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Publication/Creation

Dublin : Ill. ; J. Falconer, 1867.

Persistent URL

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ON

CEPHALOTRIPSY.

BY

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Reprinted from the Dublin Quarterly Journal of Medical Science, February and
May, 1867.

DUBLIN :

JOHN FALCONER, 53, UPPER SACKVILLE-STREET,

PRINTER TO HER MAJESTY'S STATIONERY OFFICE.

1867.



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ON

CEPHALOTRIPSY.

AT one of the meetings of the Dublin Obstetrical Society during the present session I read a paper on cephalotripsy in which I showed that though this operation had been ignored hitherto in the Irish and English schools of midwifery, it was regarded in other schools as one of the greatest usefulness, and by some as an improvement in midwifery only second in importance to the forceps. In that communication I detailed some cases in which I had used the cephalotribe, gave extracts from some of the leading authorities who had written on the subject, and stated in the form of distinct propositions the reasons that induced me to prefer the cephalotribe to crotchets, hooks, and craniotomy forceps in all cases of embryotomy. The paper was published in the Proceedings of the Obstetrical Society, at page 224 of the last number of this Journal; and as I have now had an opportunity of using the instrument in two other cases of extreme narrowing of the antero-posterior diameter of the pelvis which further proved the correctness of the assertion made, viz., "that the use of the cephalotribe reduces the dangers of embryotomy to a minimum, and allows of its performance in cases where it would not otherwise be possible," I think it my duty to record the particulars, as I believe a correct estimate of the powers of the instrument will enable us at least to save women from undergoing the risks of the Cesarean section to give birth to children already dead.

On Friday, 25th January, a woman was brought into the Coombe Lying-in Hospital, from a country district, in labour of her first child; my colleague, Dr. Ringland, saw her soon after her arrival. He found the body and limbs of a $7\frac{1}{2}$ months putrid male fetus expelled from the vagina, the head of the child being still within the uterus, and above the brim of the pelvis. On examination, he found the neck had been torn through close to the base of the skull, in the efforts that had been made to extract the head; all the tissues, even the ligaments connecting the vertebral column with the skull, had given way under the force used, and a portion of skin, about an inch in breadth, at the back of the neck was the only connecting medium between the head and the body of the child. Dr. Ringland tried to apply the forceps, but could only get one blade of this instrument introduced, as the curved point of the second caught so in the torn tissues of the neck as to prevent its introduction without the risk of completely severing the connexion between the head and body. He now passed a hook into the mouth, and fixed it on the lower jaw, and tried in this way to extract the head; but the bone gave way, and he did not think it prudent to persevere, deeming the case more suitable for the cephalotribe. I arrived at the hospital at this period, and Dr. Ringland kindly complied with my request to be allowed to use the cephalotribe; so we put the woman under the influence of chloroform, and I proceeded to introduce this instrument, taking care not to complete the detachment of the head.

The promontory of the sacrum projected so much that though I got my hand well into the cavity of the pelvis I could not pass more than two fingers through the brim to guide the point of the blades. The os had closed in some degree below the head, and it was difficult to keep clear of the torn and ragged structures remaining where the neck had been torn away from the base of the skull, and, at the same time, to avoid the lips of the os uteri. By proceeding slowly and cautiously, however, I succeeded in introducing the blades in the transverse diameter of the brim and in seizing the head, which I at once compressed, causing the brain to break down, and pass out through the *foramen magnum*. I now turned the head, so as to bring its compressed and shortened diameter to the narrowest part of the pelvis, and attempted, with a moderate amount of force, to extract, but found the resistance still too great; so I loosened the blades, and applied them again, in a new direction, getting Dr. Ringland to steady the head by placing his hand over

the pubes, while I did so; and proceeding in this way, I made four crushings of the head, and then extracted it with the greatest ease.

I confess I had but little expectation of this woman's recovery. The amount of violence to which she had been subjected, and which had torn the body from the head, must have been very great. She had, moreover, been driven several miles on an uncovered vehicle in very harsh weather, coming to the hospital, and in consequence had a severe attack of capillary bronchitis; but she made a perfect recovery, and left the hospital at the end of three weeks. For some days after delivery there was great swelling of the vagina and labia, and incontinence of urine. The abdomen was tender, and the uterus large, but these symptoms soon disappeared, and recovery was only retarded by the condition of the lungs.

When convalescence was sufficiently established, we made a very careful exploration of the pelvis. We found that its antero-posterior diameter was little more than one inch and three quarters in length. When two fingers were introduced, so that the point of the middle finger touched the promontory of the sacrum, the side of the index finger was in contact, at its first joint, with the symphysis pubis. The transverse diameter was elongated. When examined externally the sacrum was found to be greatly curved and projected forwards. This deformity was, doubtless, due to rickets, of which the skeleton presented other evidence; but we expected rather to have found an exostosis as the cause of the narrowing, for the bones of both upper and lower extremities presented most remarkable examples of these growths. At the right knee there was one on the inner condyle of the femur, and one on the inner side of the head of the tibia, which appeared to form a single mass, and projected inwards, at right angles to the axis of the bones fully three inches; but as the free movements of the limb were not interfered with, there must have been a line of separation between them corresponding to the joint.

Had this woman presented herself at the hospital at the commencement of labour, with a living child, the question of Cesarean section would necessarily have arisen; but with a dead and mutilated child, the body of which was already born, there was no alternative but to extract the head by whatever means we could.

