Impact Of Physicians Decision Making On Cesarean Section In Nulliparous Women In Spontaneous Labor

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Citation

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Abstract
Background: The current study tries to explain a wide variation in the Cesarean Section rate of an obstetric team attending nulliparous women at term in spontaneous labor.

Methods: Physicians were divided in two Groups: Group A formed by doctors in the first quartile of Cesarean section rate and Group B formed by doctors in the fourth quartile. Differences in maternal and fetal factors, clinical practice and perinatal outcomes were studied.

Results: No differences were observed in maternal and gestational characteristics. No significant differences were found in length of the first stage of delivery (5.02 hours vs. 5.31 hours; p>0.05) nor in the second stage (1.82 hours vs. 1.99 hours; p>0.05). There were significant differences in obstetric practice: Group A presented a significant lower trend in diagnosis of dystocia (23.26% vs. 46.84%, p<0.05), fetal loss of wellbeing (0.72% vs 9.30%; p<0.05) and use of forceps(11.72% vs 27.14%; p<0.05). No differences were found in use of epidural analgesia (89.86% vs 78.29%, p>0.05) and episiotomy (60.94% vs. 50%; p>0.05). Perinatal outcomes were similar in both Groups.

Conclusions: Cesarean section in nulliparous women were significantly influenced by individual physician’s decisions due to possible over diagnosis of dystocia and fetal compromise. These results should inspire specific actions to homogenize results between different professionals.

INTRODUCTION

Cesarean section rates worldwide have been increasing in the past few years. In Europe it increased by 13.8% in the last 14 years. Causes of this increase are not simple or easy to understand and vary in function of different factors such as parity, category of pregnancy, and course of pregnancy and delivery. Therefore, it’s necessary to classify different groups of women to understand the causes of cesarean section rates.

The Ten Group Classification System (TGCS) is a new approach to classify the obstetric population according to total inclusive and mutually exclusive categories. This system allows to better understand obstetric events creating solid and robust groups that are comparable between different delivery units.

Nulliparous women at term with single gestation and cephalic presentation in spontaneous onset of labor (Group 1 of the TGCS) are often the largest contributor to overall obstetric population. Therefore, its contribution to the overall cesarean section rate uses to be quite important.

The cesarean section rate shows wide variation among different geographic areas. Inside an Obstetric unit we can also observe differences between professionals involved in the obstetric process. This variation is usually justified because of some maternal characteristics (age, weight, ethnicity), obstetric pathologies (hypertension, diabetes) or fetal compromise (growth restriction, loss of fetal wellbeing…). In summary, we can categorize the causes of cesarean section rates in two big groups: 1) increasing proportions of patients with conditions necessitating cesarean delivery; or 2) changes in physician practice patterns, leading to cesarean deliveries that would not have been performed previously.
The aim of this study is to better understand differences in the cesarean section rate among professionals in our team, taking into account maternal and obstetric factors but also focusing on obstetric practice and perinatal outcomes.

**METHODS**

We conducted a retrospective analysis of women belonging to TGCS Group 1 admitted for spontaneous onset labor to our Delivery Unit during 2015. Our institution, the Hospital Universitari General De Catalunya (HUGC), is a tertiary hospital in the region of Barcelona (Spain), serving 2400 deliveries per year. The medical team is formed by local staff and external doctors who attend their own patients.

Data were extracted from our local database which contains records of all patients admitted in the labor ward. These records include information about the medical team, characteristics of patients, monitoring of pregnancy, course of delivery, and obstetric outcomes.

The Ten Group Classification was carried out following the guidelines published by Robson\(^2,3\). In the table obtained we can identify relative size (calculated as women in the group divided by number total of women), intra-group cesarean section (cesarean sections in the group divided by total deliveries in the group) and contribution to overall cesarean section (total cesareans in the group divided by total number of women) of each group.

We restricted the analysis to doctors having attended to at least five patients belonging to Group 1. Doctors were divided in two groups: Group A formed by professionals with a cesarean section rate in the first quartile, and Group B formed by professionals with cesarean section in the fourth quartile.

We compared differences in maternal and gestational factors (age, length of pregnancy, BMI, and high risk gestation) among Group A and Group B. After this, we analyzed if there were differences in obstetric care (duration of first and second phase of delivery, mode of vaginal delivery, indication of mode of delivery and maternal analgesia). Finally obstetric outcomes (birth weight, Apgar score lower than 7, admissions at NICU and maternal complications) were also described to detect weather there were differences of results between the two groups.

Categorical variables were analyzed using a chi-squared test for difference in the observed proportions. Numeric variables were compared using the Mann-Whitney test.

Statistical significance was set at 95%. All calculations were performed using the 3.3.1 version of free R software (R Studio Team (2015). Integrated Development for R R Studio, Inc., Boston, MA).

**RESULTS**

A total of 2367 deliveries took place in 2015 in HUGC. Main contributor to this population were women from TGCS Group 1 (653 women, 27.59% contribution). The cesarean section rate in the TGCS Group 1 was 22.36% being the third contributor (6.17%) to the overall cesarean section rate following Group 2 (11.53%) and Group 5 (8.91%).

