Fetal Mortality in Placenta Previa

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THERE IS GOOD REASON to review the treatment of placenta previa. This complication constitutes a major obstetric hazard. Among the dangers are severe hemorrhage, major surgery with its attendant complications, high fetal mortality, and intrauterine hypoxia capable of producing permanent central nervous system damage.

To counteract these risks, there are several weapons at our disposal: early hospitalization for diagnosis, new x-ray technics for diagnostic aid, adequate and efficient blood transfusion, and safer cesarean section. In addition, investigators have shown that under certain conditions it is possible to increase fetal salvage by delaying delivery until the fetus gains needed maturity.

To study these problems, a representative series of recent cases treated in a single institution are analyzed.

MATERIAL

In the 6-year period ending June 30, 1953, 213 cases of proved placenta previa were encountered at the Los Angeles County General Hospital. Proved placenta previa is defined here as including only those cases where the placental location could be demonstrated by vaginal examination prior to delivery or by direct observation at the time of surgery. Omitted from this group are all patients in whom the diagnosis could only be inferred from circumstantial evidence. Excluded, then, are patients with vaginal bleeding delivered before vaginal examination was made, patients in whom for any reason the examiner did not reach a placental edge, and those cases in which a marginal hole in the membranes suggested low implantation.

Fifty-five per cent of the patients who delivered were Caucasian and 45 per cent were Negro, conforming to the racial distribution found on this service. The average age was 27.5 years and the average parity 3. Less than 10 per cent of the patients were nulliparous.

During this period there were 48,143 deliveries and 213 cases of placenta previa. The incidence of placenta previa was 1 to every 226 deliveries. The true incidence must be somewhat higher because of the restrictions placed on diagnostic criteria in this series.

The location of the placenta was as follows: Total (covering entire internal cervical os) 87; partial (covering part of internal cervical os) 46; marginal (extending to edge of internal cervical os) 70; lateral (palpable by vaginal examination but not extending to os) 10. This division is arbitrary in that the location of the placenta in each patient depends on the examiner's interpretation of what was felt or seen. As judged from experience, there is a considerable error in vaginal examination. Few cases were classed as lateral previa, perhaps due to inexact differentiation between marginal and lateral previa. The division is not important because marginal and lateral previa present the same clinical problem.

There were 159 cesarean sections and 54 vaginal deliveries, illustrating the importance of operative delivery as a subject for analysis.

Two complications frequently associated

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with placenta previa are abruptio placentae and transverse lie. There were 21 cases of abruptio placentae and 26 cases of transverse lie.

It is felt by some observers that progressive dilatation of the cervix can expose an increasing area of the placenta beyond the edge of the cervical rim. This was not observed in 54 vaginal deliveries. In those patients in whom repeated vaginal examinations were conducted during labor, the edge of the palpable placenta disappeared behind the advancing head.

A diagnosis of placenta previa is said by some to contraindicate the use of pituitary extract. Consequently, experience with the use of this drug is limited to 5 patients receiving an infusion of intravenous Pitocin. A surviving liveborn infant was delivered to each of the 5 and none had excessive postpartum bleeding.

DIAGNOSIS

Two methods of confirming a suspected diagnosis of placenta previa were x-ray placentography and vaginal examination.

Placentography

Placentography was most often selected for a premature group not suitable for immediate delivery. It was felt that vaginal examination might precipitate hemorrhage sufficient to force termination of the pregnancy. Using soft-tissue technic, the placental shadow was located by means of lateral, anteroposterior, and, when necessary, oblique views. In 83 cases subsequently proved to be placenta previa the placental locations are listed in Table 1.

It can be seen from these figures that while there is a certain amount of error, this technic constitutes a valuable diagnostic test. Satisfactory films located the placenta in the lower uterine segment in over 90 per cent of the proved cases.

Two drawbacks to placentography are: (1) The test is less accurate in the earlier months of pregnancy when it is most needed. (2) It does not differentiate between low-lying placenta and the various gradations of placenta previa. For this reason operative delivery is not justified because of an unsupported x-ray diagnosis.

TABLE 1. PLACENTAL LOCATIONS

	%
Lower uterine segment	88
Not in lower uterine segment	7
Unsatisfactory films	5

Vaginal Examination

Vaginal examination to confirm diagnosis was used in 187 cases. In keeping with accepted standards of practice, all examinations were conducted in the hospital. Unless circumstances made delay impossible, examination was deferred until at least 1000 cc. of whole blood was available for immediate transfusion. Ideally, examinations were made in an operating room prepared for laparotomy. Less ideally, some patients were examined fully draped in a delivery room. Experience demonstrated that any deviation from the ideal exposed the patient to the risk of additional hemorrhage. The accuracy of initial vaginal examination is shown in Table 2.