In a most instructive case, recently recorded by Dr. Greenhalgh (*Trans. of the Obst. Soc. of London*, Vol. VII., p. 220), this question arose, and the result of that case might have led us to determine on the adoption of the Cesarean section. It was the

patient's second pregnancy. Labour now set in at the end of the eighth month, the previous delivery having been effected, by the crotchet, with extreme difficulty. It was found that a foot presented; and as the woman had already given birth to a child, it was determined to attempt delivery *per vias naturales*, though the outlet and cavity of the pelvis were below the average dimensions, and there was little, if any, more space than an inch and three-quarters in any part of the antero-posterior diameter of the brim. The feet were drawn down; then the breech and arms, and traction made on the body, and the perforator introduced, but with little effect, in reducing the size of the head. Simpson's cephalotribe was now applied, and the head compressed, and while extractive efforts were made with it, an assistant pulled firmly and steadily on the body. After the most persevering endeavours for about twenty minutes, the body unfortunately separated from the head, and at the same time the cephalotribe slipped. The patient now became alarmingly collapsed, but rallied in about ten minutes, when an attempt to introduce the hand into the uterus failed, and the Cesarean section was performed. The patient died thirty-one hours after the operation.

The close resemblance in many particulars between this case and the one I have detailed is very remarkable, and as I have said the knowledge of it might have led us to perform the Cesarean section at once had the other circumstances of our case permitted; especially as Scanzoni who is a warm advocate of the cephalotribe, says the use of it should not be attempted even with an immature fetus if the shortest diameter of the pelvis be less than $O^m 055$ (2.16 English inches). But Pajot's having succeeded by the system of repeated crushings without tractions in safely delivering a woman whose pelvis did not measure more than five centimètres, or 1.9 English inches, and the experience I have now acquired of this system of repeated crushings without traction, both in the case I have detailed, and in experiments on the heads of dead children convince me that cephalotripsy may legitimately be tried in all suitable cases in which the instrument can be passed through the brim of the pelvis.

In the next case, the narrowing of the pelvis was not to the same extent as the antero-posterior diameter was nearly three inches, but the child was full grown, and had not undergone putrefaction, so that the difficulty of delivery was still very great.

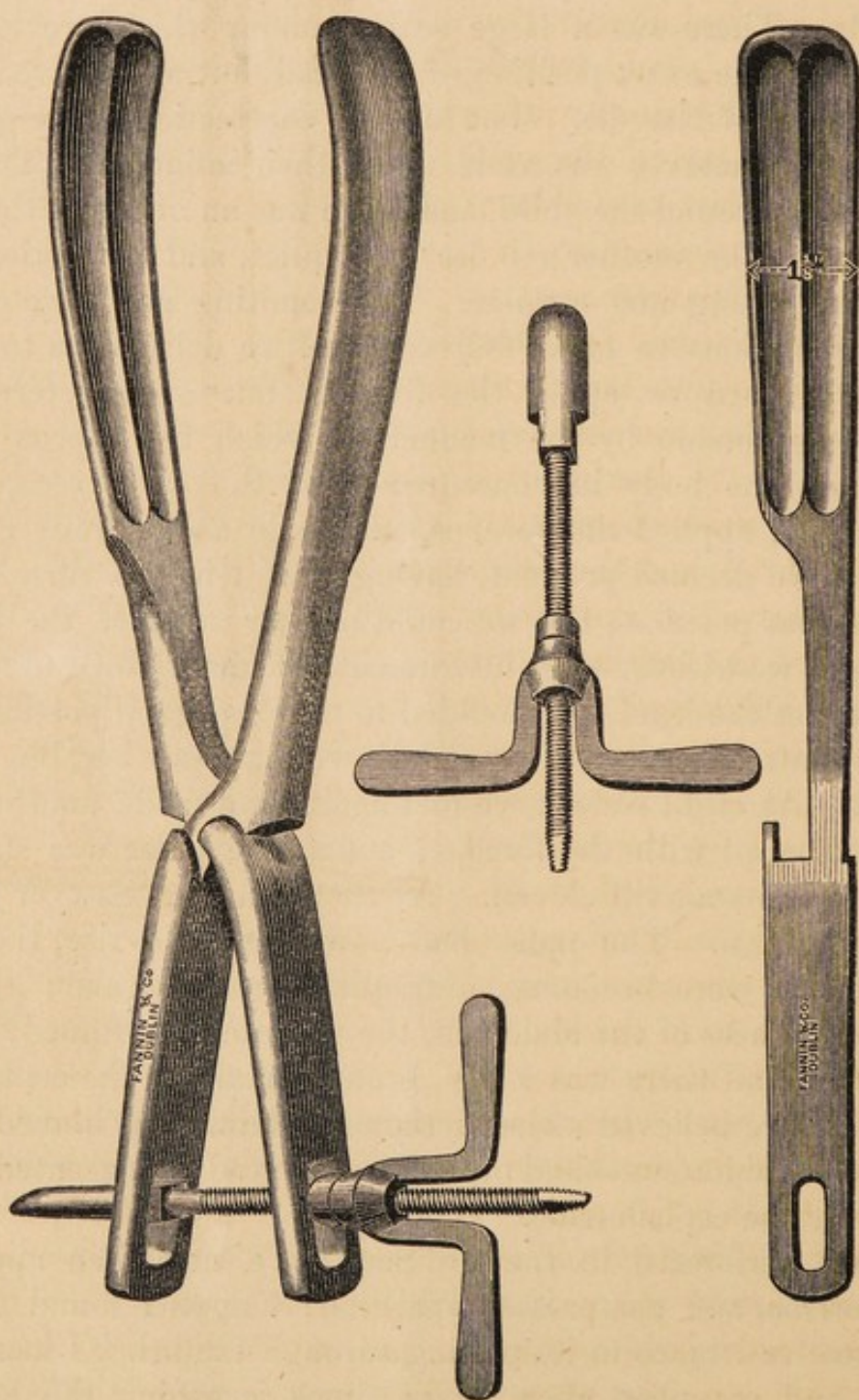
A woman was admitted into the hospital on Friday, 19th April,

