

HEART DISEASE COMPLICATING PREGNANCY

A STUDY OF 436 CASES

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A STUDY of 436 women, suffering from cardiac disease and observed in 493 pregnancies in the Lying-in Hospital (Woman's Clinic of the New York Hospital) during the five-year period ending Sept. 1, 1937, is the basis for this report. In a recent publication¹ Kuder and I described the role of a special ante-partum and post-partum cardiac clinic and the manner in which cardiac patients are treated in the Lying-in Hospital. In the present analysis emphasis is directed mainly to the important role heart disease plays in maternal mortality.

During the five-year period under review, cardiac disease occurred as a complication in 493 of 14,009 pregnancies on the Indoor Service of the Lying-in Hospital, an incidence of 3.5 per cent.





CLASS	335 - TOTAL NUMBER OF CLASSIFIED CASES	
1		50.5 %
2 a		37.3 %
2 b		10.4 %
3		1.8 %

Chart 1.—Distribution of heart disease according to functional classification.

As stated elsewhere² we employ the functional classification of heart disease, formulated by the New York Heart Association. In 335 of the 436 patients studied, there was full agreement as to the exact classification, and we, therefore, believe that an analysis of this smaller group would be more accurate as to the relative frequency of the various classes of heart disease. In these 335 patients the distribution, according to the functional classification, is shown in Chart 1, which reveals 50.5 per cent of the cases of Class I, 37.3 per cent in Class IIa, 10.4 per cent in Class IIb, and 1.8 per cent in Class III. In other words, half of the patients belong in the mild Class I, whereas the other half fall in the potentially or actually dangerous groups (Classes IIa, IIb, and III).

In order to portray our attitude as to the value of early hospitalization prior to delivery in the several grades of heart disease, Chart 2

*Read at a meeting of the New York Obstetrical Society, December 14, 1937.

has been prepared. Whereas the Class I patients averaged only slightly over one day in the hospital prior to delivery, the severe Class III patients averaged 51.5 days. Although we have, of course, no rule or standard routine regarding the period of hospitalization, the figures in Chart 2 show almost a geometric progression, dependent on the grade of heart involvement.

Not only is it necessary that heart disease, if present, be recognized before or very early in a pregnancy, and adequate rest and hospitali-

CLASS	335 - TOTAL NUMBER OF CLASSIFIED CASES
1	1.4 DAYS
2 a	5.6 DAYS
2 b	17.2 DAYS
3	51.5 DAYS

Chart 2.—Average duration of hospitalization prior to delivery.

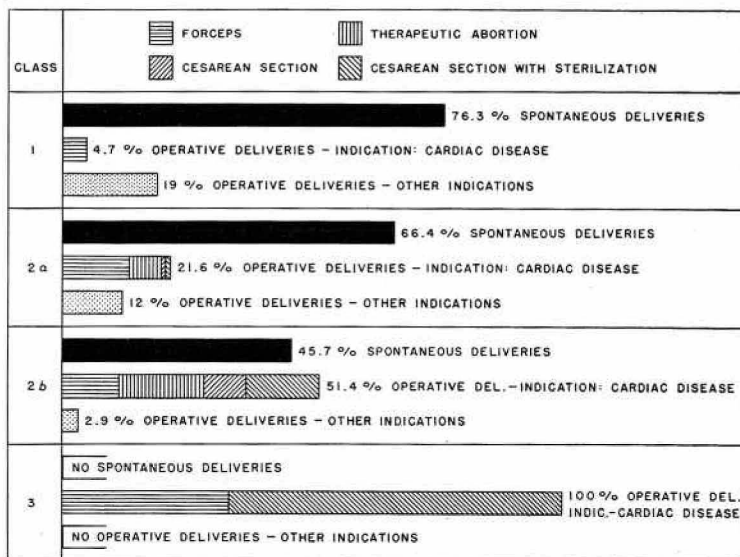


Chart 3.—Type of delivery in the various classes of cardiac disease.

