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Evaluation and Relevance of Indications for Primary Caesarean Section: A Five-Year Experience Report from Nevers Hospital Center

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Abstract

Context: The caesarean section rate continues to increase in our different health structures specially for women who have not had a scar in the uterus. **Objectives:** The aim of this study was to analyze the key factors and main indications for primary caesarean sections and to find ways to reduce the increasing rates. **Patients and Method:** This is a longitudinal and retrospective study carried out from June 1, 2018 to July 31, 2022. The study included all patients who had a cesarean-section for the first time (primary caesarean). An anterior uterine scar was a non-inclusion criterion. Data were collected prospectively using Synfonievre and Agopra software via patients' files and information collection sheet. Data were analyzed with SPSS 21 software, Mac version. Averages were calculated for quantitative data and percentages for qualitative data. The statistical tests used were the Pearson Chi^2 test. The observed differences were considered significant when the p-value was less than 0.05. **Results:** During the study period, we recorded 8832 deliveries and 3148 caesarean sections (35.6%). Primary CS concerned 70% of overall C-section rate. The main indications were FHR Fetal Heart Rate abnormalities (FHRA) (27%), followed by the other indications (including preterm delivery, umbilical cord dystocia, malpresentation of fetus, foetal abnormalities, elective CS, triple gestation, mother abnormalities); dystocia or prolonged labor (18.7%), breech presentation in a twin pregnancy with 11.3% and 9.6% respectively. We recorded more vaginal deliveries with labor induction: 81.4% against 75.2%. An obstetrical audit led to better labor management and a reduction in the cesarean section rate. **Conclusion:** We need to focus on diagnosis of fetal distress, management of breech presentation during of a twin birth and a singleton. Induction of labor can be an effective alternative in certain indications. An obstetrical audit is needed to reverse the caesarean section rate.

1. Introduction

According to new research from the World Health Organization (WHO), caesarean section use continues to rise globally, now accounting for more than 1 in 5 (21%) of all childbirths. This number is set to continue increasing over the coming decade, with nearly a third (29%) of all births likely to take place by caesarean section by 2030, the research finds.

While a caesarean section can be an essential and lifesaving surgery, it can put women and babies at unnecessary risk of short- and long-term health problems if performed when there is not medical need [1]. According to the World Health Organization (WHO), an appropriate C-section rate should be between 5 and 15% [2]. The caesarean section rate is steadily increasing in many countries [2]. In several countries, the CS rate reaches 30% or more: 31.1% in the United States of America in 2006 [3], more than 30% in many European countries and 30.5% in Singapore in 2003 [4]. In France, between 2000 and 2007, the caesarean rate increased steadily, from 17.4% to 20.2%. Since then, it has stabilized and stands at 19.9% in 2021. By way of comparison, in 2017, France ranked 9th among all the countries of the Organization for Economic Co-operation and Development (OECD), excluding Japan and Greece for its overall caesarean section rate. However, an analysis must be made to identify the sources of what appears to be, on the one hand, inadequate access to caesarean section and, on the other hand, an unnecessary indication for caesarean section. According to Robson's ten group classification system, one of the steps in maintaining an appropriate caesarean section rate is an assessment of obstetric management [5] [6]. Numerous studies have shown the major contribution of group 5 (history of caesarean section, singleton, cephalic, after 37 weeks of gestation) in the increase in the CS rate [4] [7] [8].

We carried out this study to identify the key factors leading to primary caesarean section and find ways and means to avoid it if it is unnecessary.

2. Patients and Methods

This longitudinal and retrospective study was conducted at the period between June 1, 2017 and July 31, 2022 at Nevers hospital center, the only structure of this level in the Nièvre department.

The inclusion criteria were all the patients with term pregnancy who underwent a primary caesarean section. Therefore, an anterior uterine scar was a criterion for non-inclusion.

Indeed, the medical data was recorded with Sinfonievre software retrospectively from June 1, 2018 to July 31, 2022. After this date, the data is recorded

daily to Agopra software. Since 2015, an audit has been carried out on a daily basis to analyze C-Section indications.

Multiparas are patients who have given birth at least once.

