

**EMBRYOTOMY,
ITS PROGNOSIS AND LIMITATIONS.¹**

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(With six illustrations.)

Definition.—It is perhaps best stated here that the general term embryotomy is selected to include every operation by which the fetus is diminished in size, whether by cutting or crushing. The term, then, includes:

1. Perforation of the fetal skull.
2. Comminution of the bones of the fetal skull—cephalotripsy; cranioclastm.
3. Combinations of the above—basiotripsy; basilysis.
4. Separation of the fetal head from the body—decapitation.
5. Opening of the thoracic and abdominal cavities, with the removal of a part or the whole of their contents—evisceration.
6. Amputation of extremities.

¹ Read by invitation at the obstetric discussion before the Medical Society of the State of New York, February 8th, 1893.

In a general way it may be stated that operative interference during labor does not markedly increase the maternal mortality, if intelligently carried out. Dührssen¹ reports the results of two hundred and thirty obstetric operations performed in outdoor (polyclinic) practice under strict antisepsis. They included vaginal and uterine tampons for hemorrhage; version in flat pelves when possible; incisions of cervix and labia for rigidity; forceps, the head being forced to engage by suprapubic pressure when above the brim, and adaptation of the instrument was often elected; the immediate emptying of the uterus by finger or curette in abortion; the removal of adherent placenta under complete anesthesia. Of the two hundred and thirty operations there were three deaths from sepsis and one from eclampsia. The results for the children were also good.

The statement that embryotomy is usually attended by as much danger as Cesarean section is untrue. It is true, moreover, that embryotomy, even in unskilful hands, and particularly in those of one unaccustomed to celiotomy, is by long odds the safer operation in those cases where the absolute indication for Cesarean section does not exist. Leopold,² from 1883 to 1887, performed seventy-one craniotomies, with a mortality of 2.8 per cent. Fehling,³ in Leipzig and Stuttgart, up to 1889, performed twenty-three craniotomies with a mortality of 4.3 per cent. It is interesting to note that in pre-antiseptic times Von Häcker⁴ (Munich), from 1859 to 1879, had twenty-three cases of craniotomy with a mortality of 56.5 per cent. Zweifel⁵ gives the statistics of sixty-eight craniotomies with five deaths; two of the deaths were due to previous rupture of the uterus and three to eclampsia. The maternal mortality, therefore, directly due to the operation, was *nil*. Zweifel states that he himself has never lost a case of craniotomy. John Philips⁶ reports sixteen successful cases of craniotomy for various indications. He adds that ten of the fetuses were probably alive before operation.

The perforation of the after-coming head gives a greater mortality than that of the fore-coming. In Leipzig the mortality

¹ Berliner klinische Wochenschrift, xxiii., xxiv., 1890.

² Kehler, "Lehrbuch der operativen Geburtshülfe," Stuttgart, 1891, p. 223.

³ Loc. cit.

⁴ Loc. cit.

⁵ Therapeutische Monatshefte, February, 1889.

⁶ British Medical Journal, June, 1889.

of the perforation of the fore-coming head was 4.7; after-coming head, in Leipzig, 25 per cent.¹

Lewers, in a paper before the London Obstetrical Society, May 4th, 1892, reported six cases of craniotomy for pelvic contraction. Four were neglected cases, having been hours in labor before delivery was effected. In two delivery was only accomplished with great difficulty. All the cases recovered. In four instances the conjugate was two and a half inches or less. He concluded the Cesarean section should be undertaken as a necessity and not as an operation of election, because the mortality of Cesarean section in London, the operation being performed by operators of acknowledged skill, was still twenty to fifty per cent. Because Sänger, Zweifel, and Leopold on the Continent, and Cameron in Glasgow, have had an exceedingly low rate of mortality (seven to ten per cent), it was no argument in favor of the performance of Cesarean section in London, where the operation, in the hands of "operators of acknowledged competency," still gave a mortality of from twenty to fifty per cent. Cameron² cites the case of a woman who had eleven pregnancies, terminated eight times by embryotomy and three times by induced labor, two at half-term and one at eight months. The last three labors were under his personal care, and he then told the woman that should pregnancy again ensue she must submit to section; and he adds, "I have had no further trouble on her account."

