Michigan. Bureau of Maternal and Child Health

Cesarean Section Survey
Grand Rapids, Michigan
January 1, 1935 to June 30, 1940

Prior to an analysis of the 340 cesarean sections which took place in the city of Grand Rapids hospitals, and Blodgett Hospital in East Grand Rapids, it may be well to pause for a brief review of the total situation of obstetrical practice in this city during the sixty-six month period of this survey.

The estimated corporate population of Grand Rapids, Michigan, during the interim of this survey, was 176,000 individuals. A total of 16,063 deliveries were recorded in the intervening time between January 1, 1935 to June 30, 1940. Included in this number were 478 stillbirths. There were then 15,585 living infants born of pregnant women prior to the allocation of deliveries by residence. The "adjusted" number of births (corrected for residence allocation) was 15,016 total births (resident cases). This number included 410 "resident" stillbirths leaving thereby 14,606 living infants born of resident patients. These calculations would indicate, then, that 1047 non-resident deliveries occurred in the city of Grand Rapids. The incidence of non-resident deliveries in the city was 6.5 per cent. Sixty-eight stillbirths occurred among these 1047 non-resident deliveries.

In the first 60 of the 66 months of the period of this study we find a total of 71 maternal deaths (after allocation) and 368 illegitimate pregnancies (as listed in five Michigan Department of Health annual reports). The figures for the first six months of 1940 were not available.

The above statistics will be at some variance with those of the State Health Department figures as the latter includes all illegitimate births while the City Health Department does not include such births for the state law provides that birth certificates of illegitimate pregnancies should be filed only at the state office. It is common knowledge, however, that the incidence of illegitimacy varies between 2.2% and 3.5% of all deliveries in the state. Hence, any discrepancy in the above unallocated figures, those of the City Health Department and the State Health Department corrected annual reports, will not vary beyond this percentage range.

Incidence of Cesarean Section

The crude incidence of cesarean section to the number of unallocated total infant births was 2.1%. Approximately every forty-eighth delivery among all city births was effected by the abdominal route.

Ten thousand nine hundred and seventy-nine (10,979) of the total 16,063 Grand Rapids deliveries took place in three Grand Rapids hospitals, or 68.3% were hospital deliveries. The incidence of cesarean section to the total hospital deliveries, in this 66 month period, was 3.09% or one cesarean section to each 32 deliveries. Interestingly enough, this was the same ratio found by Doctor de Normandie in his 1938 cesarean section survey of the State of Massachusetts.

The relationship between the total number of deliveries to the number of cesarean sections for each of the three hospitals, by years, is illustrated in table I.

Table I

Total Number of Deliveries and Cesarean Sections

340 Cases

January 1, 1935 to June 30, 1940

Year	Hospital A		Hospital B		Hospital C		All Hospitals	
	No.Del.	No.Sec.	No.Del.	No.Sec.	No.Del.	No.Sec.	No.Del.	No.Sec.
1935	608	44	368	18	514	12	1490	74
1936	665	25	420	16	548	10	1633	51
1937	831	31	517	18	718	17	2066	66
1938	846	18	544	29	789	19	2179	66
1939	935	20	571	17	753	20	2259	57
1940 (6 mos.)	547	12	314	10	491	4	1352	26
Total	4432	150	2734	108	3813	82	10979	340

There were 150, 108, and 82 cesarean sections performed respectively in hospitals A, B, and C. Two hundred forty-seven of the 340 cesarean sections were performed upon resident cases while the remaining 93 cases occurred among the non-resident group. The hospitals did not furnish the number of non-resident total deliveries per year and accordingly these figures must be omitted. Table II depicts the residency and hospital distribution of these 340 cesarean sections.

Table II

Residency and Hospital Distribution of Cases

	Hospital A		Hospital B		Hospital C		All Hospitals		Total Cases
	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	Res.	Non-Res.	
1935	41	3	11	7	8	4	60	14	74
1936	19	6	10	6	8	2	37	14	51
1937	27	4	10	8	10	7	47	19	66
1938	16	2	20	9	14	5	50	16	66
1939	13	7	10	7	13	7	36	21	57
1940 (6 mos)	8	4	8	2	1	3	17	9	26
Total	113	26	69	39	54	28	247	93	
Total all cases	150		108		82		340		340

The changing incidence of cesarean section, during calendar intervals in the study, and the approximate ratio of that operation per number of pregnancies delivered by other routes is depicted in table III. To illustrate the trends in percentage of cesarean sections in each hospital the chart was further developed upon an annual basis. The highest incidence of cesarotomy happened in 1935 in hospital A, where every fourteenth delivery was effected through the abdominal route. In contrast to this, one notes the unusual record of every one hundred and twenty-second birth, through the abdominal route, at hospital C in the first six months of 1940.

