon this imaginary transverse axis, the promontory of the sacrum advancing downwards and forwards, while its apex moves in a contrary direction, and *vice versâ*. In the downward motion of the promontory, which in the non-pregnant is to the extent of about a line, the brim of the pelvis is diminished to the same extent in its conjugate diameter, while the corresponding upward motion of the apex of the bone to the extent of about two lines puts the sacro-sciatic ligaments on the stretch, and enlarges the dimensions of the outlet. By observations on the living and on the dead subject, Mr. Zaglas has shown that in the erect position the sacral promontory is not in the position of greatest projection into the brim of the pelvis, but the reverse, and consequently that the apex is in its forward posi-

^a Monthly Journal of Medical Science, January, 1854, p. 83.

^b Monthly Journal of Medical Science for Sept., 1851, p. 289.

tion diminishing the outlet, and relaxing the sacro-sciatic ligaments. When the body is bent forward, on the other hand, the base of the sacrum is protruded into the brim, the apex is tilted upwards, the sacro-sciatic ligaments put on the stretch, and the outlet of the pelvis consequently enlarged. These movements take place ordinarily in both man and woman, but in her they are of greatest interest and importance in the function of parturition. Before entering on this part of the subject, I shall first point out some peculiarities in the pelvic articulations in woman, and describe the changes taking place in them in the end of pregnancy.

The three large pelvic articulations present the following important peculiarities in regard to their mode of union:—Each articulating surface of bone presents two distinct parts; the one, comparatively smooth, covered with cartilage and only partially united to its neighbour; the other, rough for the attachment of very strong and numerous bands of fibrous and fibro-cartilaginous tissue firmly uniting it to the corresponding surface of its neighbour. The former surfaces form the anterior and inferior parts of the sacro-iliac joints, and in the skeleton are known as the auricular surfaces. In the symphysis pubis these surfaces form the superior and posterior parts of the joint. Interposed between the investing cartilages at these parts is a synovial bursa. It is on these surfaces that the articular motion is most free, the ulterior advantages of which, in the physiology of the erect position, &c., this is not the place to demonstrate^a.

Mr. Zaglas points out that on the os innominatum we may divide the entire articular surfaces into four parts. The two antero-inferior of these correspond to what is called the auricular surface, and are inclined to one another at an angle which looks outwards, and forms a ridge inwards. The two posterior superior surfaces (which are separated by a large mass of fibrous ligamentous tissue from the corresponding surface of the sacrum) are inclined to one another at a similar angle; and there is accordingly a crooked ridge running between the four surfaces in a direction from the spine to the symphysis. Taking the four surfaces, however, in another relation, it may be seen that the two posterior superior surfaces are separated from the two anterior inferior by a groove (running nearly parallel with the

^a In a specimen I exhibited to the Obstetrical Society there is a double synovial bag in the symphysis pubis. This joint was removed from a virgin about eighteen years of age. For a fuller exposition of these anatomical points see the *Traité des Accouchements* of P. A. Dubois; also Mr. Zaglas's *Observations on the Symphysis Pubis*, in *Monthly Journal* for Nov., 1851, p. 489.

axis of the sacrum), and are inclined to them at an angle which looks inwards. The consequence of this arrangement is, that while some motion is permitted, any tendency to displacement is entirely obviated, so long as the innominate bones are retained in a due degree of proximity by the pressure on the acetabula, and by their ligaments^a. But besides these just remarks on the general arrangement of the whole joint, it is important to notice another striking peculiarity always observed, and frequently in a very marked degree. This consists in the existence upon the posterior articular surface of the ilium of a bony prominence of irregular outlines, but frequently assuming the form of a solid projecting angle. This projection is found to correspond to a distinct cavity on the opposed surface of the sacrum, which is, in some of its functions, analogous to a cotyloid cavity. For, upon these parts (which are generally on a level with the upper part of the second bone of the sacrum) the motions of the ilia must take place; and whilst they will offer no absolute resistance to the motions of the ilia upon the sacrum analogous to flexion and extension in the limbs, they will, like the general arrangement of the entire articular surfaces of the articulation, prevent the slipping upwards or downwards of the one bone upon the other, motions which would necessarily prejudice the security of the erect position.