zation during pregnancy be instituted but it is equally important that the patient receive the proper attention and treatment during parturition. We have found it exceedingly difficult, if not impossible, to follow any rule or routine. In Chart 3 an attempt is made to present a comprehensive view of our treatment during the delivery period. In each Class of cardiac patients, the types of delivery are divided in three groups, spontaneous, operative because of heart disease and operative on indications other than heart disease. Four further subdivisions of operative deliveries are shown, viz., forceps, therapeutic

abortion, cesarean section, and cesarean section with sterilization. Spontaneous delivery occurred in 76.3 per cent of Class I, 66.4 per cent of Class IIa, 45.7 per cent of Class IIb, and zero per cent of Class III cardiac patients. On the other hand, the operative deliveries performed because of heart disease form 4.7, 21.6, 51.4, and 100 per cent, respectively, in the four classes. The third set of figures, namely those for operative deliveries on indications other than cardiac disease, are inserted to complete the figures and so enable one to compute the correct percentages for the several groups. Although, as stated above, no rule of treatment is followed in our clinic, it is noteworthy how the number of operative deliveries, because of heart disease, proceeds from 4.7 per cent in Class I to 100 per cent in Class III.

Therapeutic abortion for heart disease was done in only Classes IIa and IIb. That this operation was not performed in Classes I and III, is presumably due to the fact that in the former the heart affection was not deemed sufficient reason for interruption of a pregnancy, while in the latter the patients were too ill or too far advanced in pregnancy to make interruption the procedure of choice.

It will be noted that whenever cesarean section was performed in Class III cardiac patients it was on the cardiac indication and was always accompanied by sterilization. On the other hand, cesarean section constituted only about half of the operations, based on cardiac indication, in Class IIb, and again, in only slightly over half of these cesarean sections was sterilization performed. Expressed differently, pregnant patients with cardiac decompensation or Class III heart disease complication are invariably treated with long periods of hospitalization followed by forceps delivery or cesarean section and sterilization; while those with Class IIb heart disease are similarly hospitalized, but usually for shorter periods, and are delivered either by forceps or cesarean section, with or without sterilization. It must, of course, be evident that the decision as to type of delivery, as well as to the question of sterilization, rests on many factors and is an individual matter in each patient.

It is our very definite conclusion¹ that pregnancy is a strain on the heart and that labor adds still more to this load; furthermore, that where the heart is already diseased, this strain of pregnancy and labor may be sufficient to either markedly aggravate the cardiac condition or produce actual failure resulting in death. Analysis of the maternal mortality in the Lying-in Hospital has brought this conclusion particularly to our attention. In Chart 4 are given the causes of our maternal mortality. During the five-year period studied we had 46 maternal deaths in 20,957 obstetric discharges, an uncorrected mortality of 2.18 per 1,000 obstetric discharges. This incidence may be expressed as 2.62 per 1,000 full-term and premature deliveries, or 2.69 per 1,000 live births or 2.43 per 1,000 pregnancies. We believe, as stated in an earlier publication,³ that the last figure is the most accurate expression of maternal mortality, as it takes into account abortions, ectopic pregnancies and patients dying undelivered and is not vitiated by multiple births. The method of expressing maternal

deaths on a basis of live births may be of use where full statistical data are not available, but is decidedly inaccurate as it is affected by the incidence of twins or other types of multiple births and actually utilizes the fetal mortality rate to express maternal mortality.

Approximately one-fourth of our deaths were due to hemorrhage (ante partum and post partum), and 15 per cent were due to infections. Pneumonia accounted for 13.2 per cent, while cardiac disease is the fourth most important cause of maternal mortality, accounting for 8.7 per cent of the deaths, and followed by toxemias with only 6.5 per cent. Furthermore, it is to be noted that the 3 maternal deaths, or 6.5 per cent of the maternal mortality, due to toxemias, were all caused by acute yellow atrophy and chronic nephritis. In this chart, therefore, infection is no longer the major cause of maternal mortality and the toxemias account for a relatively small percentage of the death rate, and even then it is necessary to include under "tox-

