FETAL AND NEONATAL RISKS RELATED TO CESAREAN SECTION*

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IN the past seventy years tremendous strides have been made in the maternal results following cesarean section. Prior to 1882 the maternal mortality was frequently quoted as being 75 per cent or more. Today it has fallen to a small fraction of a per cent. Indeed a recent series[1] of over 2000 consecutive operations has been reported showing a maternal loss of 0.05 per cent, actually slightly less than the death rate following vaginal delivery in the same institution. Lusk,[2] in the first edition of his textbook published in 1882, found it necessary to defend the procedure, which had fallen into such disrepute because of its record of disaster, that it rarely was performed. He pointed out the extremely unfavorable circumstances under which it had been undertaken and felt that the results could be much improved if the procedure was carried out earlier in labor, before rupture of the membranes and not as a last resort in an exhausted and infected patient. He described closure of the classical type of uterine incision with carbolized silk sutures although credit for this surgical innovation is usually given to Sanger[3] who published his report in the same year. In 1887 he performed the second successful cesarean section in New York City in which both mother and child survived, the first having been reported in 1883. In 1888 he reported two more cases so that he must be regarded as the pioneer of the modern operation in this city.

The great change in the maternal outlook has been attained by an appreciation of the relationship of the duration of labor to the development of amniotic sac and uterine infections and that this relationship was accelerated by the presence of ruptured membranes; by improvement in operative technique with the evolution of the lower segment and extraperitoneal operations; by the broad application of antepartum

care and the adoption of radiological methods for estimating the adaptability of the presenting part to the pelvis; and finally during the past decade by the ready availability of suitable blood for replacement purposes; the use of the sulfonamides and, later the antibiotics to minimize and almost eliminate the serious infectious complications; and the development of improved methods of anesthesia. These latter adjuvants to surgery have resulted in a reduction of maternal hazard estimated to be at least tenfold during this latter period. Today the hazards to the mother following such an operation conducted under proper circumstances can be calculated as being only slightly greater than the mortality following vaginal delivery.

With the increased safety of the operation, it is natural to expect the greater frequency with which it is being utilized at the present time and a broadening of the indications for its performance. In 1882 it was carried out strictly in the interests of the fetus, Lusk[2] stating that it was justifiable only in cases of extreme pelvic contraction, when tumors encroached on the pelvic cavity, and in the presence of extreme carcinomatous degeneration of the cervix. Today we find that the fetal indications are greatly extended with a growing tendency to supplant the more difficult and hazardous type of vaginal operations with cesarean section. In addition it is being used to terminate pregnancies in which serious complications exist, in the interest of the mother rather than the fetus. While this trend is justifiable, one cannot escape the conviction that it is being overdone when series of operations are reported with an incidence above 6-7 per cent. In order to attain a rate higher than this, all forms of vaginal procedures must be abandoned and forgotten except for the use of outlet forceps, an operation which in most circumstances is not strictly necessary. With the abandonment of the more difficult vaginal operations, training, knowledge and skill in their use will be lost. They are not always dangerous to both fetus and mother but only when one fails to estimate all the factors involved in the particular situation in which they are applied. Granted that high forceps operations should be discarded, the mid-forceps operation is still a useful procedure and close to 90 per cent of breech presentations can be delivered with relative safety by the vaginal route. We have continued to use mid-forceps procedures in about 2.5 per cent of our deliveries at Bellevue with the loss, directly attributable to the operation, of two fetuses or newborn infants during the past five years.

We still deliver 90 per cent of our breech presentations by the vaginal route; about once a year we have occasion to regret our judgment on this matter. This conservative attitude, which may not be shared by everyone, may account for the fact that the cesarean section rate on the Bellevue service is at present only slightly over 4 per cent.