In the latter half of pregnancy the soft tissues contributing to form the pelvic joints are invariably, or almost invariably, found softened as if by serous infiltration; and the joints are consequently relaxed. All anatomists and obstetricians^b, who have paid attention to this subject, agree in this statement. The softening of these tissues is generally accompanied by their increase in thickness, a change which will in itself have, as a necessary consequence, the separation of the bones, and the enlargement of the pelvic circle. And I have no doubt that this favourable circumstance, together with others connected with the motions of the joints to be presently discussed, forms an important part of the explanation of some cases of delivery, by a simpler operative procedure than was predicted to be necessary. Indeed, the experiments of MM. Giraud et Ansiaux^c seemed to them to show that in contracted pelvis this change in the joints takes place to a greater extent than in well-formed pelvis. In some cases the thickening of the tissues goes on to quite an extraordinary extent. Boyer states that in one case

^a See Report of the Physiological Society, *loc. cit.*

^b See Burns' Principles of Midwifery, p. 8; Velpeau, *Traité des Accouchements*, Bruxelles, p. 122; also Moreau, *Traité des Accouchements*, tom. i. p. 40.

^c Jacquemier, *Manuel des Accouchements*, tom. ii. p. 476.

he found the sacro-iliac joint separated to the extent of half an inch; Chaussier found the symphysis pubis separated still more in an easy labour, and Madame Boivin asserts that she sometimes found the pubic bones separated to the extent even of an inch. In some cases, as in those of Smellie, Diemerbroek, and Denman, the separation appears to have taken place chiefly during the course of a difficult labour.

But although there can be no doubt as to the thickening and softening of the tissues forming the pelvic joints, there is great difference as to their capability of motion. In this country, indeed, most authors seem to think that motion in these joints in pregnancy is always to be considered the result of a morbid process. This opinion is, without doubt, erroneous, although there are observed not unfrequently cases where the natural relaxation of these joints increases to such an extent as to interfere with the function of progression^a.

The observations which I have already made upon the movements in the pelvic joints in the non-pregnant set aside at once all the arguments adduced to show that there is naturally no such mobility in pregnancy, and that when movements are observed in these joints a morbid condition exists. Founding upon what has just been stated as to the condition of the ligaments of the pelvic articulations in the latter part of pregnancy, we can, without difficulty, assert that at that time the pelvic bones enjoy freer and more extensive movements than at other times. In very numerous cases scattered through obstetric literature, where these joints have been examined after delivery, authors have described the mobility of these articulations, sometimes, indeed, as being to a very great extent. In addition, cases are not very unfrequent where these movements, either from their freedom and extent, or from their causing pain, attract the attention of the patient and physician. They are then sometimes easily perceived on making the proper examinations.

The movements which occur may be described as consisting in the elevation and depression of the symphysis pubis, the ilia moving upon the sacrum; or if the sacrum be regarded as the moving bone, it describes a rotatory motion upon an imaginary transverse line passing through the second bone. By the ele-

^a Some extraordinary observations have been made by obstetricians in regard to certain motions of these bones in difficult labours, and under the influence of the pressure of the presenting part. For instance, Madame Lachapelle mentions a case where one ilium became dislocated forwards upon the sacrum, so as to enlarge the oblique diameter of the pelvis, through which the head was passing. Others have described a similar dislocation of both bones simultaneously.

vation of the symphysis pubis (or nodding forwards of the promontory), the angle of inclination of the pelvis is lessened, and the conjugate diameter of the brim of the pelvis is diminished to the extent of one or even two lines; the corresponding diameter also of the outlet is increased probably about twice as much. This different ratio of the effects of the motion upon the brim and outlet results from the fact of the centre of motion being much nearer the promontory than the apex of the bone. The promontory, therefore, will describe an arc of a smaller circle than the apex.

