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E. B. SINCLAIR, A.M., M.D., President, in the Chair.

Craniotomy and its Alternatives—Cæsarean Section, Laparo-Elytrotomy, and Porro's Operation. By R. J. KINKEAD, A.B., M.D., *Dubl.*; Professor of Obstetrics, Queen's College, Galway; Examiner in Obstetrics, Q.U.I.; Surgeon to H. M. Prison, Galway, &c.

CRANIOTOMY.

“No surgical operation whatever is, abstractedly considered, more revolting to human nature than that of craniotomy, or embryulcia. It is, at best, a dreadful expedient; in too many instances it implies the direct and deliberate murder of a fellow-being by the hands of the accoucheur.”^a

“In the whole range of surgery, it is the only operation recognised and sanctioned by the British profession which is undertaken with the avowed intention of destroying life.”^b

That it should be necessary to recognise or sanction an operation so revolting, and having for its object the destruction of human life, although it be undertaken with a view of saving the life of another, is a reproach to surgery, and one which modern science ought strenuously strive to take away.

To see if this can be effected—if it is within the bounds not merely of probability, but also of possibility—it is necessary to investigate the grounds upon which craniotomy is justified, its statistical aspect, and its alternatives.

I do not at present propose to enter on the question of turning and the induction of premature labour. Both, in this country, are accepted as true conservative efforts. The former is limited in its utility by the shape and size of the pelvis; the latter reduces the prospect of the survival of the child, and we have seldom an opportunity of resorting to it in primiparæ.

The teaching of the British school has been most emphatic—that where a living child cannot be extracted entire *per vias naturales*, its

^a Sir J. T. Simpson's *Obstetric Work*. Priestly and Stever. Vol. I., p. 621.

^b Ramsbotham. *Obstetric Medicine*. 4th Edition, note, p. 303.

destruction and mutilation are justifiable, and that the safety of the mother is always to be preferred to that of the child.

This emphatic teaching—positive with regard to craniotomy, and, if anything, stronger in its negative side against Cæsarean section—has produced the only effect that could be expected from it. Thus nearly all the efforts of the profession have been expended in perfecting the details of the operation of embryulcia, and inventing instruments to so lessen the bulk of the child that its membra disjecta may be drawn through the smallest possible limits.

Most authorities, too, whilst justifying the operation, confess what is to be expected as the result of such decided teaching, that it is performed where there is no real necessity for it.

From this teaching a terrible result too often follows. Attempts to perforate and extract in extremely narrow pelves are made; extraction being found impossible, no option is left but either to operate on the mother, or let her die undelivered. Perhaps the latter course would then indeed be wisest, for her prospect of recovery after prolonged efforts to deliver by the crotchet or cephalotribe would be very slight indeed.

If the child's life was, in its essence, something different before birth from what it is after—if, whilst in its mother's womb, it had no separate existence—if it was merely a portion of its mother, and not a separate, distinct individual—if it was "a mere vegetative life"—then indeed the doctrine "that embryotomy stands first, and must be adopted in every case where it can be carried out without injury to the mother," or "with a reasonable prospect of safety to the mother,"* would be established on a firm and unassailable basis, and we need have no more hesitation in removing the child, than we have in cutting off a leg or amputating a breast. But the case is widely different. Before birth the child is just as much a living, distinct individuality as it is after. It has as perfect a right to its life as its mother has to hers. We are equally bound to save its life if we can, and we ought not only to dare, but it is our bounden duty, to put its life—"that of an unborn child—into the scale against that of a being like ourselves, accountable to the Almighty."

"Assuredly no man would consider himself justified, on any plea whatever, in perforating and breaking down with a pointed iron instrument the skull of a living child an hour after birth, and subsequently scooping out its brain. But is the crime less when perpetrated an hour before birth? Modern physiology has fully shown that there is no such distinction between the mental and physiological life of an infant an hour before labour is terminated and an hour after it, as to make any adequate distinction between the enormity of the act as perpetrated at the one or at the other of these two periods."^b

* Barnes' *Obstetric Operation*. 3rd Edition, p. 419.

^b Simpson. *Op. cit.*, pp. 606, 607.

“ In fact, it ought to be deeply impressed upon every practitioner that he who destroys the child without due evidence that this is his only resource for saving the mother, is guilty of murder.”^a

I do not mean to argue that, with our present knowledge and experience, craniotomy is in every case unjustifiable.

I admit that there are cases in which it is justifiable to take away human life; but it appears to me that the question of the value of one life over that of another cannot be entertained. We are not the judges of which is the most valuable; if we entered on the course how wavering would be our decisions, how uncertain our actions, how many perplexing and disturbing circumstances would arise? We would be taking upon ourselves the arbitration of life, the functions of the supreme Judge.

In the case of a woman in labour, with pelvic obstruction, we have two human beings, innocent, yet as it were struggling with one another; unless aid is given, and that speedily, both will die; to all intents and purposes they will kill each other.

Our plain duty is to save one of the two so endangered, if we cannot rescue both. To carry this indication into effect, at the same time imbued with horror at the idea of gastro-hysterotomy, and shrinking from the awful idea of “plunging an iron instrument into the centre of the skull of a living human being,” it has been proposed and practised to wait for the death of the child before proceeding to lessen its bulk.

Is there much difference between waiting and watching—nay, for the mother's sake, hoping—for the death of the child, and operating whilst it is still alive? “The destruction of the infant from procrastination differs very little from taking its life with the perforator.”

But granting, for the sake of argument, that there is a great difference in moral responsibility between craniotomy before, and waiting for, the death of the child, yet by so waiting we incur an equal responsibility with regard to the mother. Whilst we wait for the death of her offspring, her prospect of recovery is becoming less and less. “The chances of her death increase with the lapse of every hour,” until finally, when craniotomy is resorted to (the child being believed to be dead), the operation proves fatal in her exhausted condition. Thus this practice, instead of saving one life, too often occasions the loss of both.

The rule for our guidance being that, if we cannot save both, we are bound to save one, it follows that, craniotomy being necessarily fatal, should never be performed unless we are assured that with reasonable skill in its performance the mother's life will be spared, that we do not expose her from the operation to equal peril with that resulting from gastro-hysterotomy; and, on the other hand, the Cæsarean section ought not to be undertaken unless we are assured that the child is alive, or, if dead, that it would be impossible to deliver it by any means *per vias*

^a Churchill. Op. cit., p. 174.

naturales, or that the effort to do so would place the mother in greater danger.

The smallest diameters admitting of the extraction of a dismembered foetus are laid down by

	Inches		Inches
Campbell as	3×2	Churchill as	$3 \times 1\frac{1}{2}$
Dewees	$3\frac{1}{2} \times 2$	Ramsbotham	$3 \times 1\frac{1}{2}$
Bedford	$3\frac{1}{2} \times 2$	Playfair	$3 \times 1\frac{1}{2}$
Burns	$3 \times 1\frac{3}{4}$	Osborne	$3 \times 1\frac{1}{2}$
Barlow	$3 \times 1\frac{1}{2}$	Barnes from	$3 \times 1\frac{3}{4}$ to 1
Hamilton	$3 \times 1\frac{1}{2}$		

The limitation of capacity depends on the safety of the mother; not merely the probability of it, but the assurance, that by reason of the operation not only will her life not be lost, but, further, that it will not be placed in as dangerous a condition as if the Cæsarean section had been performed. That it can be accomplished with this assured safety in such low pelvic diameters some assert, others deny.

And, first, the objection that it is very difficult, if not "impossible, to ascertain with mathematical accuracy the precise measurement of an extremely contracted pelvic brim, in which a mistake of a very small fractional diminution would render the extraction of the base of a full-sized head quite impossible,"^a has real weight; for, although it has been argued that this tells as much against Cæsarean section as against craniotomy—"for, if we cannot determine in a given case that a pelvis is under two inches, how are we justified upon a mere conjecture in subjecting the woman to so terrible an operation, when probably she might be saved by craniotomy"^b—yet the answer is plain—How, under such circumstances, are we justified in taking the infant's life, when probably the woman cannot be saved by craniotomy?

Again, we have no means of judging before birth what is the sex and size of the infant; and whereas it might be possible to extract, with safety to the mother, a female or ordinary-sized child, it might be impossible to extract one at all if above the average, or only after such prolonged and violent efforts as would place the mother in imminent peril: are we justified in killing the child on the chance of its being small?

Another view must also be taken. Dr. Barnes says:—"Obviously we cannot recognise fatal cases of craniotomy in extreme deformity, say of conjugate diameter reduced to 2 in. or to 1.75 in., unless the operation was begun under selected circumstances—that is, before exhaustion had set in—and conducted with due skill and after the most improved methods. We are fairly called upon to reject all fatal cases in which craniotomy was performed with bad instruments, in which the skull was

^a Radford. *Medical Times and Gazette*, Jan. 16, 1869.

^b Barnes. *Ibid.*, Jan. 9, 1869.

either not crushed down by the cephalotribe or the calvarium not removed, so as to leave nothing but the base to bring through the brim, edge on, or the head and trunk not reduced by sections as by my method;"^a but this simply means that all fatal cases are to be rejected unless performed by experts. Before arriving at the conditions here specified, how many children are to be sacrificed, how many mothers lost? We want a rule; we require guidance, not for such a master of his art as Dr. Barnes, but for the general practitioner.

But even with the specialist to extract an infant through a low pelvic diameter is no easy task, and too often proves fatal to the mother. Dr. Meigs, in a case where the pelvis measured 2 inches in the conjugate, took several hours to break down the head, and afterwards three or four to extract the child. Murphy, where the pelvis measured $4\frac{1}{2} \times 1\frac{1}{2}$, could not complete the operation under seven hours; and one can only, on reading Osborne's account of the case of Elizabeth Sherwood, wonder at her recovery.

The very nature of the operation makes it most difficult and dangerous. "I question much," says Burns, "if extreme cases of embryulcia be not as dangerous as the Cæsarean section."^b

"I, without hesitation," observes Bedford, "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 anterior posterior diameter measured less than 2 inches."

"If the circumstances of the case be such that the risk to the patient is increased much beyond ordinary perforation, I do not think we should venture upon that operation in preference to the Cæsarean section. In the former case the child must be sacrificed for a very doubtful advantage; in the latter there is every reasonable chance of preserving the child, while the mother has at least an equal chance that she will recover."^c

"Modern skill and ingenuity have devised means whereby the operation of craniotomy can be accomplished through a pelvis of much smaller dimensions than would have admitted of delivery in Smellie's day and with the resources at his command. But it remains to be proved whether in cases where the pelvis is so small that the conjugate diameter is only 2 inches or thereabouts the maternal mortality is less than in the cases of Cæsarean section operated on at an early stage of labour."^d

Whilst Playfair admits that "in such extreme deformities" ($1\frac{3}{4}$ in conjugate) "the difficulties of the operation are so great, and the bruising of the maternal structures so extensive, that it becomes an operation of

^a Barnes' *Obstetric Operations*. 3rd Edition, p. 418.

^b Burns' *Midwifery*, p. 501.

^c Murphy. *Op. cit.*, p. 24.

^d Smellie's *Midwifery*, edited by M'Clintock. New Syd. Soc. Note, p. 365.

the greatest possible severity, with results nearly as unfavourable to the mother as the Cæsarean section.”^a

And Dr. Parry “is forced to conclude that perforation and breaking up of the fœtus is not more successful than Cæsarean section in pelves with a conjugate $2\frac{1}{2}$ inches and less.”^b

And Dr. Hodge, in his quarto work on *Obstetrics*, says:—“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 the one side and the head on the other, greatly endangering their integrity and safety. The greater, therefore, the contraction the greater will be the risk to the tissue. 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 and rectum and other tissues, but also to the life of the mother.”