in labour of her first child. The membranes had broken on the previous Tuesday, but the os had scarcely begun to dilate when she applied for admission. She had suffered from vomiting and retching since the waters escaped; and when she came into the hospital the vomiting was incessant and very distressing. At one o'clock, p.m., on Saturday, Dr. Ringland and I saw her together, when we found the head completely above the brim, the os nearly fully dilated, but its anterior lip hard, rigid, and caught between the head and the pubes. The promontory of the sacrum was projected very much forwards. There was a large scalp tumour which prevented our ascertaining the exact position of the head, but we believed it to be in the fourth of Nægélè. The uterine contractions were good, but no advance whatever was made under their influence. The uterus was moulded round the child, and there was an offensive thick, olive discharge. The mother's pulse was quiet, and the action of the fetal heart strong and regular. The vomiting and olive discharge made us anxious to effect delivery, and we debated as to whether we should turn or apply the forceps, but were deterred from attempting version by the manner in which the uterus was contracted on the body in consequence of the early escape of the waters; so I applied the forceps, and made as vigorous extractive efforts as we deemed prudent, having first tried to turn the head into the first position; but we could neither advance the head nor turn it; so we withdrew the instrument, and determined to wait some hours, to let the head get moulded to the passage, if possible, by the uterine contractions. At four o'clock we again saw her, but found no change. At eight o'clock we met again, and made another unsuccessful attempt with the forceps; and as the pulse was still quiet, we agreed to wait till eleven. At that hour Dr. Sawyer joined us in consultation. The pulse had now begun to rise, the uterine contractions were becoming unfrequent and irregular; there was some tenderness of the abdomen, the vomiting continued, hiccough had set in, and there was a dry, brown streak on the centre of the tongue. We believed these symptoms demanded immediate delivery—by craniotomy—and my colleagues readily consented to allow me to use the cephalotribe.

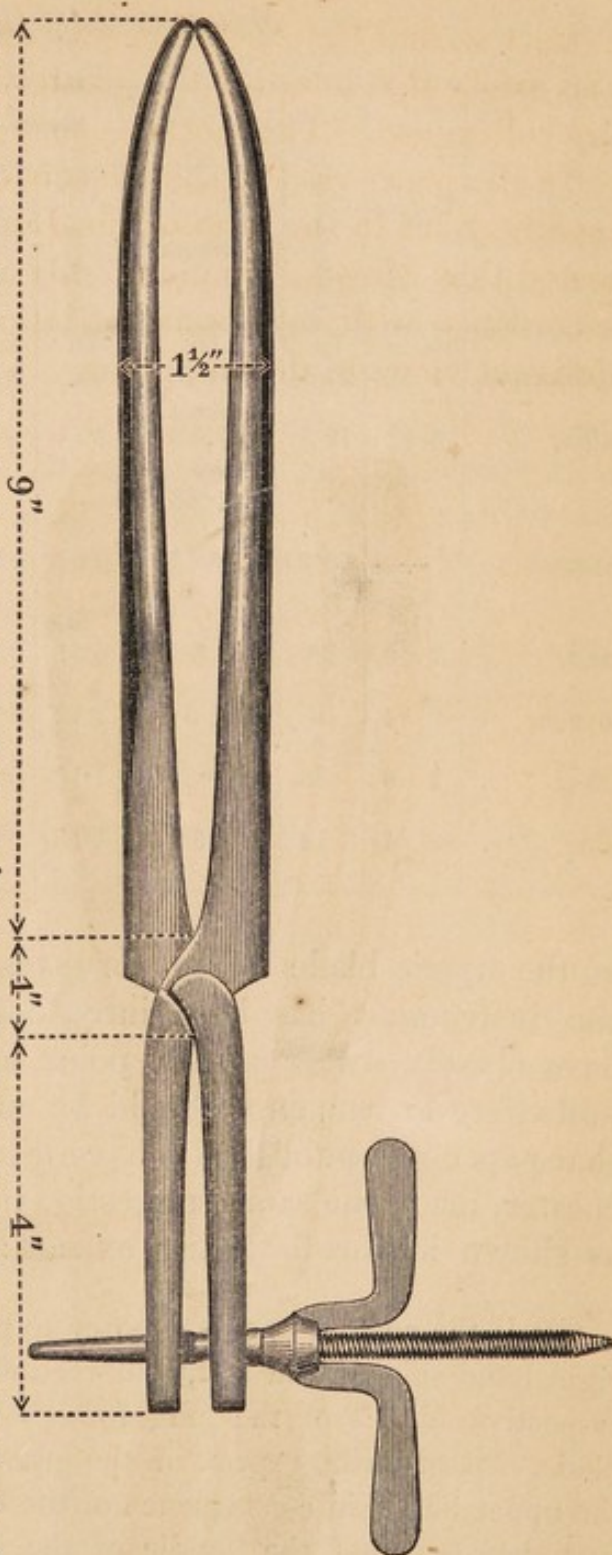
I first perforated in the ordinary way, and then applied the cephalotribe, and compressed the head; but, as I found there was still great resistance to its passing through the brim, I loosened the blades and reapplied them three times, crushing the head each time, when a very moderate amount of force was sufficient to

extract it, and the operation was completed with a degree of ease and safety that afforded the greatest satisfaction both to myself and my colleagues. The mother's convalescence was uninterrupted.

In the paper read at the Obstetrical Society, I suggested certain modifications in the form of Sir James Simpson's cephalotribe, and stated that Messrs. Fannin of this city had made the instrument in accordance with my recommendations. In the annexed drawings different views of this are given.