Table III
The Changing Incidence of Cesarean Section
Percentage and Approximate Ratio

	Hospital A Incidence		Hospital B Incidence		Hospital C Incidence		All Hospitals Incidence	
	%	Ratio	%	Ratio	%	Ratio	%	Ratio
1935	7.2	1:14	4.8	1:21	2.3	1:42	4.9	1:20
1936	3.7	1:27	3.8	1:26	1.8	1:54	3.1	1:32
1937	3.7	1:27	3.4	1:29	2.3	1:42	3.1	1:31
1938	2.1	1:46	5.3	1:19	2.4	1:41	3.0	1:33
1939	2.1	1:47	2.9	1:34	2.6	1:27	2.5	1:39
1940 (6 mos.)	2.2	1:46	3.1	1:26	0.8	1:122	1.9	1:52
66 mos.	3.4	1:39	3.9	1:25	2.1	1:46	3.09	1:32

The numbers of cesarean operations per each of two hospitals was double checked by a comparison of the lists submitted and the day to day search of the operating room sponge books. Cesarotomy, in this survey, includes only those abdominal operations done to remove a viable fetus through an uterine incision. Abdominal hysterotomies performed before the time of viability were placed in the category of therapeutic abortions. It was of particular and incidental interest to observe in passing, however, that 17 hysterectomies were done upon early pregnant patients to effect a sterilization. Such procedures would appear somewhat radical and especially so when one discovers that 8 of these surgical cases were under the supervision of one operator.

Types of Cesarean Section

The choice of operative technics used in these 340 cesarean sections were distributed as follows:

Table IV
Types of Cesarean Section

Hospital	Classical Section No.	%	Low Cervical Section No.	%	Porro Section No.	%	Total No.
A	135	90	2	1.4	13	8.6	150
B	97	89.8	6	5.5	5	4.7	108
C	67	81.7	7	8.6	8	9.7	82
All Grand Rapids	299	87.9	15	4.5	26	7.6	340

There were 267 elective cesarean sections and among this number 264 cases were recorded definitely, by various descriptions, as not in labor while in the remaining small number of 3 patients the status of labor was not mentioned by any of the usual indications. These three cases were added to the 264 patients whose charts stated they were not in labor. "Elective cesarean section" will be the term used in this survey for these patients submitting to cesarotomy prior to the onset of actual labor pains. In short, 78.5% of all the cesarean sections done in Grand Rapids were "elective cesarean sections". These elective sections were further subdivided as in table V.

Table V
Elective Cesarean Sections

Total Number of Cases	Percentage	Legend
267	78.5%	of all cesarean sections were "elective"
237	69.7%	of all cesarean sections were elective classical type
237	88.9%	of all classical cesareans were elective
10	3.7%	of all low cervical sections were elective
20	7.4%	of all Porro cesarean sections were elective

Approximately seven of each ten cesarean sections were operated upon in the usual classical type of operative approach. It is of considerable interest to note, although the smaller numbers do not permit emphasis, the fact that the ratio of Porro elective sections (26 total and 20 not in labor, 76.6%) was found to have occurred in approximately three of every four cases.

It would appear that when 20 patients out of a total series of 340 cases (5.9%) were forced to have the uterus "electively" removed at the same time cesarean section was performed that the surgical care of difficult cases was somewhat radical, and more so, in view of the statistical fact that more than three-fourths of these Porro sections were performed upon women not in labor. To provide basic data for further consideration by individual doctors interested in the numbers of patients in labor and not in labor table VI was constructed.

Table VI
Cesarean Section Survey
Grand Rapids, Michigan
January 1, 1935 to June 30, 1940

Relation of Labor to Cesarean Section

Type of Section	Hospital A	Hospital B	Hospital C	All Grand Rapids
Not in Labor				
Classical	116	80	41	237
Low cervical	2	5	3	10
Porro	9	5	6	20
Total Electives	127	90	50	267
In Labor				
Classical	19	17	26	62
Low cervical	0	1	4	5
Porro	4	0	2	6
Total Non-elective	23	18	32	73
All types, elective and non-elective	150	108	82	340

Table VI illustrates the statistical conclusions that hospital C, when studied on a ratio basis, tends to defer operative interference at least until the patient has had some degree of a test of labor. This conclusion is further supported when one considers the indications for cesarean section on those cases both in labor and not in labor. The gross figures are included in this report so the authorities of each hospital may have comparable data to compute and compare the minor differences of their institutions to others in the city. The general purpose of this survey was but to point out the highlights of cesarean sections in Grand Rapids, and one such fact is that hospital C does report that about two of every three cesarean patients (65%) does permit some "test of labor" prior to surgery. This is in contrast to hospital A wherein nearly 9 of each 10 patients (84.7%) are operated upon before labor is present. In hospital B the same ration was present, 83.3% operated upon prior to labor onset.

Age and Parity of Patients

Age

The youngest patient was sixteen years old while the eldest patient was fifty-one years of age. The greatest incidence of cesarean section took place in the group between the ages of twenty-six to thirty. Table VII discovers the age distribution in this series of 340 case records.

Table VII
Age at Time of Cesarean Section
Grand Rapids, Michigan

Age Interval	Number	Age Interval	Number
16 - 20	21	36 - 40	41
21 - 25	82	41 - 45	13
26 - 30	100	51	1
31 - 35	82	Total	340

Parity

There were one hundred and twelve women pregnant with their first full term pregnancy who submitted to cesarean section, 32.9%. The remaining group of 227 women reported one or more previous children, 68.1%. One patient's record failed to reveal parity. The 227 women who gave a history of previous pregnancies reported a total of 533 previous pregnancies, exclusive of their pregnancy at the time of their cesarean section.

