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THE ROLE OF CESAREAN SECTION IN THE TREATMENT OF PREMATURE SEPARATION OF THE NORMALLY IMPLANTED PLACENTA*

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IN 1870 Goodell¹ laid down as the principles of treatment for premature separation of the normally implanted placenta the dictum of Theodore Mayern that the uterus should be evacuated as soon as possible ("Praestantissimum remedium est foetus extractio"). Cesarean section has always appealed to the obstetrician as the most effective and rapid method of accomplishing this end. In the early days, however, patients were brought to the hospital after many hours of labor and in a state of shock so that all of the earlier writers reported high mortality rates for cesarean section, as opposed to the vaginal method of delivery.

During recent years many factors have combined to reduce the dangers of cesarean section. The most important of these is the adoption of a carefully individualized anesthesia, given by the most skilled anesthetists available. Of equal importance is also the modern attitude toward operation in shock. It has been found that prompt and repeated transfusions can place an otherwise desperate patient in satisfactory condition to withstand operation.

In 1870 Goodell wrote "by far the most frequent symptom is an alarming state of collapse." This is not true today for there are many communities, in which my own is included, where prenatal care is all

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but universally given by physicians who are well acquainted with the danger signs of bleeding in the last trimester of pregnancy. In my community, as in many others, hospitalization of obstetric patients is practically universal, and transportation to the hospital is quickly accomplished. In 1890 Holmes² wrote, "Cesarean section will be of value in selected cases, but never will be popular, for the conditions and surroundings favoring celiotomy will seldom be at hand." This is no longer true in my community.

Notwithstanding recent papers by DeNormandie,³ McGlinn and Harer,⁴ Falls,⁵ Montgomery,⁶ and Stander,⁷ we find that Irving,⁸ and Holmes,⁹ as late as 1937 and 1940, respectively, considered cesarean section as a dangerous method of delivery compared with the vaginal methods, and voiced the opinion that hysterectomy in such cases greatly increases the mortality. Holmes quotes Irving's tables showing 4.9 per cent mortality for the conservative type treatment as against 16.8 per cent mortality for cesarean section, and Irving in his review of the subject gives a mortality of 2.9 per cent for conservative as against 14.5 per cent for the cesarean method. Irving further states that since giving up the use of cesarean sections for this purpose at the Boston Lying-in Hospital there has been only one death since 1931. He quotes DeSnoo who gives 6 per cent mortality for the conservative treatment as against 33 per cent for the more radical method in cases where the placenta has about half separated.

I wish to protest against such use of mortality figures. This is not justified for two reasons: First, no account has been taken of improvement in the matter of transfusions and anesthesia; and second, it is obvious that cesarean sections, and especially hysterectomies, were done in the more serious type of case. Comparing such operative mortalities with those of the vaginal deliveries, where many cases of minor degree are included, is a fundamental statistical error. We have learned from studies of the end results of cancer treatment that we must compare groups of cases which, at the beginning of treatment, have arrived at similar stages of the disease, otherwise the comparisons of the results of one clinic with another are quite meaningless. The same holds true in this discussion.

The attitude of obstetricians at the Hartford Hospital is in line with that advocated by McGlinn and Harer,⁴ which is briefly as follows: Delivery by the vaginal route is warranted only when delivery is actually immediately impending or may be promptly accomplished by use of an obstetrical maneuver. In all other cases cesarean section is indicated. Stander⁷ puts it as follows: "most cases . . . except those in which the cervix is dilated and delivery can be quickly accomplished should be subjected to cesarean section." As will be seen from the various tables which follow, death of the fetus is not considered a contraindication to cesarean section. We believe that cesarean section is best used very early, as soon as the diagnosis is made, before the condition of the patient and of the uterus has become grave and if possible before the baby has died.

It is obvious that clinics where most of the patients are brought in late in labor, and in bad condition, have been prejudiced against cesarean section and in favor of vaginal methods. Teachers of obstetrics who are preparing practitioners for home deliveries will accent those maneuvers which the practitioner must know how to perform in the absence of ideal surroundings. We believe, however, that the deliberate choice of the vaginal method of delivery early in labor and where ideal surroundings are present is justified neither by our clinical experience nor by our understanding of the progressively malignant process which is going on in the uterus.