“I much doubt whether the more timely application of art combined with the utmost dexterity in the use of modern appliances will so materially lessen the mortality as to bring it up to the standard of favourable Cæsarean cases. The means which facilitate craniotomy by bringing the child within easier reach are the very means by which the greatest amount of evil is inflicted on the mother. After weighing these facts as far as they go, I feel confident that the most sceptical must admit that the mortality to the mother is as great, if not greater, from craniotomy and crotchet operations in extreme distortion of the pelvis as in the Cæsarean section; whereas by the latter, which is a far easier operation, and therefore requiring less dexterity, the child stands a chance of life, which by the former procedure is wholly precluded. Nothing would induce me again, even under the most favourable circumstances, to attempt delivery by the crotchet where the conjugate (true) diameter of the brim does not fully measure 2 inches, exclusive of the soft parts; and cases have arisen, and will again arise, where a larger space exists, but where either from a generally distorted or altered shape of the pelvis, or from great exhaustion, or from inflammation and swelling of the passages, or malposition of the child, and more especially where the child is alive, I should not hesitate to prefer the Cæsarean section to craniotomy.”^c

“Both these cases prove the great danger of craniotomy when the disproportion is so great, and seem to justify the rule that when the conjugate axis of the pelvis is 2 inches or less, the Cæsarean section

^a Playfair. *Op. cit.*, p. 199.

^b *American Journal Obstet.* Vol. V. 1872.

^c *Cæsarean Operation and Craniotomy.* Robert Greenhalgh, M.D. *Obstet. Trans.* Vol. VII., p. 285.

should be performed to preserve the child. The difference in the danger in such cases is, however, very slight, and when such is the case we are justified in the endeavour to save the child's life when that of the mother is in such hazard."^a

Unfortunately the question cannot be decided without statistics, which are sadly imperfect both in quantity and quality.

The average maternal mortality in Cæsarean cases is given as 1 in $2\frac{1}{2}$, in craniotomy as 1 in 5; but when we analyse these cases, and divide them into classes, according to time and cause, we obtain very different results. Thus, in Collins' cases the average of 1 in 5 obtained; but of these where labour had lasted more than forty-eight hours it rose to 1 in 8; and if his forceps cases be added, the maternal mortality, after a similar lapse of time, rose to 1 in $2\frac{1}{2}$; thus reaching the level of Cæsarean cases. Johnston and Sinclair publish the results of craniotomy in 180 cases; of these 26, or 1 in 5, died. It is curious that here the rule of the increase of mortality with the duration of labour does not hold good. There were 26 cases in which labour lasted forty-eight hours and more; of these 4 died, or 1 in $6\frac{1}{2}$.

But we have much later and more valuable statistics collected by the late Dr. Parry, of Philadelphia, who shows that in 70 cases where the conjugate was $2\frac{1}{2}$ inches, or less, the maternal deaths amounted to 26, or about 1 in $2\frac{1}{2}$, or 37·14 per cent., which is almost as great as that resulting from the Cæsarean section in America or on the continent of Europe. That this mortality was not due to unskilfulness is shown by the fact that nearly all of these cases were under the care of obstetricians of well-known reputation, amongst whom were Barnes, Dubois, Braxton Hicks, Greenhalgh, Radford, Meigs, Fordyce Baker, &c.

Hitherto I have only considered the mortality of craniotomy in contracted pelves. It has, however, to be resorted to in other cases.

In carcinoma of the cervix uteri or vagina the woman's days are numbered; she is suffering from a disease which in a short time must put an end to her existence, "whilst the child, if saved, and not sacrificed, may possibly" (nay, probably) "grow up and become a useful and important member of society. Under such circumstances we are assuredly justified in preserving the life of the child, even were it at the expense of some additional risk to the mother."^b On the other hand, it has been stated that "we have no right to lessen the woman's chance of life, because it is already small."^c This would be quite true if we had not to deal with the question of the child's right to live. Craniotomy in such cases places the woman's life in extreme peril. We are not, therefore, justified in sacrificing a healthy life on the chance of saving a failing one.

^a Murphy. Rankin's Half-yearly Abstract. Vol. XLI, p. 232.

^b Simpson. Op. cit., p. 649.

^c Barnes. Op. cit., p. 421.

From what we know as to the danger arising from pressure in labour complicated by pelvic, uterine, and ovarian tumours, it is evident, unless in the case of very small tumours, and those capable of being enucleated, or emptied of their contents, that, even after the reduction of the bulk of the head, they must be subjected to very dangerous pressure. "Unlike most cases of bony deformity the diminution of the pelvic canal is not limited to one diameter, but the tumour generally obstructs all the measurements of the pelvis, the lateral as well as the antero-posterior; hence there is usually very great difficulty in performing the operation, and in breaking down the head sufficiently to admit of its passage. This difficulty is alluded to by several authors."^a A most interesting case is recorded by Playfair, in a paper on the treatment of labour complicated by ovarian tumours, in the ninth volume of the "London Obstetrical Transactions." The patient, aged nineteen, had been in labour for more than twenty-four hours. The tumour left little more than "two inches clear space in the antero-posterior diameter;" it was tapped with a full-sized trocar without any favourable result. Efforts were in vain made to push it above the brim. "Under these circumstances it was evident that only one of two alternatives was left—either craniotomy or the Cæsarean section. *In accordance with the usual precepts taught in this country, the former was chosen, and as further delay only seemed to make matters worse, and the pulse was beginning to rise, I proceeded at once to perforate. This was effected without much trouble, but the extraction of the head was attended with the greatest possible difficulty. Even after the whole of the brain substance had been removed, and as much of the vault of the cranium as possible, little or no progress was made. Two hours and a half had now passed, and little had been done, when I procured Dr. Simpson's cranioclast, and succeeded with it in effectually destroying the base of the cranium, and eventually, but not without much difficulty, in extracting the head. . . . Within twenty-four hours symptoms of diffuse peritonitis came on which resisted all treatment, and the patient sank on the third day.*"

Statistics of the results of labour, complicated with ovarian and other pelvic tumours, have been collected by Dr. Playfair and Professor A. Stadfeldt, and the study of them will give, not only the results to be expected, but an indication for treatment. Dr. Playfair has collected 57 cases of ovarian tumour obstructing labour. The following table, constructed from his, shows the maternal and foetal mortality:—

^a Playfair. *Obstet. Trans.* Vol. IX., p. 74.

Treatment	Total Cases	Children died	Mothers died	Per-centage of Maternal Deaths
Natural powers - - -	13	5	6	46.1
" (Cyst ruptured) -	4	1	2	50.0
" (lacerated Uterus)	2	2	2	100.0
Puncture - - - -	9	3	—	—
Tumour pushed above brim -	5	1	—	—
Premature labour - - -	1	—	—	—
Embryotomy - - - -	15	15	7	46.6
Turning - - - - -	5	4	4	80.0
Forceps - - - - -	2	1	1	50.0
Cæsarean section - - -	1	1	1	100.0
	57	33	23	—

These figures bring out very decidedly two facts:—1st. That in ovarian cases the procrastination practice is little less than criminal neglect, and that to wait for the death of the child before operating, or to postpone treatment hoping for the natural powers to expel the child, is to subject the mother to risks far greater than those attending gastrotomy; and 2nd. That the mortality attending craniotomy and turning is also appallingly high, and, when the necessary destruction of the child is taken into account, it is unjustifiable.

In some of these cases a double line of treatment was adopted, such as puncturing or pushing the tumour above the brim. Eliminating these, there were 10 cases of craniotomy, pure and simple, with a mortality of 60 per cent.

Table constructed from Professor A. Stadfeldt's.

Nature of Case	Per-centage	
	Maternal Mortality	Foetal Mortality
Cases in which it was not stated that any operative measures had been adopted, but noted "died undelivered," or that they were cases of natural labour - - - - -	75.0	87.5
Premature labour induced - - - - -	25.0	100.0
Turning - - - - -	25.0	75.0
Forceps - - - - -	25.0	50.0
Tumour excised - - - - -	—	50.0
Craniotomy - - - - -	40.0	100.0
Cæsarean section - - - - -	61.9	33.3

From this it appears that the highest death-rate, as regards the mothers,

was when the cases were left to nature, next in the Cæsarean operation, and next in craniotomy; whilst the lowest foetal mortality was in the Cæsarean cases.

He remarks:—"Craniotomy is indeed well known to be an operation dangerous also for the mother—eight of twenty died—and there is no doubt that craniotomy, with subsequent extraction, in many of the cases here cited, has been performed under so perilous and difficult circumstances that sectio-Cæsarea would have been preferable, particularly if due regard had been had to the life of the child. It is the tenet that the life of the mother, in the case of mechanical disproportion during labour, demands the greater regard, which induces the accoucheur to prefer craniotomy to sectio-Cæsarea, when thereby a tolerably fair prospect is obtained for delivery *per vias naturales*. This view is also, according to my opinion, justifiable whenever there is the least reasonable doubt of the vital capacity of the child, and it can be excused when once in a way, in order to spare the mother if possible, a mistake is made. But I believe, on the contrary, that in all cases where an impediment to the labour exists on account of malignant and destructive pelvic tumours, which in a short time will cause the death of the woman, that mode of delivery should unconditionally be chosen which is the most merciful to the child, whenever a living foetus is concerned, even if the mother should incur greater danger. Consequently, sectio-Cæsarea or similar operations should be preferred to craniotomy. If we, under such circumstances, when expectation leads to no result, should perforate the foetus for the benefit of the weak vital frame of the mother, we should carry our respect for the life of the mother to an unwarrantable extreme."*

With regard to the maternal mortality in carcinoma of the uterus, a number of cases have been collected and analysed by Dr. G. Ernest Herman, which also prove the fatality of craniotomy in such cases. The results to the mothers of the various methods of treatment are shown in the following table:—

Number of Cases	Treatment	Mothers		Per-centage of Maternal Deaths
		Died	Recovered	
51	Natural powers - - -	16	35	31·3
9	Forceps - - -	4	5	44·4
14	Turning - - -	8	6	57·1
14	Incision of tumour - -	3	11	21·4
12	Craniotomy - - -	9	3	75·0
12	Cæsarean operation - -	8	4	66·6
11	Rupture of uterus - - -	11	—	100·0
13	Died undelivered - - -	13	—	100·0
5	Part removed or expelled -	2	3	40·0
141		74	67	—

* Stadfeldt. *Obstet. Journal*, p. 357, Sept., 1879.

The high maternal mortality following craniotomy in extreme pelvic obstruction having been demonstrated, it remains for us to consider the substitutes for it, the mortality which has attended them, and whether that mortality is inherent in them, or due to other causes.

I believe that an examination of these operations will show that, if performed at an early period of labour, before exhaustion has set in and structural change taken place, with reasonable skill, with proper anti-septic precautions—in fact, with that care and foresight which modern abdominal surgery has taught us, the maternal mortality can be so lessened that it will sink below that following embryulcia, and experience produces evidence to corroborate this belief.

The alternatives which have been proposed are—symphysectomy, Cæsarean section, laparo-elytrotomy, and hysterectomy, or Porro's operation.

CÆSAREAN SECTION.

The first place must be given to the Cæsarean section, not merely from its antiquity, but because, no matter how valuable experience may prove laparo-elytrotomy and Porro's operation to be, their range is limited, and the Cæsarean operation must be performed where they are not available.

That the maternal mortality after Cæsarean section has been very great, especially in England, is an admitted fact, and the wonder is, not that so few have escaped, but that so many have survived.

For generation after generation it has been taught that it is an operation almost certainly fatal—consequently, it has seldom been performed until labour has lasted for many days; and when it was at length had recourse to, as was to be expected, the woman died. The experience so gained was taken as a proof of the truth of the denunciation of the operation, and thus, arguing in a vicious circle, the opinion became more and more firmly rooted that the mortality depended on the operation. Writer after writer repeated the condemnation uttered by their predecessors, until it became a maxim of the British school that the Cæsarean section should never be performed as an operation of election.

That the operation is dangerous, very dangerous, no one will venture to deny; but that "it is the most dangerous operation in surgery," that it is necessarily sacrificial, that it should be "resorted to with a feeling akin to despair for the fate of the mother, which is scarcely tempered by a hope of rescuing the child," I do deny; and I submit that, when we carefully study the evidence placed before us, and investigate the causes which produce danger in the operation itself, and those which have occasioned the excessive mortality hitherto recorded, we must admit that in the operation *per se* there is nothing to account for great fatality.

Owing to pregnancy a series of wonderful changes go on in the body; not only does the uterus grow and develop, but there is also general glandular growth and activity, altered condition and pressure of the

blood, and marked changes arise in the nervous system. In this condition any operation becomes more dangerous than in the unimpregnated; but that by care and strict antiseptic precautions they are not as dangerous as would have been *à priori* expected is proved by the results of ovariectomy during pregnancy. But after labour a condition of affairs obtains which is even more dangerous, for then we have the system loaded with *débris*; the enormously hypertrophied uterus has to be got rid of, and the secretion of milk, the starting the mammary glands into activity, has to be effected. We know how prone parturient women are to septic poisoning, and we often see disturbance of the system during the establishment of the mammary functions in the affection known as milk fever. Such a condition must make any operation then undertaken more dangerous than at any other period; but it is more than doubtful whether efforts at embryotomy are not more likely to result in septicæmia than the Cæsarean section.