Table VIII
Parity at Time of Cesarean Section
Grand Rapids, Michigan
January 1, 1935 to June 30, 1940

Parity	Number	No. Previous Children	Parity	Number	No. Previous Children
Unknown	1	--	Seven	2	14
Zero	112	--	Eight	3	24
One	98	98	Nine	1	9
Two	62	124	Ten	2	20
Three	21	63	Eleven	1	11
Four	21	84			
Five	10	50	Totals	340	533
Six	6	36			

The distribution of the "primiparous" patients in the three hospitals is correlated with their ages, in half decades, in table IX

Table IX

Correlation of Para 0 Cases with Ages by Half Decades

Ages Interval	Hospital			
	A	B	C	All
16 - 20	3	2	5	10
21 - 25	14	10	18	42
26 - 30	9	9	7	25
31 - 35	7	9	3	19
36 - 40	2	7	2	11
41 - 45	1	1	1	3
51	1	0	0	1
Totals	37	38	37	112

Among the age interval group, 16 to 20, ten were para 0, nine were para I, and two were para II. Those patients in the age interval 41 to 51 had their parity distributed as follows: para 0, 4; para I, none; para II, 3; para III, 1; para IV, 1; para V, 2; para X, 2; and para XI, 1.

The Relationship of Fetal Position and Presentation to Types of Cesarean Section

The long axis of the fetus with vertex presentation was found in 290 of the 340 patients. In 15 other cases the position or presentation of the fetus was not recorded. There were thus 35 unusual positions and presentations of the fetus. The correlation of the position and presentation of the fetus to the type of cesarean section for each hospital is illustrated in table X.

Table X
Relation of Fetal Position and Presentation to Type of Cesarean Section
Grand Rapids, Michigan
January 1, 1935 to June 30, 1940

Position and Presentation of Fetus	Hospital A			Hospital B			Hospital C			All City			Grand Total All types
	C	LC	P	C	LC	P	C	LC	P	C	LC	P	
OLA	74	1	5	50	3	2	27	4	2	151	8	9	168
ORA	31	1	4	21	1	1	15	2	1	67	4	6	77
OLP	2	0	0	8	1	0	3	1	0	13	2	0	15
ORP	5	0	1	8	0	1	6	0	0	19	0	2	21
OLT	1	0	0	1	0	0	1	0	0	3	0	0	3
ORT	4	0	0	0	0	0	1	0	0	5	0	0	5
Breech, all types	9	0	1	4	1	1	7	0	0	20	1	2	23
Twins	3	0	3	0	0	0	3	0	0	6	0	0	6
Shoulder	0	0	1	1	0	0	1	0	2	2	0	3	5
Face	0	0	0	2	0	0	0	0	0	2	0	0	2
Unknown	6	0	1	2	0	0	3	0	3	11	0	4	15
Totals	135	2	13	97	6	5	67	7	8	299	15	26	340
GRAND TOTALS		150			108			82			340		

C - Classical; LC - Low Cervical; P - Porro

The Primary Indications for Cesarean Section

The leading indications for these 340 cesarean sections included in this survey may be grouped generally as shown in table XI.

Table XI
Primary Indications for Cesarean Section
Grand Rapids, Michigan
January 1, 1935 to June 30, 1940

Primary Indication	Hospitals A			B			C			All			Grand Total
	C	LC	P	C	LC	P	C	LC	P	C	LC	P	All Types
Passage Bony Parts	15	0	1	15	0	0	10	0	1	40	0	2	42
Passage Soft Parts	57	0	5	29	3	2	18	4	1	104	7	8	119
Passenger	13	1	1	10	1	0	14	0	1	37	2	2	41
Other)Hem.	10	0	3	18	0	2	18	3	5	46	3	10	59
Maternal)Tox.	6	0	0	9	0	0	1	0	0	16	0	0	16
Indications)Other	28	1	3	16	2	1	6	0	0	50	3	4	57
No Indications	6	0	0	0	0	0	0	0	0	6	0	0	6
Total	135	2	13	97	6	5	67	7	8	299	15	26	3
GRAND TOTAL		150			108			82			340		340

The bony passage of the mother was deemed responsible as the primary indications for cesarean section in 42 cases, 12.4% of the group. The principal single cause given as the primary indication for cesarean section was that involving the soft parts of the maternal passage. This group included 119 patients or 32%. The passenger was held accountable for 41 of the primary indications. Other maternal indications for cesarean section included 59 cases on the basis of maternal hemorrhage, 16 cases of maternal toxemia, and 57 other cases had to be classified as "other" maternal indications. In 6 instances the records, all in hospital A, gave no single clue as to the indication for operative delivery via the abdominal route.

The greatest single causes listed as indication for Porro cesarean section included "soft parts" of the maternal passage in 8 cases, and hemorrhage on the part of the mother in 10 cases.

The Specific Primary Indications as Distributed in Each Hospital Subdivisions

The larger general primary indications for the cesarean sections are subdivided for each hospital in the following tabulations. In that immediately following all sections were performed by the classical operative technics while the more special operative technics will be given with their specific indications in a second tabular listing.

