THE MODERN PRACTICE OF CAESAREAN SECTION— SOME CONTROVERSIAL VIEWS

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The title of this article may need some qualification. The views expressed are not modern in the sense of expressing the current general opinion, for controversial topics have deliberately been chosen. Nor can the article claim to be modern in the sense of new; the choice between the extra- and intra-peritoneal approach has been discussed for a century, and the place for Caesarean section in the treatment of placenta praevia has been argued for 50 years. All that is attempted is to elaborate the points on which modern opinions differ most.

In any practical debate indications and technique should be discussed together, as each will affect the other, and for that reason the subject is here subdivided as follows:—1. Caesarean section for dystocia (a) before labour or early in labour; (b) late in labour. 2. Caesarean section for antepartum haemorrhage. 3. Caesarean section for other maternal or foetal indications.

1. *Caesarean section for dystocia (a) before labour or early in labour.* The management of the 'borderline case' of contracted pelvis has lately been authoritatively reviewed by Munro Kerr (1948), who stresses the value of radiological pelvimetry, but a warning may not be out of place here against unskilful photography, or even worse, faulty interpretation of the films, which may lead an inexperienced obstetrician to perform unnecessary operations for minor pelvic abnormalities (Allen, 1947). The simple truths that the effectiveness of the forces and the degree of moulding are unknown before labour cannot be overstressed, and indeed it must be added that the size of the foetal head is often uncertain too. Expert radiology is entirely helpful, and more often influences the obstetrician *against* operation than in favour of it (Williams and Phillips, 1946). Barnett (1942) has suggested that modern radiological pelvimetry will allow the revival of the induction of labour for primiparae with suspected disproportion, but this is not yet to be accepted. While it is true that induction will 'prevent' a few sections that would follow if subsequent trial labour failed, induction is

only suitable for the cases with slight disproportion, and it is in just this group that easy delivery so often occurs in trial labour. On the whole it is still true that more harm will be done by inducing much unnecessary prematurity than by doing a few avoidable sections (see discussion *Proc. R.S.M.*, 1936; Davidson, 1936; MacLennan, 1944). For multigravidae in whom the disproportion is not gross, induction is generally recommended, and in a few cases may be used after a previous Caesarean, especially if the previous labour was one in which the delay was partly due to inertia.

Although it is accepted that the lower segment operation is the safest procedure for patients in labour, or in cases in which there is a risk of infection, there is no such agreement when the operation is performed before labour. Even if the lower segment is not fully formed before labour, it is always possible to make a transverse incision below the line of firm attachment of peritoneum to the uterus, and the only good argument against doing this is that the classical incision is easier. It may be easier for the surgeon, but what of the patient? The advantages that the low scar is unlikely to become adherent to bowel, and that it is unlikely to rupture in a subsequent pregnancy seem to be conclusive, even if a repeat Caesarean is proposed for any later pregnancy. If subsequent vaginal delivery is possible, the chance of the scar giving way in labour must also be weighed, and here we are on less certain ground. It is my own strong belief that the lower scar is the safer, but it must be admitted that there is no satisfactory statistical proof of this. Although many more ruptures of the upper segment have been reported, the upper segment operations have been more numerous in the past, and sometimes performed by less expert surgeons. Williams (1939) has for many years advocated the use of silkworm gut sutures for the classical operation, and claims that the risk of rupture is small with this material. It is sometimes said that the classical route is safer for the inexperienced surgeon, but this is surely an

improper suggestion; for if the patient is not in labour there is time to refer her to another surgeon, and if she is in labour then the greater risk of sepsis with the classical operation will outweigh the slightly greater difficulty of the lower approach. (The place of the classical technique for cases of placenta praevia, or for cases in which the foetal head is deeply fixed in the pelvis, is discussed below.)

It is convenient to mention here the treatment of cases of dystocia due to *fibromyomata* or *ovarian tumours* in the pelvis. It is well known that a fibroid that occupies the pelvis early in pregnancy will often rise up as the uterus enlarges, and come to lie above the presenting part at term. It is less well known that a pelvic fibroid, attached to the lower segment, may be drawn up during the first stage of labour, and if a fibroid is not too firmly impacted it may be worth waiting for a *short* time in the hope that it will be drawn up, before performing a Caesarean section. If an ovarian tumour is found during labour, and cannot be pushed up above the presenting part, Caesarean section is usually necessary, as the cyst is inaccessible until the uterus is emptied and can be drawn forward or to one side. Even if it is sometimes possible to allow vaginal delivery to proceed after laparotomy and removal of the cyst, this treatment seems to me grossly unkind, unless the cervix happens to be fully dilated and the forceps used to complete delivery under the anaesthetic (see Discussion in *British Medical Journal*, 1945).

