CASE OF DELIVERY,

WITHOUT OPERATIVE AID,

THROUGH A PELVIS EXTREMELY DEFORMED BY MALACOSTEON.

By J. Y. SIMPSON, M.D.,
PROFESSOR OF MIDWIFERY IN THE UNIVERSITY OF EDINBURGH.

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CASE OF MALACOSTEON.

Preliminary Remarks on the Modes of Delivery required in different Gradations of Pelvic Deformity.

Different classifications of the morbid conditions and deformities of the maternal pelvis have been proposed by obstetric pathologists, Some have arranged them in relation to their causes, others in relation to their nature, seats, &c. But the most *practical* classification consists in dividing the morbid states of this part of the skeleton into several grades, according to the actual degree and amount of physical contraction in the pelvic apertures, which is induced by these states; and, consequently, according to the kind and modification of measures required to extract through the defective apertures, a child arrived at or near the full term of utero-gestation.

Drs Denman and Ramsbotham, and Professor Paul Dubois have for instance, followed this principle of classification in discussing the effects of diseased and deformed conditions of the pelvis upon the process of parturition. Laying aside all pelves of the normal form and standard dimensions, as requiring no accessary aid from art for the transit of an infant through them, these authors have divided all varieties of pelvic contractions into the three following gradations:—

I. Pelves somewhat diminished below the natural standard, but still admitting of the child being expelled through them by nature, or extracted by instruments safe (such as the forceps and vectis) both to the mother and infant.

II. Pelves contracted to such a degree as not to allow a child, at or near the full term, to pass through their apertures till its head was reduced in size by craniotomy.

III. Pelves so very small as not to admit of the extraction through them of a child even after it was mangled and mutilated by embryulsio, and where that last resort of the obstetric art—the Cæsarean section—constituted the only possible mode of delivery.

It is evident that the reference of individual cases of labour to one or other of the preceding degrees of difficulty in the process of delivery, must be often regulated by other circumstances than the mere physical dimensions of the maternal pelvis. The strength and powers of endurance of the patient, the activity of the uterus, and above all, the dimensions and compressibility of the infant's head, as modified by its actual volume and by its state of ossification, the width of its sutures and fontanelles, the separation or not of the bones by previous death and putrefaction, &c., are so many matters forming important points and elements of difference in different instances. But still, however, most of our highest authorities in midwifery have attempted to lay down, in the form of general principles, more or less exact and fixed pelvic admeasurements between the several classes or gradations of pelvic deformity that I have mentioned. In other words, they have endeavoured to reduce to abstract arithmetical formulæ, as it were, the boundaries and limits between morbid states of pelvic contractions, admitting respectively of delivery at or near the full time, *first*, without the necessity of embryulsio; *secondly*, by means of embryulsio; and *thirdly*, where embryulsio is inadequate and insufficient for the purpose.

For the purpose of illustrating these points and statements, I shall collect and throw into a condensed tabular form the opinions of some of our most eminent British accoucheurs on the pelvic dimensions relatively fitted for these different modes of management and delivery. It is necessary, however, to premise one observation in order to understand the figures and formulæ which I shall quote. The apertures of the brim and outlet of the human pelvis are normally of an irregular ovoid form, and they maintain more or less of this configuration under all kinds of morbid contraction and deformity. Indeed it generally happens, more particularly in cases of rickets and malacosteon, that when any of these pelvic apertures is morbidly contracted in one diameter, it comes to be elongated in the other. One of the diameters, either of the brim or outlet, however, is always contracted; and hence in speaking of the relative size of different deformed pelves, accoucheurs often note their dimensions by simply stating (as in the first of the following tables) the length of their shortest or narrowest diameter.

Smallest size of pelvis through which a child may pass without mutilation. In the standard and normally formed pelvis the narrowest diameter of the brim (the conjugate), and the narrowest diameter of the outlet (the transverse), are each, on an average, about four inches in length. A child, however, may pass through these pelvic openings, though their narrowest diameter be reduced very considerably. The following table shows the opinion of some of the most eminent British accoucheurs on this point.

Smallest Pelvic Diameter admitting of the Passage of a Child without Embryulsio.

$3\frac{1}{4}$ inches—Joseph Clarke,[1] Burns.[2]
3 „ —Denman,[3] Davis,[4] Ramsbotham.[5]
$2\frac{3}{4}$ „ —Osborne,[6] Hamilton,[7] Barlow.[8]

[1] "Having examined by dissection the bodies of many women, who died after tedious and laborious labours, I am enabled to state with some confidence that three inches and a quarter from pubes to sacrum, is the least diameter through which I have known a full-grown fœtus to pass *entire;* but it was a very putrid fœtus, consequently the head was soft and pliable."—*Dr Clarke in Transactions of the Irish College of Physicians*, vol. i. p. 374.

[2] Dr Burns considers Dr Clarke "correct when he says that the head cannot pass entire if the diameter be under $3\frac{1}{4}$, and even this will generally require the perforator."—*Principles of Midwifery* (1843), p. 471. See also p. 473.

[3] "Should the capacity of the pelvis be reduced under three inches, we have no good reason to expect a living child of its full growth, however small, to pass through it, either naturally or by the assistance of art; though the head of one that is dead, especially if it be putrified, or one much below the common size, may be pressed through a pelvis of these dimensions, even without artificial assistance. Should the capacity of a pelvis not exceed, according to our judgment, two inches and a half, then the head of a child, unless the contents be evacuated, cannot pass or be extracted through it."—*Denman's Introduction to Midwifery*, p. 457–8. Edit. of 1816.