Then, the women were classified according to the classification in ten groups of Robson as it appears in Table 1 [9] allowing us to evaluate the contribution of each group in the primary caesareans. In addition, we have classified the indications for CS according to a group of main indications which are as follows: obstructed or prolonged labor, suspicion of fetal distress, breech presentation, twin delivery, antepartum hemorrhage, arterial hypertension associated with pregnancy and others.

Obstructed labor is a mechanical obstruction resulting from foeto-pelvic disproportion. Prolonged labor is due to dynamic labor disorders with inadequate uterine contractions [10]. The diagnosis was made in two main forms: a stationary cervical dilation of 2 hours after 4 cm or a latent phase which lasts more than 12 hours for primiparous and 8 hours for multiparous.

Concerning the anoxo-ischemic asphyxia, it is suspected in front of an abnormal fetal heart rate with disturbances of the pH of the scalp.

The antepartum hemorrhage involved placental abruption and placenta previa.

The impact of induction of labor was also assessed. Labor induction is a method of artificial induction of labor [11]. We used a prostaglandin E2 analog, in this case Dinoprostone (PROPESS) vaginally at a dose of 10 mg for 24 hours with continuous diffusion.

The characteristics of newborns were analyzed using mainly the Apgar score.

Data were analyzed using SPSS 21 software, Mac version. We used the calculation of the Average for the quantitative data while the qualitative ones were expressed in percentages. The Pearson Chi^2 test or Fisher's exact test was used accordingly. The observed differences were considered significant when the

Table 1. Robson's ten groups classification.

Groups	Definition of groups
1	Nulliparous with single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour
2	Nulliparous with single cephalic pregnancy, ≥37 weeks gestation who either had labour induced or were delivered by CS before labour
3	Multiparous without a previous uterine scar, with single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour
4	Multiparous without a previous uterine scar, with single cephalic pregnancy, ≥37 weeks gestation who either had labour induced or were delivered by CS before labour
5	All multiparous with at least one previous uterine scar, with single cephalic pregnancy, ≥37 weeks gestation
6	All nulliparous women with a single breech pregnancy
7	All multiparous women with a single breech pregnancy including women with previous uterine scars
8	All women with multiple pregnancies including women with previous uterine scars
9	All women with a single pregnancy with a transverse or oblique lie, including women with previous uterine scars
10	All women with a single cephalic pregnancy ≥36 weeks gestation, including women with previous scars

p-value was less than 0.05.

3. Results

During the study period, we recorded 8832 deliveries and 3148 cesarean sections (35.6%). Women with an unscarred uterus accounted for 2266 which is equivalent to 60% of the overall caesarean section rate.

The final sample representing patients with an unscarred uterus undergoing caesarean section was 1008 patients. Concerning the age of the patients, the average was 27.2 years (from 13 to 47 years). Multiparas represented almost half of the sample (49.7%).

The Robson 1 and 3 groups, respectively 29.3% and 17.6%, were the most represented among the patients having undergone a primary caesarean section.

Table 2 represents the contribution of each of the ten Robson groups to the primary CS. The most common indication for caesarean appears to be Foetal Heart Rate (FHRA) abnormalities (29.1%). However, only 6.6% of these newborns had an Apgar score below 7 at the 5th minute.

Table 3, representing the evolution of deliveries over the 5 years, revealed an increasing number of deliveries and a variable caesarean section rate. The lowest caesarean section rate was reached in 2022 (19.2%) and the highest rate was recorded in 2018. The lowest rate of obstructed labor and prolonged labor was recorded in 2022 (4.7%) and the highest rate in 2018.

Table 4 shows once again that the most common indication remains the FHRA, the others indications (including presentations abnormalities, premature delivery, cord-abnormalities…).

Prolonged labor thus comes in third place (18.7% of indications).

The gynecological and obstetrical team regularly carried out an obstetrical audit

Table 2. Distribution of patients according to Robson's ten groups classification.