1. *Caesarean section for dystocia (b) late in labour or in the 'suspect' case.* Even with intact membranes, and in the absence of vaginal examination, vaginal bacteria can often be found in the uterus after labour of more than six hours' duration (Harris and Brown, 1927; Brown, 1939). In patients who have been in labour for more than 24 hours with the membranes ruptured, Douglas (1941) found anaerobic streptococci in the uterus at Caesarean section in 52 per cent. of cases, and aerobic non-haemolytic streptococci in 26 per cent. of cases. These organisms are often found in the vagina before labour, and even in the absence of vaginal examination may ascend. Although they have not the virulence of the 'extrinsic' haemolytic streptococci, they are common invaders in cases of prolonged labour.

Before the introduction of the lower segment operation even vaginal examination might influence the obstetrician against Caesarean section, but the risk of properly conducted vaginal examination has probably been exaggerated. This statement must not be misunderstood; vaginal examination has some risk, and should *never* be done needlessly, but it is now agreed that even after repeated examination a necessary section

should not be refused. It is often advised that rectal examination is preferable, especially during a trial labour, but this is very doubtful. With careful technique the only organisms that are likely to be carried through the cervix by vaginal examination are those already present in the vagina, which will in any case be in the liquor. Rectal examinations may be less trouble, but often lead to inexact diagnosis, and since the posterior vaginal wall is pushed into the os, carry vaginal organisms upward with certainty. In 1937, before chemotherapy was available, Sir William Gilliatt reported a series of lower segment operations performed during labour, and though the figures are not large enough to be 'significant' they at least suggest that morbidity is not very obviously related to the number of vaginal examinations performed.

No. of Vaginal Examinations	No. of Cases	No. of Cases Morbid
0-2	20	8
3-4	20	6
5-6	12	4
7-10	8	1

The following very similar figures are taken from Marshall's 'Caesarean Section' (1939), cases of failed forceps and of surgical induction being excluded.

No. of Vaginal Examinations	No. of Cases	No. of Cases Morbid
0-2	20	3
3-4	13	3
5-6	4	1
7-9	5	0

When we turn to consider the case in which surgical induction of labour has been attempted or performed, the danger of subsequent Caesarean section is greater. The risk of section following induction by bougies or stomach tube is high, as organisms are carried for some distance between the membranes and uterine wall, and the risk after plugging has often been reported. Marshall (1939) reported 14 cases of section after tube or bougie induction, and eight were morbid. The risk of section after rupture of the membranes is probably somewhat less, and with the help of chemotherapy few would now withhold an essential Caesarean if induction by artificial rupture had failed. The examples may be given of a case induced for toxæmia in which the cord prolapsed, or of a case induced for disproportion in which foetal distress occurred. The risk of Caesarean section would have been quite un-

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justifiable before the lower segment operation and chemotherapy were available; Holland (1921) for example, stated that the mortality of Caesarean section after induction was 14 per cent., though this gross figure needs qualification, as methods and intervals are not considered.

The gravest risks arise when section is performed in cases of prolonged labour, whether due to abnormalities of the birth canal or to inertia. (In cases due to malpresentation without disproportion vaginal delivery is frequently possible and preferable.) Gross disproportion is usually recognized before labour; it is the minor degree of disproportion, often associated with inertia, that may only be discovered after labour has been in progress for some time, or sometimes only after attempted delivery with the forceps. Equal danger arises in cases of stubborn inertia (or inco-ordinate uterine action), as intervention may only be proposed when the patient's general condition has started to deteriorate. We can consider these cases together and ask two questions. *Firstly, can we safely perform more sections now that chemotherapy is available? Secondly, if section is performed in late labour, what technique is best?*

No series of cases has been published that proves conclusively that the risk of Caesarean section has been much altered by chemotherapy, although this is the general impression. Good surgical technique may be equally important. For example in 1937 Sir W. Gilliatt reported 75 consecutive cases of the lower segment operation performed during labour, without a maternal death. In 55 of these cases three or more vaginal examinations had been made, and in 30 of the cases the membranes had been ruptured for between 11 and 80 hours, yet the post-operative temperature only exceeded 100.4° F. in eight cases. In 1939 Marshall reported 70 operations in suspect or infected cases, including 13 cases which were febrile before operation, 5 cases of failed forceps, and 15 cases in which surgical induction had been attempted. No mother died, and the morbidity rate was 30 per cent. These results could hardly be bettered with chemotherapy.