Recently the writer has been called upon to perform embryotomy in three instances upon the dead fetus. In the first instance a partially adherent uterus, as the result of a previous puerperal peritonitis for which celiotomy was performed, together with a state of tetanic contraction, resulted in such a thinning of the lower uterine segment as to render the danger of rupture imminent. The second case was one of flattened pelvis, where compression, shoulder and jaw traction, and the forceps failed to deliver the after-coming head. The last case was one of perforation of the fore-coming head in a primipara with a moderately contracted inlet (three and three-quarter inches) and a large male fetus, the first stage having been allowed to continue without interference until the fetus died. The records of the Lying-in Hospital and of the New York

¹ Kehrer, loc. cit., p. 224.

² British Medical Journal, 1., 1891, p. 509.

Maternity show that the three puerperæ made uninterrupted recoveries.

While it is true that in the hospitals of Germany, where the most brilliant results have been obtained from the improved Cesarean section, there have been comparatively few deaths from embryotomy, yet it is not true that embryotomy is attended with no difficulty and that it is easy of performance by the inexperienced. Experience in teaching obstetric operations upon the manikin has demonstrated to the writer that, even with the lesser degrees of contracted inlet, what at first sight appeared a very simple undertaking resulted in failure with the cranioclast, scissors, or cephalotribe. The dangers of embryotomy reside not so much in the perforation or decapitation as in the extraction of the mutilated fetus. It is one thing to open a skull and wash out the brains or sever the neck with Schultze's sickle hook, and quite another to extract the fetus through a cervix perhaps imperfectly dilated and edematous from prolonged pressure, and a pelvis too small to render a cephalotribe safe, and so small that even the cranioclast is with difficulty properly adjusted. The breaking-up of the skull and the removal of the bones piecemeal the writer would never elect, believing, as he does, that such an operation performed within the uterus, whether the cervix be fully or imperfectly dilated, is one of the most dangerous in midwifery.

The mortality rate from embryotomy is undoubtedly rendered higher than it otherwise would be, because of the repeated and unsuccessful attempts at delivery by forceps, version, or traction which we know so often precede it. We find here an explanation of the paradox that the maternal mortality has at times seemed greater in slight than in marked contraction at the inlet, for in the latter useless attempts at delivery were omitted. The rule holds good, however, that the maternal mortality is directly proportionate to the amount of pelvic obstruction. Embryotomy in those instances where the fetal head is larger than usual and the pelvis a trifle under size does not give a high rate of mortality, two to three per cent at most. Given, however, a conjugata vera of two and a quarter inches or under, and we observe the mortality immediately rising to twenty to thirty per cent.

If every physician did but form an estimate of the amount of contraction before labor set in, or early in the first stage—and surely he should be able to, as the promontory of the sacrum is