MATERIAL

The present review is a study of 120 cases which have been found on careful search of the records of the Hartford Hospital from Oct. 1, 1916, to Oct. 1, 1940. These dates were chosen because my experience in the hospital covered this period and my previous studies of hospital histories have been made on admissions since 1916. In all fairness it should be said at the outset that one death following cesarean section done for premature separation of the placenta is recorded in the year 1914. This is the only such death in the hospital's cesarean section experience. The patient was severely toxic, was operated upon by an interne under staff supervision, while in shock, with gas-oxygen-ether anesthesia. Both the mother and baby died, the mother surviving the operation by two hours. Prior to 1916 adequate records do not permit statistical study in this field. During the years covered by this study, hospital deliveries increased from 985 to 2,371 per year. Eleven hundred and sixty-two cesarean sections were performed from 1927 to 1940: 4.6 per cent for placenta previa and 4.7 per cent for premature separation of the placenta. During the last nine years the incidence of cesarean section for the whole clinic was 5.0 per cent, and the mortalities for 883 cesarean sections was 0.68 per cent. Since the last death after cesarean section, there have been, up to Oct. 1, 1940, 332 consecutive cesarean sections without a death. It will be appreciated, therefore, that cesarean section is done on very liberal indications. While it is undoubtedly true that some of the cesarean sections done for premature separation might have been avoided in favor of vaginal delivery, adverse criticism cannot be based on our mortality record.

Table I is a synopsis of the individual case histories. It will be noted from the hospital history serial numbers that the use of cesarean section, especially in the more serious cases, is a development of the more recent years. It will be noted that very few such diagnoses were made prior to 1926, the histories of which period are numbered below 200,000. For the years prior to 1926 all cases which had cesarean sections are listed, whereas it is probable that many of the milder cases delivered by the vaginal route failed to be included. The omission of these cases prior to 1926 does not materially change the enumerations. This table arranges the cases in what we believe to be the order of their severity, giving primary consideration to the estimate of the degree of separation. The scale of one to four is used in which one is the least and four the greatest. The secondary items of arrangement concern the estimated blood loss, shock, the degree of rigidity, and in cesarean section cases the degree of apoplexy. In the absence of such accurate data as those

TABLE I*

CESAREAN SECTIONS (59)											VAGINAL DELIVERIES (61)										
HISTORY NUMBER	SEPARATION	BLOOD LOSS	SHOCK	RIGIDITY	APOPLEXY	TOXEMIA	BABY	AGE	GRAVIDA	PARA	HISTORY NUMBER	SEPARATION	BLOOD LOSS	SHOCK	RIGIDITY	TOXEMIA	BABY	AGE	GRAVIDA	PARA	
302973	4	3	4	0	3	0	SB	23	1	0	198796	4	4	4	4	0	SB	34	2	1	
275539	4	3	3	3	4	0	SB	18	1	0	380959	4	3	1	3	0	SB	39	7	4	
395456	4	3	3	3	4	0	SB	25	1	0	206764	4	2	1	2	0	SB	18	1	0	
350751	4	3	3	4	2	3	SB	40	13	10	238126	4	2	0	4	ECL	SB	35	3	0	
334078	4	3	3	4	1	0	SB	36	3	2	373128	4	2	0	0	1	SB	30	3	0	
301501	4	3	2	0	3	2	SB	33	2	1	349719	4	2	0	0	3	SB	18	1	0	
338648	4	3	0	4	2	3	SB	41	6	3	368412	4	1	0	0	0	SB	23	1	0	
330660	4	3	0	4	2	0	SB	31	3	2	220077	3	3	0	3	0	SB	34	4	3	
209568	4	2	0	4	2	2	SB	37	5	4	393541	3	2	0	0	0	SB	33	3	2	
367329	4	2	0	4	2	2	SB	30	1	0	200050	3	2	0	0	0	NN	30	6	5	
336836	4	2	0	4	2	0	SB	28	3	2	236883	3	1	0	4	4	SB	37	7	4	
266185	4	2	0	4	1	0	SB	32	3	2	238131	2	3	0	2	0	SB	37	9	4	
345707	3	3	2	4	2	0	SB	27	2	1	374116	2	2	0	0	0	L	22	1	0	
301516	3	3	2	0	2	1	SB	25	1	0	293360	2	2	0	0	0	L	28	3	2	
190241	3	3	0	4	3	0	SB	43	10	8	219135	2	2	0	0	0	SB	31	6	5	
309093	3	2	0	3	0	0	SB	27	3	2	356988	2	1	0	2	0	L	24	3	2	
251247	3	2	0	3	0	0	SB	37	4	3	348922	2	1	0	0	ECL	SB	26	1	0	
337193	3	2	0	2	2	0	SB	38	1	0	345403	1	3	0	0	0	L	22	1	0	
321980	3	2	0	0	1	0	SB	36	3	2	369983	1	2	0	0	0	L	29	1	0	
284842	2	3	2	4	0	4	L	32	7	5	395806	1	2	0	0	0	L	31	2	1	
271346	2	3	0	1	2	0	SB	21	3	2	328296	1	2	0	0	0	L	28	2	1	
397032	2	2	2	0	2	1	SB	36	7	4	325741	1	2	0	0	4	L	30	4	3	
353462	2	2	1	4	2	0	L	31	1	0	328931	1	2	0	0	0	L	35	3	2	
212284	2	2	1	4	4	0	L	26	1	0	314126	1	1	0	0	2	L	36	1	0	
274529	2	2	0	3	2	1	L	33	2	0	271127	1	1	0	0	2	L	22	1	0	
379874	2	2	0	2	0	0	L	38	3	4	373517	1	1	0	0	0	L	31	1	0	