[4] "Pelves of somewhat less dimensions than those of a standard pelvis may occasionally admit of children being born alive at the full period of gestation. For example, a living child of average size, at that period might be born alive, provided the conjugate diameter of the brim of the mother's pelvis was three inches and three quarters, and the head presented in the best possible position. But, if it amounted to no more than three inches, a well-grown child at full period could not be expected to pass without an operation to reduce the bulk of its head."—*Davis's Principles and Practice of Midwifery*, vol. i. page 25.

[5] "Some practitioners have thought that a pelvis measuring only two inches and three quarters in the conjugate diameter would allow of the head passing whole, provided there was sufficient room laterally. My own conviction, derived from clinical observations, is, that the dimensions I have just mentioned (three inches in the conjugate by four in the lateral diameter), are the smallest which will grant the passage to a full grown fœtus."—*Ramsbotham's Obstetric Medicine and Surgery*. Second edition. Page 30.

[6] "Whenever the capacity of the pelvis is only two inches and three quarters, or certainly less than three inches," there is, Dr Osborne conceives, "an utter impossibility for a child of ordinary size, at full time, being born alive by any means, either of nature or art, through so small a pelvis."—*Osborne's Essays on the Practice of Midwifery*. Page 223. At p. 194, he states that "when the bones approach much nearer than three inches, it is utterly impossible for a living child at full maturity, by any means to pass," and embryulsio should be performed early in the labour.

[7] Dr A. Hamilton, in his letters to Dr Osborne, adduces several cases in which delivery took place safely and spontaneously, "where the deformity of the pelvis seemed to be such, that according to your (Dr O.'s) data, the head of the child should have been opened at the beginning of labour," p. 119. In the first case detailed by Dr Hamilton, a living child passed though the pelvic brim was ascertained by admeasurement after death, to be "sensibly under three inches." Page 101.

[8] Dr Barlow, in his Essays on Surgery and Midwifery, p. 354, gives the

I am not aware that any English writer on Midwifery has stated it as practicable that a child could pass, without mutilation, through a pelvic diameter less than that mentioned in the last line of the preceding table, namely, two inches and three-fourths. Instances, however, in which children, at or near the full time, have been expelled by the uterus, or extracted with forceps, through pelves measuring only two inches and a half in their narrowest diameter, have been mentioned by some foreign authors. Solayres, Baudelocque and Capuron,[1] each advert to cases illustrating the possibility of this occurrence.

In an obliquely deformed pelvis in my Museum, the conjugate diameter of the brim is one or two lines below 3 inches; and yet through it a dead full-sized child passed as a head presentation, after a long labour, but without instruments. I extracted a second infant through the same pelvis footling. Further, I believe, that when the child presents by the feet, and thus the apex, instead of the vertex or base of the cone formed by the head and body of the fœtus, comes first, that it may make its transit *without* embryulsio through a pelvis, the smallness of which would otherwise have necessitated mutilation or the operation of craniotomy. In this way I have, through a pelvis probably not above 2½ inches in its narrowest diameter, extracted a child by the operation of turning, the parietes of the skull becoming compressed and indented to allow of its passage. (See this Journal for March 1847, p. 722.)[2]

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following Synoptical Table of the various degrees of distortion of the pelvis and their appropriate treatment.

Degrees of Deformed Pelvis.	Conjugate Diameter of Brim.	Modes of Delivery.
First degree, . . .	From 4 to 3 or 2¾ inches.	Efforts of Nature, or assisted by forceps or lever.
Second degree, . . .	From 2¾ to 2½ inches.	Premature delivery.
Third degree, . . .	From 2½ to 1½ inches.	Embryulsio.
Fourth degree, . .	From 1½ to the lowest possible degree of distortion.	Cæsarean operation.

[1] Baudelocque's Midwifery (Heath's Translation) vol. ii. p. 370. Capuron's Cours des Accouchemens (Brussels Edit.) p. 221.

[2] I have elsewhere stated the advantages, in deformed pelves, from turning in comparison with embryulsio to be, that—1. It gives the child a chance of life; 2. It is more safe to the mother, because it can be performed earlier in the labour and more speedily; 3. It enables us to adjust and extract the head of the child through the imperfect pelvic brim in the most advantageous form and direction, the head flattening *laterally* under the traction; 4. The neck of the child (if it be living or only lately dead) is so strong as to allow us to exert such a degree of traction upon the obstructed head, that the sides of the cranium may become very greatly compressed, or even indented under it, and that without necessarily destroying the child; and, 5. It is a prac-

Highest pelvic dimensions necessitating the performance of the Cæsarean section.—It is well known that Continental practitioners have sometimes recourse to the Cæsarean section under degrees of pelvic contraction that are not considered by British accoucheurs to demand an operation of such great severity and hazard.

In one of the last and best works upon Midwifery, published in Germany, the following observations occur in reference to the degree of pelvic deformity, indicating the Cæsarean operation.