Too much must not be expected from chemotherapy, as in these cases of prolonged labour infection may be due to insensitive bacteria, although the anaerobic streptococci are sensitive to high

concentrations of penicillin. This must be remembered when penicillin is used for prophylaxis, and large doses given. The value of the local implantation of sulphonamides at operation may also be discussed. High local concentration can be obtained by placing the powder in the uterovesical pouch, or under the bladder flap (Kenny, 1945). On the other hand Hesseltine and Theeler (1946) found no evidence of reduction of infection in these cases, and advised against the local use of sulphonamides as there was risk of sensitization. The intrauterine use of sulphonamides has also been recommended (Brown, 1944), but the rate of absorption is uncertain, and the drug can only reach the danger zone in the outer part of the uterine wound by the blood stream. The writer's own opinion is that there is no advantage in adding sulphonamides to penicillin in these cases.

Few individual surgeons perform many sections for cases late in labour, so that statistics are often crude aggregations, without sufficient detail for fair comparison. There is a widespread opinion that more liberties can now be taken with the suspect case, and the following figures from Queen Charlotte's Hospital at least show that the number of sections done for prolonged labour has increased and that there is no obvious reason to regret this.

Yet the suggestion that special technique and chemotherapy will permit Caesarean section even in infected cases, is a most dangerous doctrine that needs critical consideration. It must never be forgotten that in many of these cases, particularly after failure to deliver with the forceps, the child has a poor chance of survival however delivered, and often dies after delivery from infection. It is impossible for the individual with limited personal experience to lay down firm rules, but to read the notes of a series of these late cases is depressing, and with the after-the-event wisdom of the spectator, it appears that cases with no evidence of progress are too often left in the hope that the uterus will suddenly alter its ways, a hope that becomes a dangerous disappointment as time goes on. The third day of a prolonged labour frequently seems to be the day on which the vital decision between vaginal and abdominal delivery should be made. That is *not* to say that a Caesarean should always be done then, but that

	Total No. of deliveries	No. of cases in which labour lasted more than 48 hours	No. of cases of Caesarean Section after more than 48 hours' labour		
			No.	Maternal deaths	Morbidity Cases
1936-43	22,474	555	10	2	3
1944-46	9,963	217	12	1	2

it should be realized at that stage that if the case is left much longer then Caesarean section will become increasingly dangerous.

When all cases in which Caesarean section was performed during labour for inertia and obstruction are considered, the following figures are obtained (Q.C.H. Reports) :—

	Labour over 48 hours			Labour less than 48 hours		
	Cases	Mother		Cases	Mother	
		Died	Mor-bid		Died	Mor-bid
1933-38	15	1	4	30	—	6
1939-43	4	1	—	17	—	1
1944-46	12	1	2	15	—	—
	31	3	6	62	—	7

The figures are too small to permit any deduction to be drawn from the penicillin and sulphonamide 'years,' but they show how the maternal risk increases after the first 48 hours.

In the past cases of prolonged labour due to obstruction were not uncommon, today delay is more often due to incoordinate uterine action; but this is hardly less dangerous. Among 674 cases in which the first stage of labour lasted more than 48 hours, in the absence of disproportion, there were five maternal deaths (7.4 per cent.), 82 still-births (12.2 per cent.) and 18 neonatal deaths (2.6 per cent.), (Q.C.H. Reports, 1937-46), and for each addition to the duration of labour the risks rise progressively. These cases differ from those of contracted pelvis, as delivery can be completed with the forceps as soon as the os is fully dilated. Even if the cervix is not quite full, and foetal distress occurs, it may be possible to apply the forceps and then to push up the rim of cervix, or even incise it; or if the foetus is dead perforation and weight traction are also possibilities. Caesarean section is not necessary for any of these cases. But when the os is half or less dilated, and there is maternal or foetal distress, the problem is far more difficult. For these cases manual dilata-

tion of the cervix or incision are usually condemned, as forcible dilatation easily causes shock, and there is risk of a laceration extending upwards into the lower segment. On the other hand the risk of late section is high. The figures below are taken from the Q.C.H. Reports.