With these preliminary remarks dealing with the development of the procedure, demonstrating that the maternal risk constitutes a problem that appears to be well on its way to solution, and commenting on present trends, one may well turn to a consideration of the hazards of the fetus delivered by such an operation. Most reports dealing with cesarean section consider the fetal mortality as only a small facet in the problem as a whole. D'Esopo,[4] reporting on 1000 consecutive operations performed between 1912 and 1947, states that the fetus was lost in thirty-seven instances, a fetal mortality of 3.7 per cent which compared favorably with the gross fetal mortality of 3.3 per cent following vaginal delivery during the same period. In only five instances was he able to relate the loss of the fetus to the operative procedure itself. In four instances the operation was carried out too early in the third trimester; on three occasions because of an error in estimating the duration of pregnancy; once in an effort to secure a live infant for a mother who gave a history of repeated intrauterine death of the fetus. In one instance, the fetus was lost because of vascular collapse in the mother during spinal anesthesia. The remainder he attributes to the maternal complications for which the operation was carried out. Dieckmann,[5] reporting from the Chicago Lying-In Hospital between the years 1942 and 1949, showed a neonatal and stillbirth rate following cesarean section of 5.9 per cent as compared with a rate of 2.4 per cent following vaginal delivery. He emphasizes the role which prematurity plays in the higher rate following cesarean section carried out because of a severe maternal complication appearing well before term, and briefly outlines certain measures that can be followed in an effort to reduce this factor.

More recently reports such as those of Landesman[6] and Huber[7] have appeared which devote themselves purely to the fetal and neonatal hazards of the operation. The former, reporting from the New York Lying-In Hospital, finds that the fetal and neonatal loss associated with cesarean section has decreased between 1933 and 1949 but still remains 2.5 times as great as the over-all rate of the institution. He has analyzed

TABLE I—INDICATIONS

A. Maternal		B. Fetal	
Uterine Scar	233	Cephalo-pelvic Disproportion	199
Placenta Previa	58	Breech Presentation	30
Premature Separation of Placenta	14	Other Abnormal Presentations	8
Pre-eclampsia	20	Uterine Inertia	25
Eclampsia	2	Cervical Dystocia	9
Granuloma of Vulva	8	Contraction Ring of Uterus	2
Previous Plastic Operation	7	Premature Separation of Placenta	9
Ruptured Uterus	2	Pelvic Tumor	8
Fibromyomata Uteri	2	Foetal Distress	4
Amniotic Sac Infection with dead		Elderly Primiparae	4
fetus	1	History of Previous Stillbirths	4
		Diabetes	1
	347	Prolapse of Cord	1
		Postmortem Section	1
			303
Miscellaneous		4	
Total		654	

very carefully the factors which underly this difference. In an effort to follow their example, the cesarean sections performed at Bellevue Hospital over a ten year period, 1942 to 1951, have been reviewed with particular emphasis on the fetal and neonatal results.

During this time 654 cesarean sections have been performed. In the earlier part of this period the incidence was about 2 per cent; in the latter it approached or slightly exceeded 4 per cent. Two mothers were lost, one from hemorrhage occurring in a patient with toxemia, and one from cardiac failure. There have been no deaths due to infection. During the ten year period the maternal mortality rate has been 0.3 per cent; over the past five years it has been 0.2 per cent which compares favorably with our over-all rate of about 0.1 per cent. While the indications for these operations were often multiple, it is possible to select the chief indication for which they were performed. These have been listed in Table I dividing them into two groups, dependent upon whether the operation was carried out in the interests of the mother or the fetus. Under the maternal indications are found a large number of secondary operations, the patient usually having had one or more previous cesarean sections, a few of them extensive myomectomies. Since 1948 we have rarely allowed such patients to undergo normal labor. There are found also the various hemorrhagic and

