

To Study the Effect of Decision to Delivery Interval in Deciding Maternal and Fetal Outcome in Emergency Caesarean Section

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Abstract: ***Aim:** To study the effect of decision to delivery interval in deciding maternal and fetal outcome in emergency caesarean section. **Introduction:** Dating of pregnancy is a very important concept in obstetrics. Many decisions in obstetrics are taken based on the length of the pregnancy, nothing but the time spent by the fetus in utero. **Material & methods:** This study was carried out at a tertiary care urban hospital in Western India. Women who underwent emergency singleton caesarean delivery at term were included. The study was conducted over 18 months from the Department of Obstetrics and Gynaecology from 1st December to 30th May 2019. **Results:** Most of the deliveries took place within 45 minutes of the decision, and only 18 of them took more than one hour. Most deliveries took between 31-45 minutes.*

Keywords: Emergency caesarean section, obstetrics, decision to delivery interval

1. Introduction

Time is the most valuable resource and its context in medicine has been emphasized in numerous medical articles.¹ Objective structured interviews have now established that medical education and research should devote themselves more into research in the relationship between time efficiency and healthcare outcomes.² For example, in one audit among patients with acute abdominal pain among patients in an emergency setting, 43% appeared to have a delay in receiving any form of analgesia.³ Chin et al delved into the matter of delay in service provision among gynecological disorders and found that benign disorders appear to have a larger delay than among oncological disorders.⁴

The above passages emphasize the importance of time, in general and in medicine. Obstetrics is no exception. Dating of pregnancy is a very important concept in obstetrics. Many decisions in obstetrics are taken based on the length of the pregnancy, nothing but the time spent by the fetus in utero. The durations of latent labor and duration of active labor are measured in laboring patients. One of the parameters to measure adequate uterine activity is the duration of the activity and the duration in between two contractions. These, again, are time units. Many sinister problems in obstetrics are defined using time units.⁵

The eventual result of any research is formulation of recommendations which can improve patient outcomes. This research project considered the similar question, as to whether there needs to be a reduction in the “decision-to-delivery” duration, and what recommendations can be arrived for improvement of this performance measure. Considering these aspects, this study was conducted with the undermentioned aims and objectives.

2. Aim and Objectives

To study the effect of Decision to Delivery Interval in deciding Maternal and Fetal Outcome in Emergency Caesarean Section

The objectives of this study are:

- 1) To determine decision to delivery interval (DDI) in emergency caesarean section in minutes.
- 2) Factors influencing this interval.
- 3) Its implications on maternal and perinatal outcome.

3. Material & methods

This study was carried out at a tertiary care urban hospital in Western India. Women who underwent emergency singleton caesarean delivery at term were included. The study was conducted over 18 months from the Department of Obstetrics and Gynaecology from 1st December to 30th May 2019. Patients were contacted during their hospital stay and written informed valid consent was taken. All details needed for the study were noted.

Study design

This was a prospective, descriptive and observational study.

Sample size

The initial sample size was 210 women who underwent emergency caesarean delivery

Sample size calculation

Sample size estimated using Stata version 13.1, the statistical output for estimation of sample size has been shown below Study parameters:

alpha = 0.05

power = 0.8

delta = 0.1000

p0 = 0.3240

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$pa = 0.4240$ (based on study by Gupta et al) The sample size estimated was 192.

To account for any missing data, we inflated our sample size by 10%. Thus, one final sample size is 210 women.

Inclusion Criteria:

- Women who underwent emergency singleton caesarean section at term in this hospital
- Women who gave consent for the study

Exclusion Criteria:

- Multiple pregnancy
- Pre-term and post-term pregnancy

Evaluation Study procedure

These were, the age and demographic details of the patients. The details of the indication for caesarean section, the time at which the decision for CS was taken, the time taken for each of the steps taken between the decision for CS and the completion of the baby delivery were noted. The neonatal outcomes were also noted in terms of Apgar scores, NICU admission and need for resuscitation. The case record details were all entered in a systematic manner for all the participants. The indications for LSCS were categorized as under. This is based on the NICE guidelines.⁶

Category I: Immediate threat to life of woman or fetus.

Category II: Maternal or fetal compromise but not immediately life threatening. Category III: Needing early delivery but no fetal or maternal compromise.

Category IV: Delivery timed to suit woman or staff

The following durations were individually noted and the total DDI was then calculated.