TABLE 2. ACCURACY OF EXAMINATION

	%
Placenta correctly located	62
Placenta felt but not accurately located	7
Equivocal	7
Placenta not felt	24

It was surprising to observe that the error of examination was so great. In a number of cases 3 examinations were made before a placenta was felt.

There are several possible explanations for this margin of error in vaginal examina-

tion. Some patients were first examined at a stage of pregnancy when the lower uterine segment was not well developed and not easily examined. Frequently the examiner was (not without reason) overcautious to the extent of not being thorough. At times it was difficult to distinguish between placenta, blood clot, and the irregularities of a soft cervix. On occasion the cervix was long, firm, and tightly closed. When the presenting part was floating, it was not always easy to palpate an intervening soft-tissue mass through the lower uterine segment.

If failure to diagnose by vaginal examination is to be charged to inexperience, it is pertinent to observe that the relative infrequency of placenta previa does not permit many physicians to familiarize themselves with its various vaginal findings. One must conclude that a single vaginal examination does not always rule out the diagnosis.

Pelvic Examination

Pelvic examination can initiate hemorrhage sufficient to jeopardize the infant or force an immediate termination of the pregnancy. Such hemorrhage occurred in 10 patients in this series. There were 4 neonatal deaths (1134, 1531, 1814, and 1985 Gm.).

If pelvic examination is deferred, an occasional patient may be unnecessarily hospitalized with an incorrect tenative diagnosis of placenta previa. During the period studied, 6 patients with third trimester bleeding due to low implantation of the placenta were hospitalized for periods of 1 to 3 weeks. Ultimately they were discharged, undelivered. All subsequently delivered vaginally at term without any further bleeding episodes.

MATERNAL MORBIDITY

There were no maternal deaths in this series. However, that there are well-defined maternal risks is illustrated by the following statistics: (1) 27 per cent of the patients sustained sufficient blood loss to require 2000 cc. or more blood replacement. (2) 7 per cent were at one time in clinical shock. (3) 76 per cent required delivery by cesarean section. Table 3 lists complications seen.

TABLE 3. COMPLICATIONS IN CESAREAN SECTION

	No.
Endometritis and parametritis	3
Schizophrenia	3
Superficial wound separation	2
Incisional hernia	2
Pyelitis	1
Wound evisceration	1
Wound abscess	1
Thrombophlebitis	1
Serum hepatitis	1
Bladder laceration	1

Bleeding from the placental site required additional procedures (Table 4).

TABLE 4. PROCEDURES FOR PLACENTAL BLEEDING

	No.
Uterine pack	4
Subtotal hysterectomy	3
Sutures, lower uterine segment	3
Oxytocics and transfusion	1

FACTORS CONTRIBUTING TO FETAL MORTALITY

Because of the availability of blood transfusion and safer operative procedures that greatly reduce maternal risk, our attention is increasingly directed toward the problem of fetal mortality, which has always been high. In this series there were 53 deaths, a rate of 24.9 per cent. To clarify the reasons for fetal demise, the probable contributory factors are analyzed.

Prematurity

As might be expected, prematurity di-

TABLE 5. FETAL MORTALITY

	No. live	*No. dead*	*% mortality*
2523 Gm. or more	94	13	12
1616 Gm. to 2495 Gm.	53	14	21
1162 Gm. to 1588 Gm.	12	14	54
1134 Gm. or less	1	12	94

rectly influenced fetal survival. Table 5 illustrates the correlation between prematurity (as measured by weight) and fetal mortality.

Hemorrhage

The influence of hemorrhage on fetal death may be measured 2 ways, by the number of bleeding episodes and by the total blood loss. There was no causal relationship between the number of bleeding episodes and the mortality rate (Table 6). On the

TABLE 6. BLEEDING AND MORTALITY

No. episodes	*Fetal mortality, %*
0	25
1 or 2	26
3 or 4	22
5 or more	25

other hand, total blood loss, as measured by blood replacement, can be related to fetal survival. Fetal death was accompanied by a greater blood loss, being 420 cc. more for cesarean section and 850 cc. more for vaginal delivery. Among 53 fetal deaths, 23 were associated with major hemorrhage, which in itself could easily have accounted for fetal demise. In short, it is the quantity of blood loss, not the frequency of bleeding, which is the important consideration.

Type of Placenta Previa

Bearing in mind that the classification of placenta previa is not always exact, the mortality rates were as follows: central 24 per cent, partial 17.4 per cent, marginal 30 per cent, and lateral 30 per cent.

Method of Delivery

Table 7 correlates fetal mortality with the method of delivery.

As the figures of the table suggest, cesarean section was the method of choice for delivery in central and partial previa. In order to avoid operation, a few dead or previable infants were delivered vaginally. In addition, 4 viable, living infants in the 3½- to 5½-lb.