The state of health of the patient—pelvic deformity being an evidence of disease past or present—has been put forward as a cause of the mortality; but the same argument would apply to all surgical operations, and would tell as strongly against craniotomy, for it could not be maintained that in the parturient or unhealthy condition the peritoneum was more tolerant of bruising or contusion than of a cut, or that septic infection was not as liable to result from bruised, semi-necrosed, or lacerated tissue as from an incised wound.

But experience proves that neither the constitutional condition nor the puerperal state are, in themselves, sufficient to cause the excessive mortality recorded. This is shown by the favourable results which follow gastrotomy after laceration of the uterus. Dr. Harris attributes this to the necessity of prompt interference being at once perceived, and asserts that it has “caused the rate of success to very nearly approach that claimed for ovariectomy.”

The sources of danger are—1. Peritonitis; 2. Hæmorrhage; 3. Shock; 4. Septicæmia; 5. Incarceration of intestines. There is no cause to which death is more frequently attributed than to peritonitis. Thus from it Harris records 16 deaths out of 37, and Keyser 77 out of 123. As its occurrence is much more frequent than after ovariectomy, where, when adhesions exist, much more injury is inflicted on the peritoneum, it must be occasioned by something more than the incision. The cause is found in the escape of blood, lochia, or other discharge, and, above all, in long-continued labour. Of course cases will be met with where the health of the patient is broken down, but similar cases turn out badly in all operations.

The incision in the uterus has been assumed to be a cause of peritonitis, and doubtless this is the case when the uterus has been bruised and injured by long-continued efforts to drive or drag the child through a

contracted pelvis. Injuries are occasioned by compression of the uterine tissue between the head and pelvic bones, and, when the liquor amnii has drained away, by pressure on the body of the infant. Furthermore, as a result of long-continued labour, the uterine tissue undergoes structural change; in some cases it is reported as being almost gangrenous. It is not to be wondered at, then, that the wound in it should not heal kindly, that it should become unhealthy, and that from it inflammation of a low type, probably septic, should be communicated to the peritoneum.

The danger from hæmorrhage was one of the principal reasons urged against the operation by older writers. Modern authorities are not at one on the subject. The weight of opinion seems to be that it has been overrated.

Hæmorrhage may occur from wounding a vessel in the abdominal incision, from opening a large sinus in the uterus, from cutting down over the placental site, or it may come from the internal surface of the uterus as it does in ordinary labour. The danger of bleeding from a wounded vessel in the abdominal wall does not deter the surgeon from an ovariectomy, or from an exploratory incision, or from operating for strangulated inguinal hernia. The danger of hæmorrhage from the uterus itself, either from the incised portion or placental site, is reduced to a minimum by adopting those expedients, by which we restrain or prevent hæmorrhage after labour. The great hæmostatic is the uterine contraction; and how this should be obtained we have a most valuable demonstration in Dr. Edmunds' cases.

If the uterus contracts well and tonically there will be no hæmorrhage, either at the time of or after the operation, and there will be no need of sutures. It takes place only in those cases where the uterus either does not contract, or having done so relaxes again.

The cause in most instances is not far to seek. Is it not what occurs in tedious labour?—the uterus worn out by prolonged and vain efforts, the nerve force expended, and the woman exhausted, there is little or no contractile force left; the uterine sinuses and arteries are not ligated by the interlacing muscular fibres, or, if contraction for a time takes place, relaxation shortly follows, either allowing an effusion of blood, or, if the prior contraction has been sufficiently long to allow of coagulation in the vessels taking place, or the relaxation is not so complete as to permit a decided hæmorrhage to occur, yet the next contraction expels coagula and fluid into the abdomen; and thus we have the explanation of cases in which the *post mortem* demonstrates blood in the peritoneal sac.

This danger can be combated by ergot, ice, perchloride of iron, and the other means we adopt to secure uterine contraction; but "to avoid uterine inertia or complete atony and an unfavourable closure of the

incision in the uterus, an early and, if possible, an elective operation should be performed."*

Hæmorrhage from cutting down on the placental site can be avoided, or controlled by rapidly detaching the placenta and emptying the womb.

The great danger of septic infection has been fully recognised by authors. It is, however, extremely probable that many of the deaths attributed to shock, peritonitis, or even to secondary hæmorrhage are, in truth, due to blood-poisoning.

Whilst from the nature of the case the danger of septic poisoning after the Cæsarean section is clear, the prophylactic means to be adopted appear equally plain. The first place in this respect, as in everything connected with this operation, must be given to a timely operation.

The peritoneum being a great lymph sac, a continuous sheet, as it were, of the mouths of lymph ducts, although tolerant of rough handling and injury, is most intolerant of decomposing animal matter. If experience has taught any lesson more clearly than another it is this, that in operations engaging the peritoneum, all blood and discharge must be removed with the greatest care at the time of operating, and free exit must be given to any fluid which may collect afterwards.

The records of ovariectomy and laparotomy for extra-uterine foætation tell us over and over again the history of a rising temperature, hourly getting higher and higher, of the patient sinking, of unfavourable symptoms becoming more marked, when, on the abdominal wound either opening spontaneously or being deliberately opened, and exit afforded to pus, blood, or decomposing fluid, and the cavity washed with antiseptics, the temperature sinks, the pulse falls and becomes stronger, and the patient rallies.

The removal of blood and liquor amnii (if any has been allowed to enter the abdomen) at the time of operation is easily effected. To prevent its being poured out afterwards is a much more difficult matter. To secure this it is essential that the edges of the uterine wound should be brought into, and kept in, apposition, so that not only no fluid should escape through the wound into the peritoneal cavity, but also that septic infection may not take place through them, that they themselves remaining ununited may not become unhealthy or gangrenous, and so supply septic matter for absorption. This indication is met by timely operation.

Failing to secure permanent contraction, it is necessary to take other steps—1. The closure of the wound by sutures. 2. The removal of effused fluid as rapidly as it is poured out.

The question of sutures is a vexed one. It is held by some that if the uterus contracts well they are not required; if it does not they are useless; that it is dangerous to sew up an organ like the uterus, which expands and contracts, and is irritable under the presence of a foreign

* *Harris. Op. cit.* April, 1878. P. 320.

body; that the incision will gape between the stitches, and that if left in the abdominal cavity they are foci of irritation likely to culminate in inflammation.

If the uterus contracts tonically it is quite true that sutures are not needed. "In no timely operation," says Harris, "except in one instance, were sutures required, and in this one the knife cut through an intramural fibroid which caused the wound to gape,"* but that if the uterus does not contract they are useless, is not borne out by experience.

In complete uterine inertia there is no other resource, not merely to guard against the effusion of fluid into the peritoneum, but to restrain bleeding from the incision. In such cases well-applied sutures have before now apparently saved life, as in a case recorded in the "Half-yearly Abstract of Medical Science," Vol. XLVIII., page 246.

In those cases where partial relaxation and contraction occur, and in which sutures are said to be dangerous or useless, because they will either be torn out or the wound will gape between them, careful attention to two points will remove the objection.

After normal labour tonic contraction does not immediately set in; the womb contracts and relaxes rhythmically, as it did during pregnancy and labour; but when it relaxes it does not get larger—it goes through a sort of squeezing process, expelling the fluid portions of the coagula. After a time it becomes quiescent, and the mistake generally made is closing the abdominal wound too soon. This ought not to be done, nor ought sutures, save in cases of bleeding from the incision, be introduced until this process has ceased.

The introduction of the ordinary interrupted suture has two great objections; they must be left in permanently, and the wound is likely, unless a large number are introduced, to gape between them. To obviate the former difficulty carbolised gut has been used, but it is now universally condemned, as bathed in moisture the knots untie and permit the wound to reopen.

Ovariectomy has shown that sutures may be left in the abdominal cavity without doing any harm. With the object of removing them Dr. Barnes has proposed an ingenious method by which the uterine wound is closed and brought into apposition with the abdominal wall, and by which the sutures may be withdrawn. A somewhat similar plan was adopted by Martin; but it is open, in addition to the objection that he himself admits arises from the sinking of the uterus in the pelvis, to others resulting from interference with the functions of the bladder, due to the fixation of the uterus, and that as pregnancy may again occur, trouble would then be likely to result from the adhesions.

In the ordinary interrupted suture the binding force is at right angles to the line of the incision; there is nothing to prevent the wound

* Harris. *Op. cit.* January, 1879. P. 55.

elongating, and they only keep it in apposition at the points where they are inserted; they cannot prevent it gaping above, below, or between them.

In 1865 and 1875 Mr. Spencer Wells adopted a better plan; he made use of a long uninterrupted suture, leaving one end hanging out of the vagina, by pulling on which it was removed. His first case recovered, the second died, and at the *post mortem* it was discovered that it had worked its way out of the upper half of the wound.

The wound can be perfectly closed, so that it cannot open, the suture removed when its work was done, and a certain amount of drainage provided for by the following method:—A long suture is armed with a needle at each end. Commencing at the upper angle of the wound a needle should be passed from within outwards on each side of the incision at the level, or a little above it, of the termination of the incision. The suture is now drawn until its centre is in the middle line. The right hand needle is then passed through the left, and the left hand needle through the right, side of the uterus about $\frac{1}{2}$ inch from the edge of the wound from without inwards, and so on from within outwards and without inwards until the entire wound is closed, taking care that the needles pierce the uterine tissue exactly opposite each other, and that the distance between the points inside the uterus should be less than that on the exterior. When the lower angle is reached one end should be drawn through the os uteri and vagina, which can easily be done by a loop of silver wire, tubular needle, or catheter, and the other through the lower angle of the abdominal wound.

There being no knots, carbolised gut can be used and allowed to remain until the internal portion is absorbed and the ends drop off.

The second indication of providing a free exit for discharges should not be overlooked. Drainage and antiseptic irrigation have proved of signal service in abdominal operations. The natural channel for escape of lochia is through the os uteri. If this is kept open, and firm contraction has been established, and the lips of the wound retained in apposition, there will be no escape of discharge into the abdomen, as the contents of the uterus will find their way through the opening which offers least resistance; clots not being formed, there will be no uterine effort to force out its contents. But as it will not always be possible to secure this favourable condition, drainage by artificial means becomes advisable. Dr. T. Mayer, in a case operated on by him, passed a drainage tube through the lower angle of the uterine and abdominal wound, and the other through the os and vagina. Tying both together over the pubes, it was left in until the sixteenth day. There was no metritis, metro-peritonitis, or hæmorrhage.

“The plan has been tried with success by several operators on the Continent, and without uterine suture.” “As the contracted state of the

os uteri and vagina are frequently obstacles to the discharge of the lochia, the use of the drainage tube would seem to be a valuable improvement, particularly as caoutchouc appears to possess but little irritable properties." ^a

In ovariectomy, if symptoms of septic poisoning show themselves, there is no hesitation in opening the lower portion of the wound and giving exit to decomposing fluid. Glass drainage tubes have been inserted, and the cavity washed out with antiseptics. There is no reason why this should not be done with equal success after the Cæsarean section, and there is more need for it, for in it there is a source of continuous infection.

That after such an operation shock should be a source of danger appears self-evident. Yet experience does not prove this to be as great as would *à priori* have been imagined.

The general health of most of the patients is, and the power of rallying after the shock of the operation ought to be, superior to that of ovariectomy cases. It is in cases exhausted by tedious labour, and perhaps fruitless efforts to extract the child, that shock might be expected to act most fatally; yet, comparatively speaking, how few are the cases where death actually results from this cause. Thus, out of Harris's cases there are only 15 attributed to shock or exhaustion.