Subdivision of Cesarean Section Indications Classified Under the General Connotation "Maternity Passage, (all cases delivered by classical operation) bony parts"

Bony parts of Maternal Passage	Number of Cases in Hospital A	Hospital B	Hospital C	All Hospitals
"Polio" pelvis	2	1	0	3
"Butterfly Sacrum"	1	0	0	1
"Generally contracted pelvis"	10	12	4	26
Low Assimilation pelvis	1	0	0	1
Bilateral Congenital Hips	1	0	0	1
"Traumatic" Pelvis (Post-accidental)	0	1	0	1
"Acute" lumbo-sacral angle	0	1	0	1
"Flat" pelvis	0	0	2	2
History "difficult labor" with infants stillborn	0	0	2	2
Naegele Pelvis	0	0	1	1
Large Promontory of Sacrum	0	0	1	1
Totals	15	15	10	40

Subdivisions of Primary Indications for Cesarean Section (Classical Type) Included Under General Category of "Maternal Passage, Soft Parts"

Specific Indications	Number of cases in Hospital A	Hospital B	Hospital C	All Hospitals
One previous cesarean section	38	22	10	70
Two previous cesarean sections	7	2	0	9
Previous plastic operation	0	2	1	3
Congenital atresia upper third vagina	1	0	0	1
To "protect" previous laparotomy scar	0	0	1	1
Previous "difficult labors" but infants all lived	8	0	1	9
Failure "Labor Induction"	1	0	0	1
Fear of Breech Delivery (mother's tissues)	0	1	1	2
Uterus didelphys	1	0	0	1
Vaginal Hernia	1	0	0	1
"Inertia"	0	2	4	6
Totals	57	29	18	104

The Passenger (Fetus) as the Primary Indication for Classical Cesarean Section in Grand Rapids

Specific Primary Indication	Hospital A	Hospital B	Hospital C	All Hospitals
"Face" Presentation	0	1	0	1
Monster or dead baby	1	1	0	2
Mother was an "Elderly Primipara"	3	2	2	7
"Twins"	1	0	0	1
Post-maturity	5	1	2	8
Cephalo-pelvic disproportion (Primarily Fetal)	2	4	9	15
Posterior Position	1	1	1	3
Totals	13	10	14	37

"Hemorrhage" of Mother as the Primary Indication for Classical Cesarean Section Grand Rapids

Specific Primary Indication	Number of cases in Each Hospital A	B	C	All Hospitals
Abruptio Placenta	3	2	5	10
Placenta Previa (all types)	6	16	12	34
Ruptured Uterus	1	0	1	2
Totals	10	18	18	46

"Toxemia" of Mother as the Primary Indication for Classical Cesarean Section Grand Rapids

Specific Primary Indication	Number of cases in Each Hospital A	B	C	All Hospitals
"Hypertension"	1	0	0	1
Preeclampsia	1	5	1	7
Nephritic Toxemia	4	4	0	8
Totals	6	9	1	16

"Other" Maternal Factors Given as the Primary Indication for Classical Cesarean Section Grand Rapids

Specific Primary Indication	Number of cases in Each Hospital A	B	C	All Hospitals
Fulminating Hydramnios	0	0	1	1
Cardiac Condition in Mother	5	1	0	6
Court Order Sterilization at time of delivery	5	4	0	9
Pyelitis	1	0	2	3
Sterilization of Mother(Voluntary)	14	10	0	24
Thoracoplasty (Mother)	0	0	1	1
Uterine "Tumor" (usually fibroid)	1	0	2	3
Hydronephrosis One Kidney	1	0	0	1
Kyphosis of Spine	1	0	0	1
Torsion of Ovarian Cyst during Labor	0	1	0	1
Totals	28	16	6	50

In six instances a classical cesarean section was performed, all in Hospital A, with no specific primary indication for such procedure as indicated by a detailed perusal of the patients' hospital records or the sponge count books. Two of these six patients were sterilized at the time of cesarotomy.

A glance at the detailed indications for cesarean section will reveal certain relevant conclusions although brevity forbids a lengthy mention of obviously apparent inconsistencies between the different hospital primary indications in this section survey. It is worthy of note, however, that the indication of "one previous section" was nearly four times more common in hospital A than in hospital C. Hospital A also evidences the greater number of primary indications for classical cesarean section (31 different factors) in contrast to hospital B (21 different factors) and hospital C with 23 different primary indications. In short, the chance for cesarean section would seem to be one third greater in hospital A which had a larger choice of primary indications to explain its increased numbers of cesarean sections as opposed to the records of the other two hospitals in Grand Rapids.

The Specific Primary Indications for Specialized Cesarean Sections
(Porro and Low Cervical)
Grand Rapids

In view of the fact that the Porro cesarean section entails loss of the uterus following operative delivery the specific primary indications were deemed important enough to list separately and thereby permit the reader to judge in his own mind whether the radical operation was justified upon the basis of the primary indication for such a procedure. To add contrast to this tabulation the laparotrachelotomy operation (low cervical section) is included in this compilation.