275004	2	2	0	2	0	0	L	27	3	2	220807	1	1	0	0	0	NN	27	4	3?	
370781	2	2	0	1	?	0	L	30	1	0	286634	1	1	0	0	0	SB	25	1	0	
331515	2	2	0	0	1	2	L	26	1	0	300255	1	1	0	0	0	SB	30	1	0	
378021	2	2	0	0	0	0	L	37	2	1	218511	1	1	0	0	0	L	25	2	1	
255706	2	2	0	0	0	0	NN	21	1	0	234491	1	1	0	0	0	L	25	2	1	
331855	2	2	0	?	2	0	L	32	2	1	356954	1	1	0	0	0	L	32	2	1	
241144	2	2	0	?	1	0	L	26	1	0	373368	1	1	0	0	0	L	35	2	1	
173384	2	2	0	?	0	1	L	30	1	0	346340	1	1	0	0	0	L	31	2	1	
393804	2	1	0	2	2	3	L	25	3	2	242244	1	1	0	0	0	L	21	1	0	
349193	2	1	0	0	1	0	L	23	1	0	313899	1	1	0	0	0	L	30	4	3	
358600	2	1	0	0	0	0	L	32	5	1	239463	1	1	0	0	0	L	29	3	2	
366943	1	2	2	0	0	0	SB	36	3	2	354334	1	1	0	0	3	L	24	1	0	
311567	1	2	0	2	2	0	L	25	1	0	260996	1	1	0	0	3	L	36	2	1	
320741	1	2	0	0	2	0	L	27	1	0	393520	1	1	0	0	0	L	33	1?	0	
100164	1	2	0	0	0	0	L	28	1	0	393135	1	1	0	0	0	L	24	1	0	
226279	1	2	0	0	0	0	NN	23	1	0	385786	1	1	0	0	0	L	?	2	1?	
368419	1	2	0	0	0	0	L	27	2	?	393182	1	1	0	0	0	L	41	11	7	
135491	1	2	0	0	0	0	L	32	2	1	393635	1	1	0	0	0	L	27	1	0	
377112	1	2	0	0	0	0	L	33	3	2	267815	1	1	0	0	2	L	29	7	6	
319567	1	2	0	0	0	0	L	19	1	0	302722	1	1	0	0	1	L	34	3	2	
289984	1	2	0	0	0	1	L	27	2	1	314289	1	1	0	0	0	L	38	10	8	
311651	1	1	0	4	0		ECL	L	22	1	0	313895	1	1	0	0	0	NN	33	4	1
248660	1	1	0	2	0	0	L	33	1	0	347043	1	?	0	0	0	L	30	2	1	
387922	1	1	0	2	0	0	L	26	1	0	388893	1	?	0	0	0	L	30	2	1	
396638	1	1	0	2	0	0	L	29	3	1	211267	1	?	0	0	0	L	22	3	1	
381632	1	1	0	0	0	?	L	28	2	1	383091	?	2	0	0	0	L	21	1	0	
213566	1	1	0	0	0	0	SB	35	1	0	309685	?	2	0	0	?	SB	28?	5	3	
312607	1	1	0	0	0	2	L	33	1	0	383657	?	1	0	0	0	L	34	1	0	
260748	1	?	0	0	0	3	NN	35	5	4	369140	?	1	0	0	0	NN	24	1	0	
347005	?	4	1	?	2	0	SB	26	1	0	288925	?	1	0	0	0	NN	31	1	0	
275449	?	2	2	?	0	2	L	17	1	0	274215	?	1	0	0	0	L	37	2	1	
327861	?	?	0	3	0	0	L	22	1	0	285905	?	1	0	0	2	SB	27	2	1	
318661	?	2	0	0	0	0	L	35	1	0	113860	?	?	?	3	?	SB	?	5	4	
											391901	?	?	0	0	0	SB	25	1	0	
											121652	?	?	?	?	?	SB	28	7	6	

*SB, signifies stillbirth; NN, neonatal death; L, discharged alive; ECL, eclampsia; ?, insufficient data.

who work in University clinics are accustomed to find, it is obvious that certain errors in assigning the degree of severity for all these factors may creep in. Sufficient records, however, were available to furnish a shrewd guess for the purposes of this study.