Although these figures are small they do not encourage a belief that Caesarean section is safe after the third day. The risk is not only uterine or peritoneal infection, but may be cardiac failure, and a common complication is ileus, even in the absence of evident peritonitis.

In my own opinion any case that is undelivered after 48 hours of *definite* labour should be assessed critically. If progress is being made, however slow, perhaps as a result of general sedation and uterine stimulation, then it may be justifiable to continue, especially if the uterus relaxes completely between the contractions, and the maternal and foetal condition is good. But in the absence of progressive dilatation, especially if the uterus is 'irritable,' this is the time to consider section, even though the condition of mother and child is yet good. The protest that this may lead to a few unnecessary sections leaves me unmoved; cases that show no progress after 48 hours definite labour are not common, and the present results are deplorable.

In cases of obstructed labour there is no general agreement about the place of Caesarean section. It would be agreed that lower segment Caesarean section or Caesarean hysterectomy would be chosen if the child is alive, and many obstetricians would even consider the operation if forceps delivery had been attempted and the foetus was still in good condition, which it seldom is. With penicillin 'cover' the maternal risk is thought to be reduced, and the penicillin will also reach the child and help to reduce the risk of neonatal death from infection.

If the child is dead, some have suggested that modern Caesarean section is safer than craniotomy. Green Armytage (1931) reported that among 104 craniotomies the maternal mortality was 32.7 per cent., whereas among 75 lower segment operations (including 48 'septic cases') the mortality was

CASES IN WHICH THE FIRST STAGES OF LABOUR LASTED MORE THAN 48 HOURS IN THE ABSENCE OF DISPROPORTION :

Caesarean Section										
						No. of cases	Mother died	Child		Duration of labour in these cases (Fatal cases in bold figures)
								S.B.	Died	
1937-38	..	..	..	..	..	2	I	—	I	65, 80
1939-43	..	..	..	..	..	4	I	—	—	50, 69 , 96, 100
1944-46	..	..	..	..	..	6	I	I	—	52, 58, 88, 94, 145
						12	3	I	I	

Manual Dilatation of the Cervix and Forceps, or Craniotomy and Weight Traction

					No. of cases	Mother died	Child		Duration of labour in these cases (Fatal cases in bold figures)
							S.B.	Died	
1937-38	..	..	..	..	5	—	3	—	73, 84, 87, 110, 182
1939-43	..	..	..	..	5	1	2	1	79, 80, 96, 112, 126
1944-46	..	..	..	..	4	—	—	—	84, 96, 115, 155
					14	1	5	1	

					C.S. after 48 hours' labour		Craniotomy after 48 hours' labour		All craniotomies.	
					No.	Mat. deaths	No.	Mat. deaths	No.	Mat. deaths
1933-38	..	..	..	..	15	1	15	6	26	6
1939-43	..	..	..	..	4	1	3	1	10	1
1944-46	..	..	..	..	12	1	1	—	4	—
					31	3	19	7	40	7

14.6 per cent. In a case in which the head is free above the brim this contention may be true, particularly with severe pelvic contraction and if the cervix is incompletely dilated, but in most cases craniotomy is far safer. Craniotomy has the disadvantages of a longer anaesthetic and of greater risk to maternal tissues, but the danger of peritonitis is less. Craniotomy was performed 79 times at Queen Charlotte's Hospital during the years 1930-46, excluding cases of hydrocephaly or breech birth. Sixteen mothers died, but this crude figure cannot fairly be compared with that for all cases of Caesarean section during labour, and the only fair comparison is with sections performed after 48 hours of labour.

At first sight it would appear that Caesarean section is the safer operation, but when it is found that the foetus survived in 25 of the cases of Caesarean section, it is evident that the general condition of these cases was far better than that of those subjected to craniotomy, and the same criticism may well apply to other published series.