Specific Primary Indication for Section	Number of Cases in Each Hospital							
	A		B		C		All	
	Low Cervical	Porro	Low Cervical	Porro	Low Cervical	Porro	Low Cervical	Porro
Ruptured Uterus	0	2	0	0	0	3	0	5
DDS Pelvis (?Android)	0	1	0	0	0	0	0	1
Dead Baby Anencephalus	0	1	0	0	0	0	0	1
Pyelitis	0	1	0	0	0	0	0	1
Hydronephrosis	1	0	0	0	0	0	1	0
Two previous sections	0	3	0	0	0	0	0	3
Sterilization	1	1	1	1	0	0	2	2
Previous Vesico-Vaginal Fistula Repaired	0	1	0	0	0	0	0	1
Previa (central)	0	1	0	0	0	0	0	1
Bandl's Ring BOW rup. 2 days	0	1	0	0	0	0	0	1
TBC of Spine BOW rup. 2 days	0	1	0	0	0	0	0	1
Fractured Pelvis Torn Plexus	0	0	0	0	0	1	0	1
Cephalo-pelvic disproportion	0	0	2	0	2	0	4	0
Abruptio Placenta	0	0	0	1	1	2	1	3
Placenta Previa	0	0	0	1	2	0	2	1
One previous section	0	0	0	0	2	0	2	0

Habitual Neonatal Death						Lived		
(2 previous occasions)	0	0	0	0	0	1	0	1
Fibroids	0	0	0	2	0	1	0	3
Cardiac (Mother)	0	0	1	0	0	0	1	0
Extensive Vaginal Repair	0	0	1	0	0	0	1	0
Breech Delivery	0	0	1	0	0	0	1	0
Totals	2	13	6	5	7	8	15	26

Hospital A found 10 different primary indications to justify the radical Porro cesarean section while in hospital B we find 4 different indications and in hospital C there were but 5 different factors involved. In contrast to this statement we find 4 primary indications for laparatrachelotomy at hospital C; 5 separate factors at hospital B and but 2 different indications for the less radical low cervical cesarean section.

The Story of "Previous Cesarean Sections"

Up to this point in the survey the general term "previous cesarean section" was used only to connote a specific indication for the operative deliveries as reported in the study. It was obvious that some of those cases having had a cesarean section upon a previous occasion may require a second or even a third section for totally different primary indications than simply "previous section". To illustrate the total primary indications for all types of cesarean section cases which gave also a previous history of cesarean section, Table XII was developed. In all 95 women gave a history of previous operative delivery (abdominal route) and of these 53 cases were found in records of hospital A; 27 cases at hospital B; and 15 cases at hospital C. In each of the three hospitals, two cases (total of six cases) who in each gave a history of two "previous sections".

Among this series of 340 patients there were more than one-fourth of that number who gave a history of one or more previous sections and among this group of 95 patients five cases were found to have ruptured uterus at the time of their last delivery and three gave a direct history of previous <u>sterilization failure</u> (and subsequent pregnancy and section; the latter cases were all in hospital A.)

Table XII
Primary Indications for the Last Cesarean Section
Among Patients Giving a History of Previous Cesarean Section

Specific Primary Indication for Last Section	Number of Cases in Each Hospital A	B	C	All Hospitals
None (not given)	16	2	6	24
Two previous sections	11	2	0	13
Placenta previa	4	0	2	6
Separation of symphysis	1	0	0	1
Ruptured uterus	1	0	0	1
Cephalo-pelvic disproportion	2	2	3	7
Generally contracted pelvis	6	2	1	9
"Borderline" pelvis	5	2	2	9
Fractured and deformed pelvis	0	2	0	2
Nephritic toxemia	2	1	0	3
Other toxemia	1	0	1	2
Cardiac condition	1	0	0	1
Sterilization	3	12	0	15
Failure test of labor	0	1	0	1
Vaginal repair	0	1	0	1
Totals	53	27	15	95

Anesthesia in Cesarean Section

The choice of anesthesia varied in the three hospitals. Hospital A physicians favored a combination of ethylene and nitrous oxide while hospital C surgeons selected cyclopropane as their choice and hospital B adhered to the combination of nitrous oxide and ether although the latter did use local anesthesia and spinal anesthesias more than the other two hospitals.

Table XIII
The Choice Anesthesia in Cesarean Section
Grand Rapids, Michigan
January 1, 1935 to June 30, 1940

Anesthesia	Hospitals A	B	C	All Hospitals
Nitrous oxide alone	15	25	19	59
Nitrous oxide and ether	35	47	6	85
Nitrous oxide and ethylene	62	1	0	63
Nitrous oxide and ether and ethylene	33	0	1	34
Nitrous oxide and avertin	0	1	0	1
Cyclopropane	0	7	37	44
Cyclopropane and ether	0	0	1	1
Cyclopropane and nitrous oxide	0	2	0	2
Spinal	1	5	0	6
Ether alone	1	3	15	19
Ether and ethylene	0	1	2	3
Local	2	11	1	14
Local and nitrous oxide	1	4	0	5
Local and cyclopropane	0	1	0	1
Totals	150	108	82	340

The Physicians Doing Cesarean Section in Grand Rapids

There were 34 physicians who performed the total 340 cesarean sections in the three hospitals of Grand Rapids during the 66 month interim of this survey. It was observed that six of these doctors performed cesarean sections in each of the three hospitals, while 8 physicians operated their cases in each of two hospitals and the remaining 20 surgeons limited their cesarean operations to a single institution.

The distribution of cesarean section cases per operator is illustrated in the following table XIV. The master code number of each operator occupies the first column, the number of hospitals in which the operator performs his cesarean sections is listed in column two, while column three lists the total number of patients delivered by cesarean section by the individual physicians. The type of cesarean sections performed by each operator is illustrated in the three columns on the right.