Table II summarizes Table I and clearly shows that in all enumerations, except toxemia, the more serious cases tended to be handled by cesarean section and the less serious by the vaginal route.

TABLE II. PREMATURE SEPARATION OF THE PLACENTA, HARTFORD HOSPITAL 1916-1940
Comparison (by Grades) of Cesarean Section vs. Vaginal Deliveries

GRADES	VAGINAL	CESAREAN	GRADES	VAGINAL	CESAREAN
<i>Separation</i>			<i>Rigidity</i>		
4	7	12	4	3	11
3	4	7	3	2	6
2	6	18	2	1	8
1	34	18	1	0	2
?	10	4	0	53	24
	<u>61</u>	<u>59</u>	?	2	8
				<u>61</u>	<u>59</u>
<i>Blood Loss</i>			<i>Toxemia</i>		
4	1	1	Ecl.	2	1
3	4	13	4	2	0
2	16	34	3	2	3
1	33	10	2	4	6
?	7	1	1	2	5
	<u>61</u>	<u>59</u>	0	45	44
			?	4	0
				<u>61</u>	<u>59</u>
<i>Shock</i>					
4	1	1			
3	0	4			
2	0	7			
1	2	3			
0	56	44			
?	2	0			
	<u>61</u>	<u>59</u>			

Table III shows the division according to the number of pregnancies and the duration of gestation.

TABLE III. PREMATURE SEPARATION OF THE PLACENTA
HARTFORD HOSPITAL 1916-1940

Total	120	Private	79	Ward	41
Gravida i				50	
Gravida ii-v				54	
Gravida vi and over				16	
Gestation up to 28 wk.				9	
Gestation 29 to 31 wk.				2	
Gestation 32 to 35 wk.				21	
Gestation 36 and over				83	
Not stated				5	

Table IV shows the number of the various grades of toxemia. It is highly probable that, in the five instances where toxemia was not stated, the degree was either "zero" or "one." It would seem from this table that private patients received closer prenatal supervision than ward cases.

TABLE IV. PREMATURE SEPARATION OF THE PLACENTA
HARTFORD HOSPITAL 1916-1940

Toxemia Grade	0	88
	1	7
	2	10
	3	5
	4	5
Not stated		5
Eclampsia		3
Private cases with no toxemia		90%
Ward cases with no toxemia		70%

Tables V and VI attempt to analyze the relationship between toxemia and hemorrhagic infiltration of the uterine muscle in cesarean sections. It is clearly evident that severe toxemia, in our experience, has played a very small part in the production of the uterine lesion.

Table VII shows comparison of the fetal loss by the two methods of delivery according to the degree of separation of the placenta. For

TABLE V. PREMATURE SEPARATION OF PLACENTA, HARTFORD HOSPITAL 1916-1940
Cesarean sections 59 Toxic 15

TOXEMIA GRADE	APOPLEXY GRADE					TOTAL
	0	1	2	3	4	
0	24	5	11	2	2	44
1	2	0	3	0	0	5
2	2	1	2	1	0	6
3	1	0	2	0	0	3
4	0	0	0	0	0	0
Eclampsia	1	0	0	0	0	1
	30	6	18	3	2	59

TABLE VI. PREMATURE SEPARATION OF PLACENTA, HARTFORD HOSPITAL 1916-1940
Cesarean sections 59. Apoplexy (hemorrhagic infiltration of uterine muscle) 29

APOPLEXY GRADE	WITH TOXEMIA	NONTOXIC
1	1	5
2	7	11
3	1	2
4	0	2
	9	20

TABLE VII. PREMATURE SEPARATION OF THE PLACENTA, HARTFORD HOSPITAL 1916-1940

Fetal Loss by Cesarean Section vs. Vaginal Deliveries
(By Degree of Separation of the Placenta)

DEGREE OF SEPARATION	METHOD OF DELIVERIES		LIVE BABIES		STILLBIRTHS		NEONATAL DEATHS	
	C.S.	VAG.	C.S.	VAG.	C.S.	VAG.	C.S.	VAG.
1	18	35	14	30	2	3	2	2
2	18	6	15	3	2	3	1	0
3	7	4	0	0	7	3	0	1
4	12	7	0	0	12	7	0	0
?	4	9	3	3	1	4	0	2
Totals	59	61	32	36	24	20	3	5

this series there is very little difference in the number of live babies which were discharged from the hospital after the neonatal period. It is also evident, as it was in Table I, that cesarean sections were done more frequently in the serious cases.