- Calculation of DDI Total decision to delivery interval (DDI) was calculated as the sum of the following intervals:
 - Interval between decision of caesarean section and shifting the patient from the labour room to the pre-operative area of the OT (Interval-1).
 - Interval between receiving the patient by OT team and shifting the patient to the operation table (Interval-2).
 - Time taken for induction of anaesthesia (Interval-3).
 - Interval between induction of anaesthesia and delivery of the baby (Interval-4).
- Causes of delay factors resulting in prolonged interval at each step were noted

- Non availability of OT whether due to another ongoing surgery or the OT not yet ready after a previous surgery.
- Delay due to refusal by patient and or relatives to give consent or delay by hospital authority in case of non-availability of relatives
- Procedural delay (in terms of multiple attempts for spinal anesthesia etc.)
- Others

Statistical analysis

All these details were noted and entered into Microsoft excel v365 2017. The results were analysed by using statistical software available with Microsoft excel. Freely available US- CDC approved statistical programme EpiInfo was also used for analysis. www.graphpad.com was also used for few statistical analyses.

Demographic data was analysed by using simple percentages and represented using bar graphs and tables.

Pearson's Chi Square test was used for cross tabulations and statistical significance. Unpaired t test used to compare the time durations between the groups. Microsoft Excel v 365 was used.

Pearson's Correlation coefficient was calculation between independent variables.

4. Results

Demographic features

The largest number of participants (100 out of 210, ie 47.6%) belonged to the age group of 31-35 years, closely followed by the age group of 26-30 (75 out of 210 ie 35.7%). The average age was 31.52 years. In this study majority ie 64% of the participants were primigravidae, while second gravidae were 23%.

Category wise distribution of patients undergoing emergency LSCS

As defined in study design the category wise distribution of patients, the maximum number of LSCS belong to Category 3 which is shown in Figure 1. Kindly note that distribution of the category of LSCS has already been discussed in study procedure.

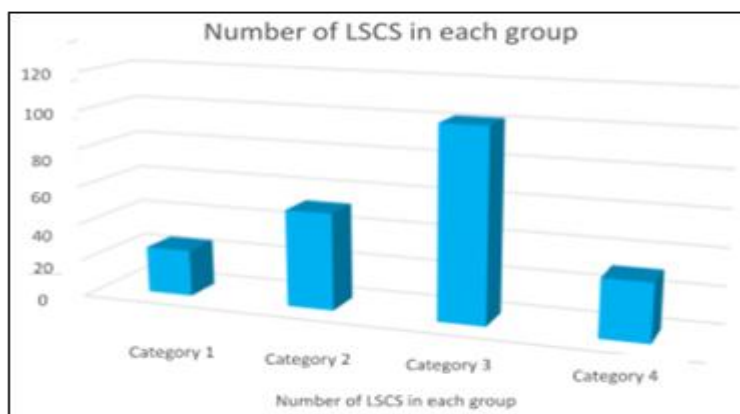


Figure 1: Category wise distribution of patients undergoing emergency LSCS (n=210)

Distribution of Decision-to-Delivery-Interval

The Distribution-to-Delivery interval had an average of 41.85 minutes and a standard deviation of 16.05. The decision-to-delivery interval in minutes has an average of

41.85 minutes as shown in figure 2. Most of the deliveries took place within 45 minutes of the decision, and only 18 of them took more than one hour. Most deliveries took between 31-45 minutes. This is shown in figure 2