TABLE II

FETAL & NEONATAL DEATHS OPERATIONS PERFORMED FOR MATERNAL INDICATIONS		FETAL & NEONATAL DEATHS OPERATIONS PERFORMED FOR FETAL INDICATIONS	
Uterine Scar	10—4.3%	Cephalo-pelvic Disproportion...	7—3.5%
Placenta Previa	10—17.2%	Breech Presentation	1—3.3%
Premature Separation of		Other Abnormal Presentation...	1—12.5%
Placenta	14—100%	Contraction Ring of Uterus......	2—100%
Pre-eclampsia	4—20%	Elderly Primipara	1—25%
(1 set of twins)		Fetal Distress	1—25%
Eclampsia	1—50%	Postmortem Operation	1—100%
Granuloma of Vulva	1—12.5%		—
Ruptured Uterus	2—100%		14
Amniotic Sac Infection with			
dead fetus	1—100%		
Diabetes	1—100%		
Recent Fracture of Pelvis......	1—100%		
	—		
	45		
FETAL MORTALITY (UNCORRECTED)...... 13%		FETAL MORTALITY (UNCORRECTED)...... 4.6%	

toxemic complications observed in the last trimester of pregnancy. Finally, there is a·group in which, if one excludes the two patients with ruptured uteri, a long range consideration of the patients' interests favored delivery through an abdominal incision. Under the fetal indications cephalo-pelvic disproportion holds high rank, followed by abnormal presentations of the fetus, and abnormalities of the labor mechanism. Contrasting with the complete separations of the placenta classified under the maternal indications and operated upon in the presence of a known stillbirth, are nine instances of partial separation, in all of whom living children were obtained. Finally there is a mixed group in whom delivery through an abdominal incision seemed to favor the chances of the fetus.

As a result of these operations 661 infants were delivered, since among them were found seven pairs of twins. There was a gross fetal mortality of 8.8 per cent, amounting to a loss of fifty-nine including one pair of twins. This is exactly twice our over-all fetal and neonatal mortality which amounts to 4.4 per cent. Correcting both these rates by the elimination of babies or stillbirths weighing under 1500 grams, macerated fetuses, and anomalies incompatible with life, the fetal and

neonatal mortality after cesarean section was found to be 6.3 per cent compared to 3.09 per cent for the service as a whole or still approximately double. Table II shows the fetal and neonatal deaths tabulated in relation to the operative indications. Forty-five of them occurred after cesarean section undertaken in the interest of the mother, a loss of 13 per cent. Only 14 were lost when the operation was performed in the interest of the fetus, a loss of 4.6 per cent. Certain of these categories justify further comment. While the fetal mortality in secondary operations was low, nevertheless the loss of ten fetuses or infants in this group deserves some explanation. Three of these were lost because of prematurity, two because the mother had gone into premature labor, one because of an overestimation of the stage of the pregnancy. One fetus was lost because of a ruptured uterus. In two and possibly more, the type of anesthesia was thought to be a factor. This will be considered later. Seven of the ten fetal or neonatal deaths associated with placenta previa were due to prematurity since circumstances compelled interruption of the pregnancies between twenty-four and thirty-three weeks. One at term was dead before operative intervention was attempted. In one, prolapse of the cord occurred just prior to operation. In the last, maternal shock seemed the likely explanation of the fetal death. The neonatal deaths occurring after operations performed because of pre-eclampsia and eclampsia were due to prematurity; those following rupture of the uterus were due to extrusion of the fetus into the peritoneal cavity and separation of the placenta; the neonatal death in the diabetic was due to hemorrhagic disease of the newborn; the operation in the patient with the recently fractured pelvis was carried out because of the onset of premature labor, the infant dying because of a laceration of the liver and prematurity.

Among the fetal and neonatal deaths, following operations performed for cephalo-pelvic disproportion, were two due to anomalies incompatible with life. Two were due to intracranial injury, in one of which forceps delivery had been attempted. One infant succumbed in the neonatal period to congenital pneumonia. In two, anesthesia appeared to be the important factor. The only fetus lost among the breech presentations showed evidence of embarrassment before the operation was begun. This was also true of a fetus lost in a transverse presentation and of both fetuses in the patients showing contraction rings.

