

## A FIFTEEN-YEAR SURVEY OF CESAREAN SECTIONS

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THE problem of cesarean section is one of increasing interest and prominence concerning its role in obstetrical surgery. A survey of the cesarean sections done at the Milwaukee Hospital during the past fifteen years was made, dividing this period of time into five-year intervals with more detailed analysis of the last five years. The study includes 1,231 cesarean sections performed on private patients from Jan. 1, 1933, to Dec. 31, 1947. The series is consecutive and includes all cases found in the cross-file index in the record department.

### Incidence

There were 1,231 operations performed among 19,890 deliveries, an incidence of 6 per cent. In Table I the incidence is divided into three five-year periods and shows a decrease from 7.5 per cent in the early period to 5.4 per cent in the last period. During the period from 1943 to 1947, consultation with another staff member was required prior to operation. Almost one-half (43.4 per cent) of these operations were repeat cesarean sections, making the primary section incidence 3.05 per cent. While the incidence in this hospital shows a progressive decrease, statistics from the Wisconsin Bureau of Maternal Health show a steady rise throughout the State. The incidence of cesarean sections in the State of Wisconsin was 2.02 per cent from 1934 to 1940, and rose to 3.11 per cent in 1947.

TABLE I. CESAREAN SECTIONS, 1933 TO 1947

	1933-1937	1938-1942	1943-1947
Total deliveries	3,854	5,482	10,554
Cesarean sections	287	384	560
Incidence	1 in 13 7.4%	1 in 14 7%	1 in 16 5.4%

We consider an incidence of from 5 per cent to 5.5 per cent the irreducible minimum to which this operative treatment can be reduced under our present indications for cesarean sections. Andrews, Nichols, and Andrews<sup>2</sup> show an incidence of 10.5 per cent, of which 6.9 per cent were private and 3.6 per cent were referred patients. Thoms and Godfried<sup>3</sup> reported an incidence of 3.2 per cent in ward and 9.6 per cent in private cases at the New Haven Hospital in a ten-year survey. Irving<sup>4</sup> reported 1,887 consecutive sections at Boston Lying-in Hospital from 1934 to 1943 with an incidence of 3.12 per cent in ward cases and 6.7 per cent in private cases.

At Milwaukee Hospital from 1943 to 1947 there were 560 operations done by 19 operators, thirteen of whom were recognized specialists in obstetrics and gynecology. The remaining six were general practitioners who accounted for fourteen cases or 2.5 per cent of the total.

### Types of Operation

The low cervical cesarean section has become the operation of choice in most cases, 92.5 per cent of the operations having been of this type during the last five-year period. Table II shows the marked increase in the incidence of this operation during the fifteen years, and the marked decrease in the classical type.

TABLE II. TYPES OF CESAREAN SECTIONS, 1933 TO 1947

	1933-1937	1938-1942	1943-1947
Classical	74 (25.8%)	25 (6.5%)	33 (5.8%)
Low cervical	174 (60.7%)	336 (87.5%)	517 (92.5%)
Cesarean hysterectomy	3 (1%)	5 (1.3%)	9 (1.5%)
Hirst	0	0	1 (0.2%)
Sellheim	9 (3.1%)	0	0
Type not given	27 (9.4%)	18 (4.7%)	0
Extraperitoneal	0	0	0

The extraperitoneal operation was not performed at this hospital. Our records indicate that it was unnecessary. There were no maternal deaths or severe infections during the last five years. Undoubtedly this view was not shared by clinics in which indigent and infected patients were more prevalent. Proper prenatal care and instruction can do much to prevent intrapartum or postpartum infection.

For the past five years it has been a routine procedure in all patients with ruptured membranes to instill into the vagina every four hours either a 5 per cent aqueous mercurochrome or 1:2,000 aqueous Zephiran solution. Patients admitted for elective cesarean section receive this treatment the night preceding and the morning of surgery. Penicillin and the sulfonamides are used prophylactically in potentially infected patients, and therapeutically in those showing signs of morbidity. The incidence of cesarean hysterectomies remained quite constant (1 per cent to 1.5 per cent). Conservatism was our aim in the management of both mother and child. This low incidence of cesarean hysterectomy would have been much higher if severe infections had ensued in spite of the previously mentioned treatment.