Operative technique for the 'suspect case.' In Britain the intraperitoneal lower segment operation is usually chosen, with the occasional performance of Caesarean hysterectomy for the multiparous or more elderly patient. The *extraperitoneal operation* has been much recommended on the Continent and in America, and merits consideration. The modern operation dates from 1906, when Frank of Köln approached the lower segment through a transverse supra-vesical incision. Krönig (1912) soon realized that the chief advantage of Frank's operation was the low incision that could be covered by free peritoneum, and it has yet to be proven that the risk of the intra-

peritoneal lower segment operation is greater than that of any extraperitoneal operation. The pelvic peritoneum has a high resistance, and so long as it is efficiently closed so that constant reinfection does not occur, will usually localize any infection. The hope of such localization is much greater with the low incision, not only because the free peritoneal layer can be closed more securely, but because any infection first occurs in the utero-vesical pouch, where it is easily confined by adhesion between the surfaces. Any true extraperitoneal operation, whether by the Latzko or Waters technique, opens up much more cellular tissue, with consequent risk of the spread of infection, and indeed the very object of conserving the peritoneum intact often fails. Norton (1935) reported 26 operations, in the course of which the peritoneum was opened nine times and the bladder once, and Aldridge (1937) reported 27 operations, during which the peritoneum was opened five times and the bladder once. Among Waters (1940) first 32 cases the peritoneum was opened six times, and unless a surgeon decided to perform this type of operation in early cases so as to gain facility, which would seem to be unjustifiable, then he is likely to open the peritoneum at least as often. Another serious disadvantage of the operation is that it takes much longer, and while this is an obvious danger to the foetus it is hardly less a danger to the mother after prolonged labour.

It is difficult to judge from published reports whether the operation is on the whole safer than the orthodox lower segment operation. Norton (1935) reported 26 cases performed 15 to 90 hours after rupture of the membranes without a maternal death, and Aldridge (1937) reported 27 cases per-

formed on the average 40 hours after rupture of the membranes, with one maternal death ; but we have already seen that Gilliatt (1937) and Marshall (1939) published equally good results from the intraperitoneal operation. In none of these cases was chemotherapy used. Dieckman (1945) mentions that Waters has performed 250 extra-peritoneal operations with only two deaths, but points out that most of these operations were performed for teaching purposes, and not for the dangerous cases of late labour.*

There is not space here to describe technique ; the reader is referred to the articles of Waters and Aldridge.

An unusual operation for the infected case is that of Portes (1924) in which the uterus is delivered unopened through the abdominal wound, and the parietal peritoneum is sutured about its cervical portion. After delivery of the child the exteriorized uterus is kept covered with moist dressings, and only returned to the abdomen after some days (Phaneuf, 1938). It may be asked whether the tubes would not become occluded by adhesions, with loss of the reproductive function that the operation is designed to conserve.

Intraperitoneal lower segment section remains the operation of choice for the suspect case, with the occasional performance of Caesarean hysterectomy (Adair, 1938). In a suspect case details of technique are of the greatest importance and the following are selected for mention. The operation may be preceded by the intramuscular injection of a large dose of penicillin (150,000 units). Pre-operative vaginal instillations of antiseptics have been recommended (Brown, 1939) and although it cannot be denied that such instillations may reduce the total number of organisms, they will certainly not destroy them all, and those that have spread furthest will most probably escape. To be effective repeated instillations are required, and an immediately pre-operative instillation is of little or no value. Any temporary bacteriostasis will not be continued in the dangerous post-operative period, and for these various reasons the writer does not recommend this treatment.

Perhaps the most important point is to reduce the 'spill' of infected liquor as much as possible. Packing will only partly achieve this, as the most carefully placed packing becomes loose when the uterus is emptied, but lateral packs will at least mop up some of the fluid. An efficient suction apparatus is essential. It is most dangerous to place the patient in the Trendelenburg position.

* Since this was written M. L. McCall (*Am. J. Obst. Gyn.*, 1949, 57, 520) has reported 18 extraperitoneal operations on grossly infected cases without a maternal death.

Fortunately, however, the lower segment in late labour is easily accessible. Many surgeons have suggested that the peritoneal layers should be stitched together so as to shut off the area of the incision from the general peritoneal cavity, and of the many methods described that of Cooke (1938) seems to be the most practical, and deserves an extended trial.