That the alteration of the dimensions of the brim and outlet by these movements is not insignificant, but the reverse, is a proposition which every obstetrician will confirm. It only remains, then, to be observed how these alterations correspond with the phenomena of the progress of the child in parturition. Now it has been already stated, that in the erect position the brim of the pelvis is in its enlarged condition, the symphysis pubis being then depressed, while the outlet is correspondingly contracted. Now in the course of the first stage of labour, while the head is pressing into the brim, the human female is generally standing, sitting, or lying on her back, or in an easy position. But as soon as the head has descended into the pelvis and impinged upon the sensitive vagina, then forcing efforts accompany the pains. These forcing efforts consist, in great part, of powerful contractions of the anterior abdominal muscles, the effect of which, especially the action of the two recti muscles, will be to tilt up the symphysis pubis, thus throwing the promontory forwards, contracting the brim, and enlarging the outlet, and diminishing the angle of inclination of the pelvis. To all these changes the position usually assumed by the female in the second stage of labour will contribute. For it has already been stated, that the simple bending of the body forwards has for its effect the tilting upwards of the apex of the sacrum and enlarging of the outlet. And it is a curious fact, that a woman in her forcing pains, in the second stage, is found to draw up her legs, and bend her body forwards, thus inducing changes in her pelvis which facilitate the advance of the child in that stage.

The motions of the pelvic bones, which we have been detailing, agree exactly with those which take place in the cow in parturition. In that animal the first effect of each pain is to elevate the tail, and thus enlarge the outlet for the escape of the calf.

The mechanism we have just been describing in the human female is analogous to that which we have previously shown

to occur in the pregnant and parturient cow. The changes which occur at the time of labour in the Guinea pig find their analogues in the altered conditions of the symphysis pubis in the human female. But in her they are only to a small degree comparatively. It is important, however, to remember, that in this joint the thickening of the ligaments is generally more apparent than in the sacro-iliac joints. The distention of the pubic ligaments will be easier in the recumbent than in the erect attitude, which last implies strong compression of the tissues of the joint by the pubic bones. Moreover, the separation of the thighs, which is habitually practised at the latter part of a labour, will favour any possible slight separation of the pubic bones, especially if the internal femoral muscles are in a state of contraction while the thighs are apart. Indeed, the study of the whole subject illustrates beautifully how nature leads the human female in the act of childbirth to assume positions and make exertions which are necessary for perfecting the mechanism of the process.

There is another source of information as to the state of the pelvic joints, especially the sacro-iliac, namely, the results of section of the symphysis pubis, an operation which appears to me to have been prematurely abandoned. In the performance of this operation upon the living female in order to aid in delivery, it has been found that the pubic bones can be separated to the extent of from one and a half to two or even three inches, without any damage to the sacro-iliac joint, or with the result of merely lacerating the capsular fibres of the anterior part of the articulation. In many of the cases the pubic bones, after the division of the symphysis, seemed to part from one another with resiliency, as if their union counteracted some force tending to separate them. This phenomenon admits of two explanations: either by attributing it to the weight of the limbs acting upon the acetabula, or by ascribing it to the elasticity of the great mass of elastic fibrous tissue in the posterior and upper parts of the sacro-iliac articulation, which is not resisted by the different mode of union in the anterior and lower part of the joint as already described. In the pelvis of the male and non-pregnant female, when this operation is performed after death, it is found that a separation of from one, in some cases, to even two inches can be effected without injury. These facts illustrate the relaxation of the sacro-iliac joints at the end of pregnancy. They are, however, perhaps of more importance in regard to symphyseotomy, as showing the amount of separation that may be produced without injury. But the dread of injury is pro-

bably, in the main, a groundless fancy; for we know that to destroy the sacro-iliac joint, after section of the symphysis pubis, it is necessary to use great force, a circumstance which is, in itself, the best guardian of the safety of the joint.