TABLE III—ANESTHESIA

Inhalation Anesthesia		332
approximately one-half cyclopropane-oxygen with or without ether, one half nitrous oxide-oxygen-ether.		
Conduction Anesthesia		
Spinal	285	
Local	35	
		320
Intravenous Anesthesia		2
Resuscitation of the newborn required following:		
(1) inhalation anesthesia		22%
(2) conduction anesthesia		6.8%
(3) intravenous anesthesia		100%

A variety of anesthetic methods were used in these operations, as can be seen in Table III. Almost equal groups were given conduction and inhalation anesthesia, while an intravenous agent was utilized in two instances. Among the patients subjected to inhalation anesthesia approximately one-half were given nitrous oxide, oxygen and ether and one-half cyclopropane, oxygen and ether. Twenty-two per cent of the infants born from operations performed under this type of anesthesia required resuscitation. The proportion requiring resuscitation was slightly greater under cyclopropane, oxygen and ether anesthesia than under nitrous oxide, oxygen and ether, despite the much higher oxygen content of the former. When conduction anesthesia was utilized only 6.8 per cent of the newborn infants required resuscitation. Many patients in both groups had been subjected to labor and to analgesic drugs. However, the difference in the two groups of the reactions of the fetus at birth is striking. Both infants delivered under intravenous anesthesia required resuscitation, an experience which has not encouraged their further use. In addition, there have occurred two long and difficult inductions of anesthesia with nitrous oxide, oxygen and ether in both of which the fetus, apparently normal at the start, was found to be dead at the time of delivery. Another such fatality occurred with deep cyclopropane oxygen anesthesia. Besides these clearcut instances, the use of inhalation anesthesia may have played a part in at least five other fetal or neonatal deaths. In all of these cases the fetus was already compromised by prolonged labor and showed evidence of embarrassment prior to operation. In all fairness, it must be

stated that three unexplained stillbirths were obtained in operations performed under spinal anesthesia. Nevertheless one must conclude that in this group of cases general anesthesia considerably increases the fetal hazard as compared to the results obtained under conduction anesthesia.

After a consideration of the fetal and neonatal mortality occurring in the material presented, it would appear that discussion might be pursued along four distinct lines. One, the hazards to the fetus related to the stage of pregnancy when the operation was performed;[8] two, hazards due to the operation itself; three, hazards due to anesthesia; and finally, remote hazards in a subsequent pregnancy due to the presence of a scar in the uterus.

1. Pregnancy can be interrupted prematurely by cesarean section under two circumstances, (a) in the presence of a serious complication in the prospective mother such as placenta previa; toxemia of pregnancy; diabetes which has proved difficult to control, or (b) the onset of premature labor in a uterus impaired by an old scar. Interruption at the 28th week of pregnancy offers little chance to the fetus of survival. The closer the patient can be carried to term, the greater chance there is of obtaining a living infant. It has been said recently[9] that the care of premature infants has advanced to such a degree that pregnancy can be interrupted at the 32nd week without serious impairment of the fetal prospects. With this statement disagreement must be voiced strongly since it is believed that at least 15 to 20 per cent will be lost who are delivered between the 32nd and 36th week. It has been shown recently by Wellen[10] that the fetal risk in mild toxemia is not increased by allowing the patient to proceed to term. Only when severe pre-eclampsia develops, which may or may not progress into eclampsia, is the fetal risk greatly increased. Early intervention by cesarean section in this latter group of cases is often necessary in the interest of the mother and in disregard of the fetus. In the former group many infants may be saved and, indeed, abdominal delivery avoided altogether by utilizing induced labor, if the mother is allowed to proceed with the pregnancy, under conservative therapy and under close observation. A similar attitude[11] may often be followed in cases of placenta previa. Cesarean section carried out at the first hemorrhage exhibited by patients with this complication will often be done so early in the third trimester that the premature infant will not survive. The