Table VIII shows the comparison of our cases with those of the Boston Lying-in Hospital, published by Goethals.¹⁰ A strict comparison of these two series should not be made, for the greater number of the Hartford Hospital group was handled in the fourteen years after the Boston series ended. The number of primiparas in our series is appreciably greater. The periods of gestation and the number of non-toxic cases are almost identical. The greater number of eclampsia, cesarean section deaths, fetal deaths, maternal mortality, and severe degrees of detachment and rigidity in the Boston series undoubtedly indicate to some extent the greater severity of the cases in the early period.

TABLE VIII. PREMATURE SEPARATION OF THE PLACENTA, HARTFORD HOSPITAL 1916-1940

Boston Lying-in Hospital and Hartford Hospital Series Compared

	B.L.I. 1916-26	H.H. 1916-40
Total	128	120
Gravida i	39	50
36 weeks +	85	83
Nontoxic	91	88
Eclampsia	6	3
Cesarean section (deaths)	39-(3)	59-(0)*
Rigidity (3 and 4)	42	22
Detachment (4)	35	21
Mothers died	11	2
Fetus died	80	52

*One death after cesarean section in 1914. (The only such death in the Hartford Hospital cesarean history.)

Objection can be raised against the use of cesarean section where vaginal delivery might be employed on the score that subsequent child-bearing will be diminished. Table IX shows that our experience in this regard does not bear out such criticism. Whatever limitation to subsequent childbearing might have been caused by the employment of cesarean section, there was still greater loss of subsequent productive fertility in cases where cesarean section was not employed.

TABLE IX. PREMATURE SEPARATION OF THE PLACENTA, HARTFORD HOSPITAL 1916-1940

Subsequent Pregnancies in Patients Delivered as Shown Prior to Oct. 1, 1939.
Comparing Cesarean vs. Vaginal Deliveries

	CESAREAN SECTION	VAGINAL
Total	49	51
Hysterectomies	6	0
Sterilized	1	0
Possibly fertile	42	51
No known pregnancies	29	41
Subsequently pregnant	13	10
Subsequent pregnancies	17	11
Live babies	13	7
Subsequent cesarean section	11	2
Subsequent premature separation	3	3

Objection to the cesarean method may be raised also on the score of danger of rupture of the uterine scar in subsequent pregnancies. The records of all subsequent pregnancies were studied and in only one instance was there observed a poorly healed uterine incision. [In that instance I had personally sutured the uterus with care. The uterus was not hemorrhagic in any degree, nor was the patient toxic, and the failure of adequate healing cannot in my opinion be ascribed to anything but the cesarean method.] In this case, however, a subsequent cesarean section was done at the time of election without a rupture of the uterus, and a live baby was obtained.

MORTALITY

The two deaths recorded in this series were of patients who were delivered by the vaginal method. A synopsis of these cases is given.

CASE 1.—In 1920 a private case of a general practitioner, gravida vii, para vi, 28 years of age. She bled severely on admission and after delivery. Her total labor lasted six hours. She was packed before admission, following which the packing was removed, bag inserted and manual dilatation was performed. A still-born fetus was delivered spontaneously under chloroform anesthesia. The patient died on the fourth day, her temperature having risen to more than 100.4° F. on one day only. Albumin and casts were present in large amounts, and she died with the appearance of cardiac decompensation with pulmonary edema.

CASE 2.—The second patient, gravida ii, para i, 34 years of age, was delivered in 1927 (private case of an obstetrician). She came in promptly after the onset of pains which awakened her from sleep. The pains were accompanied by considerable blood loss. On admission the cervix was dilated manually from one to three fingers. The edge of the placenta was felt and the membranes were ruptured, allowing the head to descend. Bleeding then stopped. It was noted, however, that the uterus was boardlike, and when she delivered spontaneously (six hours after onset of labor), a stillborn baby and placenta were extruded with a very large amount of fluid and clotted blood. In spite of uterine tamponade which was carried out twice, the patient died (ten hours after the first pains) before a transfusion could be arranged. The diagnosis in this case was both a placenta previa marginalis and premature separation of the low-lying placenta. An autopsy was not obtained.

This second death recalls the cases presented by Rudolph¹¹ in which he was able to observe at cesarean section a typical hemorrhagic uterus and found the placenta attached to the lower posterior wall. Not only Rudolph but Montgomery⁶ and Kellogg¹² report that numerous such instances of premature separation with low-lying placenta are encountered. Such cases raise the question as to whether the classical definition of this condition is fully justified. I do not agree, however, with Montgomery that these cases with retroplacental hematomas, spasm of the uterus, and hemorrhage in the muscle should be called placenta previa.*

In his paper on "Ablatio Placentae," Holmes⁹ said "failure to find the placenta within reach of the finger makes the diagnosis certain. In placenta previa the discovery of the afterbirth is positive, no pain so characteristic of ablatio is present, and no distention is met with." His definition recognizes only anatomic boundaries, viz., if the placenta has attached above that portion of the uterus which must dilate, the case is properly called ablatio. It would seem that this definition does not include some of the undoubtedly typical cases.