TABLE 7. DELIVERY AND MORTALITY

	Section		*Vaginal delivery*	
	No. cases	*Mortality, %*	*No. cases*	*Mortality, %*
Central	85	22.4	2	100
Partial	38	10.5	8	50
Marginal	34	26.6	36	33
Lateral	2	50.0	8	25

group were electively delivered vaginally past a partial placenta previa. All survived.

The best opportunity to compare section with vaginal delivery is in marginal placenta previa. The figures show a slight advantage for cesarean section. This advantage is offset by the fact that these babies were larger (2155 Gm. to 1446 Gm.) and by the fact that there had been a smaller antepartum blood loss in the cesarean section group (820 to 1450 cc.). It is fair to say that section does not offer a clear-cut superiority when vaginal delivery is judged possible.

Anesthesia

The influence of anesthesia on fetal mortality is difficult to evaluate. General anesthesia, capable of depressing the fetus, could conceivably be a deciding factor when the infant is premature or affected by the preceding blood loss. To measure this possible effect, the 2 principle anesthetic agents used for cesarean section in this series are compared. Cyclopropane was frequently chosen as the primary anesthetic in the belief that it protects the maternal vascular system against the effects of the major blood loss characteristic of placenta previa. Fetal mortality following cyclopropane was 30.3 per cent. When spinal anesthesia was selected the mortality dropped to 9.2 per cent.

It should be noted, however, that cyclopropane was usually employed in instances of greater blood loss. Therefore, it is difficult to separate the influence of hemorrhage and the influence of the anesthetic. On the other hand, all neonatal deaths occurring in term infants followed the use of cyclopropane.

MISCELLANEOUS

Death was ascribed to the effects of anoxia or prematurity in all but 3 cases. There was 1 congenital abnormality, hydrocephalus. In 1 baby intestinal obstruction was suspected but not proved. In another death was due to amnionitis following ruptured membranes.

Other possible factors were compression of a suspected low-lying cord and excessive blood loss from the fetal side of the circulation. Long-range effects of fetal hypoxia are not yet possible to evaluate. An efficient premature infant nursery significantly influences fetal survival.

DELAYED DELIVERY

A major problem in the treatment of placenta previa is the selection of the optimal time for delivery. Prematurity increases fetal mortality. It is, therefore, of vital importance to know whether the interests of the child will be best served by immediate delivery, or by a delay designed to gain additional maturity.

It has been postulated that the initial hemorrhage of placenta previa is almost never fatal, justifying observation of these patients under conrolled conditions for long periods, replacing blood loss as it occurs, until a time more favorable to the fetus is reached. If this concept is to be useful, it is necessary to know when delay can and should be attempted and when it is better abandoned.

In this series 104 cases were terminated immediately and 109 after varying periods of delay. This experience led to several conclusions.

Death from Delay

There were no maternal deaths as a result of delay. However, severe hemorrhage did occur in some patients, enough to precipitate shock and antepartum fetal death.

Effect of Delay

The policy of delay will be effective in a limited number of cases only and for a limited period of time. Hemorrhage, labor, and other factors can force delivery prior to an elected date. In 109 cases considered suitable for delayed delivery, termination became necessary (Table 8). In all it was possible to effect delay of 2 weeks or more in only 15 patients, and a lesser delay (which may have benefited the fetus) in 14 others.

TABLE 8. REASON FOR TERMINATION

	No.
Elective	30
Significant hemorrhage (7 followed pelvic exam.)	49
Labor	20
Toxemia	8
Other	2

Benefit of Delay

The benefits from delay after diagnosis varied according to the stage of pregnancy. Less benefit resulted in those approaching term. To study this the infants are grouped according to maturity. Since menstrual dates were none too accurate, the infants are divided by birth weight into groups which roughly correspond to the last 4 lunar months of pregnancy. In order to properly classify each, it was necessary in a few instances to calculate the weight of the infant in utero from a subsequent birth weight at a later date.

TABLE 9. FETAL WEIGHT 1134 GM. OR LESS

	Total	*Still-born*	*Neonatal death*	*Mortality, %*
Immediate termination	8	2	6	100
Delayed termination	9	3	2	55.5

This group of smallest infants (Table 9) were either immature or at the borderline of viability. It is logical to think that delivery should be delayed whenever possible. In 8 cases terminated immediately, delay was not

possible because of labor (6) or severe hemorrhage (2). Mortality was 100 per cent. In the remaining 9 cases it was possible to gain some delay, salvaging 4 of the 9 infants. One delivery was delayed 90 days. The other delays were for shorter periods (5 to 16 days), but the birth weights of the surviving infants (1049 Gm. to 1219 Gm.) suggest that even these short periods of time may be decisive.

TABLE 10. FETAL WEIGHT 1162 GM. TO 1588 GM.