much more readily reached in a contracted than in the normal pelvis—we would have fewer craniotomies upon the dead fetus to record. Surely in a given instance there can be no difficulty in determining that the conjugata vera is or is not below three inches, and thus decide whether a living child cannot pass through the pelvis but must be delivered by section. When in any doubt respecting the amount of obstruction at the pelvic brim, we should have the gravid or parturient woman placed completely under the influence of chloroform, and then, with the whole hand passed into the pelvis, thoroughly explore the same. “I will assert that the general practitioner must, in the practice of midwifery, be more than a generally useful person, otherwise he will sink to the level of an ignorant midwife. Not only must he be able to form an estimate of the amount of contraction, but, by the patient study of normal cases, qualify himself to form an opinion as to whether it will be impossible for a living child to pass, and also whether, under the circumstances in which he may be placed, it would not be wiser to send the patient where Cesarean section could be safely performed than to extract a mutilated fetus through a minimum diameter. Upon the skill of the medical man who first sees and examines such a case will always rest the fate of the patient, as a surgeon, however well qualified to perform a Cesarean or Porro operation, will not assume the responsibility of deciding whether the case could be terminated by forceps or that abdominal section should absolutely be performed.”¹ Cameron had two cases, within a few days of each other, with a conjugate of about three inches. One fetus weighed nearly nine pounds, and the other was, if anything, smaller than normal. “It is only the skilled practitioner or obstetrician who, influenced by principles and principle, can, under such circumstances, give an opinion worth having, as such men do not allow a love of novelty, a thirst for notoriety, or a fit of heroics to interfere with better judgment. Experience alone will enable one to avoid extreme measures in cases with a conjugate measuring more than three inches, and where, by inducing labor near the eighth month, it may be possible to extract a living child through the natural passages. Where the diameter is much under three inches the child can only be saved by section.”²

¹ Cameron, *British Medical Journal*, 1891, i., p. 509.

² Cameron, *loc. cit.*

To compare the statistics of embryotomy in this country with those of the Continent of Europe is impracticable. There is no disputing the fact that slight degrees of pelvic contraction are much oftener overlooked here than in Europe; repeated and prolonged attempts with the forceps, shoulder or jaw traction, are continued; and embryotomy finally is resorted to, with the soft parts already extensively bruised and the patient more or less shocked by previous unsuccessful attempts at delivery. The writer deems it here not egotistical to state that within the past three years a school of midwifery¹ has risen up in New York City in which, during the year just ended, 2,071 confinements were conducted by its students, in which pelvimetry is daily taught, and in which the pelvimeter and tape measure are as constantly present in the labor bag as the syringe and catheter. Moreover, in the first three years of its existence, just ended, 3,225 confinements were cared for and 665 graduates and students of medicine were instructed in midwifery. It has been stated that in order to obtain the brilliant results of Sanger, Zweifel, and Leopold in Cesarean section, the operation must be performed more frequently. So far as the indication exists in contracted pelves, there are not enough cases, in New York City at least, to furnish obstetricians many operations apiece. Indeed, were the number of operators, eager and ready for the opportunity to perform section, one-quarter what it is at present, there would still not be enough cases to "go round."

Extreme pelvic contraction does not appear to be of common occurrence, hence the absolute indication from this source rarely presents itself. After examining the records of the Lying-in Hospital for the first two years of its existence, during which time 1,154 cases were attended in confinement, and upon whom in many instances pelvimetry was practised at the antepartum examination, the writer cannot find a single instance where a markedly contracted inlet existed, not once was mutilation of the child to diminish its size demanded, nor did the absolute indication from any cause exist for Cesarean section. The nativity of these 1,154 cases of confinement is distributed as follows:²

¹ The Lying-in Hospital of the City of New York, 314 Broome street.

² First and Second Annual Reports of Midwifery Dispensary.

Russia.....	574	Switzerland.....	2
United States.....	212	Sweden.....	2
Ireland.....	82	Syria.....	1
Germany.....	84	Turkey ..	1
Poland.....	35	Nova Scotia.....	1
Austria.....	31	Norway.....	1
England.....	28	Arabia.....	1
Roumania.....	14	Austro-Hungary.....	3
Hungary ..	9	Italy.....	1
Scotland.....	4	Unknown.....	65
Holland.....	3		
		Total ..	1154

The writer further finds that of the 3,225 women confined by the students of the Lying-in Hospital in the first three years of its existence ending January 1st, 1893, in only one instance was reduction in size of the fetus demanded on account of a contracted pelvis, and in this case the writer was called upon to perforate and extract an after-coming head, the fetus being dead, where podalic version and repeated attempts at extraction by jaw and shoulder traction, forceps, and expression had failed. In several instances induction of premature labor¹ was demanded, but in not a single instance of the 3,225 did the absolute indication for Cesarean section exist from any cause.