The operation of symphyseotomy, as reintroduced to the profession in 1768 by MM. Sigault and Le Roy, is one which has, with justice, been condemned. But the jealousy of the Academy of Surgery, which discountenanced M. Sigault's operation at the first, led the members, after the subsidence of the excitement produced by its first and only occasional successes, to repeat their condemnations of it, and prevented its obtaining a fair consideration. It yet remains to be seen whether the operation, as more broadly proposed, long before Sigault, by Severin Pineau, may not be one which is destined to have a small place among the operations of practical midwifery, devoted to saving the life of the unborn child. In this country the operation received, after its proposal by Sigault and Le Roy, the high sanction of W. Hunter and Denman, so far as its own peculiarities were concerned. But they, at the same time, showed that it could be of very little, if any, service, in the cases for which it was proposed, namely, those of extreme pelvic distortion where Cæsarean section would otherwise be required. In this condition matters have been allowed to rest. British obstetric authors have loaded the operation itself with calumnies which are quite unfounded, and raised difficulties about it which are sufficient to deter a superficial inquirer from its consideration.

There is every reason to believe that the operation, in itself, is one of slight danger at the time, or even ulteriorly, if compared with the dreadful results of craniotomy and Cæsarean section. For the latter operation it can very seldom be a substitute. But it remains to be seen whether the former, namely craniotomy, may not in some cases be superseded by it. There is every reason to think that the operation would be much less dangerous to the mother than craniotomy, even with the allowance of great freedom in the selection of cases; and it would give a chance of saving the child, whose life is necessarily compromised by that proceeding. Moreover, the operation might probably be simplified by adapting to it the subcutaneous method.

I conclude these remarks with the following quotation from the most esteemed author in British obstetrics, whose name and influence have contributed greatly to the neglect into which the operation has fallen:—

"It is proved," he says, "in the first place, that some enlargement of the capacity of the pelvis is actually obtained by dividing the symphysis of the ossa pubis.

"Secondly, that the evils which have followed this operation have been very much occasioned by its being performed unskilfully, or by injudicious endeavours to increase that enlargement of the capacity of the pelvis beyond the degree which naturally follows the division of the symphysis.

"Thirdly, that many women who have undergone this operation have recovered; though of those who recovered, many suffered very serious complaints for a long time, or for the remainder of their lives.

"Fourthly, that some children were born living when this operation was performed.

"We may, therefore, presume to say that if a case could be so precisely marked that there should only be a deficiency of just so much space as would be supplied by the simple division of the symphysis, the operation might in that particular case be considered.

"We may also say, that this operation is not so certainly fatal to those women on whom it may be performed as the Cæsarean operation; nor so certainly destructive of children as that of lessening the head.

"We may, then, be allowed to suppose a case, and such a one is more than possible, in which a person of very high rank, the life of whose child might be of the greatest public importance, could not be delivered without the destruction of the child, or her child be preserved but by the Cæsarean operation at the expense or great hazard of her life; and that she, through human frailty, might refuse to submit to the Cæsarean operation, yet the great interests and policy of the nation might forbid the destruction of the child. Of course both the mother and child would be inevitably lost. Should such a case occur, which, as I said before, is more than possible, then the section of the symphysis of the ossa pubis might be proposed and performed, as it would in some measure meet both these interests; being less horrid to the woman than the Cæsarean operation, and, instead of adding to the danger, give some chance of preserving the life of the child."

This testimonial from the eminent and sagacious Dr. Denman is the more extraordinary, as he is an author who joins strongly in the cry against the operation, and expressly says, in regard to the above passage quoted from his own work on Midwifery, that he does not "mean to insinuate a wish or advance an argument in favour of this operation, in the cases

for which it was originally proposed, or any other which can be imagined."

The last paragraph of the passage just quoted gives in few words a general notion of the cases to which this operation may yet be adapted. But it must be remembered that, in our day, a section of this class of cases has already been provided with a suitable treatment in the operation of premature labour; an operation, however, whose use is not inconsistent with the simultaneous use of symphyseotomy.