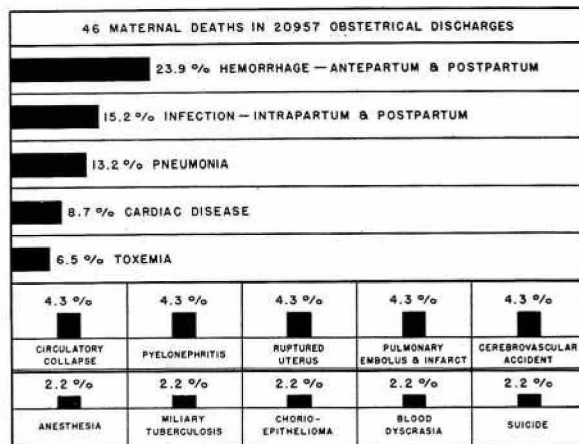


Chart 4.—The causes of maternal mortality.

emia," chronic nephritis. I have elsewhere⁴ discussed in detail the factors responsible for the reduction in maternal mortality in both these groups, infection and toxemia. Here I wish to emphasize the important roles played by pneumonia and cardiac disease as factors in maternal mortality. Hemorrhage, both ante partum and post partum, is receiving particular attention in many maternity hospitals and in our clinic by Pastore and his co-workers, who are studying the problem of blood loss in relation to infection and the toxemias.

To repeat, cardiac disease, as shown in Chart 4, is the fourth most important cause of our maternal deaths and is a greater factor, in the total maternal death rate, than the toxemias of pregnancy.

Of the 493 pregnancies complicated by cardiac disease, 475 occurred in registered and 18 in unregistered patients. Chart 5 shows that in each of the two groups, registered and unregistered, there were two maternal deaths, giving a death rate of 0.42 per cent in the registered and 11.11 per cent in the unregistered patients. It will be noted that

the maternal mortality in the unregistered patients is over 26 times that in the registered group. Although other factors come into play, such as the fact that seriously ill patients are generally brought to a hospital, the difference in these rates is exceedingly striking, and bespeaks the value of early recognition of the disease and proper hospitalization.

What is the effect on fetal mortality of heart disease in the mother? In Chart 6 we have compared the total product of conception loss in our cardiac patients admitted to the Lying-in Hospital during the

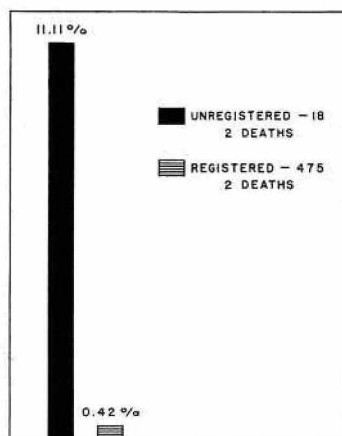


Chart 5.—Maternal mortality in registered and unregistered patients.

CARDIAC PATIENTS			
INFANTILE MORTALITY	A B O R T I O N S		11.64%
	NON-THERAPEUTIC	THERAPEUTIC	
3.71%	5.38%	2.55%	
INFANTILE MORTALITY	A B O R T I O N S		10.37%
	NON-THERAPEUTIC	THER.	
4.12%	5.46%	.79%	
TOTAL CLINIC PATIENTS			

Chart 6.—Incidence of infantile mortality and abortion in cardiac disease.

five-year period. This loss in offsprings is composed of abortions, both spontaneous and induced, whether criminal or therapeutic, and infantile mortality. Again infantile mortality includes premature, full-term, and neonatal deaths occurring within two weeks after delivery. The percentage loss in each group is calculated on the basis of the total possible live babies, which include all pregnancies, whatever the duration, as well as the multiple births. On such a basis the total offspring loss in the cardiac group is 11.64 per cent compared with 10.37 per cent in the clinic population. These totals, when analyzed further, show a therapeutic abortion loss of 2.55 in cardiac and 0.79 per cent in clinic patients, nontherapeutic abortion loss of

5.38 in cardiac and 5.46 in clinic patients, and an infantile mortality of 3.71 per cent in cardiac and 4.12 in the total clinic patient group. From these figures we may conclude that cardiac disease in the mother does not increase the loss in offspring by increasing either the rate of spontaneous abortion or infantile mortality. The only way in which cardiac disease may effect infant loss would be indirectly, through the number of therapeutic abortions performed because of heart disease.