Of the 653 deliveries potentially eligible, 40 were excluded because the obstetrician had performed less than five deliveries in the TGCS Group 1 in 2015 or the data were not correctly recorded in the database. Cases including in the first and fourth quartiles were selected. A total of 267 deliveries performed by 15 obstetricians were included in the analysis. Two Groups of doctors were created: Group A was formed by obstetricians in the first quartile (138 women; CS rate 0 to 13.04%) and Group B was formed by obstetricians in the fourth quartile (129 women; CS rate 27.27% to 57.14%).

No differences between Group A and Group B were observed for any of the maternal characteristics analyzed (Table 1): maternal age (32.52 years vs 32.49 years, p>0.05), duration of pregnancy (277.2 days vs 278.14 days, p>0.05), BMI (27.53 vs 27.82, p>0.05), high risk pregnancies (10.14% vs 13.95%, p>0.05), hypertension (0% vs 0%, p>0.05) or gestational diabetes (2.17% vs 2.33%, p>0.05).

When looking for the course of delivery (Table 2), we found no differences in length of the first phase (5.02 hours vs. 5.31 hours; p>0.05) or in the second phase (1.82 hours vs 1.99 hours; p>0.05). There were significant differences in obstetric practice: Group A presented a significant lower trend in diagnosis of dystocia (15.21% vs. 31%, p<0.05), fetal loss of wellbeing (0.72% vs 9.30%; p<0.05) and use of forceps(11.72% vs 27.14%; p<0.05). No differences were found in labor arrest (10% vs 16.94%, p>0.05) and episiotomy (60.94% vs 50%, p>0.05). Increased use of epidural analgesia was observed in Group A (89.86% vs 78.29%, p<0.05)

Perinatal outcomes were similar for both, Group A and Group B (Table 3): Fetal weight (3279.72gr vs 3265.85gr, p>0.05), perineal severe laceration (2.34% vs 0%; p>0.05), admission at NICU (0% vs 0.05, Apgar score <7
The Ten Groups Classification System combines 5 obstetric concepts (category of pregnancy, previous obstetric record, course of labor and delivery and gestational age of pregnancy) that are prospective, mutually exclusive and totally inclusive and easy to understand. Thus, the Ten Categories allows making comparisons over time in one unit and between different units.

Since its implementation, many papers have been published analyzing the distribution of the groups in different areas and the evolution of rates of cesarean section over time. Our intention was to focus on Group 1 to better understand differences between different physicians working at the same institution.

A recent communication on this issue remarked the impact of individual physician decision making in regard to cesarean section rates but didn’t explain the differences in primary indications of cesarean section.

In our series, the mean rate of cesarean section in group A was 22.84% with a range of variation of 57.14% between physicians involved. No differences were observed in any of the maternal factors analyzed. However, significant differences were detected in medical indications: fetal distress and dystocia were reported more frequently by obstetricians in group 2. The explanation could be that, for some reason, deliveries were longer and more difficult in this group; but this was ruled out after proving no differences in duration of either first or second stage of labor. Another possible reason could be some shortfall in obstetric skills to approach fetal malposition in the second stage of labor. Recent literature emphasizes the role of instrumentation to reduce the cesarean section rate.

Paradoxically, in our series, the rate of forceps delivery was significantly increased in group B, so no difference in surgical abilities could be argued. According to other studies conclusions, higher rates of epidural analgesia observed in Group A didn’t increased cesarean rate in this group.

It seems that the data described above confirm a trend in group B towards over diagnosis of dystocia or fetal compromise. This idea is reinforced by the increased rate of forceps in vaginal deliveries, indicating a trend towards more interventionism in this group of doctors. This attitude that could reflect a cautious behavior against potential complications and/or future litigations - labor, delivery and its complications account for 33.1% of obstetric claims in our region - but this was not reflected in a lower rate of adverse perinatal events.

This information should be used to generate recommendations to normalize the cesarean section rate in group B and reduce variations between physicians. There is evidence that multifaceted strategies including peer-review process, audit and feedback are efficient in reducing

### Table 1

<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
<th>P value</th>
<th>OR</th>
<th>CI (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25 years</td>
<td>32.92</td>
<td>32.49</td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>26-34 years</td>
<td>32.98</td>
<td>32.68</td>
<td>0.89</td>
<td>0.70-1.215</td>
</tr>
<tr>
<td>35-39 years</td>
<td>32.98</td>
<td>32.68</td>
<td>0.89</td>
<td>0.70-1.215</td>
</tr>
<tr>
<td>40-44 years</td>
<td>32.98</td>
<td>32.68</td>
<td>0.89</td>
<td>0.70-1.215</td>
</tr>
</tbody>
</table>

| Cesarean  | 32.98 | 32.68 | 0.89| 0.70-1.215 |
| High-risk gestation | 32.98 | 32.68 | 0.89| 0.70-1.215 |
| Dystocia | 32.98 | 32.68 | 0.89| 0.70-1.215 |
| BMI      | 32.98 | 32.68 | 0.89| 0.70-1.215 |

