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Original Research Article

## Decision to delivery interval in emergency LSCS and its impact on fetal outcome

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### ABSTRACT

**Background:** Emergency LSCS can be categorized based on RCOG guidelines into category I and II which indicates maternal or fetal compromise. Here an urgent delivery and the DDI (decision to delivery interval) within 30 and 45 minutes respectively is needed.

**Methods:** This is a retrospective cross-sectional analysis conducted on a sample of 630 patients who underwent caesarean section over a year, from June 2016 to June 2017. The DDI were further classified into ≤30 and >30 minutes for category I, ≤45 and >45 minutes for category II LSCS. The primary objective is to determine whether DDI in Category I and II emergency LSCS has an impact on fetal outcome and secondary objective is to ensure that DDI is within the standard criterion as per RCOG protocol.

**Results:** Out of 630 samples of caesareans, it was found that 173 falls in Category I and 189 falls in Category II. Out of 87 (50.29%) patients delivered within 30 minutes in Category I, 29 babies required NICU admission. DDI was more than 30 minutes in 86 (49.71%) cases in Category I out of which 38 babies got admitted in NICU with low APGAR scores. Out of 176 (93.12%) patients who delivered within 45 minutes in Category II, 56 babies required NICU admission. DDI was more than 45 minutes in 13 (6.88%) cases in Category II and all these babies got admitted in NICU.

**Conclusions:** Decision -delivery interval has a significant impact on fetal outcome.

**Keywords:** Category I, Category II, Decision-delivery interval, Emergency LSCS, Fetal outcome, RCOG protocol

### INTRODUCTION

The American College of Obstetricians and Gynaecology committee in 1989 had declared that a hospital which can provide obstetric services should have the capacity to deliver the baby within 30 minutes after the decision is made.<sup>1</sup> In 2000, Lucas et al. proposed a new classification of emergency LSCS based on clinical definitions.<sup>2</sup> Emergency LSCS can be categorized based on RCOG guidelines (2010) into four categories.<sup>3</sup> Category I and Category II indicates maternal or fetal compromise

where, there should be an urgent delivery and the decision delivery interval should be within 30 and 45 minutes respectively. In 2011, National Institute of Clinical Excellence (NICE) UK guidelines suggested a Decision to delivery interval of 30 minutes for Category I emergency LSCS and both 30 minutes and 75 minutes to Category II Emergency LSCS.<sup>4</sup> In 2012, American College of Obstetricians and Gynaecologists and American Academy of Paediatrics jointly concluded that hospitals capable of accomplishing delivery within 30 minutes should also take into consideration both maternal

and foetal risks and benefits.<sup>5</sup> The World Health Organisation recommends an optimum Caesarean Section Rate of 15%.<sup>6</sup> The global incidence of category I Emergency LSCS is 0.6 to 0.7%.<sup>7</sup> Worldwide hospitals are conducting audits on a routine basis to assess if their standards could be met as per RCOG guidelines.<sup>8</sup>

**Table 1: LUCAS classification.**

Category 1	Immediate threat to life of woman or foetus with maternal or foetal compromise
Category 2	No immediate threat to life of woman or foetus With maternal or foetal compromise
Category 3	Requires early delivery No maternal or fetal compromise
Category 4	At a time to suit the woman and maternity services

**Table 2: Categories and indications RCOG 2010 guidelines.**

Categories	Indications
Category 1 Decision to delivery interval: <30 min	Fetal distress/ persistent fetal bradycardia
	Cord prolapse
	Severe placental abruption
	Antepartum hemorrhage (APH) with maternal hypovolemia
	Uterine rupture and scar dehiscence
Category 2 Decision to delivery interval: 30 - 45 min	Failed instrumental delivery with fetal distress
	APH without maternal hypovolemia
	Failed induction of labor
	Abnormal Doppler
Category 3 Decision to delivery interval: 45 - 75min	Non reassuring CTG
	Previous LSCS in labor
	CPD (Cephalo- pelvic disproportion)
Category 4 Decision to delivery interval- no specific time (> 75 min)	Breech in early labor
	Elective LSCS
	Mal presentations
	Multiple pregnancy with first twin non cephalic
	LSCS on demand

The study aimed to determine whether decision- delivery interval in Category I and II Emergency LSCS has an impact on fetal outcome and to ensure that decision to delivery interval is within the standard criterion as per RCOG protocol.