In many cases it is recorded that the patient, even when worn out by a tedious labour and long suffering, rallies very shortly after the operation, expresses herself as feeling comfortable—the operation being so much less painful than labour, the relief from pain and unavailing efforts so great, that the condition of the patient improves; but assistance has come so late, such irretrievable mischief has been done, that recovery is hopeless. "Moreover," writes Dr. Greenhalgh, "this case proves to demonstration how trifling was the shock of a grave operation, even when performed upon a woman greatly reduced in general health by a mortal disease and while in a state of alarming prostration." ^b

In one of Professor Mayer's cases "the patient stated after her recovery, that the ventral incision felt like drawing a red-hot needle over the skin; that cutting the uterus was not at all painful; but that stitching the abdominal wound was the most severe stage in the operation. It has been repeatedly stated that the operation was not any more severe than a violent natural labour, and this complaint of the sutures is a general one. The whole process is much less severe than the suffering during a protracted delivery by craniotomy and evisceration." ^c

If a further analysis of recorded cases is made, it will be seen that exhaustion prior to operation has obtained in most of the cases where

^a Harris. *Op. cit.* April, 1878. P. 331.

^b *Obstetrical Transactions.* Vol. VII., p. 279.

^c Harris. *Op. cit.* April, 1878. P. 332.

death was attributed to shock. It is, therefore, unfair and misleading to attribute to the operation an effect which does not properly result from it. Shock follows every injury to the body—surgical or otherwise—usually in proportion to the magnitude of the operation and the pain inflicted; and if that injury happens to persons who have undergone hard and painful work, who are greatly exhausted, who have been for hours or days insufficiently nourished, and who, owing to suffering and work, have been unable to digest and assimilate a sufficient quantity of food, the prospect of recovery from the shock of the injury is not good; but we do not attribute the fatal result to the shock so much as to the condition of the person. Why, then, should we reason differently in Cæsarean cases? Operation is deferred until hours, in some cases days, of labour—which is very hard work, attended with acute suffering—have been gone through; and if the patient then succumbs to the shock of the operation, it is the fault of the delay—of the exhaustion of all the vital powers; it is our own procrastination that is to blame.

Thus it appears that there is nothing in the operation itself which care, antiseptic precautions, and the knowledge which modern abdominal surgery has taught us, should not enable us successfully to grapple with. We have in a great measure, in ovariectomy, conquered peritonitis, septicæmia, hæmorrhage, and shock; is there any reason why we should not be as successful in Cæsarean section?

The causes, then, of the enormous mortality hitherto recorded must be sought for outside the operation. It may be due to circumstances antecedent to, or independent of, labour—such as malnutrition, grave organic disease, or bad habits of life. Dr. Harris attributes the bad results of English cases to the beer-drinking habits of the peasantry. But, however these may influence the results in some cases, there can be little doubt but that delay in operating is the prime factor of the mortality.

This is generally acknowledged, but strange to say its significance as a means of producing more favourable results—as placing the Cæsarean section amongst elective operations—has been ignored or overlooked.

Testimony to the fatal effects of procrastination is borne by Playfair, Barnes, Harris, Stadfeldt, and others. The enormous importance of early operation will be more clearly seen from an examination of the recorded cases, and will show—so far from being “necessarily almost a forlorn hope,” almost certainly fatal—that the Cæsarean section, when properly performed, before symptoms of exhaustion have set in, has a comparatively low mortality, and is absolutely more favourable to the mother than craniotomy.

In the cases which I have collected and tabulated, there were 9 operated on within 24 hours of labour coming on. Of these, 3 died and 6 recovered; but out of the 3 deaths we find 1 was a case in which labour was induced a fortnight before term, and another was a subject

of a cancerous tumour of the recto-vaginal septum. Although it is stated that she was about eight hours in labour, her condition at the time of operation is thus recorded:—Temperature, 102°; pulse, 130; tongue brown; general condition prostrate. Here we have either exhaustion from a very short labour, or an almost moribund condition prior to the operation, and the fatal issue from peritonitis and exhaustion is not fairly attributable to the operation. Eliminating these two cases, in the former of which an operation prior to the Cæsarean section was undergone, we have 7 cases, with 6 recoveries, or 85 per cent.

In the cases recorded by Dr. Harris in the *American Journal of Medical Science* for April and July, 1878, and January, 1879, we find that there were 24 cases in which the operation was performed early, before the lapse of 24 hours. Of these, 6 died and 18 were saved, or 75 per cent.

M. Pehan-Dufeillay has also shown that of cases operated on early, and before the strength was exhausted, 81 per cent. recovered.

The most remarkable feature in all English and American records is the few cases in which an early operation has been resorted to. Thus, out of 103 recorded by Harris we find only 24, in those by Radford 20, and in the 32 which I have collected only 9.

The time when to operate cannot be decided by hours, for although for statistical work a limit of hours which have passed since labour set in must be taken, yet the rule ought to be, not that the operation should be performed before so many hours have elapsed, but before symptoms of exhaustion have set in. One woman is more exhausted after a few hours' suffering than another would be in many. The rallying power, too, is greater after a short than after a protracted labour. In this point of view, the case which I have taken from the *American Journal of Obstetrics* for April, 1879, is most instructive.

It has been recommended to induce labour, and operate before term, in order to avoid the degeneration of uterine tissue that follows delivery. But I believe nothing is gained by this course. Involution will occur, no matter at what period of pregnancy the fœtus is removed. The shock of inducing labour being added to that of the Cæsarean section, increases the danger, and if operation before term is considered advisable, the cases in which it was combined with ovariectomy prove that the induction of labour is needless.

I have tabulated 32 cases which I have collected from various journals; these are all the cases, both favourable and unfavourable, which I could find. I may have overlooked one or two cases, as the series of journals accessible to me had a volume or two missing, and I have omitted two or three in which only the fact of the operation having been performed was stated, in which the time that had elapsed after the operation was too short to enable the result to be recorded, and in which the details were so defective as to render them worthless; and I have

purposely, with one exception, tabulated only cases recorded in British journals, and performed by British surgeons.

The cases I have thus collected date from 1865, when Dr. Radford's series ended, one case (No. 1) excepted, which seems to have escaped his notice.

On analysing them it appears that out of 32 cases 12 mothers recovered, and 20 died, or 37·8 and 62·5 respectively; 18 children were born alive, or 56·2 per cent.; 12 children were dead before operation, or 37·8 per cent.; and of 2 there is no report.

From this it appears that Radford's opinion is correct—that the prospect of saving the infant is as good after Cæsarean section as after natural labour. It is obvious that the operation cannot be blamed for not saving 12 dead children.

Table showing percentage of Maternal and Fetal Recoveries with regard to time of operation.

Time after Commencement of Labour when Operation was performed	Percentage of Mothers Saved	Percentage of Children
24 hours, 8 Cases, ^a - - -	75	62·5
48 " 6 " - - -	33·16	50
72 " 7 " - - -	42·8	86·7
Over 72 " 5 " - - -	-	-
Time not stated, 5 " - - -	20	60

This marked difference between the results of early operation and late confirms remarkably the conclusions drawn by Dr. Harris from the cases which he has collected; and the favourable results to be expected from early operation is still more clearly shown by looking at them from another point of view. Out of the 32 cases collected 12 mothers were saved; of these 6 were from those operated on in the first twenty-four hours of labour.

Dr. Harris, from an analysis of Dr. Radford's tables,^b points out that in British cases the mortality is much higher than in American. Thus, he says, in 20 operations where labour had lasted from five to eighteen hours, but 4 women were saved. In the United States they would expect to save 60 to 70 per cent.

By extending the time to twenty-four hours he finds in same tables 25 operations with 6 women saved, or 24 per cent. In the States, under

^a One case moribund at time of operation from carcinoma omitted.

^b *American Journal of Medical Science*, Jan., 1879, p. 63.

same limit of time, they would expect to save 50 to 60 per cent.; and he endeavours to account for this excessive mortality by attributing it to dampness of climate, extreme poverty, and beer-drinking. In the cases I have collected the mortality after early operation is not more than in America, with same limit of time.

He also remarks that within the last decade the results *quâ* the mother have been more unfavourable, and attributes this to the teaching that this operation is to be regarded as a last resort, and never as an operation of election if there is a possibility of delivery by cephalotripsy, even although it may rightly be considered equally dangerous to the mother.^a

Although the cases tabulated show in many instances an unaccountable delay that can only be attributed to similar influence, yet the results of British operations since 1870 show that at least we have not retrograded; out of 8 timely cases 5 were operated on in the last decade. But, on the other hand, it cannot be shown that we have progressed, that early operation is the rule, or that the weight of the teaching of the fatality of the operation is lessened.

With regard to the use of uterine sutures I find that in 14 cases where they were used 4 recovered and 10 died. The number used varied from 16 in one case to one in another. The materials used were silver wire, fishing gut, carbolised gut, silk, and iron wire. In some cases the patient was obviously moribund, and in one she died on the table. It is impossible, therefore, to draw from the records any conclusion as to the advisability of suturing the uterus or not, though in some cases they seem to have been decidedly beneficial; and it would appear that, if sutures are used at all, a sufficient number to secure closure of the uterine wound ought to be inserted.

There were 10 cases of dwarfs—the tallest measuring 4 ft. 9 in., the smallest 3 ft. 6 in., whilst one is stated not to be larger than a girl of ten years old. Only 2 recovered, or 20 per cent. This was also the number in which a timely operation was resorted to; but the early date of operation was not the reason of recovery, as both died; in one premature labour was induced, in the other the uterus was sutured by carbolised gut. This patient died of septicæmia and embolism; and at the *post mortem* the sutures were found untied and fluid effused into the peritoneal cavity. Of the two cases which recovered one had been thirty-five hours in labour; but, save being small, there does not appear to have been any constitutional defect; the other was a Hindoo woman.

Adding the 32 cases which I have collected to the 100 recorded by Dr. Harris, we find that out of 132 operations 56 mothers were saved, or 42·4 per cent.

There were 32 timely operations; of these 24 mothers, or 75 per cent., were saved.

^a Harris. *Op. cit.*, p. 56.

In 100 cases the operation was delayed from periods varying from over twenty-four hours to seven days, and only 32 per cent. recovered. No stronger argument in favour of early operation, or against the folly of deferring interference, could be produced than placing these figures indicating the different results side by side.

In most of the cases chloroform was used; in some ether; in one, at least, ether spray; and in a very few no anæsthetic. It appears, however, to me that it is a very doubtful question if anæsthetics ought to be used. Vomiting, always distressing, sometimes uncontrollable, frequently occurs after operations on the abdominal cavity; and the use of chloroform or ether is generally followed by this distressing affection. In these cases it is sure to aggravate the tendency, and so cause serious injury. On the other hand, the pain of the operation without an anæsthetic does not seem much. It has been described as not as severe as the pangs of labour itself—the most painful portion being the incising the skin and the introducing of the abdominal sutures, whilst the uterine incision seems to be accompanied with little, if any, suffering. Ether spray, if merely applied during the cutaneous incision, has not the disadvantage of inhaled anæsthetics; but it is doubtful if the pain of the freezing is not as acute as that which results from the knife; and at night ether would be very dangerous, owing to its highly inflammable nature.

Although the treatment which is best for the child ought to have weight in deciding what ought to be done, yet the merits of the Cæsarean section as an alternative of craniotomy will be generally judged with regard to its results in saving the mothers.

The mortality in craniotomy cases where the conjugate is $2\frac{1}{2}$ in. or less has been shown by Parry to be $37\frac{1}{2}$ per cent.; Dr. Harris states that he has verified this by his own researches. In the whole Cæsarean cases which I have referred to it was 57.6 per cent.

But these cases include patients exhausted after long labour, some *in articulo mortis*, others suffering from grave and mortal disease, and in nearly all it was decided that craniotomy could not be performed, whilst in some it had been tried and failed—in a word, they were, with few exceptions, operations of necessity, death resulting not so much as a consequence of the operation as of other causes. But when we come to the few cases in which timely operations were performed, we find the maternal mortality only 25 per cent., or $12\frac{1}{2}$ per cent. less than the craniotomy cases. Dr. Barnes remarks, as I have quoted before, that fatal craniotomy cases cannot be recognised unless the operation was performed before exhaustion had set in—conducted with due skill, and after the most improved methods; and it may be argued that, judged by this standard, the mortality would be less than $37\frac{1}{2}$ per cent.

If this method of exclusion be applied to craniotomy, does it not apply with equal force to the Cæsarean section? and if applied and practised,

I doubt not that the mortality would be reduced below 25 per cent., and more than hold its own against embryulcia.