"When the smallest diameter amounts to only $2\frac{3}{4}$ inches, the termination of labour is possible only by making an artificial passage, or by breaking up the child. The possibility of terminating it in the latter manner ceases whenever the small diameter amounts to only $2\frac{1}{4}$ inches or less, and the Cæsarean section is then the only possible mode of delivery, and that to which we must have recourse in all cases, whether the child be dead or not. If the contracted pelvis measures from $2\frac{1}{4}$ to under 3 inches, then the Cæsarean section is indicated when the child is alive, while, if it is dead, perforation is to be had recourse to."[1]

Jacquemier, the latest French writer on Midwifery, states, that when the pelvis is below two inches in its narrowest diameter, the Cæsarean section is the only justifiable mode of delivery, even when the child is dead; and when it varies from two inches to two inches and a half, and the child is alive, the Cæsarean operation should be adopted in preference to embryotomy, not only for the sake of the life of the child,—but as, perhaps, not more dangerous to the mother than a protracted and difficult delivery by embryulsio generally proves to be.[2]

As far as I am aware, Velpeau is the only author who has hitherto attempted to collect, in a generalized form, the measurements of the pelves of patients, who have been submitted to the Cæsarean section. He tells us that out of 80 cases in which the cause for the operation was specified, in 62 cases it was required by contraction of the pelvis, particularly in the antero-posterior diameter of the brim. Thus it was:

1 inch	- - - -	in	1 case.
1	to $1\frac{1}{2}$ inches	in	8
$1\frac{1}{2}$	to 2	in	23
2	to $2\frac{1}{2}$	in	25
$2\frac{1}{2}$	to $2\frac{3}{4}$	in	5[3]

In a number of these cases the Cæsarean operation was adopted under degrees of pelvic contraction, in which delivery, by means

tice which can be followed when proper instruments are not at hand, and the avoidance of instruments is generally desirable when it is possible.

[1] Busch and Moser's Handbuch der Geburtskunde (Berlin, 1842) vol. iii. p. 108.

[2] Manuel des Accouchemens (Paris, 1846) vol. ii. p. 162.

[3] Traité Complet de l'Art des Accouchemens, vol. ii. p. 458.

of embryulsio, would have been followed by British practitioners. This remark specially applies to the thirty cases included in the two last lines of the table; and it applies to them the more strongly when we further recollect that the sizes of these pelves in English measurements would have been somewhat more than they appear under French measurements, the French inch being about $\frac{1}{15}$ part longer than the English inch.

In choosing in any case of contracted pelvis, between the alternatives of craniotomy and the Cæsarean section, Continental practitioners generally look upon the life of the child, as well as the probable degree of difficulty and danger likely to ensue to the mother from a painful and protracted delivery by embryulsio, as important points and elements in deciding between these two methods of delivery. In this country, little, or indeed no attention has hitherto been given to these considerations in forming a practical conclusion on the question. In fact, British accoucheurs have never deemed themselves entitled to have recourse to the Cæsarean section, unless the pelvic apertures were so much reduced as to prohibit the practicability of the extraction of the child through them by embryulsio. With them the *propriety* of delivery by the Cæsarean section begins exactly with that degree of pelvic deformity at which the *possibility* of delivery by embryulsio terminates.

Hence in order to fix and determine the highest limit of pelvic contraction which necessitates the performance of the Cæsarean section, we have merely, in the first instance, to fix and determine the lowest limit of pelvic contraction at which delivery by embryulsio is capable of being effected.

The following table presents, in a condensed form, the opinions of various British and American obstetricians upon this question, namely, the actual degree of pelvic contraction *above* which it is considered still possible to deliver by embryulsio, and *below* which it is deemed proper, and absolutely necessary to extract the infant by the Cæsarean section.

Smallest Pelvic Diameters admitting of the Passage of a Child by Embryulsio.

$3\frac{1}{2}$ inches	by 2 inches	Dewees,[1] Bedford,[2]	&c.
3 ——	by $1\frac{3}{4}$ ——	Burns,[3] Hull,[4]	&c.
3 ——	by $1\frac{1}{2}$ ——	Barlow,[5] Hamilton,[6]	&c.

[1] "By a sufficient diameter I mean, where there is at least two inches in the antero-posterior, and at least three and a half in the transverse; below this, delivery *per vias naturales*, I repeat, I believe to be impossible."—*Dewees' System of Midwifery* (1837), p. 579.

[2] "I do not believe it is possible to remove a child by embryotomy, when the antero-posterior diameter of the superior strait measures less than two

During the last ten or twenty years, various improvements have been proposed in our embryulsio instruments, particularly with the view of rendering that operation more safe and easy in cases of unusual difficulty and deformity. Lest, with such additions and improvements, the preceding table be supposed to misrepresent the existing rules and doctrines of our modern British schools of Midwifery respecting the degree of pelvic contraction, necessitating the adoption of the Cæsarean section, I shall cite, in reference to the indications for this operation, the opinions expressed upon the subject in the three last obstetric text-books that have issued respectively from Edinburgh, Dublin, and London.

In his "Introduction to the Study and Practice of Midwifery," (Edinburgh, 1843) Dr Campbell observes, "unless we have a clear space of two inches, or nearly so in the transverse (conjugate), and fully three in the lateral diameter of the brim, embryotomy must be abandoned, as not likely to ensure the safety of the parent," p. 319.