**METHODS**

A retrospective cross-sectional analysis on a sample of 630 patients who underwent emergency LSCS over a period of 1 year, from June 2016 to June 2017 in the tertiary care hospital was conducted. RCOG Guidelines - Classification of urgency of Caesarean section-Good practice guidelines no: 11 were used as standards. Data were collected from labor room birth register, operation theatre call slip register and neonatal registers. Maternal information gathered were age of the patient, gravidity, parity and gestational age. Decision time was selected as the time for issue of call slip. Delivery time was selected as the time of delivery of the baby. Details of the babies who got admitted in NICU in view of low APGAR score were collected from neonatal registers. Collected data were analyzed using statisticians help and accordingly plotted using representation diagrams for the ease of understanding.

All patients who underwent emergency LSCS were included in the study. The following were excluded: elective LSCS, vaginal deliveries, instrumental deliveries, pregnancies involving fetus with major congenital anomalies. The DDI of Category 3 and Category 4 LSCS were not studied as these were non- urgent categories. The research protocol was approved by the Ethics committee of our research center.

**Statistical analysis**

To test the equality of two proportion of items in the same class on the basis of two independent samples one tailed T test was utilized.

**Table 3: Test the equality of two proportions of items in same class.**

	Class 1	Class 2	Total
Sample A	A1	A2	N1
Sample B	B1	B2	N2
<b>Total</b>	<b>A1+B1</b>	<b>A2+B2</b>	<b>N1+N2</b>

The observed proportions are

$P1 = A1/N1$

$P2 = B1/N2$

$Q1 = 1 - P1 = A2/N1$

$Q2 = 1 - P2 = B2/N2$

The test statistic is:-

$Z = (P1-P2) / \sqrt{P^n Q^n (1/N1+1/N2)}$

$P^n = A1+B1 / N1+N2$

$Q^n = 1 - P^n$

If  $Z >$  tabled value obtained from normal tables we reject the hypothesis that  $P1 = P2$ .

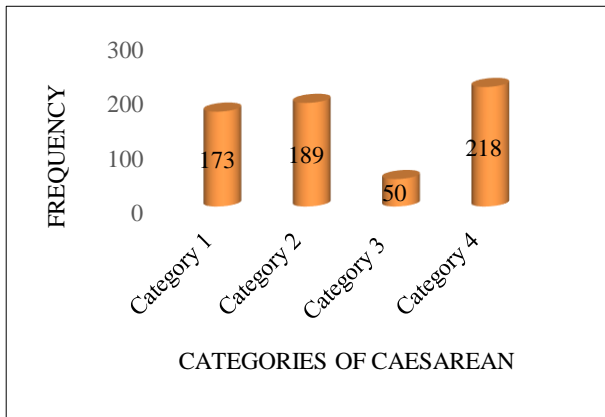
(P1 is the proportion of babies born to mothers who are within the stipulated decision delivery interval, and got admitted in NICU.

P2 is the proportion of babies who do not follow the criteria for satisfaction of decision delivery interval and got admitted in NICU).

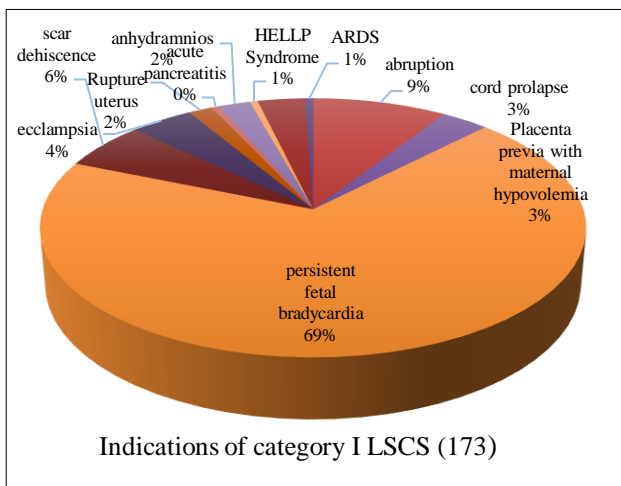
**RESULTS**

Out of 630 samples of LSCS obtained from labor records, it was found that 173 falls within the definition of Category I and 189 can be classified as Category II. The major category was category IV with 218 patients and least patients were in category III with 50 patients (Figure 1).