initial hemorrhage of placenta previa is usually not severe and is almost always self limited. Such patients often can be carried on for several weeks without serious blood loss and can be regarded as being perfectly safe as long as they are under close observation with blood replacement available. Interruption as close to term as possible by cesarean section best serves the interest of both mother and fetus. A similar philosophy[12] may be voiced in regard to the severe and poorly controlled diabetic. Once premature labor has begun in a patient who has previously been subjected to cesarean section, intervention cannot be avoided, providing one does not wish to subject the prospective mother to the immediate and remote hazards that a vaginal delivery will sometimes entail. These remarks have to do with operative intervention in pregnancies known to be premature. Another risk is faced by the fetus in elective cesarean section performed before the onset of labor. Here the operation is performed at a date often set far in advance based on the estimated time of labor. An unexpectedly premature infant may be obtained because of error in calculation. It is well in all such patients to check on the size of the fetus and the character of the maternal soft parts. If the patient does not appear to be at term, operation should be postponed. Finally, in any case subjected to cesarean section in which the fetus is premature, pre-operative medication should be avoided and conduction anesthesia is particularly desirable because of the depressive effects of analgesic and anesthetic agents on the respiratory center of the premature.

2. Hazards to the term fetus or newborn infant because of the operation itself probably are negligible. No longer do we see deep incised[13] wounds of the fetus due to an entry through the abdominal wall and uterus performed in a single slash in order to perform the operation with the utmost speed. The hypothesis, most recently propounded by Bloxsom[14] that the fetus is prepared for respiration by the process of labor, and so begins to breathe more readily after normal vaginal delivery than after delivery through an abdominal incision, is no longer tenable. Considerable light has been thrown on the respiratory mechanism of the fetus during the past fifteen years. The existence of respiratory movements in the fetus, first suspected by Ahlfeld[15] has been proved definitely by the experiments on rabbits by Snyder and Rosenfeld[16] and verified in the human by Davis and Potter.[17] Extrauterine respiration, therefore, is but a continuance of the function already in ex-

istence in utero, its different character being in all likelihood due to the change of the media which is being respired. The lung, of course, takes on a much greater functional importance since it takes over the burden of gaseous exchange from the placenta. It has been demonstrated[18] that the fetal blood before the onset of labor is relatively unsaturated with oxygen and even less so after vaginal delivery.[17] In fact the experiments of Snyder and Geiling[19] on rabbits during parturition suggest that the greatly increased proportion of stillbirths obtained after the administration of morphine are due, not to the drug but to the prolongation of labor. The adverse effects of prolonged labor on the human fetus have recently been studied by Corner and his associates[20] who find, in a series of such cases subjected to rigid criteria, that there was a fetal mortality of 18 per cent, 79 per cent of which were due to asphyxia. It seems safe to say that the term infant suffers no greater hazard from abdominal delivery itself than from a short normal labor and certainly less risk than when it is subjected to a protracted labor.

3. Anesthesia in the patient subjected to cesarean section presents a problem quite different from that encountered in the average run of surgical procedures. In addition to the patient herself one must consider the fetus. The respiratory center of the latter, as has been shown experimentally by Rosenfeld and Snyder,[21] and by innumerable reports on clinical human material, is especially vulnerable to analgesic and anesthetic drugs which readily pass the placental barrier. In regard to the barbiturates,[22] there is evidence that they accumulate in the fetus in higher quantities than they do in the mother, indicating that the fetus may be deficient in its capacity to destroy them. All gaseous and volatile anesthetic agents have been shown to depress the fetal respiratory center even when given in a dosage which has no observable effect upon the mother. Slight degrees of anoxemia in the mother, if maintained for thirty or forty minutes, may have a lethal effect on the fetus, already existing under a state of low oxygen tension prior to the onset of labor. Such effects may be produced more frequently and more rapidly if the fetus has been subjected to prolonged labor with ruptured membranes,[19, 20] which from clinical and experimental results would seem to favor the development of an anoxemic state. Nitrous oxide[21] has been demonstrated as being dangerous to the fetus if it is given for any length of time with less than 20 per cent