In his work "On the Theory and Practice of Midwifery," (1843) Dr Churchill of Dublin, after an elaborate investigation of the subject, draws the following deduction. "We may therefore (he observes) safely conclude, that when from any cause, the antero-posterior diameter of the upper outlet, or the transverse diameter of the lower, is not more than 1½ inches, there is no possibility of delivery *per vias naturales*, but that we must have recourse to the Cæsarean section," p. 314.

Dr Francis Ramsbotham of London, in his "Obstetric Medicine

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inches, without subjecting the mother to severe hazard, provided the child be of the ordinary size. I am satisfied, that even with the space of 2¼ inches, all the dexterity which the operator can bring to his aid, will be required to protect the mother from serious, if not fatal inquiry. I, without hesitation, would prefer the Cæsarean section (if I had certain evidence that the child lived) to any attempt to extract it, *per vias naturales*, if the antero-posterior diameter measured less than 2⅛ inches."—*Dr Bedford in his Translation of Chailly's Midwifery*, note p. 386.

[3] "The crotchet cannot be used, when the head is of the full size, unless we have a passage through the pelvis and its linings measuring fully an inch and three quarters in the short diameter, and three inches in length; or if the child be premature and soft, an inch and a half broad, and two inches and three quarters long."—*Dr Burns' Principles of Midwifery* (1843), p. 508.

[4] "I am of opinion, that it still remains to be proved whether a mature fœtus of the ordinary size has ever been extracted, with safety to the mother, through a pelvis in the superior aperture of which there was not in any point from the fore to the hind part a space equal to 1½ inch."—*Dr Hull's Defence of the Cæsarean Section*, p. 391.

[5] See Dr Barlow's Synoptical Table quoted in preceding page, or "*Essays on Surgery and Midwifery*," p. 354.

[6] "Whenever the short diameter of the pelvis, either at the brim or at the outlet, will not admit above one ordinary sized finger, or really falls under one inch and a half, no other means are justifiable for the delivery, if the child be arrived at the full period of gestation, than that tremendous expedient, the Cæsarean operation."—*Dr A. Hamilton's Letter to Dr Osborne*, p. 139.

and Surgery" (London, 1844), observes when speaking of deformity of the pelvis (p. 30), "I am quite convinced, that unless there be at the brim one inch and three-eighths in the conjugate, by three and a half in the iliac (diameter), or 1½ inches in the conjugate by three in the iliac, it would be useless to attempt delivery *per vias naturales*." And again, when treating of difficult labours he remarks, "If upon a measurement conducted with the utmost care, we find there is less space at the brim than three inches and a half laterally, by one inch and three-eighths in the conjugate diameter; or three inches by one inch and a half; we ought to consider it our duty, however painful and appalling, that may be, at once to propose the Cæsarean section as the only means by which it is possible to save the mother's life; and as offering also the sole chance of safety to the child," p. 179.

Our highest, as well as latest authorities in British midwifery, seem thus to have fixed upon a degree of pelvic contraction, in which the dimensions varied from 3½ to 3 in the long diameter, and from 2 to 1½ in the short diameter, as the lowest limit at which delivery by embryulsio can be performed,[1] and below which it is always and invariably necessary to have recourse to the Cæsarean section, when the child has reached the full time. In the case, which it is my object in this communication to detail, the inferior pelvic aperture of the patient was so deformed and contracted from Malacosteon, that it was considerably less in its dimensions than the lowest limit stated in the preceding table and extracts, as capable of permitting of delivery by embryulsio, and yet the mother after arriving at, if not past, the full time of utero-gestation was delivered not only without embryulsio, and without the Cæsarean section, but in fact without instrumental interference of any

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[1] I do not stop to discuss the question whether, in all cases of great deformity, embryulsio is always *proper*, where it is *possible*. The difficulty attendant upon its performance in instances of marked contraction has sometimes been extreme. In a case where the narrowest diameter of the brim was thought to measure *two inches*, Dr Meigs required many hours to break down the cranium, and afterwards three or four hours' pulling to extract the child with the crotchet. The mother was altogether three or four days in labour (Philadelphia Practice of Midwifery, p. 322). In a woman with a pelvis, the conjugate diameter of which "was estimated at *little more than an inch and a half*," Dr Hamilton effected delivery by embryulsio. The extraction alone occupied four hours, and "required such an exertion of force, that he was literally obliged from exhaustion to be carried home in a sedan chair." (Practical Observations, p. 263). Lately my friend Professor Murphy extracted a child by embryulsio in a pelvis, the brim of which measured *one inch and a half* in its conjugate, and four and a half in its lateral diameter. The operation required about seven hours' work on the part of Dr M. The patient was in labour from Tuesday to Friday (Lancet for April 3d, 1847). "I question much (observes Dr Burns) if extreme cases of embryulsio be not as dangerous to the patient as the Cæsarean operation, certainly they are more painful." (Midwifery, p. 501). And he elsewhere adds (p. 509), "I shall not be surprised, if in a few years, British practitioners come to resort more frequently, especially in extreme cases, to the Cæsarean section."

kind. Further, the child, after its birth, was passed through an unyielding aperture measuring under one inch in its short, and two and a half inches in its long, diameter; or, in other words, this aperture was fully half an inch in all its dimensions *below* the limits supposed to demand the necessity of the Cæsarean section. Before showing the solution of such a seeming obstetric enigma, I shall briefly state the anterior history of the patient. [1]

Details of the Case of Malacosteon, and Inferences from it.