The measurements are contrasted in the table, which I reproduce from my former paper, with those of Sir James Simpson's and some other instruments. The whole length is the same as Sir James Simpson's, but the handles are half an inch shorter and the blades half an inch longer, that they may more surely include the base of the skull within their grasp. During the operation in the last case I have mentioned, it appeared to Drs. Ringland and Sawyer, and to myself, that it would be better to have the blades made still longer, or rather the shanks of them; for, in the case referred to, the head was so completely above the brim, and the pelvis so deep, that when the blades were applied the lock was quite within the vulva, and there was considerable difficulty in preventing the soft parts from being nipped by the lock. I have therefore advised Messrs. Fannin to add fully an inch to the length of the shanks, so as to throw the lock outside the vulva. The blades have no pelvic curve, and when closed they measure, from the outside of one blade to the outside of the other, only one inch and a half, and each blade is one and an eighth inch broad. The inner surface of each blade is grooved, as in Scanzoni's and Simpson's, that it may hold firmly the part to which it is applied; and the point of each blade is blunt and round, to facilitate its introduction without injuring the uterus. The lock is made the reverse way to that of Simpson's and all others, and is made so that the groove



Measurements of Cephalotribes.

| | Weight | Entire Length | Blades | | | | | Handles | | Power |
|--------------|---------------|---------------|----------------------|----------|-----------|-----------------------------|---------------------------|-------------------|-----------------|---------------------------------------|
| | | | Length | Breadth | Thickness | Breadth Closed ^a | Pelvic curve ^b | Length of Handles | Length of Joint | |
| Baudelocque, | lbs. oz. 4 12 | In. 20·5 | In. 10·5 | In. 1·25 | In. 0·25 | In. 1·75 | In. 3·75 | In. 9 | In. — | Winch and screw |
| Hodge, . | 3 12 | 19·5 | Shank 6·41 × 3·41 | 1·41 | — | 1·5 | 3 | 9·5 | — | Screw and fly-nut. |
| | | | 9·83 | | | Curve for Head | | | | |
| Scanzoni, . | — | 18·66 | 10·15 | 0·98 | 0·27 | 2·04 | 3·81 | 8·54 | — | Screw and lever, with travelling bar. |
| Braun, . | 2 0 | 16 | 8 | 0·91 | 0·16 | 2·16 | 2 | 6·5 | 1·5 | Screw and joint in handle. |
| Simpson, . | 2 4 | 14 | 8 5 | 1·12 | 0·25 | 2 | 2·37 | 4·5 | 1 | Screw and fly-nut. |
| Hicks, . | 2 6 | 15 | 9·25 | 1·12 | 0·25 | 1·5 | 3 | 4·5 | 1·25 | Screw and two movable nuts. |
| Kidd, . | 2 4 | 14 | 9 | 1·12 | 0·25 | 1·5 | 0 | 4 | 1 | Screw and fly-nut. |

in the upper blade looks forwards instead of backwards when the instrument has been introduced. In my previous paper I have already dwelt on this point, and stated my opinion that all midwifery instruments should be made in the same way. Since that paper was published I have learned that Dr. Radford, of Manchester, made the same suggestion in his *Essays*, published in 1832, as shown in the following extract:—

“It is the custom in this country to place the parturient female on the right hand side of the bed, and reclining on her left side; so that the respective blades of the long forceps are called the upper and lower blade. Most writers speak of the great difficulty experienced in passing the upper blade, in consequence of the bed or mattress below preventing that depression of the handle of the instrument which is necessary to raise the point so that it can be carried over the head to its ultimate destination. According to the usual construction of the lock of the English

^a Breadth of blades closed is measured across the blades when locked and closed, and includes the thickness of the blades except in Scanzoni's.

^b The pelvic curve is measured by placing the instrument on a horizontal plane and measuring the length of a line falling perpendicularly from the highest point of the blade to that plane. The measurement of Hodge's and Scanzoni's are taken from their books. The others from the instruments themselves.

forceps, the lower must first be introduced, and however well placed the woman at first has been, during this part of the operation her position is changed; she recedes from the operator further upon the bed, and thus is caused difficulty in passing the second or upper blade.

"Several contrivances have been made to enable the practitioner to pass the upper blade with more ease; such as having a movable hinge in the handle (*Dr. Hamilton's and Dr. Davis' forceps*), or by means of a screw, through which the handle is fastened to the shank (*Dr. Conquest's forceps*). The fears of the woman are usually awakened during the introduction of the first blade, and the anticipation of some dreadful operation leads her to recede from the accoucheur, placing herself in a most unfavourable position, perhaps on the opposite side of the bed; he cannot, therefore, proceed in his operation until she is again placed in the original position. In order, then, to meet this difficulty, the lock of my long forceps is reversed, so that the upper blade may be passed first, and then there will be no difficulty in introducing the second or under blade."—*Essays on Various Subjects connected with Midwifery*, page 14.

When the head lies low down in the pelvis the form of the lock is not of much consequence, but when it is at or above the brim, the form of lock now recommended will be found to facilitate the introduction of the instrument very much. By reason of it the upper blade may always be introduced first, and carried into its proper position, and allowed to remain there, and the second or under blade may be introduced in front of the first, and in the same manner as the first—viz., first in the axis of the outlet, then in that of the cavity, and finally in that of the brim, as is so well described and figured by Dr. Beatty; and once introduced it can be carried into apposition with the first blade, and locked without the first being disturbed or displaced. It is one of the "curiosities of literature" that in the figure given by Dr. Churchill of Dr. Radford's forceps—Fig. 76 (*Churchill's Midwifery*, fourth edition)—the lock is represented in exactly the opposite position to that described by Dr. Radford, while in Figs. 74 and 75 of other forceps the locks are represented as described by Dr. Radford, but the circumstance is quite unnoticed in the text.

The screw is the same as in Sir James Simpson's: its head is oblong and the shoulder is squared, so that it can be fixed in its place or removed without the loss of time involved in completely unscrewing the nut; and when fixed it forms a firm and very convenient cross handle to the instrument.

In conclusion, I have to remark on two objections that have

been raised to the instrument in addition to those considered in my previous paper: First—It is said that any case that would permit of the introduction of such a bulky instrument between the head and the pelvis, would be easily delivered by other means. This is founded on a misconception as to the use of the cephalotribe. The cases suitable for the use of it are those where the head cannot enter the brim, and there is consequently no difficulty in pushing it aside to introduce the instrument, or those in which the head has been caught in the brim or cavity, and where room must first be made for the instrument by the perforator, and by pushing the head back from its position.

Second—It is said a craniotomy forceps will do all that is required of the cephalotribe, but the craniotomy forceps will scarcely diminish the size of the base of the skull; it leaves spiculæ to tear the mother and the hands of the operator, and it affords no means of making extractive force.