	Total	*Still-born*	*Neonatal death*	*Mortality, %*
Immediate termination	10	1	7	80
Delayed termination	15	1	4	33

The experience with this group (Table 10) is similar to that with smaller infants. However, the results are modified by 2 factors. First, the 10 terminated immediately represent a less-favorable group. Four infants were, when first seen, seriously compromised by abruptio placenta or maternal shock. Of the remaining 6, 3 patients were in labor and their infants did not survive, 3 were terminated electively, and 2 infants survived. Second, the period of time of delay was too short (24 hours or less) to be of significance in 50 per cent of the delayed group. The fetal deaths in these were associated with toxemia (2 cases) and major hemorrhage occurring during the waiting period (2 cases).

TABLE 11. FETAL WEIGHT 1616 GM. TO 2495 GM.

	Total	*Still-born*	*Neonatal death*	*Mortality, %*
Immediate termination	33	2	4	18.2
Delayed termination	43	1	8	20.9

In this group (Table 11) if the diagnosis of placenta previa was made during the ninth lunar month of pregnancy, mortality rates were practically identical in both the immediate and delayed group. Perhaps no advantage lay with either course of action but it must be remembered that the immediate group is forced to absorb those instances in which the fetus was dead or seriously compromised at the time of diagnosis (2 known dead, 2 severe maternal hemorrhage and shock). If these 4 cases are eliminated, 25 out of 27 infants survived. When delivery was delayed, all infants were initially in good condition. Nine subsequently died. Death was due to abruption (2), maternal hemorrhage and shock (2), probable cord compression (1), maternal hemorrhage of 500 cc. or more (3), and transverse lie (1). A significant delay had been achieved in 2 of the 9 fatal cases (12 and 20 days).

TABLE 12. FETAL WEIGHT OVER 2495 GM.

	Total	*Still-born*	*Neonatal death*	*Mortality, %*
Immediate delivery	53	3	4	13.2
Delayed delivery	42	4	1	11.9

The same observations hold true for term-sized infants (Table 12) as in the preceding group. Again, immediate termination was selected for a less-favorable group, which included 3 patients with a dead fetus in utero on admission as a result of antecedent hemorrhage. Each of 4 neonatal deaths was associated with cyclopropane anesthesia. Blood loss was excessive in 1 of these 4 cases. The possible contributory influence of cyclopropane to these deaths has been mentioned.

In 42 instances, the delivery of a term-sized infant was delayed. Since these infants were not premature, a delay would be reasonable only if no risk was involved. Significant hemorrhage in the delay period in 20 cases (which was responsible for 2 stillbirths) points to a real danger. The remaining stillbirths were due to amnionitis (1) and

severe maternal toxemia (1). One neonatal death followed the use of cyclopropane.

DISCUSSION

The management of placenta previa is a difficult problem. A complexity of factors create some maternal and considerable fetal risk. The attending physician is permitted little margin of error. At the time when the diagnosis has been reasonably well established, 1 of 3 general situations can exist.

In the first, immediate delivery is mandatory, because of the spontaneous onset of labor, abruption, or hemorrhage of great magnitude. Here, the only problem is to select the proper method of delivery. The influence of methods of delivery on fetal survival has been discussed.

In the second situation, the presence of a term-sized infant makes the continuation of pregnancy unnecessary. If there is nothing to be gained in fetal maturity, then it is not rational to delay delivery in the face of the risk of subsequent hemorrhage. This subject has been discussed in the section on treatment of infants weighing over 5½ lb. It was noted that recurring hemorrhage in the delay period was frequent.

In the third situation, there is a choice of action. Delivery might be delayed to the advantage of a premature infant and can be delayed because the crisis of either labor or hemorrhage is not operative at that time. It is in this situation that the potential hazards must be thoroughly evaluated and superior judgment exercised.

When a choice of action is available, the most vital factor is the selection of the proper time for delivery. A decision must be made. Should delivery be immediate, or can it be further delayed, subject to the course of future events? Which action gives the best chance to the infant? When is delay, with its attendant financial drain, justified?

Two equivalent groups of patients are compared. These groups were treated in the same institution during the same period of time by the same group of doctors. In one group are all patients for whom pregnancy was terminated immediately, whether by choice or necessity. In the second group are all patients whose delivery was electively delayed. Because prematurity influences survival rates significantly, the 2 groups are subdivided by fetal weight to correspond, approximately, to the last 4 lunar months of pregnancy. The results of this comparison are set down in some detail and the following conclusions drawn:

1. Very small infants are definitely benefited by any delay which increases their maturity.

2. The point at which the benefit of delay becomes optimal is before the attainment of fetal maturity. In our hands infants as small as 1588 Gm. were, on the average, as well off when delivery was immediate as when delivery was delayed.

3. If delivery is delayed, hemorrhage is the principal contributor to fetal death.

SUMMARY

Two hundred thirteen cases of placenta previa are reviewed. The factors which contribute to fetal mortality are analyzed in detail.

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