oxygen. Cyclopropane anesthesia,[23] even with its high proportion of oxygen, results in the delivery of a high percentage of partially asphyxiated babies. This may be related to the strong tonic contraction of the uterus, frequently observed under this anesthesia, which may well interfere with the circulation of maternal blood in the placental sinuses and, therefore, with the gaseous exchange between it and the fetal blood. If carried to the lower planes of stage three before the delivery of the fetus it may result in irreversible fetal respiratory depression. Our fetal results from inhalation anesthesia might well be worse were it not for two factors peculiar to the fetus; one,[24] the absence of a carotid body reflex and, two,[25] a marked resistance to the effects of profound anoxemia. The absence of the former prevents the stimulation of deep respiration by low oxygen tensions and a resultant flooding of the lungs with excessive amounts of amniotic fluid. The presence of the latter prevents the dire effects of deep asphyxia which occur in a few minutes in the adult organism. The former appears within a few weeks after birth; during the same period the capacity for resisting anoxemia rapidly disappears in the infant. If inhalation anesthesia is to be utilized for cesarean section it should not be carried below plane one of stage three and a sine qua non is rapid delivery of the fetus at the earliest possible moment after the anesthesia is commenced.

From the above remarks, it can be readily seen that conduction anesthesia possesses special advantages in the performance of cesarean section since it can in no way directly affect the fetus in utero. The common forms of conduction anesthesia utilized for this operation are local, highly recommended by Beck[26] and, more recently, by Landesman,[6] and spinal anesthesia endorsed by Eastman,[27] Acker et al.[28] and others.[1, 29] Local anesthesia, providing an adequate technique is carried out, is almost absolutely safe as far as the mother is concerned but has the disadvantage that it is a slow and tedious procedure. The limitations of this form of anesthesia consist of those situations which demand a rapid delivery of the fetus and the emotional make-up of the prospective mother. Spinal anesthesia, although involving greater hazards to the mother, is becoming more and more popular. It can be administered quickly and with safety to the mother providing that the position of the patient is kept in mind, and that the blood pressure is observed constantly. Any tendency to hypotension, which may have

disastrous effects on the fetus, can be effectively counteracted by the use of vasopressor drugs such as ephedrine or neosynephrine. However, spinal anesthesia has definite limitations. It carries added risks when utilized in patients with a history of neurological disease or evidence of syphilis; in patients with severe hypertension or hypotension; in those exhibiting very severe degrees of anemia; or when any infectious condition is present on the skin of the back. As in the case of local anesthesia, emotional antagonism on the part of the patient may prevent its use.

In neither of these forms of conduction anesthesia is it necessary to obtain long periods of action since inhalation anesthesia may be safely superimposed once the fetus is delivered. Before this has been accomplished, certain observers[28] believe that the administration of oxygen to the mother may be helpful to the fetus. All that has been said previously becomes of special importance when the fetus about to be delivered is premature.

Conduction anesthesia, in some form, would appear to be much more favorable to the fetus than inhalation anesthesia. It can be used safely in the large majority of instances and is highly regarded on the Bellevue service, though the figures presented on our tables do not convey this impression. Inhalation anesthesia should be reserved for a small group of patients, presenting special indications, and given with care, skill and understanding. It is a little difficult to understand the remark of Dieckmann[5] who has utilized spinal anesthesia at the Chicago Lying-In Hospital very successfully, that he would prefer nitrous oxide, oxygen and ether if competent anesthetists were available. It would seem even more important to have a competent anesthetist available for spinal anesthesia, which while safe for the fetus, may present greater risks to the mother.