Table XIV
Cesarean Section Survey
Grand Rapids, Michigan

Master Code Number of Operator	Number of G. R. Hospitals in which the Operator performs cesarean sections	Total number of Cesarean Sections by individual operators	Distribution of Types of Cesarean Section by individual operator		
			Classical	Low Cervical	Porro
1	3	48	43	0	5
17	3	47	44	0	3
3	1	45	38	0	7
15	3	34	34	0	0
4	3	28	26	2	0
22	3	17	10	7	0
28	2	11	10	0	1
20	2	10	9	0	1
39	3	10	10	0	0
33	2	10	6	3	1
19	1	8	8	0	0
16	2	8	8	0	0
6	1	8	8	0	0
5	2	6	6	0	0
7	1	6	6	0	0
60	1	6	4	1	1
54	2	4	3	0	1
64	1	4	4	0	0
66	1	4	3	0	1
24	1	3	3	0	0
25	1	3	2	0	1
13	1	2	1	0	1
9	1	2	2	0	0
52	2	2	2	0	0
51	1	2	0	1	1
44	1	2	2	0	0
47	1	2	1	0	1
32	2	2	2	0	0
63	1	2	2	0	0
80	1	1	1	0	0
58	1	1	0	0	1
62	1	1	1	0	0
50	1	1	0	1	0
71	1	1	1	0	0
34 Operators		340	299	15	26

A review of table XIV will reveal that there were but four operators performing more than a total of 30 cesarean sections each during the whole 66 month period of this survey. These four doctors performed 174 of the total 340 operations in this series, or 53.5% of the total number. However, it was of interest to observe that not a single operator in this group doing over half the cesarean sections in Grand Rapids elected to perform the low cervical cesarean section although three of this group did perform 15 of the total 26 Porro cesarean sections. Operators with the code numbers 1 and 3 did have much more liberal indications for cesarotomy than did the other two operators and although these specific indications were studied for each doctor the numbers were such as to lead to actual identity were the indications listed. Suffice it to say that these same two individuals performed more associated sterilization operations at the time of the cesarean section and also performed 13 of a total of 17 hysterectomies (done as a means to interrupt early pregnancy, on indication, and accomplish sterilization at the same time). These cases were gathered from the operating room records and are not included in the series save as a casual although striking observation. There were five operators who did but one cesarean section each in five and one-half years and one of these individual's only operative case was the more difficult Porro cesarean section!

Eight operators (code number 60, 54, 66, 25, 13, 51, 47, and 58) who did a total of 24 cesarean sections in the whole 5½ year period actually performed the difficult Porro cesarean section operation on 8 cases or one-third of all the women submitting to cesarean section operation by this group also lost their uterus. This figure is a decided contrast to the four operators (code numbers 1, 17, 3, and 15) who performed a total of 174 cesarean sections in the same period of time and found Porro section necessary but on 15 occasions, or in 8.6% of their cases which on statistical analysis reveals that the chance of a woman losing her uterus following cesarean section was slightly more than four times as great if she permitted the "dabbler in cesarean section" to do the operative delivery! If the loose indications given for some of the Porro sections by the two less stringent operators in the more experienced group (in numbers) were removed the chance of hysterectomy was actually increased to ten times in the group of the less experienced operators (in numbers). In summary the indications for Porro sections were loose and abstract in both the well experienced and the less experienced operators, although conservatism predominated in the former.

None of the four operators doing over half of the sections in the survey series performed the laparotrachelotomy (low cervical flap) operation.

The Consultants on Cesarean Section Cases

There were 80 physicians who referred or acted as consultants in this series of 340 patients although but 34 of their number actually performed the surgery. Among these 80 physicians it was found that 22 individuals acted as consultants and 34 as operators while the remaining 14 physicians acted only in the capacity of referring doctors. In 100 instances there was no consultation service rendered these patients, slightly less than one third the entire series. The remaining 240 cases seen by consultants are listed in the following table so constructed that one can compare the total number of operations to the total number of each individual doctor's consultations.

Table XV
Correlation of Number of Operations and Consultations
of Each Participating Operator or Consultant

Master Code No. of Doctor	Total No. of Sections by Operator	Total No. of Times This Operator Acted as Consultant
No consultation at all on records	100	0
17	47	57
3	45	51
15	34	40
4	28	32
60	6	21
39	10	8
1	48	5
28	11	5
5	6	3
33	10	3
19	8	2
23	0	2
61	0	2
2	0	1
9	1	1
22	17	1
24	3	1
25	3	1
63	2	1
64	4	1
67	0	1
80	1	1
	294	240
Operator operated upon his personal cases without advice of other doctors	46	0
Total	340	240

A glance at table XV reveals that in 46 instances the operator performed a cesarean section upon his own personal patients without seeking any advice of a medical confrere. These cases were distributed about equally among all these institutions. There were four physicians who were adjudged to be competent consultants although they themselves performed no surgical deliveries via the abdominal route.

Among the four surgeons performing a total of 174 cesarean sections (of the total of 340 cases) we find their consultants to be limited largely to men of their experience, in general, or as in one instance, ignoring the consultation service. Table XVI illustrates this observation.