If the head is free it is easily delivered, but there may be real difficulty with a deeply engaged head. Having tried most things, including pressure from behind with a hand in the recto-vaginal pouch, and Murless's instrument, the writer prefers the simple use of his hand, or in a difficult case Wrigley's forceps. Willett's forceps are useful if the head can be elevated so that part of the scalp can be seen. Bourne and Williams (1948) have suggested that classical section may be safer for some of these cases, so that traction on the breech is possible, but even with chemotherapy the risk of sepsis would deter most of us ; it might be safer to direct an assistant to push the head up with two fingers in the vagina.

If the cervix is widely open, the placenta and membranes can be expressed through the vagina, but since infected liquor has already escaped the point is of secondary importance. It is a serious error to pass the hand inside the peritoneal cavity to the fundus ; if expression is attempted it should be done by external pressure. As soon as the uterine muscle is closed infected packs should be removed and gloves changed. It has been suggested that a tube may be placed to drain the subperitoneal space into the vagina through the uterine incision, but my own opinion is that such a tube might serve as an avenue of infection rather than a drain.

2. *Caesarean section for antepartum haemorrhage.* The treatment of *placenta praevia* is discussed in another article in this number, and this section is therefore brief. Great improvement in the results has been recorded, but this is as much due to better facilities for transfusion, and to the practice of transferring cases to hospital without vaginal interference, as to any particular operation. There is general agreement that Caesarean section is the best treatment for Type 3 and 4 cases (except the moribund), and equally that section is unnecessary for Type 1 (Berkeley, 1936 ; Macafee, 1945). Difference of opinion remains about the Type 2 cases, and the writer may be allowed to express his personal opinion that section should be advised for most of these cases that have reached the 36th week, except when the cervix is already widely dilated. Whatever the type, Caesarean section should *never* be employed for the severely shocked patient until she has been resuscitated, but with modern facilities the moribund patient

is becoming a rarity. In the case of a patient who has had only slight bleeding, and in whom the diagnosis is not yet established, practice has changed in recent years, or at least we now openly teach what many formerly practised in doubt. Delay in intervention is now permitted as long as the patient is in a *fully staffed* obstetric unit, with good transfusion facilities, with the object of postponing the delivery of a premature infant for as long as possible. Marshall (1939) has suggested that cases of placenta praevia can be diagnosed on the history alone, without vaginal examination, but this is surely wrong, for it is not uncommon to see cases in which the diagnosis seems highly probable, but when a finger is passed through the cervix the placenta is not reached, and section would be quite unnecessary for such cases. 'Blind' Caesareans cannot be recommended, and the risk of vaginal examination is small if it is performed on the operating table.

With regard to the actual technique of the operation, the majority advise the classical operation, though my own more limited experience would certainly support Marshall (1939) and Macafee (1945) in their advocacy of the lower segment route (see Cameron (1945) and correspondence *B.M.J.*). It is not denied that bleeding can be troublesome in the low operation, and this is perhaps the one case in which a surgeon who has to operate in an emergency, and is unaccustomed to the lower segment operation, should avoid it, though in other hands the advantages of less sepsis and a better scar would justify it. If a small central incision is made, the incision can be extended quickly, and this seems better than trying to control vessels with Bonney's compressor or Green Armytage forceps.

For *accidental haemorrhage* conservative treatment is now usually practised, even for concealed haemorrhage (Gibberd, 1945), though Caesarean section may be considered for the unusual case of severe external bleeding with a living child.

3. *Caesarean section for other maternal or foetal indications.* No attempt is made here to set forth a textbook list of indications for the operation, but only to select a few controversial points for discussion. Fewer operations are now performed for such maternal indications as cardiac disease and toxæmia, but the number of sections for foetal indications has greatly increased, probably to an unwise extent. To put it crudely, it is not always necessary to cut the mother open to achieve a premature delivery. If the patient is a multi-gravida induction is almost invariably preferable. Even in the case of a primigravida, if the pregnancy has reached the 36th week and the cervix is 'ripe,' induction should be chosen unless termination is really urgent. There is sometimes a lack of

consistency in this matter; cases of toxæmia are almost invariably induced as that is customary, whereas section will be suggested for other cases that are no more urgent for either mother or child. To advise Caesarean section to permit sterilization is utterly wrong; unless there is another good reason for the section the sterilization can be done more safely during the puerperium. On the other hand, when urgent termination is required before the 34th week (e.g. for severe toxæmia), particularly in primigravidae, Caesarean section may reasonably be considered.