Finally, I repeat my assertion that the cephalotribe is to be preferred to all other means of performing embryotomy, the dangers of which it reduces to a minimum, and the performance of which it permits in cases where this would otherwise be impossible; and to this I would add that the true use of the instrument is to lessen the size of the head, for which the crushings must be repeated as often as may be necessary to enable it to pass through the pelvis, with ease, and without forcible traction.

P. S.—It probably accords with the experience of most hospitals that peculiar cases occur in groups. At the Coombe we seem at present to be going through a series of cases presenting very narrow pelves, and so it happens that since the foregoing was written I have had an opportunity of seeing a very complicated and difficult labour case under the management of my colleagues Drs. Sawyer and Ringland, the particulars of which will, I trust, be published, in which, after several ineffectual efforts with the crotchet, delivery was completed by the cephalotribe, in a manner that afforded further proof of the great value of this instrument.

[Paper read before the Dublin Obstetrical Society, 12th January, 1867.]

Cephalotripsy, or the breaking down of the bones of the head, previous to extracting it from a narrow pelvis, is spoken of in German, French, and American works on midwifery, as an operation of the greatest usefulness and highest importance, an improvement, in fact, in scientific obstetrics only second in value to the introduction of the forceps, yet in our standard English works it is ignored entirely, or spoken of as an operation that could not, and has not, been attempted in this country. This repudiation of the operation may be traced to two causes—the formidable appearance of the instrument first recommended for its performance; and the mistaken idea that it should serve as a substitute for perforation of the head and evacuation of its contents, instead of these being essential stages in the operation.

We are indebted to Sir James Simpson for a great improvement in the construction of the instrument; and though he has not published any account of it, so far as I am aware, I know from personal communication that he uses it in all the suitable cases he meets with, and that it is daily growing more and more in favour with him. It appears also from the records of the London Obstetrical Society that Braxton Hicks, Greenhalgh, Graily Hewitt, and others, are beginning to adopt it in their practice. I have myself had Sir James Simpson's cephalotribe for some time, and used it in such cases as required it, and am convinced of the correctness of the principle on which the modern operation of cephalotripsy is founded, and of the suitability of the instrument we now possess for its performance, and I bring the subject before the Obstetrical Society because I think it full time that the merits of the operation should be fully discussed in a society that so fairly represents the Irish school of midwifery.

The earliest cephalotribe known to us was invented by Assalini, and described in a work published at Milan in 1811; but till Baudelocque, nephew of the celebrated accoucheur of the same name, invented his instrument in 1833, the operation of cephalotripsy seems to have been but little practised. Since then the value attached to the suggestion has been evidenced by the very many attempts to improve the instrument. At the Exhibition of the London Obstetrical Society last year the following seventeen different forms of it were exhibited, besides three varieties of chain-saw forceps, an instrument that may fairly be classed with it; and Hodge's, and probable other forms were not represented:—Assalini, of Milan; Lazarewitch, of Charkoff; Baudelocque, Paris; Baudelocque, by Luer; Depaul, Paris; Depaul, by Charrière; Etlinger and Hugenberg, St. Petersburg; Martin, Berlin; Braun, Vienna; Nyrop, Copenhagen; Cohen, Hamburg; Rizzoli, Bologna; Hennig, Leipzig; Scanzoni, Würzburg; Killian, Bonn; Sir James Simpson, Edinburgh; Schöller.

And of chain saw forceps:—Van Huevel, Brussels; Faye and Mette, Christiania; Lazatti, Milan.

The accouchers of repute who have advocated the use of the instrument are very numerous. I may mention Chailly, Cazeaux, Dubois, Pajot, Leynseele, Scanzoni, Killian, Crédé, Kiwisch, Hodge, and Bedford. Chailly says it has completely banished from obstetric practice crotchets and craniotomy forceps, and all such hooks and pincers. Dr. Hodge, Emeritus Professor of Obstetrics in the University of Pennsylvania, in his great quarto volume on the principles and practice of obstetrics, describes the introduction of the cephalotribe as an improvement in scientific obstetrics only second in importance to that of the forceps. In speaking of the dangers of craniotomy, he says:—

“The slightest consideration of the *modus operandi* of crochets, pincers, craniotomy forceps, and other varieties of tractors, demonstrates that they act not directly, but indirectly, in accomplishing the diminution of the head of the child, so that it may pass through the contracted passages. The head is in reality lessened—not by the tractors, but by the bones and soft tissues of the mother; for it is dragged through, for example, the superior strait of the pelvis, and this is the real agent which diminishes the head. The bony strait is covered by delicate and important tissues, such as the edges of the uterus, the vagina, bladder, &c. Hence such tissues are powerfully compressed between the bones on one side, and the head upon the other, greatly endangering their integrity and safety. The greater, therefore, the contraction the greater will be the risk to the tissues. No wonder then that there is danger of contusion, laceration, inflammation, ulceration, and mortification of these tissues in bad craniotomy cases. Hence accoucheurs have always dreaded craniotomy operations in confined pelves, as they have too often proved fatal, not only to the integrity of the bladder, rectum, and other tissues of the pelvis, but also to the life of the mother.”

The principle of cephalotripsy, according to Dr. Hodge, is that the head of the child should be reduced in size, by compressors, and not by the tissues of the parent, as in all the usual operations by the crotchet and craniotomy forceps:—“The importance of the principle now inculcated can hardly,” he says, “be over estimated. Next to the introduction of the forceps into modern practice, the idea, when the preservation of the child’s life is hopeless, of diminishing the size of the head by compressors, instead of dragging it through the contracted outlets of the body by mere force, to the great detriment and often destruction of the mother’s tissues, seems one of the most important improvements in scientific obstetrics.”

Scanzoni, in his work, advocates the operation not less warmly. In the section on the influence of perforation on the life and health of the mother, he states that the fatality of the operation and the sad results that so frequently follow it, are not due to the perforation, but are the

results of the efforts necessary for the extraction of the perforated head. We are convinced, he says, that the results will be more satisfactory for the future if a suitable perforator (he recommends a trepan) be used, and the extraction be made with a properly constructed cephalotribe.