Indications.—The indications requiring embryotomy can most conveniently be considered under two headings:

1. Those that call for the operation in the case of a dead fetus, and
2. Those that demand the operation in the case of the living fetus.

1. *Upon the Dead Fetus.*—Embryotomy upon the dead fetus is demanded in all cases where, the absolute indication for Cesarean section being absent, the extraction of the fetus undiminished in size, or the correction of a malpresentation or position, would result in greater dangers to the mother; and the ghastliness of the procedure should in no instance influence us in favor of the more dangerous means of delivery.

2. *Upon the Living Fetus.*—Is embryotomy upon the living fetus ever justifiable? This hackneyed question has given rise to endless discussion and masses of literature.² Naturally obstetricians range themselves upon two sides. It is the cry of

¹ See New York Medical Record, November 20th, 1892, "Intra-uterine Injections of Glycerin."

² Jahresbericht Geburt und Gyn., 1891, p. 810, twenty-nine papers.

Napoleon, "By all means save the mother," on the one hand, and that of Edward VIII., "Save the child by all means," on the other. There are those who claim that at the present time obstetric surgery has reached such a height of perfection as to always demand a negative answer to the above question. Others we find equally positive in the conviction that under certain circumstances embryotomy upon the living fetus is justifiable at the present day, and, moreover, always will be, although it is but fair to say that the limitations surrounding the operation are of the narrowest. In a discussion¹ before the New York Academy of Medicine, April 16th, 1891, upon this subject, Drs. Garrigues, Lusk, and Jewett expressed the belief that, of Cesarean section and embryotomy, usually embryotomy was the safer operation and, under certain conditions, was to be preferred of the two. Drs. Grandin, Coe, and Murray, while not denying that embryotomy was sometimes demanded upon the living fetus, spoke in favor of the elective Cesarean section. One speaker came out in favor of retaining embryotomy among obstetric operations, even as an operation of choice. The danger from Cesarean section, he thought, was five times as great as from craniotomy.² Another speaker³ considered embryotomy, even performed upon the living child, to have a positive place in obstetrics; still another,⁴ that embryotomy was safer under certain rare emergencies, as where the necessity existed for the rapid termination of labor in the interest of the mother, or where the mother was exhausted and unable to undergo celiotomy.

Until recently, when, during labor, the relative indication existed, namely, the choice lying between embryotomy and Cesarean section, we addressed the patient and her family somewhat as follows: "Cesarean section has its dangers.⁵ Under the very best circumstances in hospital practice from six to ten mothers in every hundred lose their lives, but then the chances of securing a living child are good. Embryotomy is comparatively safe for you, but then of course you lose your child. Hence we would advise

¹ New York Medical Record, November 24th, vol. xxxix., p. 639.

² Garrigues, loc. cit.

³ Lusk, loc. cit.

⁴ Jewett, loc. cit.

⁵ Dr. Robert P. Harris writes me under date of December 27th, 1892, that "the Sanger-Cesarean section in Leipzig, under eight operators, lost two women out of the first thirty-six, all in hospital but one case. This is the best that the operation has done."

you to choose the former operation, because you stand a good chance of obtaining a living child, even if the danger to yourself is five times as great." We all know that the choice of the patient and her family was, in the majority of cases, in favor of the less dangerous operation. Whether we shall lend ourselves to the destruction of a living fetus is quite another question. To-day we can offer to the patient, in those cases of contracted pelvis where the conjugata vera is not under two and five-eighths inches,¹ an operation in which the chances of securing a living child are nine out of ten and the maternal mortality² is *nil.*³ We refer to the operation of symphysiotomy. In those instances, however, where a Nägele⁴ or Roberts pelvis exists, or carcinoma or tumors of the cervix, pelvic exostoses, or other abnormal growths causing obstructed labor, symphysiotomy cannot be expected to avail us anything, and here, the child being alive or dead, a relative or absolute indication may exist for Cesarean section.