Group	Number of primary CS* (n)	Percentage (%)
1	363	35.9
2	33	3.3
3	290	28.8
4	28	2.8
5	-	-
6	44	4.4
7	50	5
8	92	9.1
9	15	1.5
10	93	9.2
Total	**1008**	**100**

*CS = caesarean section.

Table 3. Trends of delivery through five years.

Year Data	2018	2019	2020	2021	2022	p
Number of delivery	932	2520	2866	2750	3864	
Caesarean section	741 (38.2%)	444 (20.5%)	477 (22.5%)	509 (24.4%)	422 (19.2%)	<0.001
Preeclampsia-eclampsia	183 (22%)	182 (12%)	233 (12.5%)	187 (10.7%)	277 (9.7%)	<0.001
Prolonged or Obstructed labour	134 (16.2%)	103 (6.8%)	147 (7.9%)	110 (6.3%)	134 (4.7%)	<0.001
Labour Abnormalities*	369 (44.4%)	826 (54.4%)	938 (50.3%)	950 (54.3%)	1409 (49.2%)	<0.001
Induction labour	7 (0.9%)	24 (1.6%)	33 (1.8%)	12 (0.7%)	106 (3.7%)	<0.001
Forceps/Vacuum extractor	7 (8%)	1 (0.03%)	21 (9%)	28 (6%)	35 (8%)	<0.001
Apgar score < 7	19 (2.3%)	11 (0.7%)	20 (1.1%)	35 (2%)	74 (2.6%)	<0.001

*Labour abnormalities: fetal distress, premature rupture of membranes, high blood pressure and their complications, twin delivery, other presentation than vertex.

Table 4. Distribution of patients according to the main indication of caesarean section.

Indication	Number (n)	Percentage (%)
Fetal distress	734	27
Obstructed or prolonged labour	562	18.7
Breech presentation	338	11.3
Antepartum Haemorrhage	453	15
Twin delivery	287	9.6
Preeclampsia	185	6
Others indications*	620	20.7
Total	3148	100

*Others indications included preterm delivery, umbilical cord dystocia, malpresentation of fetus, foetal abnormalities, elective CS, triple gestation, mother abnormalities.

during the year 2016, at least 5 days a week.

The Apgar score rate below 7 varied between 0.7% and 2.6%. The lowest rate was obtained in 2019.

Breech presentation of the first twin was the main indication for caesarean section in twin birth.

The caesarean section rate was variable over the 5 years. In 2019, we observed 38.5% of caesarean sections in twins with 0.5% Apgar score less than 7. In 2018, we observed the highest caesarean section rate (38.5%) and the highest Apgar score less than 7 (4.3%). Apgar score was not related to CS rate.

Other indications included preterm delivery, umbilical cord dystocia, dystocic fetal presentation, fetal anomalies, elective caesarean section, triple gestation, maternal anomalies.

Induction of labor occurred in 3.7% of patients in 2022 and 0.9% in 2018. It was associated with the highest vaginal delivery rate: 81.4% versus 75.2% (p =

0.005 OR = 0.9 [0.87 - 0.97]).

4. Discussion

4.1. Patient Profile

In our study, we found that primary caesarean section accounted for more than half of the overall caesarean section (72%). To reduce the caesarean section rate, it is important to focus on the primary indications mainly for two reasons: first, the large proportion of parturients having undergone a primary caesarean section and the possibilities of attempted vaginal delivery in the new uterus. Obviously, a scarred uterus is considered from the outset as an obstetric pathology which strongly exposes you to cesarean section. Then, an attempt at vaginal delivery is allowed even in front of borderline pelvises or other mechanical or dynamic obstacles that can be corrected.

A proportion of 35.9% of patients who underwent caesarean section were primiparous with presentation of the vertex.

4.2. Analysis of the Main Indications

Cesarean section for suspected acute fetal distress was the largest cluster we had to deal with. Intrapartum asphyxia is defined as metabolic acidosis at birth with a pH below 7.00 and a base deficit greater than or equal to 12 mmol/l [12]. In our center, the diagnosis of fetal asphyxia was based on an abnormal fetal heart rate on cardiac monitoring and a fetal scalp pH less than 7.00 with meconium in the amniotic fluid if the membranes ruptured. According to Bouiller *et al.*, amniotic fluid aspects do not interfere with the occurrence of metabolic acidosis. Moreover, they conclude that the Apgar score at the 5th minute seems predictive of neonatal encephalopathy with 100% when the Apgar score is less than 4 and 11% when it is greater than 6 [13].