Many writers have stated that the foetal risk of Caesarean section is higher than that of normal delivery, but this may be questioned. The gross foetal mortality is high because so many Caesarean infants are premature and because so many of the pregnancies are pathological. Between 1931 and 1946, 852 sections were performed at Queen Charlotte's Hospital, with 24 still-births and 52 neonatal deaths, a foetal mortality of 8.9 per cent. But if cases of elective section for disproportion are considered, in which there are no complicating foetal factors, the true foetal mortality due to the operation can be found. There were 361 such cases, with two still-births and nine neonatal deaths; but in four cases the foetus died from gross malformation, so that the foetal mortality due to the operation and anaesthetic was 1.9 per cent. Brandberg (1940) found no foetal death in 115 elective Caesarean sections for 'mechanical reasons.' He also concluded that the mortality for a premature Caesarean infant does not differ from the general mortality of premature infants of the same weight, but it is difficult to be certain of this, as sections are only done in pathological cases. It would, therefore, seem justifiable to operate occasionally for 'bad obstetric history' or elderly primiparity, although each case must be severely judged on its own merits. *Post-maturity* is another matter, and the writer does not believe that section can be justified for this reason alone, particularly as there is no real evidence of placental failure (Masters and Clayton, 1940; Clayton, 1941; Calkins, 1948; Rathburn, 1943).

For cases of *hypertension and albuminuria* requiring termination, induction is usual, but for primiparae who need termination before the 34th week section may be considered as induction is somewhat uncertain, also in the not unusual case of an elderly primigravida with essential hypertension. Section for threatened eclampsia is not recommended; if a fit is thought to be imminent sedative treatment is preferable. In a few cases of albuminuria Caesarean section may be justified if there have been previous foetal deaths.

In *diabetics* premature delivery is essential and Caesarean section is usually recommended, though

in multigravidae induction may be considered unless (as is often the case) the previous delivery was abdominal. Similarly premature delivery is often advised in cases in which there is good reason to suspect *foetal haemolytic disease*, although its value is not established with certainty; in these cases the patient is a multigravida and induction should more often be chosen.

The place of Caesarean section in the management of a primigravida who is found to have an *extended breech presentation* at term has been much discussed. It will be agreed that section should be recommended for the case with some additional complication, including 'elderly primiparity,' but what of the young primipara? The risk to the foetus in full-term uncomplicated breech delivery is at least 11 per cent. (Peel and Clayton, 1948). Yet many breech deliveries are very easy, and if we could only anticipate the difficult cases we should no doubt advise more operations in that group, but there seems to be no certain method of selecting the difficult cases. Radiological pelvimetry should be secured for every case, and section advised if the pelvis is small or of android type. If the pelvis is normal it is still felt that Caesarean section is unwise for the young primigravida, chiefly because of the maternal risk of section, but also because subsequent pregnancies must be considered. (The value of premature induction is not discussed here. In brief, the writer is opposed to wholesale induction because the risks of inertia and prematurity outweigh the advantage of a smaller baby.)

Maternal risk of Caesarean section. In conclusion it may be well to state that the maternal mortality of Caesarean section is still more than 2 per cent. for the country as a whole, though many individual operators have published lower figures. At Queen Charlotte's Hospital between 1931 and 1946, 852 operations were recorded, with 18 maternal deaths (2.1 per cent.). In six of these cases death was chiefly due to pre-existing disease (cardiac disease five cases, Wernicke's encephalopathy one case), and in eight cases death was a direct sequel of the operation (pulmonary embolus one case, ileus three cases, sepsis four cases). In the remaining four cases the part played by the operation was doubtful (cardiac failure one case, placenta praevia one case, uterine

inertia two cases). But with every allowance for preceding disease, the risk of the operation remains at 1 per cent., even in experienced hands. Most of the indications for section are relative and not absolute, and we must always weigh and compare these risks against those of vaginal delivery. The number of Caesarean operations has certainly increased in recent years, and on the whole justifiably, but each extension of surgery in obstetrics must be critically considered.

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