Mrs D——, Cupar in Fife, now 34 years of age, was in early life regarded as a robust and large child. She became a dressmaker in Edinburgh, at fourteen years of age. The sedentary habits of this profession betimes rendered her catamenia very irregular, and brought on so much general delicacy of health that she was advised to forego the occupation. She went to Cupar and lived there with a relation. In 1837, when about 24 years of age, she married. Two years subsequently to that event she began to complain of pains in the back and sides, and stiffness about the knee-joints. From this attack she never recovered so fully as to be able to walk without support, and continued to suffer much with shifting pains. In 1840 she fell, while walking with a staff across her room, and after this the pains in the limbs were for a considerable time far more severe, and the lameness greatly increased. Since recovering she has been able to walk out of doors with the assistance of crutches. But various bones of the trunk and extremities have become shortened and deformed under the effects of the malacosteon. The spine is bent backwards and outwards in the form of a bow, with the ribs and sternum correspondingly displaced. Some of the phalanges of the fingers are bent; the right thigh bone is curved forward into a semicircular shape. And from being a handsome and somewhat tall woman, she has shrunk down, during the course of the last seven or eight years, into a deformed dwarf-like figure, measuring about four feet in height.

From the time of her marriage up to last June (1846) Mrs D. had never become pregnant. Sometime, however, during the course of June—but she is not certain at what precise period of the month—the catamenia appeared for the last time. She was delivered on the 28th of April, or ten months after the last menstruation.

For some time after pregnancy commenced, Mrs D. feared that the swelling and increased size of the abdomen was the result of dropsy, and did not watch her own feelings so as to be aware of the period of quickening. At last, however, the motion of the child, &c. became so unequivocal, that she applied to Mr Wiseman to attend her in her approaching confinement.

[1] For these particulars I am much indebted to the kindness of Mr Wiseman, of Cupar, the patient's medical attendant.

On examining into the condition of the pelvis, Mr Wiseman at once found that its outlet was extremely contracted, but the pregnancy was already so far advanced as to preclude, under such a degree of deformity, the idea of delivery by the induction of abortion or premature labour. Besides, all attempts to touch the os uteri proved ineffectual, so that none of the ordinary means of arresting pregnancy, and exciting uterine action, could have been put into practice.

Early in March I visited Mrs D. along with Mr Wiseman, Dr Graham, and Dr Grace. She was quite incapable of moving or turning in bed without assistance. The uterine tumour was high, and pressed over to the right side. On applying my stethescope to it, I readily detected the usual rapid pulsations of the fœtal heart. I found fully borne out the correct description which had been previously given me of the excessive deformity and contraction of the pelvis. The sacrum was straight above, so that its promontory did not probably encroach on the brim; but its inferior extremity was strongly and anormally curved forwards. In front the walls of the pelvis felt doubled or collapsed together; and the outlet, which was the only part that could be very accurately examined, was exceedingly deformed and diminished in size. The transverse diameter was particularly contracted. I found it impossible to introduce two fingers between the tuberosities of the ischia. Hence this diameter of the outlet was evidently under an inch. Posteriorly, or opposite the sacro-sciatic ligaments, there was transversely more space, but the strong anterior curvature of the coccyx and lower end of the sacrum seemed to curtail the conjugate diameter of the opening, and to prevent the probability of it admitting, when fully dilated, more than three, or, at most, four fingers even in this direction.

Under these circumstances, with a living child advanced to the eighth month, and a pelvic outlet so extremely contracted, I had no hesitation in coming to the same conclusion as the patient's medical advisers had all previously done,—namely, that the Cæsarean section was the only practicable mode of delivery. I was aware that Barlow, Conradi, Sprengel and others had seen and published cases of mollities ossium, in which the softened and still flexible pelvic bones had bent and yielded during labour so as to permit the passage of the child without operative interference; but in Mrs D. the osseous tissue appeared far too firm to permit us to indulge even in this faint hope. Nature, however, provided, and was perhaps already preparing for the mother, a mode of delivery that was still more safe and easy.

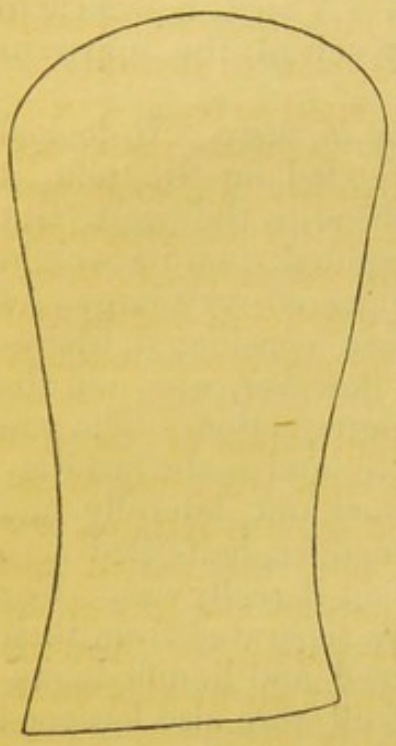
Having agreed to operate in case the Cæsarean section was required, I anxiously waited in the daily expectation of being called to Mrs D. At last, on the morning of the 28th April, I received from Mr Wiseman a note, dated the previous night, intimating that our patient had begun to complain of labour pains—

that the os uteri could be felt projected low down into the vagina —that it was not opened more than two or three lines—and that the presenting part of the child could not yet be detected. Along with some professional friends who had agreed to accompany me, I forthwith proceeded to Cupar, a distance of about thirty miles. On arriving there, we were surprised to hear that the patient was delivered, and our surprise was only increased by learning that no kind of instrumental aid had been required. A visit, however, to the room in which the child was, readily solved the apparent riddle.