How far this revival of pubiotomy will limit the performance of embryotomy upon both the dead and the living fetus, and even the Cesarean operation, subsequent experience alone can determine. A large proportion of the Cesarean section cases of Europe and this country have been within the limits of pubiotomy. Within the past few months several successful cases have been reported from Philadelphia, Brooklyn, Dublin, and Germany.⁵ The addition of pubiotomy to the means at our command for successful delivery in obstructed pelvis will undoubtedly still further narrow the indications for embryotomy

¹ Morisani's minimum conjugate for the operation.

² One fatal case reported was probably of puerperal complication. Another fatal case is reported by Törngren (Centralblatt für Gynäkologie, No. 49, 1892, p. 953) where the mother died twenty-four hours after delivery, with fatty heart and chronic nephritis present on post-mortem. The writer knows of another unpublished fatal case not due in any way to operation.

³ Dr. Robert P. Harris writes me: "The maternal mortality of symphysiotomy has not yet been ascertained, for the record of the past seven years has not all been handed in. Twenty-three operators have delivered sixty women in six countries and twelve localities, with one death, not due to the knife. I have seen three operations, and no child or woman was lost and no mother disabled. I cannot say yet how many of the sixty children survived the third day. I know of but one that was absolutely dead when delivered, and I know of eight that did not survive the third day. Two died in the United States.

"PHILADELPHIA, December 27th, 1892."

⁴ See case of ischio-pubiotomy by Pinard.

⁵ Zweifel, Centralblatt für Gynäkologie, 1893, No. 44, p. 857.

upon the living child or abolish them altogether. Pinard¹ showed a woman before the Academy of Medicine, January 10th, 1893, with an obliquely contracted pelvis associated with synostosis or ankylosis of the right sacro-iliac synchondrosis, upon whom he had performed a new operation, termed ischio-pubiotomy. Previously she had had five instrumental deliveries with four still-births. The fifth, born asphyxiated, lived five months. With a chain saw Pinard divided the horizontal and descending rami of the pubic bone on the ankylosed side, two inches from the symphysis, and with Tarnier's forceps easily extracted a living child weighing eight pounds. Between one and two inches were gained in the pelvic diameters by the operation. No interference in walking was subsequently experienced.

We may congratulate ourselves that the indications for the destruction of the living fetus have never been so restricted as they are at the present day. A recent writer² upon obstetrics advises craniotomy (perforation) of the fetal head in impacted mento-posterior positions as a *conservative operation*, after referring to two cases where "speedy death in consequence of laceration of the uterus" occurred after forced flexion of the head under complete anesthesia. Yet we find the manual conversion³ of a mento-posterior position within the pelvis into a vertex presentation successfully performed within the past few weeks in New York. The child and pelvis were of normal size, and "it looked seriously as though craniotomy might be demanded." More evidence in favor of the hand as the best obstetric instrument!

Schauta puts the mortality in eclampsia as fifty per cent for the maternal and forty-two per cent for the fetal. In the literature⁴ of the last two years I can find the reports of twelve Cesarean sections performed for eclampsia, with the result of saving six mothers and six children. Halbertsma⁵ reported six cases of Cesarean section performed for eclampsia, with the

¹ The Medical Week., Paris, January 13th, 1893, vol. 1., No. 2, p. 20.

² "American System of Obstetrics," vol. i., p. 605.

³ New York Journ. Gyn. and Obstet., vol. xi., No. 20, p. 1134.

⁴ Müller, University Medical Magazine, 1890-1, pp. 111, 741.

⁵ Kaltenbach, University Medical Magazine, 1890-91, pp. 111, 741. Swiecicki, H. von, Die Frauenartz, Berlin, 1891, vi., p. 389. Halbertsma, Verband. Tenth International Congress, Berlin, August, 1890, Bd. cxi., Abt. viii., p. 250. Herff, Otto von, Berlin Klinik, 1891, Hft. 32.

death of one mother; and only one child was lost where the operation was undertaken after the eighth month.