TABLE III. CONDENSED INDICATIONS FOR CESAREAN SECTION

	1933-1937 (PER CENT)	1938-1942 (PER CENT)	1943-1947 (PER CENT)
Previous cesarean section	18.2	33.3	43.4
Contracted pelvis	27.5	17.9	10.8
Cephalopelvic disproportion	20.3	21.9	9.7
Placenta previa	7.3	3.9	7.0
Fulminating toxemia	8.0	7.6	6.0
Premature separation of placenta	3.2	3.9	4.7
Previous difficult deliveries	4.9	3.6	3.9
Previous surgery to birth canal	.7	1.3	4.2
Pelvic tumor	—	2.4	1.7
Abnormal presentation	—	2.1	2.8
Miscellaneous	9.9	2.1	5.8

Table III shows the indications for cesarean section. In tabulating the indications, the primary reason for the operation was recorded. In many cases there were two or three substantial indications, but we have used the most predominant cause. Where previous cesarean section was performed this was tabulated as the indication regardless of other conditions which might have been present such as abruptio placentae, toxemia, or other conditions. We practice the dictum of once a cesarean, always a cesarean, and our results prove the

efficacy of this procedure. There have been no ruptured uteri in any patients who have had a previous cesarean section, and no maternal deaths in the last 560 operations. Almost one-half, or 43.4 per cent, of this group were repeat sections. This high rate was due, in part, to our classification of indications for cesarean section.

While there has been a rise in the incidence of repeat cesarean sections, there has been a marked decrease in the incidence of operations done for cephalopelvic disproportion and contracted pelvis. The increased use and knowledge of x-ray pelvimetry have contributed considerably to this reduction.

The relative number of operations done because of placenta previa and premature separation of the placenta has remained quite stationary. While not all patients were submitted to cesarean section, we believe that unless conditions exist for rapid vaginal delivery, section should be performed.

Patients with pre-eclampsia or eclampsia were treated medically, and vaginal delivery was anticipated. No patients were considered operable in the convulsive state or immediately following convulsions. When pre-eclampsia was considered progressive in spite of all medical treatment, and eclampsia was unabatable, cesarean section was performed. Until better medical management is obtained, or until more successful methods of induction of labor are known, fulminating toxemias will probably continue to be the cause of from six to eight per cent of cesarean sections done in most communities. Patients having a cesarean section performed because of previous difficult deliveries were those who should have been sectioned primarily. Many of these patients presented histories of stillbirths following long and difficult labors. They then consulted a specialist in the hope of delivering a live child. The specialist performed a section many times because of this anxiety. The remaining indications require little comment. The Rh-negative mother with increasing antibodies is no longer an indication for cesarean section. The six instances of section done because of no progress following artificial rupture of membranes were the type of indications which we attempt to limit to a minimum.

### Anesthesia

Table IV shows that general anesthesia was the anesthetic of choice in most instances at this hospital. All general anesthetics were given by competent nurse anesthetists using cyclopropane, nitrous oxide, Pentothal sodium, ethylene, and ether, in various combinations or separately. During the last five-year period there were only three cases of postoperative atelectasis, three upper respiratory infections, and one case of bronchopneumonia following inhalation anesthesia. The most satisfactory results were obtained for both mother and infant when competent nurse anesthetists used the agent which they themselves were best qualified to use. From 1943 through 1945 caudal anesthesia was used extensively. Since that time it has been discontinued because of two maternal deaths which occurred prior to vaginal delivery and which were attributable to the caudal anesthetic. In the last two years the use of spinal anesthesia has shown a relative increase. Local anesthesia has been reserved for patients in whom the other anesthetic agents were contraindicated for maternal or fetal reasons.

TABLE IV. TYPES OF ANESTHESIA

	1943	1944	1945	1946	1947
General	46	69	81	74	105
Caudal	37	42	25	0	6
Local	0	4	13	9	6
Spinal	0	0	0	5	20

### Morbidity

During the last five-year period, 85 patients, or 15.2 per cent, showed a temperature rise to 100.4°F. or more some time during two twenty-four-hour periods exclusive of the first twenty-four hours. Table V shows the various causes of morbidity. The prophylactic and therapeutic use of penicillin and the sulfonamides in these patients was of inestimable value. The previously mentioned vaginal instillation of antiseptic solution, as well as improved nursing care, has been important in obtaining this low morbidity rate.