He further speaks of the usefulness of the cephalotribe for diminishing the head and extracting it; and in a section devoted to a description of the instrument, gives the following rules for its use:—

“1. The cephalotribe is necessary when, after perforation, the head is not expelled (the necessity for previous perforation was already insisted on).

“2. Recourse should be had to the cephalotribe without previous perforation (which would then, he says, be impossible) when, the infant being dead, the inferior members and trunk have been expelled and the forceps cannot be applied to the head, which is above the superior strait, or in the pelvis, and cannot be extracted by manual efforts. By means of the cephalotribe the head can be seized firmly, reduced in volume, and delivered promptly without injury to the mother.

“3. It may be used to extract the head when it has been separated from the trunk, and is engaged in the pelvis.

“4. This instrument may be employed under the following circumstances to seize different parts of a dead fetus:—

“*a.* To extract the breach of a dead child when there is a difficulty in its passage through the pelvis, or its passage endangers the safety of the mother.

“*b.* To compress and extract the shoulder when it is delayed after the head has been disengaged, when other methods have failed, and the diminution of the volume of the thorax is indispensable; the cephalotribe is greatly to be preferred in this case to the use of cutting or pointed instruments which can wound the uterus.

“*c.* To diminish the volume of the thorax, after the expulsion of the lower extremities, when it is sufficiently large to prevent the extraction of the arms which are turned upwards.

“*d.* Finally this instrument may be recommended in presentation of the trunk, when the thorax is so engaged in the pelvis that it is impossible to introduce the hand into the uterus to perform version—the chest may be broken and a passage so cleared into the uterus.”

“Conditions of operation:—

“1. It is necessary that the pelvis should have dimensions sufficient to allow the broken fetus to pass when we wish to extract with the cephalotribe. If it be less than $0^m\cdot068$ ($2\cdot69$ English inches) in its shortest diameter the operation cannot be performed without exposing the mother to grave risks, if the child be mature, and no accoucheur should attempt it. It may be tried when the fetus is not fully developed, and is of small size, though the pelvis is not more than $0^m\cdot055$ ($2\cdot16$ English inch) in its shortest diameter.

"2. The os must be sufficiently dilated.

"3. The head must be fixed in the brim of the pelvis, or so placed that it may be fixed at the brim by pressure applied to the abdominal walls."

The objections that have been urged against the cephalotribe are chiefly as follows:—

1st. The imperfection of the instrument. 2nd. That while it diminishes the diameter of the head in one direction it increases it in the opposite. 3rd. That in comminuting the bones it causes splinters, which may protrude through the skin and injure the soft parts of the mother.

Dr. Churchill, in the fourth edition of his *Midwifery*, says the appearance of the instrument is so formidable that he doubts if it could be used in this country, and he is not aware that the attempt has been made.

This refers to Baudelocque's cephalotribe, and speaking of the same instrument, Dr. Murphy says:—"Look at it and ask yourselves how could it be used in Elizabeth Sherwood's case—to me it seems impossible." Dr. Tyler Smith makes a somewhat similar objection. In no other English class book that I am aware of is the cephalotribe even mentioned.

A comparison of Sir James Simpson's cephalotribe with some of those that preceded it will sufficiently remove the objections to the instrument on account of its enormous proportions:—

Measurements of Cephalotribes.

| | Weight | Entire Length | Blades | | | | | Handles | | Power |
|--------------|---------------|---------------|------------------------|---------|-----------|-----------------------------|---------------------------|-------------------|-----------------|---------------------------------------|
| | | | Length | Breadth | Thickness | Breadth Closed ^a | Pelvic curve ^b | Length of Handles | Length of Joint | |
| Baudelocque, | lbs. oz. 4 12 | In. 20½ | In. 10½ | In. 1½ | In. ¼ | In. 1½ | In. ¾ | In. 9 | In. — | Winch and screw |
| Hodge, . | 3 12 | 19½ | Shank 6½ × 3½ 9½ | 1½ | — | 1½ | 3 | 9½ | — | Screw and fly-nut. |
| Scanzoni, . | — | 18·66 | 10·15 | 0·98 | 0·27 | 2·04 | 3·81 | 8·54 | — | Screw and lever, with travelling bar. |
| Braun, . | 2 — | 16 | 8 | 0½ | 0·2½ | 2·2½ | 2 | 6½ | 1½ | Screw and joint in handle. |
| Simpson, . | 2 4 | 14 | 8½ | 1½ | ¼ | 2 | 2½ | 4½ | 1 | Screw and fly-nut. |
| Hicks, . | 2 6 | 15 | 9¼ | 1½ | ¼ | 1½ | 3 | 4½ | 1¼ | Screw and two movable nuts. |
| Kidd, . | 2 4 | 14 | 9 | 1½ | ¼ | 1½ | 0 | 4 | 1 | Screw and fly-nut. |

^a Breadth of blades closed is measured across the blades when locked and closed, and includes the thickness of the blades except in Scanzoni's.

^b The pelvic curve is measured by placing the instrument on a horizontal plane and measuring the length of a line falling perpendicularly from the highest point of the blade to that plane.

The second objection that I have mentioned, that all the diameters of the head are exaggerated except that in which the instrument is applied has been examined by Hersent by experiments made on the heads of twenty dead children. In five instances in which the cephalotribe was applied, without the head having been perforated and emptied of its contents, he found that the diameter in which the blades were applied was diminished, while all the other dimensions were exaggerated. In the other instances, in which the head had been perforated and emptied of its contents, all the dimensions were diminished.

These experiments were repeated by Hodge, but he does not seem to have perforated and emptied the cranial contents in the first place. The transverse diameter, where the blades were applied was easily reduced, he says, to two inches, while the occipito-mental diameter and the cervico-bregmatic were lengthened.

Dr. Hodge also found that the bones were turned inwards upon the cavity of the cranium, and though fractured, in no case did they penetrate the scalp, even when no perforation had been previously made.