In our study, only 6.6% of newborns presented a suspicion of fetal distress following an Agpar score below 7 at the 5th minute. This raises the debate about the diagnostic criteria and predictive patterns of intrapartum asphyxia. RCF abnormalities and scalp pH appear to be insufficient. Nevertheless, according to some publications, late or variable or prolonged recurrent decelerations, bradycardia with absence of fetal heart rate variability (FHR) and severe sudden bradycardia are the patterns of FHR predictive of severe fetal acidosis [13] [14]. Early diagnosis of these FCR abnormalities associated with scalp pH is a good help in successfully reducing the cesarean section rate for the risk of fetal asphyxia. In addition, it is necessary to diagnose hidden fetal distress. This strategy is cost-effective because it could reduce the cost of deliveries as well as neonatal morbidity.

Hannah's term breech trial advocated planned cesarean section for the single fetus in breech presentation at term [15]. This point of view has had an impact on twin birth in particular when the first or the second twin is in vertexless presentation [16] [17]. Thus, recent publications insist on the high rate of caesa-

reans in twins [16] [17]. In our institution, vaginal delivery was performed regardless of the presentation of the second twin. We identified several trends: one obstetrical team that performed cesarean delivery while the first twin was in breech presentation in 2018 and 2020, another obstetrical team (in 2021 and 2022) that attempted vaginal delivery in such cases.

For both (twin birth and breech presentation), the cesarean rate was lower in 2021. For twin birth, the highest cesarean rate occurred in the year 2020, while the highest rate of Apgar score less than 7. The situation was similar for breech presentation. This evidence does not support routine caesarean section for breech presentation in singleton and twin pregnancies. It is necessary for this indication to find the best compromise between low rate of caesareans and low neonatal morbidity. In our study, the caesarean section rates that provide the lowest neonatal morbidity ranged between 38.5% and 46.5% for twin birth and between 52.4% and 53.8% for breech presentation only one baby. This is the reason why we encourage vaginal delivery for first breech presentation in twins and singletons. This makes it possible to obtain a reasonable caesarean section rate and a reduction in maternal and neonatal morbidity.

4.3. Obstetric Audit to Reduce Caesarean Section Rate

According to Robson, it is necessary to update the information collected on the databases in order to be able to confirm whether there is an increase in maternal morbidity or mortality justifying an increase in the CS rate [9]. During these five years, our database does not show such an increase that could justify an increase in the CS rate. The department's doctors and interns have been performing a daily audit on a regular basis since 2021. CS rates as well as CS for obstructed or prolonged labor were lower in 2021 than had been recorded in previous years. This is the result of better management of labor during this year 2021. A certain adjustment of obstetric management is therefore necessary to achieve the right cesarean section rate with the lowest maternal and neonatal morbidities.

4.4. Other Interventions

Induction of labor can be an effective alternative in certain indications. This strategy was most often used in 2021. A prostaglandin E2 analogue, in this case Dinoprostone (PROPESS) was often used and sometimes Cook's balloon. The main indications were post-term pregnancy, preeclampsia after 37 weeks of gestation, rupture of membranes before labor and uncontrolled gestational diabetes.

5. Conclusions

Even if there are strong variations in the rate of caesareans between the different French hospitals, we can notice a stable maternal morbidity. Because many caesarean sections have been performed on the basis of suspected fetal distress without an accurate diagnosis. Additionally, further prospective studies are needed to shed light on predictors of intrapartum asphyxia.

Caesarean section for breech presentation in single or twin birth should not be systematic. A team of obstetricians and neonatologists should discuss the indications. Above a certain rate, caesarean section does not improve the Apgar score in the case of twin and breech birth.

An obstetrical audit provides information for adjustment of birth management.

The safety and effectiveness of induction of labor are demonstrated. It must take more and more place in obstetric care.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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