It is impracticable to lay down any positive rules for the performance of either celiotomy or embryotomy, based upon the pelvic measurements, if we leave out of consideration the size of the fetal head. Recently the writer¹ was called upon to induce labor in a case of flattened pelvis during the ninth calendar month of gestation, where the conjugata vera was not over three and a half inches; and although he held himself in readiness to perform version or a difficult forceps extraction, yet the labor terminated spontaneously. The biparietal and bitemporal diameters of the fetal head recorded upon the books of the Lying-in Hospital were three and one-half inches and three inches respectively, thus being each one-quarter inch below the ave-

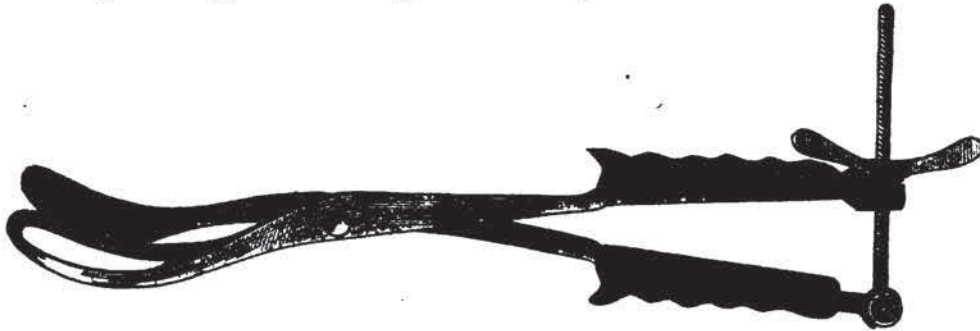


FIG. 1.—Braun's cranioclast.

rage, if we accept the average fetal head diameters as given by Tarnier and Chantreuil, which were averaged from measurements taken with great precision in forty-four cases.² The fetus in this case measured nineteen inches in length and weighed seven and one-half pounds, and is still living.

The Operation.—1. *For perforation.* The writer's choice is for any scissors perforator made after the pattern of Smellie, as easy to manipulate and clean, and as least liable to injure the mother's soft parts or the operator's hand. The trephine and basilist types of perforators possess no advantages over the more simple instrument. Before opening the skull it should be firmly fixed at the pelvic brim by means of a stout volsella forceps or by suprapubic pressure.

¹ New York Medical Record, November 26th, 1892.

² See note in Lusk's "Midwifery," p. 167.

2. *For extraction.* An instrument that will render good service is the long cranioclast of Braun, made entirely of metal,

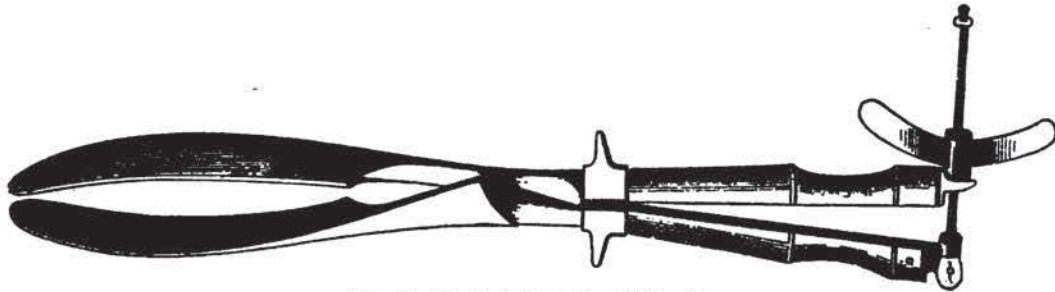


FIG. 2.—Cephalothrypter of Busch.

and it can in most instances be relied upon for extraction to the exclusion of any form of cephalotribe (Fig. 1). For easy