*It would be convenient for us to use the customary classification, for if we did so our whole series would present no death since 1920.

DISCUSSION

The necessity of removing the uterus has undoubtedly been exaggerated and our group in Hartford is convinced that too many uteri have been removed. The conservative school has shown that hemorrhage seldom persists after the uterus is emptied. We recall, however, the case reported by Frank¹³ of a severe Couvelaire uterus emptied by low classical cesarean section. Pituitrin was injected into the uterine muscle and a firm uterine and vaginal pack was later employed which failed to stop the bleeding. Hysterectomy was done six hours after the cesarean section and the patient survived, due undoubtedly to repeated transfusions. Urine and blood pressure were normal.

Some hysterectomies have been done as the easiest way to sterilize where this was desirable. Where the hemorrhagic process has extensively involved the wall of the uterus, it has been removed, having in mind the disastrous results of necrobiosis of the uterine muscle reported by Coventry and Moe.¹⁴

Since we have been doing cesarean sections very early and have observed the hemorrhagic lesion in the absence of toxemia, trauma or other discernible factors, we have become dissatisfied with the many explanations of etiology which have been advanced, and it is suggested that renewed efforts be made to study the blood vessel lesions not only in the late but in the early cases, making use of recently developed injection and special staining techniques. It is not yet clear why the separation of the placenta within the uterus should cause hemorrhagic infiltration which is invariably confined to the outer and not the inner layers of the uterus. May we not be dealing with a process which should be investigated as a result of isoimmunization reactions, bringing this lesion in line with many spontaneous abortions, miscarriages, and unexplained fetal deaths, and perhaps with erythroblastosis fetalis? (Levine, Katzin, Burnham.¹⁵)

CONCLUSIONS

1. Indications for cesarean section in the treatment of premature separation of the normally implanted placenta should be extended wherever ideal conditions are obtainable.

2. Under ideal surroundings cesarean section, even in the presence of shock, can be safely employed, provided adequate methods are used to combat shock by transfusions and fluid administration, and provided the operation is skillfully performed under expertly administered anesthesia which is suited to the patient's needs.

3. Experience of the Hartford Hospital over many years has shown that cesarean section can be employed without increase in mortality and without severely limiting subsequent childbearing, and further that in the presence of a live child, fetal losses are greatly diminished.

4. Attention is called to the inadequacy of a purely anatomic division between premature separation of the normally implanted placenta and placenta previa.

5. Hope is expressed that observation of early lesions with study of the vascular lesions by modern methods may furnish us with a clearer understanding of etiology.

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DISCUSSION

DR. RUDOLPH W. HOLMES, UNIVERSITY, VA.—Those who have written on ante-partum placental separation have erected a structure of hypotheses elaborated from presumptive evidence, and based upon conjectural notions as to the etiology. Truth will be derived only when there shall be a discovery of the specific etiologic factors. Dr. Miller and I disagree on many fundamentals. In fact, the tenor of his paper, reflecting the experience and observation of the Hartford Hospital Staff, tends to controvert the prevalent concepts held by most authorities.

An analysis of his tables reveals that practically all of his cases were definitely benign, in sharp contrast to the tragic cases reported by most writers on the subject. It is noteworthy that there is an entire absence of the tetrad in any single patient of severe toxemia, severe hemorrhage, excessive shock and complete placental separation. He makes no mention of excessive distention or severe uterine pain, which are both characteristic of ablatio. Toxemia was noted in only 27 (23.9 per cent) of his 120 case reports. No mention is made of the Couvelaire uteroplacental apoplexy.

The relative mildness of Dr. Miller's complications may be ascribed to a high order of prenatal care in Hartford, for 98.8 per cent of all parturients in 1938 were attended by physicians, and 98.4 per cent of such patients were confined in four hospitals. In the same year the Hartford Hospital housed 54 per cent of all the city births. Ablatio occurred 79 times in private, and 41 times in ward patients, which reverses the figures for relative frequency supplied by most authorities. Hartford is a commercial city with a notable absence of a large population domiciled in tenement and slums, which may account for the differences from the type of patients seen in large municipal hospitals of maritime or manufacturing cities.