The head that I exhibit is one on which I operated with the perforator and cephalotribe, in the month of June last; and on inspection it will be seen that the bones collapsed and turned inwards under the pressure of the blades, and that while the transverse diameter was shortened there was no, or scarcely any, lengthening of the other dimensions.

I have now shown, so far as authority can do so, that the operation of cephalotripsy is worthy of more consideration than it has hitherto received in the Dublin school. My own experience of the cephalotribe, as a means of extracting the head after it has been perforated, and the brain has been broken down, that is, of lessening the size of the head and of drawing it through a narrow pelvis, leads me to regard it as a most admirable instrument. By the use of it the danger of craniotomy may be reduced to a minimum, and in many cases delivery safely accomplished, in which but for it we would be called on to recommend the Cesarean section. Not that I think it can ever supersede this operation altogether, but it will lessen the number of the cases in which the necessity for this last resource of our art will arise.

Of cephalotripsy without the previous use of the perforator I have no experience, nor do I think that it should ever be resorted to in head presentations till the contents of the cranium have been broken down.

I have now used the cephalotribe in three operations. The first was the case in which the head just referred to was removed. It was the mother's first labour—the pelvis was small in all its diameters—the head lay in the brim in the third position of Naegele, Dr. Sinclair and Professor Haughton were present at the operation. Dr. Sinclair and I first tried to deliver her with the forceps, which was easily applied, but by no effort that we thought it prudent to make could we move the head

from its position. The fetal heart had not been heard, though we searched for it carefully, and as the mother's condition demanded relief, I perforated, and applied the cephalotribe, and extracted the head with great ease. The woman made a rapid recovery, and left the hospital on the ninth day.

The second case was that of a woman living in a court off Cuffe-street. She had been delivered by craniotomy four times previously; once by myself, once by Dr. Sawyer, by Dr. Ringland, and by Dr. Mason. I was called to see her on Saturday, 24th November. She had been in labour from Wednesday morning. It was a head and arm presentation; the promontory of the sacrum projected very much forwards—the brim was under three inches in its antero-posterior diameter, and the head was completely above the brim, being prevented by the arm from becoming in any way engaged in it. The fetal heart was inaudible. The mother was in a state approaching collapse. So tender was the abdomen that she could not bear the slightest touch; she had constant vomiting, the surface was cold, the pulse almost imperceptible, and the uterine contractions had ceased for some hours. In the absence of my colleagues, Drs. Ringland and Sawyer, Dr. Churchill kindly saw her with me; and I was very glad to have his co-operation, for while it was imperative that the woman should be delivered immediately, I feared she would die under the operation. With Dr. Churchill's assistance, I perforated and broke up the brain, and then applied the cephalotribe. The head was so movable, from being completely above the brim, that I attempted to fix it with the crotchet, while introducing the cephalotribe, but I found this interfered with the proper application of the blades, causing them to slip when I began to extract, so I removed the crotchet and reapplied the cephalotribe, while Dr. Churchill steadied the head by applying his hand on the abdomen of the mother. The head was easily seized and compressed, and was extracted with a degree of ease that surpassed my expectations. However, the operation had been too long delayed, the woman never rallied, and died in about eighteen hours. The ease with which the head was extracted in this case was very remarkable. Under the extractive efforts it rotated in the pelvis so as to bring the shortened diameter into the narrowest part of the pelvis, and I have little doubt that the efforts that would have been necessary to extract it with the crotchet would have caused the woman to die under the operation.

The third and last case in which I have used the cephalotribe (for, fortunately craniotomy is not required as frequently now as when the use of the forceps was less known) occurred on the 28th December last. It was the woman's second labour; she had been delivered previously in the Rotundo hospital, by Dr. Cronyn, by craniotomy, and her recovery was retarded by the occurrence of pelvic cellulitis, which prevented her leaving the hospital for six months. When I saw her I found the os very nearly

fully dilated, but still presenting a rigid band all round it. The head, which presented, seemed to be hydrocephalic, and one of the parietal bones had passed through the os, while the remainder of the head was above the brim, which was very much encroached on by the promontory of the sacrum; labour had commenced three days previously, by early rupture of the membranes. The woman was flushed, skin hot, belly tender, and she had vomiting—fetal heart not to be heard. Dr. Cronyn kindly saw this woman with me, and recognized her as having been the subject of a very difficult and tedious operation by the crotchet. We at once perforated and applied the cephalotribe; on making the first effort to extract I experienced some difficulty, so I unscrewed the instrument and, applying it in another direction, gave the bones another squeeze, when I was enabled to extract the head without further difficulty. The shoulders were now caught at the brim, and Dr. Cronyn, who kindly completed the delivery for me, as I was suffering from a severe attack of influenza at the time, had very great difficulty in extracting them—so much so, that we thought of applying the cephalotribe to break down the thorax—but after some time he completed the delivery without this.

The next day the pulse was down to 90, and soon came to the normal standard, and the woman made an excellent recovery, notwithstanding that a portion of the lip of the uterus was found, after delivery, to be almost entirely detached and hanging in the vagina. How this portion of the lip was injured I really cannot say; it was certainly not done by the cephalotribe, because it was the posterior lip, and the blades were applied laterally. I incline to think it was caused by the long-continued pressure between the head of the child and the promontory of the sacrum, which was very sharp and projecting.

These cases have fully convinced me of the superiority of the cephalotribe over all other methods of extracting the head after it has been perforated. In two respects, I think Sir James Simpson's instrument capable of improvement. The pelvic curve, which is less in his than in most others, might, I think, be done away with altogether with advantage. In cases of antero-posterior narrowing, it is desirable to turn the shortened diameter of the head into the short diameter of the pelvis, and the space through which the head will have to rotate when turned with a straight instrument will be considerably less than when turned with a curved one—besides, the introduction of a straight blade is easier and safer than that of a curved one.