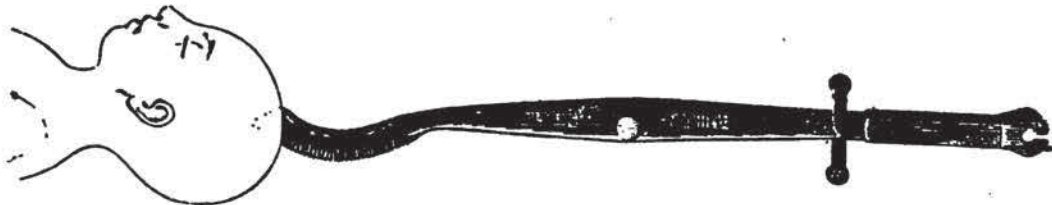


FIG. 3.—Auvard's cranioclast. Inner blade.

extractions, after evacuation of the skull, the first and second fingers, protected with several folds of gauze and introduced

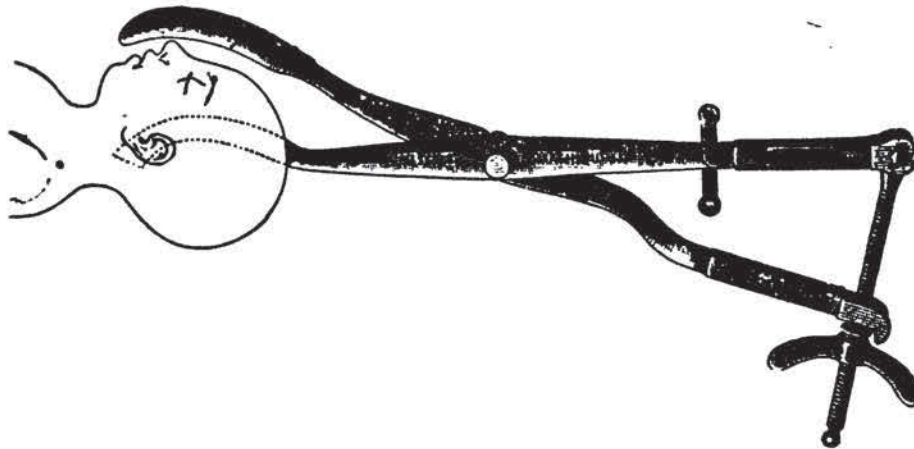


FIG. 4.—Auvard's cranioclast. Inner and second blades in position.

into the fetal skull, has proved an efficient means of delivery. Zweifel¹ describes, illustrates, and strongly recommends the

¹ *Therapeutische Monatshilfe*, February, 1890. "Lehrbuch der Geburtshilfe," Stuttgart, 1892, p. 758.

cephalotripter of Busch (Fig. 2). Dührssen¹ has found the combined cephalic embryotome of Auvard, which resembles a Simpson-Braun cranioclast with the addition of a third blade to grasp the vertex, to be the best instrument for the combined operation of cranioclasm, cephalotripsy, and extraction (Figs. 3, 4, 5, and 6).

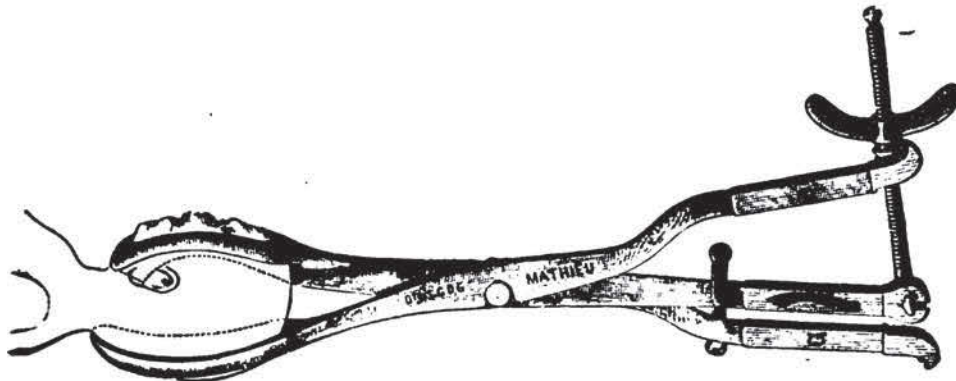


FIG. 5.—Auvard's cranioclast. Face crushed by inner and second blades, vertex being crushed by third blade.