Dr. Miller's tabulation of the cases of uterine apoplexy has put my mind in a quandary, for, so far as I am aware, every authority has maintained that apoplexy was invariable evidence of a Couvelaire type of separation. The enthusiasts for cesarean section have indeed defended the operation on the score that by this means alone a diagnosis of a true uteroplacental apoplexy might be made. In Dr. Miller's report of 59 sections 57 had notations regarding apoplexy, and this condition was noted in 28 cases as being present, only 9 of which were of toxic origin. Dr. Miller states, "It is not yet clear why the separation of the placenta . . . should cause hemorrhagic infiltration which is invariably confined to the outer, and not the inner, layers of the uterus." It may be conceived that trauma might produce such ecchymotic spots, but so far as I am aware this does not hold true of toxic apoplexies. All layers are involved, especially in the site of the placental attachment. It is the extravasation of blood in the serotina which inaugurates separation and the placental cotyledons participate in this hemorrhagic infiltration.

The elimination of eclampsia as an indication for section has probably contributed more to the lessening of the mortality of the disease and of the section than all the improved therapy of the one, and the bettered technique of the other. There is a peculiar analogy between eclampsia and ablatio, and specifically for the toxic

type. Eclampsia and toxic ablatio have poisons bathing maternal and fetal tissues, great nervous depression and coma, destruction of nephritic and hepatic tissue with an arrest of function. As a result of their similarity it is as illogical to perform cesarean sections for ablatio as for eclampsia. It is needless to state contributory indications may make a section imperative.

There is a clear trend of the world's experts to limit, even to discard, cesarean section for all types of placental separation. The experience of the Rotunda Hospital, and of Irving is indicative of this trend. As late as 1939 the French Obstetrical Congress devoted a lengthy session to the consideration of placental separation. In 1,000 cases they reported the mortality following sections was 19 per cent, and for the conservative vaginal handling it was 6 per cent. Furthermore, in no sense is hysterectomy an essential part of the management, although special circumstances may require it.

So far as we know there is nothing in the physiology or anatomy of the normally implanted placenta which would lead to a toxic or nontoxic premature separation, and prevent an associated separation in placenta previa. The prompt escape of the blood in placenta previa prevents uterine distention from retained blood. The relative absence of case reports of toxic apoplexy with placenta previa must be ascribed to a lack of observation.

DR. RAYMOND E. WATKINS, PORTLAND, ORE.—During the ten-year period from 1931 to 1941, there have been 9,051 deliveries of pregnant women in the Obstetric Clinic of the University of Oregon Medical School. All were indigent patients. Premature separation of the placenta was diagnosed clinically in 30 instances. All gestations were twenty-eight weeks or more. In 24, premature separation was proved by pathologic examination, making a true incidence of one to 377. Of the remaining 6, three showed no evidence of separation on examination of the placenta, and in 3 others the placenta unfortunately was not described. All 6 patients had had typical symptoms and findings previous to delivery.

We divided our cases according to the degree of severity into (a) mild, 2; (b) moderate, 14; and (c) severe, 8.

There was a noticeable lack of prenatal supervision in these patients, 9 having none before admission to the hospital, and 10 inadequate care. Fifteen of our 24 patients showed an absence of the fetal heart beat upon admission to the hospital after symptoms of placental separation had occurred, making live birth possible in but 38 per cent.

The bleeding occurred vaginally in 21, but in 3 it was concealed. Only one with concealed hemorrhage was considered a severe case and a low cervical section was performed in this instance.

The degree of separation was partial in 21 and complete in 3. Fourteen patients entered the hospital in active labor. Twenty-one were delivered vaginally while 3 required cesarean section. The low cervical operation was performed in each instance.

The summary of our treatment is as follows: (1) Twenty-one treated expectantly; (2) membranes ruptured 8 times as a method of controlling bleeding and to induce labor; (3) forceps used in 3 patients; (4) blood transfusions in 6 patients; (5) low cervical sections in 3 severe cases; (6) manual dilatation of the cervix was not done, nor were bags used to dilate the cervix in any case.

Our maternal mortality, 4.1 per cent, consisted of one patient, who was delivered vaginally. She was a para ii who suddenly began to hemorrhage three hours after delivery with complete placental separation and died while the uterus was being packed. In retrospect we think this patient might have been saved had the uterus been packed immediately following delivery.

Eight, or 33½ per cent, of our 24 babies were born alive, but one premature baby died thirty-six hours after birth.

The management of patients with premature separation of the placenta has been a much disputed subject. There are those who advocate active interference early, in an effort to save both mother and child, and others who treat all patients conservatively. Both claim equally good results. Certainly no criticism could be made of the maternal and fetal mortality in the large series of cases Dr. Miller has presented, for his results are remarkable, both as to fetal and maternal survivals.