Distribution of patients according to the indications in category I are represented with major indication being persistent fetal bradycardia - 69% (Figure 2). Distribution of patients according to the indications in category II are represented with major indication being failed induction - 58% (Figure 3).



**Figure 1: Distribution of categories of LSCS.**

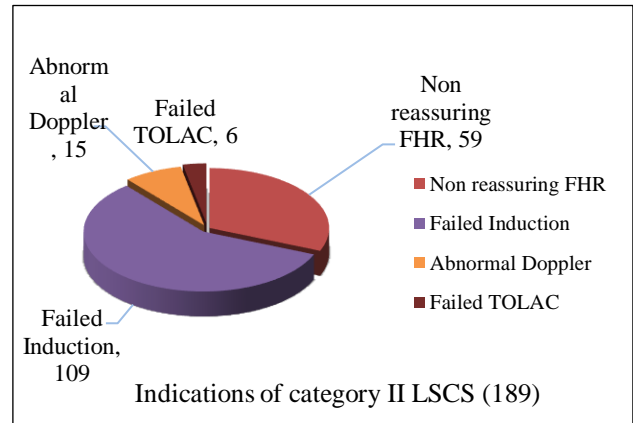


**Figure 2: Different indications of category I LSCS**

Out of 87 patients who delivered within 30 minutes in Category I, 29 babies required NICU admission and 58 babies were found to be normal. Decision to delivery interval was more than 30 minutes in 86 cases in Category I out of which 38 babies got admitted in NICU

with poor fetal outcome as determined by low APGAR scores and 48 babies were found to be normal (Table 4).

Out of 176 patients who delivered within 45 minutes in Category II, 56 babies required NICU admission and 120 babies were found to be normal. Decision to delivery interval was more than 45 minutes in 13 cases in Category II out of which all the 13 babies got admitted in NICU (Table 5).



**Figure 3: Different indications of category II LSCS.**

For Category I, Z value is calculated and found to be “5”. From normal tables, at 1% level of significance, the tabled value of  $Z_{\infty}$  (from normal tables) is 2.33 which is less than 5 (Table 4).

For Category II, ‘Z ‘value was calculated and found to be “4.9”. From normal tables, at 1% level of significance, the tabled value of  $Z_{\infty}$  (from normal tables) is 2.33 which is less than 5 (Table 5).

**Table 4: Decision- delivery interval (DDI) and NICU admission in category I.**

Category I (173)	DDI satisfied (<30 min)	DDI not satisfied (>30 min)
NICU Admission	29	38
No NICU admission	58	48
DDI satisfaction %	50.29	49.71

**Table 5: Decision- delivery interval (DDI) and NICU admission in category II**

Category II (189)	DDI satisfied (<45 min)	DDI not satisfied (>45 min)
NICU admission	56	13
No NICU admission	120	0
DDI satisfaction %	93.12	6.88

Hence, we reject the hypothesis that both proportions are same,  $P_1 = P_2$  in both categories. There is statistically

significant decrease in the number of babies who got admitted in NICU once the baby is delivered within the stipulated decision delivery intervals of 30 minutes and 45 minutes for Category I and Category II emergency LSCS respectively.

Out of the 173 patients who underwent Category I emergency LSCS, 50.29 % delivered within the proposed decision delivery interval of 30 minutes there by satisfying the RCOG criteria and 49.71% delivered after 30 minutes of decision making (Table 4). Among the 189 patients who were in Category II, 93.12% satisfied the RCOG criteria by delivering before 45 minutes of decision making and 6.88% delivered after 45 minutes (Table 5). Thus, RCOG criteria for decision to delivery interval in emergency LSCS was fulfilled more in Category II than in Category I.