Although timely operation is the great prophylactic, yet if we take Dr. Edmunds' case as a standard of the precaution and care which ought to be taken, and considering that it is the second successful case similarly operated on by him, it is reasonable to suppose that the general mortality, even with prolonged labour, would be greatly reduced; and yet we find that even in early cases, where the mortality was only 25 per cent., no such precautions were taken, and that none of the cases have been treated in an antiseptic manner which would satisfy ovariologists.

The relative maternal mortality after craniotomy and Cæsarean section, will be more easily perceived from the following table:—

Cause of Operation	Percentage of Maternal Mortality
CRANIOTOMY.	
Contracted pelvis, 2½ and less (Parry) - - -	37·5
Pelvic tumours (Stadfeldt) - - - - -	40·0
Ovarian tumours (Playfair) - - - - -	46·6
In cases where no other treatment adopted (Playfair)	60·0
Carcinoma of uterus (Herman) - - - - -	75·0
CÆSAREAN SECTION.	
180 cases, all causes (Harris) - - - - -	56·0
32 " " (Kinkead) - - - - -	62·5
TIMELY CÆSAREAN OPERATION.	
32 cases (Harris and Kinkead) - - - - -	25·0

LAPARO-ELYTROTOMY.

To escape from the dilemma, of embryotomy on the one hand, with its necessary destruction of the child and great risk to the mother, and on the other of Cæsarean section, with its high rate of maternal mortality—to devise some method of procedure that would save the child and lessen the risk to the mother—is a problem to solve which efforts have been made before our day.

With this object in view, Segault, in 1768, proposed, and in 1777 carried into effect, section of the symphysis pubis, saving both mother and child, but further experience proved it to be worse than useless, and

it remains recorded in text-books only to be condemned, and as evidence of dissatisfaction with, and a desire for something better than, craniotomy and Cæsarean section.

Symphysiotomy having failed, and obstetricians feeling, in the eloquent words of Dr. Thomas, "that clear as the light of day should be the indication, valid beyond all question the conclusion, that no safer course is known to science before one human being should take upon himself the terrible responsibility of destroying the life of another,"^a other ways out of the difficulty were sought. In 1806 Jörg proposed opening the abdomen and vagina, and delivering through the os uteri. His proposal differs from laparo-elytotomy, as advocated by Thomas, in this—that it necessitated opening the peritoneum. Fourteen years later Ritgen endeavoured to operate without wounding the peritoneum; profuse hæmorrhage occurred, and, to save the child, he turned the operation into the Cæsarean. The woman died. It was next attempted by L. A. Baudelocque; in his first case there was profuse hæmorrhage, and, like Ritgen, he abandoned the attempt at laparo-elytotomy, and removed the child by the Cæsarean section. The woman died of hæmorrhage. In his second case, whilst trying to tie the internal iliac artery, he wounded the external, and was obliged to ligature the common iliac artery; he, however, completed the operation. Somewhat similar methods of procedure were recommended by Sir Charles Bell and Dr. Physick, of Philadelphia.

The credit of reviving—in fact, of reinventing, the operation is due to Dr. Thomas, as he remarks:—"The complete oblivion into which it fell will be appreciated when I assert that, until some time after I had essayed it on the cadaver" (1870), "I was fully under the impression that the idea originated with myself."^b

The operation consists of an abdominal incision parallel to Poupart's ligament, from $1\frac{3}{4}$ inches above and outside spine of pubis to anterior-superior spine of ilium. The muscles are then cut through layer by layer. The peritoneum lifted up (not cut), a staff, or the finger if possible, is passed into the vagina, and it is pushed up into the wound. The vagina is incised on the point of the sound or finger, at a distance of $1\frac{1}{4}$ to $1\frac{1}{2}$ inches from the uterine insertion. The incision is only to be large enough to admit one or two fingers, and is then to be enlarged by tearing. The os uteri is to be lifted by blunt hooks, and at same time an assistant depresses the fundus towards the opposite groin. [Professor Stadfeldt says—"An assistant draws the fundus uteri well upward and towards the left side,"^c whereas Dr. Thomas, in reports of Cases I. and II., says distinctly that it was depressed.^d] The child is then

^a Thomas. *American Journal of Obstetrics*, p. 227. 1878.

^b Thomas. *Op. cit.*, p. 230.

^c *Obstet. Journal*, p. 415. 1879.

^d *Op. cit.*, pp. 231, 232.

delivered by version, or by the forceps. Hæmorrhage having ceased, the abdominal wound is closed by sutures. "The vagina should be syringed out every five hours with warm carbolised water, the nozzle of the syringe being carried through the vaginal opening, and the fluid forced out through that in the abdomen."^a

Prior to operation, the os uteri ought to be dilated either by the natural progress of labour, or, if delay be inadmissible, by artificial means. Independent of its results to the mother and child, its adoption will depend on the answer to the question—Is it a difficult operation? "According to the unanimous statement of all who have tried it, it is not even a difficult operation."^b

In the only cases operated on in this country, no difficulty was experienced.

From the consideration of the steps of the operation, there seems to be no reason why it should not be performed by any surgeon endowed with ordinary operative skill. The only difficult step in it is to divide the transversalis fascia without wounding the peritoneum, but this is not greater, if indeed it be so great as is daily met with in hernia.

In only two cases was there any difficulty in extracting the child, and that was caused by the ankylosis of the hip-joints at right angles to the pelvis, which was readily overcome in one, and by tonic contraction of the uterus in the other.

The dangers to the mother likely to result are:—1. Hæmorrhage; 2. Shock; 3. Septicæmia; 4. Cellulitis; and 5. Vesico-vaginal Fistula.

The three first are common to it and the Cæsarean section, but in the latter there are peritonitis, metritis, and incarceration of the intestine, which are almost, if not altogether, excluded in laparo-elytrotomy. Cellulitis may occur after Cæsarean section, and peritonitis after laparo-elytrotomy, but they are rare complications, and peritonitis is a more dangerous disease. Shock is more severe when the peritoneum is opened. The dangers, then, to be compared are hæmorrhage and septicæmia.

In laparo-elytrotomy it is evident that the danger from the latter source is less. The wound is, as it were, superficial; it is easily reached, it is readily drained, and can be kept flooded with disinfectants.

The risk from hæmorrhage is more serious. The vagina is surrounded by a vascular network of vessels freely anastomosing with those of the uterus, rectum, and vulva, and likely to bleed profusely on being cut. Ritgen's and Baudelocque's cases show how serious this may be. Serious bleeding may occur after Cæsarean section, but I have already pointed out how it may be controlled. This danger, then, appears to be less in Cæsarean section. Vesico-vaginal fistula is a complication peculiar to

^a *Obstet. Journal*, p. 247. 1879.

^b *Garrigues. Gynæcological Transactions*, p. 220. 1878.

laparo-elytrotomy. Out of the eight later cases the bladder was injured in four.

In favour, then, of laparo-elytrotomy, as contrasted with the Cæsarean section, we find metritis and incarceration of intestine excluded, peritonitis reduced to a minimum, and shock and septicæmia lessened—on the other hand, increased risk of hæmorrhage and vesico-vaginal fistula. The advocates of the operation assert, with regard to hæmorrhage, that it can, in a great measure, be prevented, and, if it does occur, controlled. "That hæmorrhage may be one of its results I freely admit, as everyone must do who examines the vascular supply to the walls of the vagina. . . . But, even admitting that it may occur, unless it be so violent and uncontrollable as to prove fatal, it may become a question whether the risks of it should not be taken, when, in compensation for them, we obtain immunity from the dangers of peritonitis and shock, and the diminution of the danger of septicæmia, or at least the acquirement of greater facility for its treatment."^a

"The third step—the incision of the vagina—may be made almost safe by using the cautery, and by tearing instead of cutting."^b The cause of the bleeding in Ritgen's and Baudelocque's cases seems to have been cutting the vagina. Dr. Thomas, after a small incision, tears enough to admit "the tips of his fingers put together as for dilating the os; whilst the hand passes the fissure tears more; and, finally, during the passage of the child's head it tears still more."^c

This plan has, up to the present, proved satisfactory, as in the eight reported cases there was no hæmorrhage. The upper and lower portion of the vagina being more vascular than the middle, and the ureter lying in the upper portion, the opening should not be made too near the uterus.

The direction of the wound is also important. Dr. Thomas endeavoured to tear longitudinally, Dr. Skene transversely. Dr. Garrigues, who made experiments on the cadaver, found that when he made a transverse incision the tear followed that direction, and when he cut in the axis of vagina it tore longitudinally, but with more difficulty. As the tear will most readily follow the direction of the strongest fibres of the vagina, which run in an oblique direction downwards and inwards, it should be made obliquely parallel to the brim.

Vesico-vaginal fistula may be avoided by prolonging the rent backwards, and by extracting slowly, so that the parts may have time to expand, and thus limit the extension of the vaginal wound. If the bladder is injured the fistula may heal spontaneously, as happened in two cases.

With regard to the range of the operation two important points remain

^a Thomas. *Op. cit.*, p. 245.

^b Garrigues. *Gynæcol. Jour.*, p. 223. 1878.

^c Garrigues. *Op. cit.*, p. 218. 1878.

for experience to decide:—1. Can it be performed on the left side? 2. Can it be performed more than once on the same side?

In all the recorded cases, save in Baudelocque's, it has been done on the right side, and in his there does not appear to have been any difficulty experienced in extracting the child; but peritonitis was discovered at the autopsy. This may have been due to ligation of the vessels.

The healing process and cellulitis, if present, would seem likely to so mat the parts together, and to so alter their relations, as to render a second operation, if not impossible, exceedingly difficult and dangerous. These points time will alone solve. Yet a case recorded by Dr. Skene [in which he says, "But on reaching the region of the peritoneum, I encountered the products of a previous inflammation, which obscured all the normal anatomy. I have always believed that previous pelvic peritonitis would greatly complicate the operation, and have dreaded that such a case would fall to my lot, and in this case I fully realised my expectations. The peritoneum, iliac fascia, bladder, and vagina were all glued together by plastic material, which rendered the normal tissues unrecognisable"] shows that, although the operation is rendered more difficult, and requires greater care and more time, it is not impossible or necessarily fatal. In his case both mother and child were saved, although the former was a bad subject for operation.

The table I have annexed divides itself into two parts—3 early cases and 8 modern. The total mortality was 7, or 68·3 per cent. But the 3 early cases must be excluded, for in 2 laparo-elytrotomy was abandoned and the Cæsarean section substituted, and in the third the operator needlessly complicated it by ligaturing the internal and common iliac arteries—in itself a serious operation. Of the 8 cases since 1870, 4 proved fatal, or 50 per cent. This would, at first sight, indicate that, however less severe theoretically, practically it was as fatal as the Cæsarean section. But an examination of the cases shows that the entire mortality cannot be attributed to the operation.

In Dr. Thomas's first case the woman was moribund, and the operation was undertaken solely in the interests of the child, with no hope or expectation that the mother's condition would be benefited. In Dr. Skene's first case the woman had been in labour for forty-eight hours. She is described as being in a condition of exhaustion; attempts at version and extraction after perforation had failed; her condition was so bad that "it was felt that if she died—which, in all probability, she would do—she would be relieved during her last hours from the severe labour pains."*

In Dr. Hime's case the patient was in a hopeless, debilitated condition from cancer of the recto-vaginal septum, and had been confined to bed for eleven weeks prior to the operation.

* *Amer. Jour. Med. Science*, p. 233. 1878.

In comparing the comparative mortality of two operations the condition of the patient must be taken into account, for in a healthy patient, unexhausted by long labour, both may give good results. Yet, when symptoms of exhaustion have set in, one may afford better results than the other.

In Cæsarean section the rate of mortality increases enormously with the duration of labour, and after four days the dangers from septicæmia, peritonitis, and shock, would render the prospect well nigh hopeless.

Although the cases of laparo-elytrotomy are too few to enable us to form a decided opinion, yet it is worthy of note that in one case the patient had been four days in labour, and her condition is described as very bad. It seems that it is probable that in such cases its mortality will be less than that of the Cæsarean operation.

If we exclude the cases moribund at the period of operation—viz., 1 from pneumonia and 1 from cancer—we find 6 cases and 2 deaths, or 33·16 per cent.