In our own experience we have not thought it advisable to do so many cesarean sections. The chance of error in early diagnosis is not inconsiderable. In 3, or 11 per cent, of our patients, the clinical diagnosis was not substantiated on examination of the placenta. The early death of the fetus is also worthy of comment in this connection. Should the woman with slight or moderate premature separation who has a dead baby be subjected to section, if by conservative measures such as artificial rupture of the membranes, the hemorrhage can be controlled? Prompt transfusions will restore her blood loss. If no further hemorrhage occurs, this method seems to us the logical one to follow.

There is a high percentage of toxemia found in every group studied. Such patients do not tolerate major surgery well. With added blood loss their risk is undoubtedly increased. The severe separation may force our hand to do a section, but, for the mild or moderate case, it has been our policy to treat the patient conservatively, delivering vaginally if possible.

Regardless of the method of delivery used the resistance of the patient must be brought to the highest level, by the arrest of hemorrhage, repeated transfusions, and other supportive treatment. Each patient presents an individual problem, and the method of management must be determined in each case by the degree of separation and the condition of the patient. No hard and fast rule can be established.

DR. JAMES R. MCCORD, ATLANTA, GA.—I would like to present 92 cases of separation of the placenta, all of which were delivered from below and the great majority of them spontaneously. The total mortality was approximately 6.5 per cent.

In my opinion, in evaluating mortality in premature separation of the placenta, the condition should be divided into three groups, mild, moderate, and severe, and each group discussed separately. I do feel very strongly, and more so as the years go by, that a severe separation of the placenta is not only not an indication for a cesarean section, but is an indication for conservative treatment.

Tables I and II show our results.

TABLE I. ABRUPTIO PLACENTAE, 92 CASES

	MILD	MODERATE	SEVERE
Number of cases	46	30	16
Multiparas	71	80	87.5
Hypertension	41	66	62.5
Albumin	38	50	53
External hemorrhage	98	80	81
Shock	4.3	36	100
Rigidity	78.5	96	100
Spontaneous delivery	96	90	93
Fetal loss	54.3	76	93
Mortality	0	6.6	31

TABLE II

CAUSES OF DEATH		OPERATIONS	
Eclampsia	2	Low forceps	3
Lobar pneumonia	1	Version and extraction	3
Uremia	1	2 Shoulder presentations	
Cardiac decompensation	1	1 Transverse presentation	

DR. RUDOLPH A. BARTHOLOMEW, ATLANTA, GA.—Several decades ago, it came to be realized that the employment of forcible measures of delivery, such as internal version and extraction, manual dilatation of the cervix, difficult forceps delivery or cesarean section, was a large factor in the high mortality of eclampsia. Substitution of supportive measures, induction of labor, and a minimum of trauma effected a reduction in mortality from the figures of 15 to 20 per cent to 5 to 7 per cent. We are coming to the same viewpoint in regard to separation of the placenta.

Eclampsia and separation of the normally implanted placenta are fundamentally of the same nature. The latter is preceded by typical manifestations of toxemia in the majority of cases, and the pathology in the placenta is identical with that of eclampsia. However, in separation of the placenta, we are confronted with two complications: hemorrhage and a marked tendency to shock, the latter being particularly dangerous.

I believe that the employment of conservative treatment is most important. By that I mean when the patient is first seen, dismiss the idea of delivering her, but rather give supportive treatment with glucose solution, whole blood or plasma intravenously, along with sedatives. Following improvement in her condition, rupture the membranes, apply an abdominal binder if necessary, and await within reason a spontaneous delivery. This will obtain much better results than if we rush in immediately with operative procedures. I think the impression should go out, particularly to the average man, that this is a condition which he can treat with greater success by conservative methods regardless of surroundings.

This is a case of separation of the placenta. You see the dark areas of acute infarction scattered through the whole strip identical in every way with those seen in eclampsia. The consistency and similarity of the placental findings in each condition have been such as to make me realize that cases of separation of the placenta are practically all on a toxic basis and that the cases due to trauma are negligible.

DR. MILLER (closing).—If our experience has served anything, it is to show that where one is confronted with a severe ablatio and what you would all recognize as an absolute indication for cesarean section, you can still do a cesarean safely if you pay attention to the fundamentals of blood loss replacement and anesthesia. Our experience has not met with the forebodings of those who have threatened us with dire consequences.

We had one death three weeks ago, since this series ended. That patient had had a systolic blood pressure of over 200 for more than three years and died with massive cerebral hemorrhage two hours after the cesarean section was done under block anesthesia, with a substitution of 1,000 c.c. of citrated blood. Personally, I should not have done a cesarean section in this case, though I believe that the operation had little to do with her death.