In conclusion, I wish to emphasize the value and need of a special cardiac clinic in every obstetric service, the necessity of an adequate workable classification of heart disease, such as the functional one of the New York Heart Association, the urgent need of early registration, with a doctor or clinic, of every woman who becomes pregnant, the importance of a thorough heart examination at this first registration, the value of rest and hospitalization for patients suffering from heart disease and the importance of the proper method of delivery for each patient.

CONCLUSIONS

1. In a five-year study, comprising 20,957 obstetric discharges, from our indoor and outdoor services, the incidence of heart disease was 3.5 per cent of the total number of pregnancies.

2. The distribution of the cardiac patients, according to the functional classification, was 50.5 per cent in Class I, 37.3 per cent in Class IIa, 10.4 per cent in Class IIb, and 1.8 per cent in Class III.

3. The duration of hospitalization, prior to delivery averaged 1.4 days for Class I, 5.6 for Class IIa, 17.2 for Class IIb, and 51.5 days for Class III patients.

4. In addition to rest and long periods of hospitalization, the treatment as to delivery is most important.

5. Therapeutic abortion for heart disease was performed in only Classes IIa and IIb patients, and amounted to 2.55 per cent.

6. Forceps delivery upon full dilatation of the cervix is a great aid in the handling of many cardiac patients. This means of delivery, because of heart disease, was performed in 4.7 per cent of Class I patients, 13.6 in Class IIa, 11.42 in Class IIb, and 33.3 in Class III.

7. Cesarean section, under proper anesthesia, preferably open drop ether or local, has a definite role in the treatment of heart disease. In our series of cases cesarean section, on the indication of heart disease was performed in 1.6 per cent of Class IIa, 22.9 of Class IIb, and 66.7 per cent of Class III patients. In Class IIa about 50 per cent of the cesarean section operations were accompanied by sterilization, in Class IIb patients 62.5 per cent and in Class III patients 100 per cent of the cesarean sections were followed by tubal sterilization.

8. During the five-year period, our total uncorrected maternal mortality in the 20,957 obstetric discharges from the indoor and outdoor services was 2.19 per 1,000 discharges, or 2.62 per 1,000 deliveries, or 2.43 per 1,000 pregnancies or 2.69 per 1,000 live births. The method of expressing mortality, on the basis of the number of maternal deaths per 1,000 women who become pregnant, appears to us to be the only

accurate one, as it includes all pregnancies, of whatever duration, and does not utilize other variables, such as fetal death rate or the incidence of multiple pregnancies.

9. Cardiac disease was responsible for 8.7 per cent of our total uncorrected maternal mortality, being the fourth largest factor in this death rate.

10. The maternal mortality in unregistered cardiac patients was 26 times that in those who registered in our clinic during the prenatal period.

11. Cardiac disease in the mother does not directly effect the loss in offsprings by increasing the spontaneous abortion rate, and/or the infantile mortality rate, comprising premature, full-term and neonatal deaths. This offspring loss, nontherapeutic abortions plus infantile deaths, was 9.09 in our cardiac patients and 9.58 in our total clinic population.

12. The early recognition of heart disease, rest and long periods of hospitalization, special cardiac clinics in maternity services and the proper type of delivery are among the important factors to reduce maternal mortality caused by cardiac disease.

REFERENCES

- (1) *Stander, H. J., and Kuder, Katherine*: J. A. M. A. **108**: 2092, 1937. (2) *Stander, H. J.*: AM. J. OBST. & GYNEC. **27**: 528, 1934. (3) *Idem*: Ibid. **28**: 421, 1934. (4) *Idem*: Am. J. Surg. **29**: 218, 1935.