The lock might also, I think, be reversed with advantage. That is made so that the lock of the upper or right blade will look forwards when the blade is introduced. This would, I think, be an improvement in the construction of all midwifery forceps, as well as the cephalotribe. I have a forceps of very old date made in this way; and in the museum of the Rotundo Hospital there is one labelled as Denman's, made in the same

way. Why all our modern instruments are made differently I cannot tell. The present construction obliges us to adopt one of three courses:—*a.* Follow the rule laid down by Rigby, and introduce “the upper or lower blade first, according as its lock is directed forwards; *b.* Introduce the second blade behind the first; *c.* Introduce it in front of the first, and afterwards cross the handles so as to bring the locks opposite to one another. Each of these courses is objectionable. The first, because it implies, as instruments are at present constructed, the introduction of the lower blade first. The second, because it interferes with the proper placing of the instrument when the head is high up, as it is then necessary to carry the handle as far backwards as the perineum will permit, that the blade may be properly placed on the head, and that the first tractions may be made in the axis of the brim of the pelvis. In the third method there is some risk, in crossing the handles, of displacing the blades however well they may have been applied, and in a narrow pelvis the crossing of the handles may not be easily accomplished. By making the instruments so that the lock on the upper blade will, when it is introduced, look forward, the lower blade can be introduced in front of the other, and the locks will come properly into position; and while the introduction of the instruments is thus much simplified their utility is in no way impaired. I have had a cephalotribe made for me by Messrs. Fannin, resembling Sir James Simpson’s, but without the pelvic curve and with the reversed lock, and I believe that with these alterations it is a very perfect instrument.

In using the cephalotribe when the head presents perforation is performed in the ordinary manner, and the brain carefully broken up. Then the blades of the cephalotribe are introduced in the same way as the forceps, but care must be taken to pass them up sufficiently high to grasp the base of the skull, as the great object of the operation is to break it, and reduce its size. For this reason the points of the instrument, especially when the head is high up, must be passed well forwards, and the handles must be carried back as far as the perineum will admit, and the reversed form of the lock will now be found specially useful. When the blades are locked the screw is passed through the openings in the handles, and by screwing the handles together we crush the head. This being done, we now proceed to extract it, when, if any difficulty be experienced, the head may be rotated so as to bring it, with its shortened diameter, to the narrowest part of the pelvis; and here the advantage of having an instrument, without the pelvic curve, will be experienced. If there still be difficulty the blades may be applied to the head in another direction, and the base of the skull again broken; and this may be repeated if necessary, and then extraction performed as if with the forceps.

In cases of extreme narrowing of the pelvis, Professor Pajot^a, of Paris, operates by repeated crushings without tractions, a method that he recommends when the pelvis measures under six and a half centimètres (2·5 English inches), and which he says may be practised where it is not more than 27 millimètres (1·06 English inches), the smallest size that will admit the introduction of the instrument.

As soon as the os is sufficiently dilated he perforates; and when it is large enough to allow of the introduction of the cephalotribe, he effects the first crushing, taking care to grasp the base of the skull. Then he slightly rotates the head to the right or left as he finds most easy, but does not persist in his efforts to do this if he finds much difficulty, as the uterus itself will, in a little time, and often in a very short time, rotate the head so as to bring its diminished dimensions into the narrow part of the pelvis. After the first crushing he withdraws the instrument without traction, and proceeds immediately to make a second and even third crushing, and then the patient returns to bed. According to the general and local state of the patient, and the weakness or energy of the uterine contractions, he repeats these crushings every second, third, or fourth hour, making two or three crushings at each sitting; in some cases one or two sittings suffice. The head, broken and elongated, is expelled by the uterine contractions; and if the thorax present any difficulty it also is crushed once or twice.

M. Pajot recites seven cases where this method was practised, the leading features of which I have condensed into the following table:—

| Pelvis measured | English inches | | No. of Sitzings | Head expelled | In about |
|------------------|----------------|---|-------------------|-----------------------------|----------|
| 6 C. M. = 2·36. | Successful. | 2. | (spontaneously) | 24 hours after perforation. | |
| 5 C. M. = 1·9. | Fatal. | 2. | " | 14 | " |
| 6 C. M. = 2·36. | Successful. | 1. | (slight traction) | — | " |
| 6 C. M. = 2·36. | Do. | 1. | (spontaneously) | 5 | " |
| 5 C. M. = 1·9. | Do. | 4. | " | 13 | " |
| 6 C. M. = 2·36. | Do. | 2. | " | 8 | " |
| 36 M. M. = 1·41. | Fatal. | Cephalotripsy attempted in three sittings with an imperfect instrument before M. P. saw the patient; he operated once, but the patient died undelivered two hours afterwards—uterus ruptured. | | | |

Professor Van Leynseele^b says truly of this method that it is only applicable to cases where the operation is determined on and commenced before labour has made much advance, or the woman suffered any fatigue, or the soft parts any compression; but in the majority of cases,

^a Archives Générales, Mar. 1863.

^b Résumé du Cours d'Accouchements donné à l'Université de Gand.

where cephalotripsy is required, the condition of the mother would not permit of any such delay and prolonged and repeated operations. I believe, however, the method is well worthy of being borne in mind, if we should meet with a case of labour in an early stage, especially if the child be dead, where the pelvis is greatly deformed, and where the decision comes to lie between embryotomy and the Cesarean section.

In conclusion, I recommend the adoption of the cephalotribe in all cases of embryotomy in preference to crotchets, hooks, and craniotomy forceps, for the following reasons:—

1st. By its use the base of the skull, the thorax, or pelvis may be completely broken up and reduced to the smallest possible dimensions without injury to the mother.

2nd. It holds the part to which it is applied so firmly that it can be rotated if necessary and extracted with ease and safety.

3rd. It causes no spiculæ, as the crotchet does, to tear the soft parts of the mother.

4th. It does not, like the crotchet, endanger the mother or the hands of the operator by slipping or perforating the part to which it is applied.

5th. It reduces, for the foregoing reasons, the dangers of embryotomy to a minimum, and allows of its performance in cases where it would not otherwise be possible.