The infant had been dead for some time *in utero*. It looked nearly the natural length, and as it lay extended on the table, it measured 18½ inches from the crown of the head to the heels. But its limbs and body were thin, lank, and atrophied; and its weight was only 3 pounds 2 ounces. Its head appeared very large and disproportionate in size, and indeed had been considered hydrocephalic. This seeming increased volume, however, was not the consequence of effusion, but the result of putrefaction. The encephalon was in a dissolved and semi-fluid state; and as the head lay on the table it was extended and flattened out laterally and superiorly, as if it consisted of a bag or bladder, half-filled with liquid or semi-liquid contents; and such in fact it really was. For all the bones of the arch of the cranium were separated from their attachments, and floated about in the dissolved and liquified cerebral matter. The bones of the basis of the skull were also loosened and more or less separated from each other—a rarer occurrence. On handling the vertex the first piece of bone which I touched was the orbital portion of one of the ossa frontis. The symphyses even of the inferior as well as of the superior maxillary bones were loosened and admitted of free motion. And the component parts of the head and face were so easily displaced and compressed that, on placing one of my fingers in the lower occipital region behind, and another on the nose or cheek in front, I found that, without any considerable degree of exertion, the two could be made to approximate to within a few lines of each other. Yet the skin of the scalp and face was continuous and entire, the epidermis only being separated at different parts. The chest and abdomen of the child seemed quite soft and pliable, though not in so disintegrated a state as the head.

Thus far the putrid and diffluent state of the fœtus appeared to afford an easy explanation of the possibility of its transit through the very contracted pelvic outlet of the mother. But I was anxious to have more full and complete proof that the fœtus, even in this state, was capable of passing through an aperture of dimensions so small as we knew the pelvis to present in the case of Mrs D. In order to obtain this proof I got oblong openings of two or three different sizes cut in plates of white iron. The smallest of these perforations, however, though only 3½ inches

long by $\frac{7}{8}$ broad, proved unnecessarily large for the experiment. We diminished it by filling it up at one end with strong, thick, and perfectly unyielding sole leather, so that the whole opening measured only $2\frac{3}{8}$ inches in its largest, by $\frac{7}{8}$ of an inch in its shortest diameter; and yet through this aperture (of which the accompanying wood-cut gives the exact outline),[1] the child was pulled without any great degree of force or difficulty. In dragging the infant through this aperture no particular resistance was met with from the bones of the head and face; but the size of the liver impeded its transit for a minute or two, as the lower part of the thorax was passing through the metallic opening. Dr Graham, Dr Ziegler, Dr Weir, Mr Wiseman, &c., witnessed these experiments with me; and, if our limited time had allowed us to remain longer in Cupar, and to have got another plate perforated, probably we would have found the child capable of passing through an aperture one or two lines smaller in some of its dimensions.



The placenta had been preserved. It was small and atrophic, and contained scattered through it a number of those white tubercles (as they are sometimes improperly termed), which we so often see connected with, and causing marasmus and death of the fœtus in utero. Some of these tubercles or fibrinous deposits were of the size of hazel-nuts, or larger.

The history of the delivery had been this. Slight labour pains had come on during the afternoon of the 27th. She was seen in the course of the evening by Drs Graham and Grace and Mr Wiseman, who found the os uteri beginning to dilate, but the pains were not severe, and the husband and attendants of Mrs D. all went to bed. About one o'clock in the morning of the 28th Mr Wiseman was raised, the waters having broken about an hour previously, and the uterine contractions having become strong and bearing down. When Mr Wiseman reached the house of the patient, he found the soft scalp of the child already bulging through the external parts. Some detached bones, included in the portion of scalp that had passed, allowed him to obtain a firm hold of the protruded portion of the head, and thus enabled him to use some extractive force. By thus assisting the effects of the pains, the child was entirely born about half an hour after Mr Wiseman's arrival. The mother has made a very good recovery, and declares that "having a child is nothing."

[1] The perforated iron plate and superadded piece of leather, are carefully preserved in the Obstetric Museum of the University.

There are no sufficient data to determine at what precise time the infant died. Milk had been discharging from the nipples for three or four weeks before delivery; but whether the child had perished about that period it is impossible to say. Mrs D. deceived herself with the idea that she felt it living and moving up to the time of delivery.

The preceding case is, I believe, unique in the annals of midwifery. It will perhaps therefore require no apology if I add one or two brief inferences which the history and details of it appear to suggest.

1. It has taught me, and is, I conceive, calculated to teach others, a strong lesson of caution in regard to our *prognosis*, under apparently even the most desperate circumstances. In such rare forms of complication as this, we must depend for our prognosis, &c., upon the anterior observations and recorded facts of others. Here all such records led me to expect a very different result, and offered no hope whatever of such a fortunate termination as actually occurred.