TABLE V. MORBIDITY

	1943-1947
Postoperative reaction and sapremia	30
Cystitis	12
Parametritis	10
Thrombophlebitis	6
Pyelonephritis	4
Pulmonary embolism	4
Wound infection	3
Upper respiratory infection	3
Postoperative ileus	3
Atelectasis	3
Mastitis	2
Bronchopneumonia	1
Rheumatic fever	1
Eclampsia	1
Mesenteric thrombosis	1
Sulfonamide reaction	1
Total	85
Morbidity rate	15.2%

### Fetal Mortality

There were nine stillbirths associated with cesarean sections performed from 1943 through 1947, a rate of 1.6 per cent, and fourteen neonatal deaths, a rate of 2.5 per cent. Tables VI, VII, and VIII show the details in these cases. It was noteworthy that all of the neonatal deaths were among premature infants, nine of whom died of atelectasis during the first twenty-four hours. Three of the infants succumbed to erythroblastosis fetalis though the Rh factor was not the indication for section in any of these cases. With increasing knowledge of the Rh problem, these deaths may soon be preventable. The neonatal death rate for the entire fifteen-year period was 3.6 per cent, and the stillbirth rate, 1.95 per cent.

### Maternal Mortality

During the entire fifteen-year period there were ten maternal deaths following cesarean section. It was significant that during the last five-year period, when nearly one-half, or 560 operations, were performed, there were no maternal deaths. Again, it was during this period that the previously mentioned treatment of antiseptic vaginal instillations and the use of antibiotics were utilized. This effect upon maternal mortality was striking. Table IX demonstrates the

TABLE VI. DEATHS FOLLOWING CESAREAN SECTION

	1933-1937	1938-1942	1943-1947
Cesarean sections	287	384	560
Maternal deaths	8 (2.8%)	2 (0.5%)	0
Stillbirths	5 (1.7%)	11 (2.8%)	9 (1.6%)
Neonatal deaths	14 (4.9%)	19 (4.9%)	14 (2.5%)

various causes of maternal deaths. The classical type of operation was performed in four and the low cervical flap in six cases.

TABLE VII. NEONATAL DEATHS\* FOLLOWING CESAREAN SECTION, 1943 THROUGH 1947

CAUSES OF DEATH	NO.
Atelectasis, death within 24 hours	9
Erythroblastosis foetalis	3
Bronchopneumonia	2

\*All infants were less than 5 pounds in weight.

TABLE VIII. NEONATAL DEATHS FOLLOWING CESAREAN SECTION, 1943 THROUGH 1947

INDICATION FOR SECTION	NO.
Placenta previa	4
Pre-eclampsia	4
Premature separation of placenta	2
Large fibromyoma with ruptured membranes and shoulder presentation	1
Previous amputation of cervix with premature rupture of membranes	1
Premature labor. Old third degree perineal laceration with three previous attempts at repair	1
Elderly primipara with previous extensive cautery of cervix. Test of labor without progress for 16 hours	1
Total	14

TABLE IX. MATERNAL DEATHS FOLLOWING CESAREAN SECTION, 1933 THROUGH 1942

Puerperal sepsis with terminal bronchopneumonia	5
Postoperative bronchopneumonia	1
Uterine apoplexy. Postpartum hemorrhage	1
Postoperative shock	1
Secondary granulopenia with bronchopneumonia	1
Malignant hypertension. Uremia	1
Total	10
Death rate	0.81%

### Summary

1. An analysis of 1,231 consecutive cesarean sections performed at Milwaukee Hospital from 1933 through 1947 has been presented.

2. The cases were divided into three five-year periods, showing the trends in present-day cesarean sections.

3. The total incidence of cesarean section was 6 per cent, with a maternal mortality rate of 0.81 per cent, neonatal death rate of 3.6 per cent, and still-birth rate of 1.95 per cent.

4. No maternal deaths occurred during the last five-year period when approximately one-half (560) of the operations were performed.

### References

1. Andrews, C. J., Nichols, R. B., and Andrews, W. C.: AM. J. OBST. & GYNEC. 54: 791-800, 1947.
2. Thoms, H., and Godfried, Milton S.: AM. J. OBST. & GYNEC. 51: 880-884, 1946.
3. Irving, F. C.: AM. J. OBST. & GYNEC. 50: 660-680, 1945.