### Table 2

<table>
<thead>
<tr>
<th>Labor length</th>
<th>Group A</th>
<th>Group B</th>
<th>P value</th>
<th>OR</th>
<th>CI (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First stage</td>
<td>0.467</td>
<td>0.222</td>
<td>0.047</td>
<td>9.73-2.1</td>
<td></td>
</tr>
<tr>
<td>Second stage</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.12-0.993</td>
<td></td>
</tr>
<tr>
<td>Forceps</td>
<td>1.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00-1.00</td>
<td></td>
</tr>
<tr>
<td>Labor arrest</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00-1.00</td>
<td></td>
</tr>
<tr>
<td>Cesarean</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00-1.00</td>
<td></td>
</tr>
<tr>
<td>Forceps</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00-1.00</td>
<td></td>
</tr>
<tr>
<td>Epidural analgesia</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00-1.00</td>
<td></td>
</tr>
<tr>
<td>Pudendal block</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00-1.00</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3

<table>
<thead>
<tr>
<th>Birth weight</th>
<th>Group A</th>
<th>Group B</th>
<th>P value</th>
<th>OR</th>
<th>CI (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3000 g</td>
<td>320.00</td>
<td>325.00</td>
<td>0.004</td>
<td>0.942-0.648</td>
<td></td>
</tr>
<tr>
<td>&gt;3000 g</td>
<td>320.00</td>
<td>325.00</td>
<td>0.004</td>
<td>0.942-0.648</td>
<td></td>
</tr>
<tr>
<td>Aggar</td>
<td>0.322</td>
<td>0.322</td>
<td>0.004</td>
<td>0.942-0.648</td>
<td></td>
</tr>
<tr>
<td>Vaginal tears</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00-1.00</td>
<td></td>
</tr>
<tr>
<td>McCallad</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00-1.00</td>
<td></td>
</tr>
<tr>
<td>Maternal obstructive care</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00-1.00</td>
<td></td>
</tr>
<tr>
<td>Pudendal block</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00-1.00</td>
<td></td>
</tr>
</tbody>
</table>

### DISCUSSION

Chances of having a cesarean section for a nulliparous woman with cephalic presentation and spontaneous onset of delivery showed wide variations. Analysis of cesarean sections must be part of a Multidisciplinary Quality Assurance Program. This concept refers to the audit of the whole obstetric process in order to obtain useful information to modify practice and improve quality and results. The program must be carried out by all the agents involved in it and needs to include reliable information.

The Ten Groups Classification System combines 5 obstetric concepts (category of pregnancy, previous obstetric record, course of labor and delivery and gestational age of pregnancy) that are prospective, mutually exclusive and totally inclusive and easy to understand. Thus, the Ten Categories allows making comparisons over time in one unit and between different units.
inappropriate cesarean sections. Thus, clinical guidelines of delivery should be reviewed by the obstetric team, focusing in the concepts of dystocia, fetal monitoring and need for instrumentation in vaginal delivery. New guidelines recently published should be taken into account. A timetable with the actions to take should be set in place in order to monitor the modifications and reevaluate the results.

**STRENGTHS AND LIMITATIONS**

Our local database includes a broad amount of information about every delivery in our institution. Many studies about cesarean sections are designed with administrative codes provided at hospital discharge which often results inaccurate and doesn’t offer important details about clinical aspects such as previous medical records or associated morbidity. Conversely, our clinical data are introduced simultaneously to the surgical intervention and are and validated by obstetricians and midwives.

Classifying cases by the TGCS system provides a robust and solid stratification of groups avoiding mixture of different clinical problems such as previous uterine scar, breech presentation or multiple gestation. We focused on group 1 because of its relative large size with an important impact in the global cesarean section rate (6,17%).

A limitation of our study was the reduced number of cases. We restricted the period to 2015 and focused in the first and fourth quartiles to emphasize differences that could explain variation in the cesarean rate. Otherwise, terms like dystocia or fetal compromise were not clearly defined and this could have had an impact in the differences observed. In our new guidelines we defined the definition given recently as “dystocia with efficient uterine action” (fetal persistent malposition and obstructed labor).

Another important issue is anesthesis and the time of onset of labor analgesia. Although slight differences were observed in use of epidural analgesia in group A, we didn’t record data about the time of administration. It’s well known that the early onset of epidural analgesia does not increase the rate of cesarean delivery, and it provides better analgesia resulting in a shorter duration of labor.

**CONCLUSION**

Chances of having a cesarean section for a nulliparous woman with cephalic presentation and spontaneous onset of delivery showed wide variations in our maternity unit. We have observed that these variations were not due to maternal factors but to differences in clinical practice. Physicians with a higher cesarean section rate over diagnosed fetal loss of wellbeing and dystocia. Increase of cesarean sections didn’t improve perinatal outcomes. A multidisciplinary quality assurance program is crucial to better understand and improve obstetric events. Institutional guidelines should be reviewed and specific actions should be taken to homogenize results between different professionals.

**ACKNOWLEDGEMENTS**

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**References**

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