2. The case affords a new and striking illustration of the just and well-known remark of Dr Denman, that "the resources of nature in every thing which relates to parturition, are infinite, and constantly exerted for the preservation of both the parent and child; yet when the two objects are incompatible, the life of the child is almost uniformly yielded to that of the parent." [1] And the mode and mechanism by which nature brought about this unexpected result in the present instance, are highly worthy of special notice. For, *first*, she set up a diseased condition of the placenta, which prevented the full and proper nourishment of the fœtus, and thus restrained as far as possible its development and growth. *Secondly*, she carried this state of marasmus to such a degree, as at last proved slowly fatal to the child, without superinducing that expulsive action which generally soon follows the death of the infant. *Thirdly*, the dead infant was subsequently retained for so long a time in utero, that not only the bones of the cranium, but the bones of the basis of the skull and face were loosened and separated from each other, and the head and other parts of the body thus rendered readily and easily compressible.[2] And, *lastly*, the

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[1] Practice of Midwifery, p. 415.

[2] No individual case in midwifery has given rise to so much discussion, as that of Elizabeth Sherwood. Her pelvis was estimated by Dr Osborne as below the lowest standard which I have given in a preceding page, as capable of allowing of the passage of a child by embryulsio, being only about ¾ of an inch from the sacrum to the pubis; and yet he delivered her successfully by craniotomy after working and pulling for three hours with the crotchet. Many authors have stated that Dr Osborne must have undoubtedly under-measured the pelvis of Sherwood;—and Drs Hull, Burns, Hamilton, &c., have denounced the operation of embryulsio as "impracticable" if Dr Osborne's measurements were at all true and accurate. Dr Campbell, for instance, observes "It would be idle to enter largely on the refutation of this extraordinary case, since Dr Osborne's narrative of what he thought he had accomplished, is irreconcilable

emaciated, dead, and highly putrefied infant after being thus reduced to this diffluent and compressible mass, and now capable of being moulded to the contracted apertures of the pelvis, is ultimately and without difficulty expelled through them by the supervention of natural uterine contractions. Each stage and step in this mechanism was necessary for the success of that which followed it, and the imperfection or omission of any one of them, would probably have entirely subverted and prevented the very fortunate and very unlooked for result that occurred from the combination of the whole.

3. Does the mode in which the delivery was effected in this instance by nature suggest any measures of practice which, under similar complications, we could induce and imitate by art? I put this question, because, in the greater deformities of the pelvis all the standard operations and means which we employ for delivery, are in fact imitations of processes and operations which nature herself employs under the same conditions. When the pelvis has been much contracted, abortion has occasionally come on in the earlier months and saved the mother; or premature labour has supervened about the seventh month, and saved both the parent and child. These natural processes we imitate successfully in the artificial induction of abortion and premature labour. If, in morbid contraction and deformity of the pelvis, the pregnancy goes on to the full time, nature is still sometimes capable of delivering the mother by other and various measures. Occasionally, during labour, the symphysis pubis has been rent asunder under the intense and

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with common sense; for how could the base of the cranium which is 1½ inches in thickness, and nearly three in breadth, be brought through the aperture which he describes. A fair estimate" (Dr Campbell continues) "of the utter impossibility of effecting it may be afforded by the simple experiment of forming in a plate of hardwood, an opening in shape and size, exactly corresponding to the pelvis of Sherwood, and attempting to force through it the base simply, divested of the other portions of the skull." (*Midwifery, pages* 317 *and* 318.) In the case of Mrs D— I obtained the corroborative evidence afforded by the very experiment which Dr Campbell here properly suggests; and I have already stated the facility with which the child was passed through the perforated plate. In Sherwood's case there was, I believe, the same reason for the practicability of delivery, for the fœtus seems to have been in the same putrid and decomposed state as Mrs D.'s child, and perhaps the bones of the face and basis of the cranium were in a similar way loosened and compressible. "The whole body" of the fœtus was, to quote Dr Osborne's own words, "in the most putrid and almost dissolved state." *See p.* 101 *of his Essays.*—But, besides, the brim of the pelvis in Sherwood was in reality not so small as the measurement of its conjugate diameter would seem to indicate. During delivery the os uteri was pulled by Dr Osborne over to the right side, or to the *space* intervening between the line of the conjugate diameter and the right ilium. *Here* there was an oblong aperture 3 inches long (as measured from the ilium to the symphysis pubis), and 1¾ inches broad; and hence in fact an aperture as great as Drs Hamilton, Burns, Churchill, Ramsbotham, &c., deem necessary for the performance of embryulsio; and greater than that through which we pulled Mrs D.'s child.—See drawing of the brim of Sherwood's pelvis, in *Dr Hull's Defence of the Cæsarean Section.* Pl. v. fig. 1.

wedge-like pressure of the infant's head; or the uterus has lacerated, or, as has happened now in two recorded cases, both the uterus and abdominal parietes have simultaneously ruptured and allowed of the escape of the child through this double opening; or the bones of the child's cranium have become deeply compressed and fractured, so as at last to allow the reduced head to pass; or the same has been effected by the infant dying, putrefying, and at last its scalp and sutures bursting so as to produce the necessary diminution in the size and dimensions of the encephalon. These several operations of nature are all imitated by art in the respective operations of symphyseotomy, the Cæsarean section, cephalotripsy, and craniotomy. And while art thus adopts the operative principles of nature, she attempts to improve both upon their facility and safety, by selecting an earlier and hence less dangerous period for their performance; and by making the required openings and lesions by cutting instruments, instead of submitting to the chance of their being made by nature by means simply of an enormous and hazardous expenditure of muscular effort and compression on her part.