4. Once a patient has been subjected to cesarean section she presents a special risk to the fetus in any subsequent pregnancy—that of rupture of the uterus. This accident often entails the loss of the fetus, may result in uterine injury sufficient to require removal of the uterus and sometimes results in a maternal death. Its possibility should be the main reason for combating the unrestricted widening and relaxation of the indications for performance of the operation. Parenthetically it can be stated that an unrestricted cesarean rate[1] will undoubtedly result in a greatly lowered fetal mortality after the cesarean section since many

more babies will be delivered by this method who also could have been safely delivered by the vaginal route. A somewhat extreme instance can be quoted of a young woman who had an adequate pelvis who was delivered by cesarean section after a few hours of labor because she had a breech presentation. The infant proved to have an incapacitating congenital anomaly of the heart and was given a poor prognosis. In her next pregnancy she ruptured her uterus at the eighth month resulting in a stillbirth and such extensive uterine injury that hysterectomy was necessary. Brierton,[30] in recent study of the material at five New York hospitals found that about 3 per cent of such patients will rupture their scars, some before the onset, but the majority after the onset of labor. This accident is twice as common with classical scars as compared with those in the lower segment of the uterus. The fetal and neonatal mortality was 46 per cent, the maternal mortality 3.8 per cent. Since the maternal risks of cesarean section have been reduced so strikingly of late years, it is believed that all patients, once subjected to cesarean, should be delivered in subsequent pregnancies by such operation. Such a policy should reduce both the maternal and fetal hazards which the presence of a uterine scar entails. So far as the fetus is concerned, an occasional operation will have to be performed because of the onset of premature labor; since these operations are commonly performed electively, an occasional premature fetus will be delivered unexpectedly unless extreme care is used; and finally all risk cannot be removed since in a minority of instances rupture takes place unexpectedly before the onset of labor. This policy is becoming more and more common. It was adopted on the Bellevue service following the occurrence of the tragic case outlined previously. Since that time 176 secondary operations have been performed with the discovery of seven ruptures of the uterus, four of them incomplete, a peritoneal window being present; an incidence of 4 per cent. No fetal deaths have occurred as a result of rupture and no uteri were sacrificed. All the mothers recovered uneventfully. During this period an occasional patient in this category was delivered vaginally because of the lateness of her arrival at the hospital. In a hospital[31] where this policy is not being followed, two such cases have been reported recently; the patients, upon being allowed to go into labor, ruptured their uteri, resulting in the loss of one fetus. Furthermore, the injury was so extensive that hysterectomies were necessary in both cases. The patients recovered uneventfully.

CONCLUSIONS

I. Fetal and neonatal mortality associated with cesarean section will remain higher than that associated with vaginal delivery providing strict indications are followed for the performance of the operation.

II. Fetal and neonatal mortality can be (a) diluted or artificially reduced by an unrestrained use of the operation, or (b) actually reduced by

(1) carrying the prospective mother as close to term as is compatible with her safety;

(2) by adequate and efficient care of the premature infants born of many of these patients;

(3) the avoidance of excessively long trial labors, and over-vigorous attempts at instrumental delivery in the presence of obvious obstacles;

(4) the intelligent use of anesthesia with proper regard to the fetus, particularly when premature or already showing evidence of embarrassment;

(5) the availability in the operating room of adequate instruments for resuscitation and individuals adept in their use;

(6) the diminution of the hazards entailed by the presence of a uterine scar by

(a) the avoidance of unnecessary primary operations;

(b) by delivering cases subjected to cesarean by a similar operation, preferably elective, in subsequent pregnancies.

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SUBSCRIPTION TO THE ACADEMY FOLDER

OCTOBER TO MAY 1952-53

The Folder of the Academy, listing meetings held during the academic year, will be mailed without request to all Fellows of the Academy residing within fifty miles of the Academy.

The Folder will also be mailed upon request and without charge to medical schools and hospitals within fifty miles of the Academy.

The Folder will be sent to other organizations and individuals at a subscription rate of $1.00 for the current academic year.