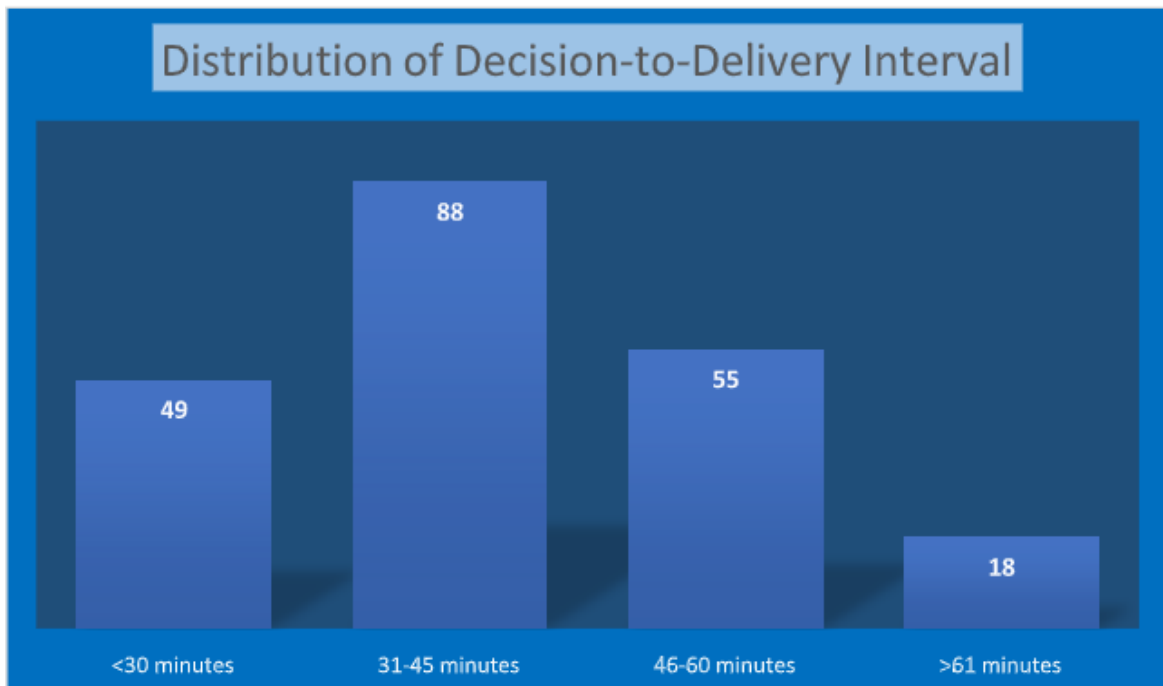


Figure 2: Distribution of Decision-to-Delivery Interval (n=210)

Distribution of neonatal outcomes based on Apgar scores. This is shown in figure 3.

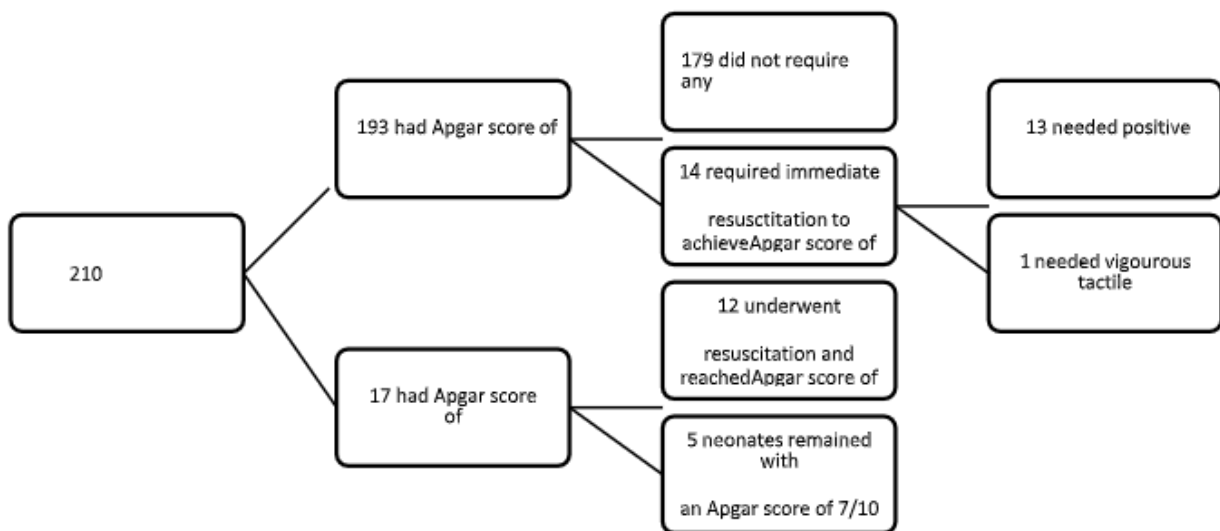


Figure 3: Distribution of neonatal outcomes based on Apgar scores

Table 1: Comparison of category of LSCS based on age of patient

Category	Average age
Category I	31.6
Category II	31.34
Category III	31.12
Category IV	33.96
Comparison	Unpaired t test
Age (Cat I) vs Age Cat II)	P value 0.75
Age (Cat I) vs Age (Cat III)	P value 0.59
Age (Cat I) vs Age (Cat IV)	P value 0.12

various categories is shown in table. **There was no difference between the age characteristics of the various categories.**

Hence the various categories were comparable from this point of view.