But, I repeat, does the mechanism of the delivery in Mrs D.'s case suggest any principles for imitation? Let us consider the answer, as it might be varied by the *date* of the pregnancy of the mother; and according as she had reached the periods, *first*, of artificial abortion; or, *secondly*, of premature labour; or, *thirdly*, had already advanced to the full time.

The case shows that through an opening of very small dimensions a child may pass, provided it be in a very compressible state. So far it evidently suggests that the induction of *abortion* at the 4th or 5th month, when the head of the fœtus is still small, soft, and very easily reducible would, as long ago proposed by Cooper, &c., succeed in such extreme deformities in saving the mother from many of the dangers accompanying delivery at a later period of utero-gestation. I have stated above that Mrs D. applied to Mr Wiseman at a time when it was already considered too late to have recourse either to artificial abortion or premature labour; and further, the high position of the os would probably have rendered either of them impracticable.

The induction of *premature labour* at or about the seventh month would not of course have sufficed with a pelvis of such small dimensions, unless we could modify the operation so as both to produce the death of the child, and *retain* it in utero, to allow of its structures becoming dissolved and disintegrated before labour at last supervened. Now, we have no known means of inducing that diseased state of the placenta which produced the attendant emaciation and death in the case of Mrs D.'s infant; nor am I acquainted with any measures which would destroy the life of the child in the later months, without superinducing labour. The retention, however, in utero of the infant, and its putrefaction would be as necessary for success, as its death, under such great degrees

of contraction. And the result shows, that when the pelvis is much deformed, and labour with a *dead* child is threatened, or the infant is destroyed by craniotomy, the longer we can retain it in utero without danger to the mother, and the more it thus becomes putrefied and disintegrated, the easier will its ultimate expulsion or extraction prove.

Lastly, suppose a patient with a very diminished and deformed pelvis to have arrived at the *full time* of utero-gestation, does Mrs D.'s case suggest any new principles or modifications of treatment for the delivery of the mother? I believe that, under these circumstances, our conduct and practice should be in a great degree regulated by the state of the child. If it be *alive*—as ascertained by auscultation, &c., and the pelvis is as small as in Mrs D.'s case, or even half an inch larger in its measurements, then I am decidedly of opinion that it is our duty to perform the Cæsarean section. We have two human lives committed to our charge, and it is our duty to try to preserve both, provided we can attain that object without subjecting the mother to a degree of danger much greater than she would otherwise undergo. Let us take, however, the other alternative, and suppose the child already *dead*. With this complication most British accoucheurs would attempt delivery by craniotomy, if the dimensions of the pelvis permitted at all of the possibility of it. And the case of Mrs D. seems to me to suggest one means of rendering it thus possible, under states of contraction, where it is at present properly regarded as in the highest degree unsafe or totally impracticable. The grand obstacle to the delivery of the child by embryulsio, in greatly contracted pelves, arises from our want of means of reducing the size, or altering the shape and compressibility of the bones of the base of the skull and face. In Mrs D.'s child, nature had disintegrated and separated these bones, removed in fact this obstacle, and thus rendered the delivery not only possible but easy. Could we imitate or induce this same fortunate result by artificial means? All our present means of reducing the size of the fœtal head in embryulsio are limited to the destruction of the arch of the skull. I am not aware that with any proposed form of osteotomist[1] we are capable of

[1] The Kephalepsalis of Dr Campbell appears to me to be an instrument preferable to, and more powerful than any of the forms of osteotomist invented by Dr Davis or others. Yet, as we have already seen, Dr Campbell believes embryulsio to be impracticable, even with its assistance, in a pelvis less than 3 by 2 inches. It is almost unnecessary to add that the French operation of Cephalotripsy is founded on the idea of crushing and compressing the bones of the base as well as of the circle of the cranium. It is used by some of the leading accoucheurs of Paris, instead of craniotomy, particularly in cases where the child is dead, and the pelvis below the dimensions that would admit of the use of the forceps. But the instrument with which the operation is performed—the Cephalotribe, is of such enormous dimensions (its blades being of solid iron 1¼ inch wide, the whole above 2 feet long and several pounds in weight) that it could not of course be applied in cases in which the pelvis was contracted to any extreme degree.

cutting or disintegrating the base of the cranium or face when the pelvis is diminished to $1\frac{3}{4}$ or $1\frac{1}{2}$ inches in its shortest diameter. Yet, probably, some modification of mechanical means would give us the power of effecting this desirable object. The common perforator might enable us to loosen and break up the bones of the basis in some cases, in the same way as with it we break up the arch of the skull. The disjunction or fracture of these bones, without their removal, might prove sufficient to permit the required degree of compressibility and alteration of shape. Or the common bone-forceps of the surgeon, or a modification of such powerful pliers as are used in dividing the needles in the operation of harelip, &c., might answer. At all events, the object seems anything but a hopeless one, more especially when we call to recollection that modern surgeons are now provided with mechanical means which sometimes enable them to seize, break up, and extract from the cavity of the bladder large and solid stones,—and that too through a canal relatively so small and elongated as the male urethra.

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