Of so new an operation it is impossible to speak decidedly. In its youth ovariectomy did not yield very favourable results. Its position is very fairly described by Dr. Thomas :—“It may be well for me to meet the question whether I regard it as proved that laparo-elytrotomy is superior, in all cases, as a resource practised in the interests of mother and child, to the Cæsarean section, and, in many cases, even for the mother to embryulcia. . . . In reply to the question I have now proposed, I would say that I do not regard the claim of laparo-elytrotomy to being established as a standard operation as yet proved, but that I do regard it as now sufficiently tested by experiment as to deserve careful consideration at the hands of the medical profession.”^a

Even if experience proves that its results are commensurate with the favourable hopes held out by theory, its field is limited. It is doubtful if it can be repeated on the same side; it cannot be performed if the head is wedged in the pelvis; if the os is occluded; if there exist occlusion or narrowing of the vagina, or its obliteration by cicatricial tissue; when the pelvis is blocked by tumours, or the os uteri is the seat of considerable disease.

It is worthy of note that in none of the recorded cases did the patient suffer from the distressing vomiting so common after the Cæsarean section.

PORRO'S OPERATION.

This, the latest operation proposed as an alternative for embryotomy, has had a wonderfully rapid development. First successfully performed by Professor Porro, of the University of Pavia, on the 21st May, 1876, it has already been performed thirty times; the second time by Professor

^a Thomas. *Op. cit.*, p. 244.

Späth, of Vienna, twelve days after Porro's case. But, truly, there is nothing new under the sun! In 1581, François Rousset (as shown by Professor Stadfeldt^a) foreshadowed it, and Dr. Blundell,^b as a result of experiments on animals, proposed its adoption. It was first performed on the human being by Dr. Horatio Storer, of Boston, in 1869. In a Cæsarean case in which there was a fibroid in the uterus, and in which the bleeding could not be stopped, he removed the uterus. The woman, however, died. He did not adopt this method as one deliberately chosen as better, and attended with less risk, to the mother than the Cæsarean section, but solely with a view of restraining hæmorrhage which resisted all other methods. In like manner, Porro's first operation was chosen to restrain hæmorrhage, and, ending favourably for the mother, was copied as an improvement on the older method. His case was shortly as follows:—On 27th April, 1876, a dwarf 4 feet 9 inches high, a primipara, entered the hospital of the University of Pavia; she was twenty-five years of age, and her pelvis was deformed as a result of rickets in childhood. Labour set in at 10 a.m. on the 21st of May; and at 4 20 p.m., just six and a half hours afterwards, the Cæsarean section was performed. The uterus not contracting sufficiently to close the wound, and much blood escaping from the sinuses, Porro, without attempting to stop it by the usual means, passed an iron wire round the uterus and ovaries, at the level of the os internum, and compressed it sufficiently to perfectly control the hæmorrhage. When the bleeding had entirely ceased he cut off the rest of the womb. He then passed a drainage tube through Douglas' sac, brought the stump of the uterus to the abdominal wound, and finally closed the abdominal incision with iron wire. The entire operation lasted nineteen minutes. In four days the *serre-nœud* was removed, all the sutures in a week, and the patient was well in forty days.

Various modifications of the original method have been proposed and performed, but it will be seen that it is a combination of the Cæsarean section with amputation of the supravaginal portion of the uterus at a level with the os internum.

Although the number of cases are too few and the operation too recent to afford satisfactory evidence of its value, yet it will be well to see what advantages it theoretically possesses over the Cæsarean operation. The dangers which attend Cæsarean section are:—1, peritonitis; 2, metritis; 3, hæmorrhage; 4, septicæmia; 5, shock; 6, intestinal obstruction, arising from a coil of intestine being incarcerated in the uterine wound.

By Porro's method the second, third, and sixth of these are abolished; the fourth is enormously reduced, and, if antiseptic precautions are fairly carried out during the operation itself and in the after-treatment, it also ought to be got rid of; the fifth remains a constant factor to both; and

^a *Obstetrical Journal*, p. 418. Oct., 1879.

^b *Lancet*, p. 167. Vol. II. 1828.

the danger of the first is reduced, for peritonitis, depending in a great measure on the presence of irritating fluid in the abdomen, is not so likely to result where the uterus is removed as in the older method, where, with too often a gaping wound, it is left behind.

The operation in itself is extremely simple at first—as in an ordinary Cæsarean case, so far as exposing the uterus. A strong iron or steel wire should then be passed over it, and brought down to its lower portion below the ovaries, as low down as the attachment of the cervix to the fundus of the bladder will allow, ready to be tightened at the proper moment. The uterus is then opened and the child extracted, and the wire ligature compressed until all bleeding has ceased; the uterus is brought out through the abdominal wound, the placenta extracted, if this has not been done before, and it and ovaries cut off. The abdominal cavity having been carefully sponged and cleaned, the edges of the incision in its walls are brought together, and the uterine stump fixed in the lower angle of the wound. The operation has been in some instances modified by bringing the uterus and its contents through the abdominal wound before opening it. This plan is in some instances undoubtedly good, as it affords perfect security against the escape of any of the contents of the wound into the peritoneal sac. If there is great distortion, especially anterior convexity of the spine, and a moderate size of the uterus, it can be easily effected without making the abdominal wound excessively large, and if the womb be twisted on its axis so that it can escape edgeways, it will pass through a comparatively narrow opening. But in the majority of cases—and especially if the uterus be large, containing a large, well-developed child, or a considerable quantity of liquor amnii—the abdominal incision would have to be considerably enlarged, and ovariectomy has shown that the smaller the wound the better the prospect of the patient's recovery; besides, careful approximation of the abdomen to the uterus during the extraction of the child, will in most instances prevent an escape of the fluid into the abdominal cavity. In all cases the iron or steel wire should be passed over the uterus and down to its place before opening it, so as to prevent hæmorrhage, or rather to control it, as soon as the child is delivered. Müller and Fehling, with a view of entirely preventing hæmorrhage, have not only done this, but have constricted the cervix with the wire before opening the uterus. The only objection to this precaution is that it may defeat one of the chief objects of the operation by endangering the child's life. In Fehling's case the child was extracted alive, in Müller's it was dead, before the operation was undertaken.

Whilst, undoubtedly, this practice is safest for the mother, its adoption must depend on its effects with regard to the child. *Prima facie* there does not appear to be any reason why the child should suffer, for the incising of the uterus and extraction of its contents need not occupy

more than a minute—more especially as, since the uterus is afterwards to be removed, and as all danger of hæmorrhage has been taken away by the tightened ligature, there need be no hesitation in making such a large incision in it as will render the extraction of the child perfectly easy, and will prevent any danger of its contracting on and grasping the neck of the infant. *Post mortem* Cæsarean, footling, and breech cases prove that the circulation can be checked and the child saved after a longer period of time than would elapse between the constriction of the cervix, the incision of the womb, and the delivery of the child through the wound.

I have already suggested that, owing to the process of involution, the system being loaded with effete material, a special susceptibility to septic infection exists in the puerperal state. This, to a considerable extent, seems diminished by Porro's operation; instead of the gradual process which follows when the uterus remains, it is got rid of, as it were, by an immediate involution. But not only is this the case, but a source of continued infection is cut off; and this is a decided gain over the ordinary Cæsarean operation.

The mortality after ovariectomy has been reduced to 7 per cent.* There does not appear to be any reason why it should not be as low after this operation. The tumour is not larger; the shock is not greater; the injury to the peritoneum is less, there being no adhesions to be separated; the time occupied in its performance is much shorter; the entire proceeding much easier and simpler, and the patient's general health at least as good, if not better.

The great objection to the operation is the removal of the uterus and ovaries; that the woman is mutilated and rendered sterile, or, as has been stated by some, that it unsexes her. As far as the question of mutilation goes it has not much weight. A mutilation is effected where the breast is removed or a limb amputated, and a similar mutilation is considered justifiable in certain uterine affections in the unimpregnated. If it be justifiable to remove the uterus in cases of chronic inversion, of fibroid tumours, or carcinoma (I do not say anything as to its advisability or otherwise, having regard to the mortality or as a method of treatment), surely it is also justifiable to remove it in the present case. In the former the mutilation is effected in an attempt to save one life, in the latter to preserve two.

The rendering the woman sterile is not an unmixed evil. Not only do the same arguments apply to this objection as hold good for the mutilation, but there are stronger and more forcible ones.

In slightly distorted pelvis, according to the amount, the child can be saved, at comparatively slight risk to the mother, by the forceps, by version, or by the induction of premature labour. Therefore, the field of Porro's operation would, in this country at least, be limited to those

* Mr. Spencer Wells. *British Medical Journal*. Nov. 15, 1879.

cases in which the child could be delivered only by embryotomy or Cæsarean section. It is proved that in extreme pelvic distortion the risk to the woman from embryotomy is very great. Therefore, her continued fecundity is a source of frequently recurring peril, of great suffering, and prolonged convalescence.

Women, with their strong maternal affection, bear the pangs of labour cheerfully, in the expectation of having their reward in the baby to love and cherish; but how dreadful is the suffering of the poor creature uncheered by such a hope, who knows that her life is in grave peril, that the result of all will be only a mangled infant, that for her there will be no little one to caress and love, and that the life she has borne through nine months will be extinguished, ere it is born, in order to prolong her own existence, and further, that if she escapes this time, in all probability she will have to go through it all again. For her would not a living child once and future barrenness be an inestimable blessing?

That this is looked upon as a desirable end by some, is shown by the proposals for and the efforts made to occlude the Fallopian tubes, and thus produce artificial sterilisation. The induction of premature labour, when the child is viable, is really conservative for both mother and child, but when practised in extreme distortion before viability it comes practically to mean sterility. No matter how skilfully performed the induction of abortion is always attended with danger to the mother; in it we have sterility with frequently repeated danger. For there is not much difference as to the results between taking away the power of conception, and allowing a woman to conceive, and then destroying the product of the conception. Indeed, the argument may be pushed further and the question asked—Whether is the woman who cannot conceive better off, or she who, having conceived and passed through the full time of utero-gestation, can only be delivered by the destruction of her child? Are not both to all intents and purposes sterile? If, then, experience proves that the maternal mortality of this operation can be reduced not even to that of ovariectomy, for then there could be no doubt of its adoption, but even to the level of that following craniotomy, there will be this decided gain—the saving of the child alive and the preventing all future risk.

This view of the subject appears to afford an answer to Denman's question as to the justifiability of sacrificing child after child, or "whether after many trials she ought to submit to the Cæsarean operation as the means of preserving the child at the risk of her own life."^a In reply to this Dr. Barnes points out that "the conduct of the woman is assumed to be culpable," that "she is subject to her husband," and, arguing on the basis that the Cæsarean section is almost necessarily fatal, decides that we are not justified in resorting to it when craniotomy is safer for

^a Barnes. *Op. cit.*, p. 421.

the mother. But if experience proves hysterectomy to be as safe as craniotomy, this difficulty is at once solved.

Does it unsex a woman—does it unfit her for marital life, and does it by so doing lead to domestic unhappiness and discord?

It has been expressly stated that after double ovariectomy, as recommended by Battey, sexual inclination was not interfered with. If it does not disappear after removal of both ovaries it is not likely it would be affected by the amputation of the uterus along with them.

I am not aware that after amputation of the uterus for inversion the woman has become unsexed; so that it appears that although it would be better that the uterus could be left, yet if saving of life is effected the objections as to mutilation, sterility, and unsexing are not of sufficient weight to forbid its performance.

A very important effect has been claimed for this operation by Professor Späth—viz., that it cures osteomalacia. If this be so, in such cases it will prove a decided improvement on ordinary Cæsarean section, for its results are not favourable in osteomalacia. This disease too usually—at least if conceptive power remains—runs on to a fatal termination. The saving of both mother and child and the curing of a hitherto incurable disease would be no trifling benefit to humanity. Like laparotomy, although wider, its range is limited—in a word, it may be said that “it is not practicable when some affection or other of the cervix uteri prevents the formation of a stump.”

It is a matter of considerable moment whether the pedicle can with safety be tied and dropped into the abdomen, or whether it must be treated externally; if it can, the range of the operation will be extended.

In the cases reported the condition of the stump varied considerably. In some a sloughy condition is reported. This is likely to be the case if antiseptic precautions have been neglected, and it is most likely to be found where structural change has occurred, or the cervix has been exposed to considerable pressure from long labour. In others a shrinking of the pedicle requiring the ligature to be tightened has been observed. Both of these conditions contra-indicate intra-peritoneal treatment. Further experience is needed to distinguish the cases in which they are likely to occur.