Correlation between age and Total Interval of DDI

Pearsons Correlation Coefficient was calculated between Age of the patient and total Decision to Delivery Interval and is found to be -0.10. Hence, **there was no relationship between age and the total decision-delivery interval.**

The average age of the patients who underwent LSCS for

Table 2: Causes for delay

Causes of delay	Number of patients
(A) Non availability of OT (another ongoing surgery/ preparation time from previous surgery/ Waiting time for instruments / waiting time for doctors/ nursing staff)	74
(B) Delay in consenting for procedure (non-availability of relatives, request for time to decide)	11
(C) Procedural delay (time taken for anesthesia, time taken Intraoperatively)	61
(D) Others (delay in admission formalities, delay in transit between ward/ labour room to OT complex)	64

*There were some patients in which there was a combination of factors, but the most important cause of delay was taken into account.

5. Discussion

With the aim to analyze Decision to delivery interval in emergency caesarean section in deciding fetal and maternal outcome, the study was carried out at a tertiary care hospital in Urban Western India.

In this study maximum patients belonged to age group of 31-35 years followed by 26-30 years of age group, and very few belonged to <25 years of age, thereby making average age as 31.52 years. Hirani et al⁷ in Tanzania found that mean age group was 29.25 years, and maximum patients were of 25-29 years of age group and very few belonged to age of <20 or >40 years which is in concordance with our study.

In current study, total 210 emergency LSCS being conducted. Out of 210 majority were category 3(48.57%). Only 31 (14.76%) were category 4, who were posted for elective LSCS but came in labour. Category 1 and 2 together included 36.66% of total emergency LSCS. Similar study conducted in Delhi, India by Radhakrishnan G et al⁸ who included 275 of emergency LSCS. Majority of cases fallen under category 1 which was 146 (53%). A lot of discussion has taken place on the optimal Decision-to-Delivery Interval. Homer CSE et al⁹ conducted a systematic review of available literature with the aim to help policy making. However, it was found that there is insufficient evidence to recommend a cesarean section DDI of less than 30 minutes. In fact, they found that 75 minutes may be a more reasonably achievable DDI. In the study by Moriarty et al¹⁰, analysis was performed of those CS which were classified as "urgent", which correspond to the Category 1 of our study. It was noted that in only 50% of the cases, delivery was achieved within 30 minutes. In around 90% of the cases, the delivery was achieved in 40 minutes. In our study 60% (15/25) of the category I cases were delivered within 30 minutes.

In this study, delay in admission procedures were contributory in 30.47% of the cases. Consenting procedures did not take contribute much to the delay in our cases. Procedural delay such as time taken for anesthesia and intraoperative issues contributed in 29% of the cases. However, in the study by Salmeen et al¹¹, the study analysed only time from consent to the delivery. The justification for such a methodology was that, if there is no consent there is no possibility of caesarean. Only after consent can actual preparation for the procedures be done. Sabol et al¹² conducted an intervention study where the DDI was measured before and after a Kaizen intervention. Basically, the study was performed to evaluate if some improvement in quality and/ or communication between various teams within the hospital environment. After the intervention, they were indeed able to reduce the DDI. Though there was no

improvement in neonatal outcomes after the intervention, the authors concluded that it is advisable to consider interventions that will improve DDI, purely from a time-efficiency perspective.

6. Conclusion

- The Decision to delivery intervals among 210 cesarean sections were studied.
- The average age was 31.5 years, and majority were primigravidae at 38-40 weeks of gestation. Most of the caesarean sections belonged to Category 3
- The Decision to delivery intervals was 41.85+/-16.05 minutes.
- Most deliveries were accomplished between 31-45 minutes of decision.
- Interval-1 (time from decision upto reaching the preoperative room in OT complex) took the maximum time (ie) 20.89 minutes.
- 193 out of 210 had an Apgar score of 8/10 or above at 1 minute.
- Only 5 out of 210 had an Apgar score of 7/10 or lesser even at 5 minutes.
- Age did not have any influence on any of the outcome parameters
- Category I LSCS had the least DDIs.
- Total DDI of Category I and category II were much lesser than Category III and IV.
- The total DDI of category I and II were significantly different from each other.
- Neonatal outcomes were not affected by increased DDI.
- Maternal outcomes were not affected by increased DDI

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