Table XVI

To Demonstrate the Number of Consultants Used by the Four Operators Doing the Greatest Number of Cesarean Sections
4 Operators - 176 Cases

Consultants	Operator's Master Code Number															
	Hospital A				Hospital B				Hospital C				All Hospitals			
	1	17	15	3	1	17	15	3	1	17	15	3	1	17	15	3
63	0	0	0	0	0	0	1	0	4	0	0	0	4	0	1	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	7	14	12	0	1	1	2	0	8	15	14	0
15	0	0	0	0	0	16	0	6	0	1	9	0	0	17	9	6
60	0	0	0	0	0	10	1	0	0	0	0	0	0	10	1	0
3	6	0	1	17	0	0	0	0	0	0	0	0	6	0	1	17
None	12	2	0	13	2	2	0	0	10	1	0	0	24	5	0	13
4	2	0	1	12	0	0	0	0	0	0	0	0	2	0	1	12
80	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
20	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
25	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
39	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
64	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
28	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0
Totals	21	2	2	45	10	42	14	6	17	3	12	0	48	47	28	45

When the operator's master code number is traced across the columns from the same number on the left that code number listed under each hospital and in the last four columns the number indicated illustrates the number of cases both seen in consultation and operated upon by that physician. When the legend (none) is traced across to each code number that number depicts the number of cases in which the doctor acts as the private physician, the consultant and the surgeon on the same case, e.g. operator No. 1 brought in 24 cases (50%) of his personal series of 48 patients and in these 24 instances he was the personal physician, the consultant, and surgeon to each patient in this group.

The portion of the survey which includes a discussion of the physicians doing the cesarean sections could have been extended into a much more valuable report if it were possible to have been able to have ascertained the number of deliveries per each doctors, as was done in the Pontiac cesarean section survey. The Grand Rapids City Health Department, however, does not have as extensive and basic demographic data available as did the aforementioned city.

Other Operations Associated with Cesarean Sections

Among the 340 patients submitting to cesarean section one can demonstrate 186 additional operations performed upon this group. Slightly more than one-half (54.7%) of these patients experienced some operative procedure other than cesarotomy at the time of their operation, or soon following it (as in 4 cases).

The largest number of secondary operations were those of sterilization by means of tubal ligation. These various operations of sterilization, all with the same basis principle, that of crushing or ligation of the Fallopian tubes, constituted 141 of the 186 associated surgical procedures, or nearly three-quarters (75.8%) of all the secondary operations were sterilization by ligation. To this number of sterilization operations could be added further 26 hysterectomy operations (Porro sections) and 9 cases of bilateral salpingo-oophorectomy, for a total of 176 (94.6%) of the 186 secondary operations which left the patient sterilized by operative procedure.

The distribution of these secondary operations at the time or soon following cesarean section is given in the following chart, viz.:

Table XVII
Associated Surgical Procedures With or Following Cesarean Section

Associated Surgical Procedures	Hospital A	B	C	All
Hysterectomy (Porro sections)	13	5	8	26
Sterilizations (ligation of tubes)	80	61	0	141
Bilateral salpingectomy	8	0	1	9
Unilateral salpingectomy	0	1	0	1
Myomectomy	1	1	1	3
Appendectomy	1	0	0	1
Removal Twisted Pedicle Cyst	0	1	0	1
Exploratory Laparotomy (Sec. for Obstruction)	3	0	0	3
Repair Evisceration 4th P.O. Day	1	0	0	1
Totals	107	69	10	186

Inasmuch as the number of hysterectomies included some interesting indications for this procedure it was thought best to list them separately under each hospital:

Porro Cesarean Sections (Hysterectomy) following Section

Hospital A

1. Ruptured uterus
2. DDS pelvis (dystocia dystrophy pelvis) X-ray measurements normal
3. Dead baby - anencepholus (Para 2 Gravida 3)
4. Placenta previa centralis with uterine fibroid
5. Premature ruptured membranes (48 hours), X-ray measurements normal, baby lived (Mother reputed to have tuberculosis of spine, was Para 0, Gravida I)
6. Two previous sections (1 stillborn by normal delivery, Para 3, Gravida 4)
7. Two previous sections (Para 4 Gravida 5) all 5 children living
8. Elective Porro section - for sterilization (So written on chart)
9. Ruptured uterus
10. Previous vesico-vaginal fistula repaired (Para 1, Gravida 2)
11. Premature Rupture of Membranes (48 hours) Bandl's contraction ring
12. Pyelitis (Patient had hematuria 8 days preoperatively)
13. Two previous sections (uterus failed to contract) Para 2, Gravida 3

Hospital B

1. Placenta previa centralis
2. Fibroid on anterior wall of uterus - orange size
3. Fibroid uterus (orange size) - maternal toxemia
4. No indication given. Sterilization mentioned. One previous section. Para 1, Gravida 2.
5. Abruptio placenta with thrombosed broad ligaments

Hospital C

1. Torn venous plexases in broad ligament
2. Convelaire uterus (severely thrombosed blood vessel). Abruptio.
3. Ruptured uterus - hand sized window
4. Bicomate uterus - two previous stillbirths. Para 4, Gravida 5.
5. Uterine fibroids (large sized)
6. Ruptured uterus with "rigid cervix" (Patient died on third P.O day)
7. Ruptured uterus. (Patient died on fourth P.O. day)
8. Abruptio placenta with severe uterine changes.