Hitherto the extra-peritoneal method has alone been attempted. Professor Stadfeldt proposes to tie the pedicle in two portions and drop it. He has not, as far as I am aware, had an opportunity of trying this plan. The division of the ligature would probably meet the shrinking which has been observed; but the stump is very voluminous, and, if simply tied thus and dropped, a large raw surface would be left exposed, giving rise to danger of peritonitis and septic infection; and although, as I have said, this duplex ligature might sufficiently guard against the shrinking of the stump, it might also fail to do so, and thus there would be added the danger of secondary hæmorrhage.

What is required is that the raw surface of the stump should not be left exposed in the cavity—that whilst sufficient constriction was employed to prevent bleeding, yet that it should not be so great as to entirely stop nutrition in the distal end of the stump, and that secondary hæmorrhage should be guarded against. This might be effected by amputating the uterus by a flap operation—that is, instead of cutting it off by a circular incision, leaving a flat surface, it should be removed by a V-shaped one. The flaps could be brought into apposition by sutures, and would probably unite by the first intention. This method would avoid leaving a large raw surface exposed, and the entire stump in the abdominal cavity would be covered with peritoneum, save at the line of junction of the flaps. But here the cut edges of the peritoneum would be in apposition, and we know how rapidly this membrane unites. As the sutures, although applied through the entire depth of each flap, would probably not be sufficient to entirely control the hæmorrhage, this could readily be effected by tying the stump in two equal portions. The best method of doing this would appear to be the Staffordshire knot, the ends of which could be brought down through the cervix and os externum. This would permit of carbolised gut being used, and of the ligature being tightened or loosened at pleasure.

Having now considered the theory of the operation, it remains to be seen what results have followed its adoption in practice, and for making an analysis of the cases the details are entirely deficient.

I have not been able to come at full reports, and so cannot tabulate the cases as I did in the instances of laparo-elytrotomy and Cæsarean sections; nor have we material for forming an opinion as to what cases were moribund, or in which the fatal result was directly attributable to the operation, nor—which is a point of extreme importance for estimating the effect on the result—of the length of time labour had been in progress prior to operation.

There have been 30 cases reported—all on the continent of Europe—with the result of 14 mothers being saved and 16 deaths, or a mortality of 53·3 per cent. This does not look a very encouraging outcome for a procedure which has, undoubtedly, theoretical advantages over Cæsarean section. But it must be borne in mind that the operation is very young (only three years old), that details are wanting to enable us to see how much of the fatality is due to the operation, and that time may show that better results may be obtained, as our experience of it increases. A markedly favourable circumstance, however, must not be overlooked—that is, that it has been successful in places where, for a hundred years, every Cæsarean case has terminated fatally.

Up to the 2nd of June, 1876, when Späth^a operated, every Cæsarean case for a century had proved fatal in the Lying-in Hospital of Vienna;

^a American Journal of Medical Science, p. 509. October, 1879.

and up to the 20th May, 1879, when Professor Tarnier operated, at the *Maternité* of Paris, a like fatality had followed from 1787.

The adoption of Porro's operation will depend on its success in saving the mother's life, and on this success being greater than that of Cæsarean section. Its results hitherto fairly entitle it to serious consideration; that on the Continent it is favourably regarded is shown by the number of cases operated on in so short a time.

It now remains to be seen what relationship these three operations bear to each other and to embryotomy—how far any, or either, of them are likely to supplant the others, or to do away with the necessity for craniotomy:—

“We can easily agree that we, by sacrificing the child, under such circumstance, deviate from the ideal humanity in obstetrics, and there lies therein an incentive to revise the question.”^a

But there is a higher incentive—the question of the morality of deliberately taking the life of a human being. Another question, too, has to be considered. Whilst a great many, perhaps the majority, of our profession believe that it is perfectly justifiable and morally right to perforate and destroy the live or *viable* infant rather than expose the mother to the risk of the Cæsarean section, there is a minority who hold that under no circumstance is it right thus deliberately to kill a human being, and there are others who, accepting embryotomy as the least of two great evils, are not satisfied in their minds of the justness of the operation. Even if we disagree with them—if we look on their scruples as unreasonable—yet are they not a strong incentive to the reconsideration of the dogma that craniotomy comes first, and that operations on the mother are to be entertained only as a last and final resource?

On reading the records of the Cæsarean operation, one cannot fail to be impressed with the conviction that if the same promptitude and care had been given to it which marks modern surgical operations—if the thought, study, and ingenuity—if the same efforts had been made to perfect it which have been devoted to embryotomy—a very different mortality would have been recorded, a vast saving of life would have been effected, and an inestimable relief have been afforded to men's consciences.

As to how far laparo-elytrotomy and Porro's operation will supplant Cæsarean section, time alone can tell. Each has also a certain limitation; furthermore, we have no evidence as to the results of timely operation. It has been shown that, with all defects of operation, timely Cæsarean section has a mortality of only 25 per cent.; to supplant it in such cases the others will require to show as low a fatality. If the mortality of laparo-elytrotomy reaches this level, I agree with Professor Stadfeldt that it ought to commence the series. In future pregnancies,

^a Stadfeldt. *Op. cit.*, p. 423.

unless the pelvic contraction is very great, the induction of premature labour will get over the difficulty. But experience has shown that, no matter how solemnly we warn a patient of the risk of allowing her pregnancy to go to full term—no matter how earnestly we impress on her the necessity of coming at the proper time to have labour induced—she will in too many cases allow the opportunity to pass, and then the consideration arises as to what operation should be performed. If Porro's method comes up to the standard of success, it will have the advantage that it will remove all chance of future danger.

It may be said—Why not resort to Porro's operation in the first instance, or why not perform laparo-elytrotomy again? In the first instance, laparo-elytrotomy gives a hopeful prospect of a living child, and leaves the power of conception uneffected, so that, if this operation proves as favourable as its supporters assert it ought to be, a prospect of a second child, without largely augmented risk, is given. In the second place, I have already shown that it is doubtful if laparo-elytrotomy can be performed a second time on the same side—at least without excessive peril—and it is doubtful if it can safely be done on the left side, where there is not only less room, but the cicatrix in the vagina from the former operation would prove a formidable bar to its success.

From what we know of the causes of mortality in Cæsarean cases, which principally result from tedious labour, those cases in which many hours have elapsed before medical advice is sought for or given, afford a field for these operations in which we can hope for more favourable results—the special liability to peritonitis, septicæmia, and hæmorrhage, which attends late Cæsarean, not attaching to them.

It seems, therefore, that, with a mortality of 25 per cent., Cæsarean section is indicated in early labour, and either Porro's or laparo-elytrotomy after prolonged. If in such the mortality is found to be low—if the theoretic benefits of the operations are realised, it will be right to resort to them in early cases.

This lesson should, however, be strongly and forcibly taught, that as soon as obstruction is discovered necessitating operative interference, no time should be lost—no delay in operating should be permitted—every hour is of vital consequence—nothing but evil can come from procrastination.

Three alternatives to embryotomy are now before the profession. It behoves it to give them most earnest attention—to put aside dogma and prejudice—to carefully weigh and balance each, so that, with modern knowledge and improved treatment, there may be, if possible, added to the list of triumphs of the surgery of the nineteenth century that of removing from its canons “the only operation recognised and sanctioned by the British profession, which is undertaken with the avowed intention of destroying life.”

TABLE I.—Cases of Laparo-Elytrotomy.

No.	Date	Name of Operator	Age	Cause of Operation	Duration of Labour	Condition of Patient at time of Operation	Result of Operation				Time and Cause of Death of Mother	Whence taken, and Remarks
							Mother	Child		Child before Operation		
							Died	Saved	Died	Saved		
1	1851	Ritgen	-	Osteomalacia	-	-	D	-	S	-	Secondary hæmorrhage	Hæmorrhage during operation; patient sinking; in order to save child operation abandoned—Cæsarean substituted.
2	1844	L. A. Baudelocque	-	Dwarf	-	-	D	-	-	-	Hæmorrhage	Same remarks as in former case.
3	"	L. A. Baudelocque	-	-	-	-	D	-	D	-	74 hours	Wounded external and tied common and internal iliac arteries; patient suffered from eclampsia; slight peritonitis found at post mortem.— <i>American Gynaecol. Trans.</i> , page 214. 1879.
4	1870	T. Gallard Thomas	40	Pneumonia	-	Almost pulseless; cyanosed breath-ling, with loud laryngeal rattle—almost unconscious	D	-	-	S	-	Child premature—badly developed; had hare-lip; though born alive, it died in an hour.— <i>American Jour. Med. Science</i> , page 231. 1878.
5	1874	Dr. Skene	-	Conjugate 2½	48 hours	Exhaustion; pulse 130	D	-	-	-	7 hours; exhaustion	Attempts at craniotomy failed.— <i>Ibid.</i> , page 232.
6	1875	Dr. Skene	31	Rickets; conjugate 2½	20 hours	Good	-	S	-	S	-	Bladder torn.— <i>Ibid.</i> , page 233.
7	1877	Dr. Skene	37	Conjugate 1½	4 days	Skin hot and dry; tongue coated; temp. 102.5°; pulse 98	-	S	-	S	-	Bladder torn.— <i>Ibid.</i> , page 236.
8	"	Dr. Thomas	20	Conjugate 2½	16 hours	-	-	S	-	S	-	Bladder torn.— <i>Ibid.</i> , page 240.
9	1878	T. W. Hime	37	Cancer of recto-vaginal septum	20 hours	Bad; had not been able to leave her bed for 11 weeks from debility	D	-	-	S	Exhaustion	<i>Lancet</i> , Nov. 9, 1878.
10	"	Dr. Edis	20	Conjugate 2½	17½ hours	Thrombus of vulva	D	-	-	-	40 hours; exhaustion	Bladder torn.— <i>Brit. Med. Jour.</i> , Nov. 30, 1878.
11	"	Dr. Gillette	23	Rickets; conjugate 1½	Pains for a week; waters discharged 18 hours	-	-	S	-	-	-	Great difficulty in extracting child from uterus, owing to tonic contractions.— <i>American Jour. Obstet.</i> , page 98. Jan. 1880.
							7	4	1	6		2

TABLE II.—*Cesarean Cases.*

No.	Date	Place of Operation	Reporter or Operator	Age	Height	Cause of Operation and conjugate diameter	Duration of Labour prior to Operation	Condition of Patient	Result to		Cause of Death, and time of occurrence after Operation	Children reported dead before Operation	Observations, and reference to where Case is recorded
									Mother	Child			
									Saved	Died			
1	1867	Lambeth Work-house	T. E. Bryant	38	ft. in. 4 7	Rickets; conjugate 2 in.	About 3 days	Bad; circulation hurried; tongue dry; patient restless	-	S	-	-	<i>Obstetrical Trans.</i> Vol. VI., page 197.
2	1863	-	N. T. Sedler	21	under average	Contracted pelvis	6 days	Strength fair; pulse 140	-	D	-	Dead before operation	<i>Edin. Med. Jour.</i> Vol. X., page 368.
3	"	Lady Berkley's Lying-in Institution, Kingston, Jamaica	W. Anderson	25	-	Rickets	30 hours	Good	S	-	-	-	Black woman.— <i>Edin. Med. Jour.</i> Vol. X., page 142.
4	1865	London	R. Greenhalgh	33	-	Mollities osium	Nearly 5 days	Skin hot and dry; tongue furred; pulse 140, feeble; tenderness over abdomen; headache; vagina hot, swollen, and tender	-	D	-	Dead before operation	Uterine wound found gaping after death.— <i>Obstetrical Trans.</i> Vol. VII., page 374.
5	"	London	R. Greenhalgh	28	-	Rickets	26 hours, when efforts to deliver by crotchet were made; not stated how long they lasted	Good up to time efforts to deliver by crotchet were made; then shock and exhaustion set in	-	D	-	Craniotomy	On opening uterus it was found to have been lacerated; fetus found to have escaped through rent.— <i>Obstet. Trans.</i> Vol. VII., page 230.
6	"	-	Sir J. Simpson	34	-	Distorted pelvis	About 4 days	Patient almost in a state of syncope	-	D	-	1	Vain efforts to turn had been made; posterior lip of uterus lacerated transversely.— <i>Edin. Med. Jour.</i> Vol. XI., page 866.
7	1865	London	R. Greenhalgh	30	-	Cancerous tumour	-	Stomach irritable; tongue white; face pale; pulse 74, firm, and steady	S	-	-	-	Child little over seven months; died after operation; ether spray to abdomen.— <i>Medical Times and Gazette</i> , Vol. I., 1866.
8	"	Stamford	Dr Newland	27	-	Cancer	11 days	-	S	-	-	-	<i>Obstet. Trans.</i> Vol. VIII., page 240.