3. *For decapitation.* It is of the utmost importance that the neck be kept as near the pelvic brim as possible. This is best accomplished by means of a sling to a prolapsed arm, and the fingers of the internal hand encircling the neck and producing traction thereon. If the whole of the elected hand is intro-

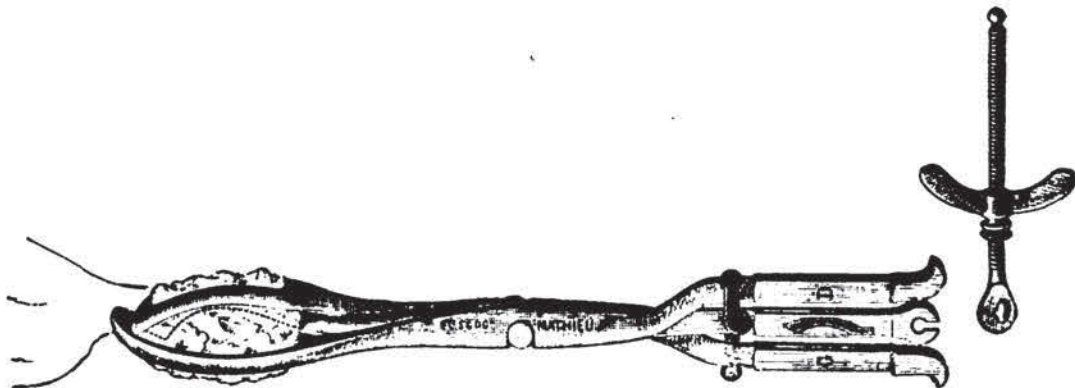


FIG. 6.—Auvard's cranioclast. Fetal head crushed by all three blades, and ready for extraction.

duced into the pelvis, the thumb, first and second fingers encircle the neck, and separation is best effected by means of Dubois' scissors or Schultze's sickle.

Conclusions.—A. *Embryotomy upon the dead fetus.* Embry-

¹ Geburtshülfe, Berlin, 1891, p. 166.

otomy upon the *dead* fetus is demanded when, the absolute indication for Cesarean section being absent, the extraction of the fetus undiminished in size would increase the dangers to the mother.

(a) This indication includes moderate degrees of pelvic contraction, malpresentations and positions, deformities of the fetus, and slight obstruction in the soft parts.

(b) In markedly contracted pelves, with a transverse diameter at the inlet of at least three inches and a conjugata vera little under two and five-eighths inches, embryotomy, in combination, if need be, with pubiotomy (embryo-pubiotomy), other things being equal, will be indicated.

(c) In instances where the conjugata vera is much under two and five-eighths inches, when labor is obstructed by fixed pelvic tumor, extensive exostosis, advanced cancer of the cervix, celiotomy is to be preferred whether the fetus be dead or alive.

(d) Where the mother's condition demands rapid delivery, and the absolute indication for Cesarean section is absent.

B. *Embryotomy upon the living fetus.* (a) Embryotomy upon the *living* fetus is indicated during labor whenever the relative indication exists and the physical signs indicate that the life of the fetus is practically lost.

(b) In certain rare instances, also, when the condition of the mother is such (temperature, pulse, dangerous thinning of the lower uterine segment), whether from repeated unsuccessful attempts at delivery or prolonged labor, as to render embryotomy by far the safer operation.

(c) In obstructed labor due to monstrosities.

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