## DISCUSSION

The RCOG, ACOG and Canadian National Consensus conference recommend DDI of less than 30 minutes in category I emergency LSCS while the German Society of Obstetrics and Gynaecology recommends 20 minutes interval.<sup>9-11</sup> NICE guidelines in 2011 mandates every obstetric units to conduct regular audits of their Decision to delivery interval.<sup>12-14</sup> Study was able to achieve since the audits were conducted regularly in the centre as per the proposed guidelines.

In the study for Category I; Z value is calculated and found to be “5”. From normal tables, at 1% level of significance, the tabled value of  $Z_{\infty}$  (from normal tables) is 2.33 which is less than 5. For Category II; Z value is calculated and found to be “4.9”. From normal tables, at 1% level of significance, the tabled value of  $Z_{\infty}$  (from normal tables) is 2.33 which is less than 5. There is statistically significant decrease in the number of babies who got admitted in NICU once the baby is delivered within the stipulated decision delivery intervals of 30 minutes and 45 minutes for Category I and Category II emergency LSCS respectively. This is in accordance with the study of Gabbay et al which showed a significant improvement in perinatal outcome with shortened DDI.<sup>15</sup>

Out of the 173 patients who underwent Category I emergency LSCS, 50.29 % delivered within the proposed decision delivery interval of 30 minutes there by satisfying the RCOG criteria and 49.71% delivered after 30 minutes of decision making. Among the 189 patients who were in Category II, 93.12% satisfied the RCOG criteria by delivering before 45 minutes of decision making and 6.88% delivered after 45 minutes.

The results were more satisfying with the study conducted by Mackenzie et al and Schauburger et al, which showed a DDI in category I emergency LSCS of 40% and 63% respectively.<sup>1,16</sup> Thus, RCOG criteria for decision delivery interval in emergency LSCS was fulfilled more in Category II than Category I.

Patient preparation and transfer was the main time limiting factor as observed by Helmy et al.<sup>17</sup> Other factors include emergency LSCS performed after office hours when an experienced senior obstetrician is unavailable in contrast to the study conducted by Lim et al. which showed no association.<sup>18</sup>

Anesthesia techniques used for the above two categories of emergency LSCS did have an impact as observed by Yakasi et al.<sup>19</sup> While general anesthesia (GA) had reduced the DDI significantly than with regional anesthesia, the mode of anesthesia depends on the skill of the anesthetist. Moreover GA has a risk of difficult intubation and increased intra op blood loss leading to poor neonatal outcome in accordance with study conducted by Ong et al.<sup>20</sup>

The limitations in the present study were if the foetus has been compromised long before the decision for emergency LSCS was made then DDI cannot be an accurate predictor of perinatal outcome. Since foetal hypoxia start at the time of onset of foetal bradycardia as proposed by Leung et al, foetal bradycardia to delivery interval was not taken for analysis.<sup>21</sup>

Poor perinatal outcome as a result of prematurity of neonate in preterm LSCS cannot be ruled out in our study. Maternal outcome in relation to DDI were not studied.

## CONCLUSION

Decision-delivery interval has a significant impact on fetal outcome. It was able to maintain the DDI in only 50.2% of Category I and 93% of Category II cases. Hence, obstetricians are encouraged to adopt the RCOG (2010) classification of urgency of caesarean section which uses four categories with specific time constraints.

Clear channels of communication are vital in all cases requiring emergency caesarean section. Clinicians should define the role of each member of the multidisciplinary team to facilitate communication and effective management as mentioned in the study conducted by Nair et al and Wee et al.<sup>22,23</sup> This is particularly important in those cases defined as category I (requiring ‘immediate’ delivery). The categorisation should be reviewed by the clinical team once the decision for emergency LSCS is made as described by Korhonen et al.<sup>24</sup>

The use of epidural analgesia to be encouraged during labours that only a top up is required if emergency CS is required.

*“A wise decision at the right time, executed at the earliest can change a baby’s life.”*

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