The Progeny of Patients Delivered by Cesarean Section

There were 350 infants born of the 340 women delivered by cesarean section. There were five sets of twins. Two sets died following delivery at hospital C. In 63 instances it was impossible to secure information anent the sex or status of the baby - this difficulty was encountered at hospital A where the separate record systems were used and the number of the baby's charts were not listed on the record of the mother as is done in most institutions.

Among the 287 known infants there were 62 deaths and 26 of these babies were stillborn in the following number, per each hospital: hospital A, 6 stillbirths; hospital B, 10 stillbirths; and hospital C, 10 stillbirths. The remaining 36 infants died in their neonatal period, i.e. prior to discharge from the hospital. Table XVIII shows the findings in each of the three hospitals.

Table XVIII
The Progeny of Patients Undergoing Cesarean Section

Sex of Infant	Hospital A		B		C		All Hospitals	
	Living	Dead	Living	Dead	Living	Dead	Living	Dead
Male	33	10	44	9	32	10	109	29
Female	35	7	47	8	25	12	107	27
Unknown	63	0	0	0	0	0	63	0
Twins	2	0	0	0	1	2	3	2
Totals	133	17	91	17	58	24	282	58
	150		108		82		340	

Cesarean Section Fatalities

Among the 340 cesarean section patients there occurred 12 fatalities, an operative mortality of three and one half (3.5%). Six of these fatal outcomes following cesarotomy took place in hospital C; four fatalities at hospital A; and two fatalities at hospital B.

Hospital	Total No. of Sections	Total No. of Fatalities	Percentage Operative Mortality
A	150	4	2.6%
B	108	2	1.8%
C	82	6	7.3%
All	340	12	3.5%

The operative mortality per individual operator is illustrated in the following table.

Master Code No. of Operator	Total No. of Sections	No. of Fatalities	Operative Mortality	Approximate Mortality Ratio Incidence
1	48	4	8.3%	1 to 12
3	45	2	4.4%	1 to 23
7	6	1	16.6%	1 to 6
15	34	2	5.8%	1 to 17
17	47	1	2.1%	1 to 47
20	10	1	10.0%	1 to 10
28	11	1	9.0%	1 to 11

The cause of deaths of the patients submitting to cesarean section included these items: at hospital A, one death from bronchopneumonia, two deaths following postoperative shock and one death resultant from generalized peritonitis following the separation of suture line in the uterus; in hospital B, one death on the 28th hospital day and the 7th postoperative after section done for preeclampsia which failed to respond to 21 days of conservative medical care, and another death occurring from bronchopneumonia on the 24th postoperative day (this patient was discharged against advice with distinct morbidity and died on her readmittance); in hospital C, five fatalities from postoperative shock (included 2 cases with previous diagnosis of ruptured uterus), and one patient succumbed on her 9th postoperative day from nephritic toxemia and its resultant uremia.

Further correlations were made but the figures lack statistical significance, and were unfair to individual operators, in view of the smaller numbers upon which certain deductions must be made. In summary, hospital C evidenced the highest operative mortality, hospital A was next, while hospital B had the lowest mortality percentage figure. No comments relevant to individual operators is necessary other than reference to the preceding table.

The Febrile Morbidity

There were 1059 days of febrile morbidity among this group of 340 cesarean section patients. The morbidity included in this category was any temperature above 100° Fahrenheit exclusive of the first two postoperative days. There were 104 patients who experienced no febrile morbidity, on the basis of the aforementioned criterion of febrile morbidity. This indicates that but slightly less than one-third (30.6%) of the patients evinced no abnormal febrile morbidity. In the three hospitals the following number of patients gave evidence of febrile morbidity:

Hospital	Total No. of Sections	Afebrile Cases	% Afebrile	Febrile Cases	% Febrile
A	150	47	31.3%	103	68.7%
B	108	32	29.6%	76	70.4%
C	82	25	30.4%	57	69.6%
All	340	104	30.6%	236	69.4%

The numbers of hospital days of febrile temperature is given in the table for each institution.

100° Febrile Morbidity or Over After Cesarean Section
(Exclusive of First Two Postoperative Days)

Days of Febrile Temperature 100° or above exclusive of first two postoperative days	Hospitals A	B	C	All
None	47	32	25	104
1	6	10	9	25
2	24	15	15	54
3	23	16	12	51
4	11	7	5	23
5	11	4	3	18
6	8	5	1	14
7	5	5	3	13
8	4	4	2	10
9	2	3	2	7
10	5	1	2	8
11	2	2	1	5
12	0	0	1	1
13	0	2	0	2
15	0	1	0	1
16	0	1	0	1
19	0	0	1	1
20	1	0	0	1
30	1	0	0	1
	150	108	82	340

Inasmuch as this study was designed merely as a fact finding survey, by an out of the city individual conducting the demographic search, no conclusions will be listed. No recommendations will be made for the same reason although it is felt that each of the three institutions participating in this study may wish to make a few obvious changes in their conduct of supervision over potential cesarean section patients, by recommending some constructive changes in their hospital staff rulings and regulations.

The author of this survey was given every support to facilitate his task and he wishes to thank the Maternal Health Committee of the Kent County Medical Society, the three hospital obstetrical staffs, and their departments of records personnel for their helpful and constructive suggestions.

Respectfully submitted

Bureau of Maternal and Child Health
Michigan Department of Health

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