No.	Year	Place, Clinician	Age	Duration	pelvis . 4 in.	Time	Condition	Remarks	Result	Diagnosis	Page 260.		
10	"	Guy's Hospital	J. Braxton Hicks	37	4 0	Contracted outlet	A few hours after labour was induced; fortnight before term	14 hours	Good	tongue furred; vagina tender and indamed	D	of peritonitis and septicaemia; uterus nearly black, as if gangrenous 4 days of exhaustion	Obstet. Trans. Vol. X., page 46.
11	"	London Surgical Home	Baker Browne John Taylor	28	-	Contracted pelvis			S		S	Died 6 weeks after operation of embolism	Uterus closed by silver-wire sutures.— <i>Lancet</i> , Vol. I. 1868.
12	1870	Ellesmere Work-house	J. W. Roe	35	little over 4 ft.	Mollities osium	114 hours		Suffering from cough; pulse 120; marked symptoms of exhaustion		D	4 days 6 hrs. of bronchitis and peritonitis	<i>Lancet</i> , Vol. II. 1870.
13	"	London Hospital	Dr. Head	35	5 4	Mollities osium	Not stated		Not stated		D	14 hours; not stated	<i>Medical Times & Gazette</i> , Vol. I. 1870.
14	"	Glasgow	A. Neilson	33	4 9	Lateral & antero-posterior curvature; contracted pelvis; rickets	58 hours		Not stated; membranes decomposing		D	16 hours, of hæmorrhage and exhaustion	Great hæmorrhage; at autopsy uterus found of bluish green colour.— <i>Lancet</i> , Vol. I. 1870.
15	"	Streatham	J. Braxton Hicks	40	-	Tumour (myoma); blocking up pelvis	Several hours		Bad; pulse over 100; tongue glazed & brown; teeth covered with scordes		D	3½ days, of exhaustion; there had been profuse hæmorrhage	Sutures through both uterine and abdominal walls; child seventh-month; lived a short time.— <i>Obstet. Trans.</i> Vol. XI.
16	1871	Wolverhampton	H. Gillbons	22	8 10	Small pelvis	Not stated		Not stated		D	40 hours; not stated	Child lived nine hours.— <i>Obstet. Trans.</i> Vol. XIII., page 131.
17	"	Kintore	A. Inglis	-	3 6	Projection of sacrum; rickets	Over 48 hours		Almost in state of syncope		D	3 days	<i>Edin. Med. Jour.</i> Vol. XVII., page 341.
18	"	Romford	N. F. Davey	30	3 8	Rickets	23 hours		Pulse weak and rapid; vagina hot, dry; offensive smell		S		<i>Lancet</i> , Vol. I., page 79. 1878.
19	1872	Leeds	Phillip Foster	22	-	Conjugate 1 in.	48 hours		Liq. annii escaped 48 hours		S		No chloroform.— <i>Lancet</i> , Vol. I. 1872.
20	"	Ballarat District Hospital	Thomas Hellas	24	-	Uterus wounded during operation for ovarian tumour	Not in labour				S		Nine or ten silver sutures in uterus.— <i>Land. Med. Record</i> , Jan. 15, 1876. Page 25.

TABLE II.—*Cesarean Cases.*

No.	Date	Place of Operation	Reporter or Operator	Age	Height	Cause of Operation and conjugate diameter	Duration of Labour prior to Operation	Condition of Patient	Result to Mother		Result to Child		Cause of Maternal Death, and time of occurrence after Operation	Children reported dead before Operation	Observations, and reference to where Case is recorded
									Saved	Died	Saved	Died			
1	1857	Lambeth Work-house	T. E. Bryant	38	ft. in. 4 7	Rickets; conjugate 3 in.	About 3 days	Bad; circulation hurried; tongue dry; patient restless	-	D	S	-	2 days	-	<i>Obstetrical Trans.</i> Vol. VI., page 197.
2	1863	-	N. T. Sedler	21	under average	Contracted pelvis	6 days	Strength fair; pulse 160	-	D	-	-	Shock; 24 hrs.	Dead before operation	<i>Edin. Med. Jour.</i> Vol. X., page 268.
3	"	Lady Berkley's Lying-in Institution, Kingston, Jamaica	W. Anderson	25	-	Rickets	20 hours	Good	S	-	S	-	-	-	Black woman.— <i>Edin. Med. Jour.</i> Vol. X., page 142.
4	1865	London	R. Greenhalgh	32	-	Mollities osium	Nearly 5 days	Skin hot and dry; tongue furred; pulse 140, feeble; tenderness over abdomen; headache; vagina hot, swollen, and tender	-	D	-	-	80 hours	Dead before operation	Uterine wound found gaping after death.— <i>Obstetrical Trans.</i> Vol. VII., page 376.
5	"	London	R. Greenhalgh	28	-	Rickets	26 hours, when efforts to deliver by crotchet were made; not stated how long they lasted	Good up to time efforts to deliver by crotchet were made; then shock and exhaustion set in	-	D	-	-	67 hours	Craniotomy	On opening uterus it was found to have been lacerated; foetus found to have escaped through rent.— <i>Obstet. Trans.</i> Vol. VII., page 220.
6	"	-	Sir J. Simpson	24	-	Distorted pelvis	About 4 days	Patient almost in a state of syncope	-	D	-	-	3 days	1	Vain efforts to turn had been made; posterior lip of uterus lacerated transversely.— <i>Edin. Med. Jour.</i> Vol. XI., page 865.
7	1866	London	R. Greenhalgh	30	-	Cancerous tumour	-	Stomach irritable; tongue white; face pale; pulse 74, firm, and steady	S	-	S	-	-	-	Child little over seven months; died after operation; ether spray to abdomen.— <i>Medical Times and Gazette.</i> Vol. I., 1866.
8	"	Stanford	Dr. Newman	27	-	Cancer	3 days	-	N	-	S	-	-	-	<i>Obstet. Trans.</i> Vol. VIII., page 241.

No.	Year	Hospital	Man- chester	Surgeon	Age	Height	Weight	Condition of Pelvis	Duration of Labour	State of System	Diagnosis	Operation	Result	Reference
10	"	Guy's Hospital		J. Braxton Hicks	37	4	0	Contracted outlet	A few hours after labour was induced; fortnight before term	14 hours	Good		D	Obstet. Trans. Vol. IX., page 260.
11	"	London Surgical Home		Baker Browne John Taylor	28	-	-	Contracted pelvis					D	Obstet. Trans. Vol. X., page 45.
12	1870	Ellesmere Work-house		J. W. Roe	35	little over 4 ft.		Mollities osium	114 hours	Suffering from cough; pulse 120; marked symptoms of exhaustion	Not stated	D	S	Uterus closed by silver-wire sutures.—Lancet, Vol. I. 1868.
13	"	London Hospital		Dr. Head	35	5	4	Mollities osium	Not stated	Not stated	Not stated	D	S	Lancet, Vol. II. 1870.
14	"	Glasgow		A. Neilson	33	4	9	Lateral & anterior curvature; contracted pelvis; rickets	58 hours	Not stated; membranes decomposing	Not stated	D	S	Medical Times & Gazette, Vol. I. 1870.
15	"	Streatham		J. Braxton Hicks	40	-	-	Tumour (myoma); blocking up pelvis	Several hours	Bad; pulse over 100; tongue glazed & brown; teeth covered with sordes	Not stated	D	S	Great hæmorrhage; at autopsy uterus found of bluish green colour.—Lancet, Vol. I. 1870.
16	1871	Wolverhampton		H. Gill bons	22	3	10	Small pelvis	Not stated	Not stated	Not stated	D	S	Sutures through both uterine and abdominal walls; child seventh month; lived a short time.—Obstet. Trans. Vol. XI.
17	"	Kintore		A. Inglis	-	3	6	Projection of sacrum; rickets	Over 48 hours	Almost in state of syncope	Not stated	D	-	Child lived nine hours.—Obstet. Trans. Vol. XIII., page 181.
18	"	Romford		N. F. Davey	30	3	8	Rickets	23 hours	Pulse weak and rapid; vagina hot, dry; offensive smell	Liq. annii escaped 48 hours	S	-	Edin. Med. Jour. Vol. XVII., page 841.
19	1872	Leeds		Philip Foster	22	-	-	Conjugate 1 in.	48 hours			S	-	Lancet, Vol. I., page 79. 1878.
20	"	Ballarat District Hospital		Thomas Hellas	24	-	-	Uterus wounded during operation for ovarian tumour	Not in labour			S	-	No chloroform.—Lancet, Vol. I. 1872.
														Nine or ten silver sutures in uterus.—Lond. Med. Record, Jan. 15, 1878. Page 25.

TABLE II.—Caesarean Cases—continued.

No.	Date	Place of Operation	Reporter or Operator	Age	Height	Cause of Operation and conjugate diameter	Duration of Labour prior to Operation	Condition of Patient	Result to Mother		Result to Child		Causes of Maternal Death, and time of occurrence after Operation	Children reported dead before Operation	Observations and reference to where Case is recorded
									Survived	Died	Survived	Died			
21	1872	City-road Work-house, London	G. E. Yarrow	34	4 3 ft. in.	Rickets; conjugate 1½	About 26½ hrs.	Not stated; liq. amnii escaped 24 hours	-	S	-	S	4 days 30 hrs., septicæmia	-	Lancet. Vol. II. 1872.
22	1873	Wisbeach	D. C. Nicholl	30	-	Cancer	Over 26 hours	Bad after operation	-	D	-	-	Shock; 41 hrs.	1	Uterus infiltrated with cancerous matter; uterine sutures.—Lancet. Vol. I. 1878.
23	1874	Brooklyn, U.S.	Cornelius Olcott	30	-	Fibrous tumour	9 hours	Extreme exhaustion; almost in articulo moritis	S	-	-	-	-	-	American Journal of Obstetrics, April, 1878. Page 312.
24	1875	Bury, Lancashire	John Parkes	32	-	Rickets	10 or 12 hours	Good	S	-	-	-	-	1	Uterine sutures.—Lancet. Vol. I., page 240. 1876.
25	"	Own Home, London	Dr. Routh; reported by Dr. Oswald	29	4 0	Rickets; conjugate 1½	16 hours	-	-	D	-	-	2 days 4½ hrs., septicæmia and embolism	-	Uterine sutures of carbolic gut, which became united.—Obstetrical Trans. Vol. XVII., page 378.
26	1876	Guy's Hospital	A. Galabin	41	-	Obliteration of vagina	7 days	Greatly exhausted	-	D	-	-	Died on table as last suture was being inserted in uterus	1	Obstetrical Trans. Vol. XVIII., page 282.
27	"	Temperance Hospital, London	J. Edmunds	28	-	Tumour in pelvis	60 hours	Good	S	-	S	-	-	-	Lancet. Vol. II. 1876.
28	"	Guy's Hospital	A. Galabin	26	-	Carcinoma of os uteri	-	Bad; evidence of septicæmia; pulse 160; temp. 102°·9°	-	D	-	-	Septicæmia; 40 hours	1	Obstetrical Trans. Vol. XVIII., page 286.
29	1877	Stanton Lees	E. M. Wrench	28	not larger than girl of 16 yrs.	Small but not deformed pelvis	25 hours	Not much exhausted	S	-	S	-	-	-	Lancet. Vol. II., page 5. 1878.
30	"	Middlesex Hospital, London	H. Morris	40	-	Mollities osium	32 hours	Bad	-	D	-	-	Peritonitis; 60 hours	1	Women exhausted from long labour and attempts at craniotomy.—Lancet. Vol. I., page 488. 1878.
30	1878	Guy's Hospital	J. Braxton Hicks	-	-	Cancerous tumour of recto-vaginal septum	About 8 hours	Temp. 102°; pulse 180; tongue brown; prostration	-	D	-	S	24 hours, of peritonitis and exhaustion	-	Obstetrical Trans. Vol. XX., page 106.
31	"	Baroda	Surg. Major Cody	86	dwarf	Kænetosis, from ruit of pubes	3 days	Very bad	S	-	S	-	-	-	Lancet. Vol. II., page 576. 1878.