

# Intra-operative Maternal Complications of Emergency Cesarean Section Done in Advanced Labor

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## Abstract

**Background:** Emergency cesarean section done in advanced labor is a big challenge in obstetrics due to increased risk of intraoperative complications. In the last decade, a rapid increase in cesarean section done in advanced labor has been observed. Difficult delivery of the fetal head during cesarean section carries a high risk of intraoperative complications like cervical and uterine tears, intra operative hemorrhage and trauma to the baby.

**Objectives:** The purpose of this study is to find out the frequency and risk factors for intra-operative complications in emergency cesarean section done in advanced labor, so that appropriate management protocols can be planned to reduce these complications.

**Study Design:** Prospective cohort study.

**Materials and Methods:** This prospective study was carried out in Obstetrics and Gynecology Unit – 2 of

Services Institute of Medical Sciences, Services Hospital, Lahore; from 1<sup>st</sup> January 2007 to 31<sup>st</sup> December 2007. All patients undergoing emergency cesarean sections done on laboring mothers were included in the study. The sample was divided into two groups; emergency C-section done in advanced labor as the study group and emergency C-section in early labor as the control group. Data were collected regarding age, parity, booked or unbooked status, indications for cesarean section, level of competence of operating surgeon, intra-operative complications and the risk factors for these complications. Data were recorded on a structured proforma and compared between the two groups.

**Statistical Analysis:** Data were analyzed using computer programme SPSS Version 14 for windows applying student t-test for quantitative and chi square test for qualitative parameters. A p-value < 0.05 was used as statistically significant.

**Results:** Out of 2064 total deliveries in the year 2007, 1290 (62.5%) were vaginal deliveries and 774 (37.5%) were C-Sections. Out of 774 C-Section, 174 (23%) were elective and 600 (77%) were emergency. Out of 600 emergency C-sections, 402 (59%) were done on laboring mothers and 198 (41%) were done on non-laboring mothers for indications like placenta previa, eclampsia, etc. Out of 402 C-sections done on laboring mothers, 241 (60%) were done in advanced labor and 161 (40%) in early labor. The intra-operative complication rate was 19.8% versus 11% (p-value 0.001) in the study and control group respectively. The main indications for cesarean section in labor were prolon-

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ged labor, deep transverse arrest of fetal head and fetal distress. The main complications noticed were the cervico – uterine lacerations and intra-operative hemorrhage. Factors associated with increased maternal complications were; un-booked cases (p-value 0.01), station of the fetal head (p-value 0.02), good size baby (p-value 0.01) and experience of surgeon (p-value 0.04).

**Conclusion:** Emergency cesarean section done in advanced labor is a high risk operation with significant maternal morbidity in terms of cervico – uterine tears and intra-operative bleeding.

**Key Words:** Emergency cesarean section, advanced labor, maternal complications, cervicouterine tears, intraoperative hemorrhage.

## Introduction

Emergency cesarean section done on laboring mothers especially if done in advanced labor is still a big challenge in obstetrics. It is associated with increased maternal morbidity and mortality<sup>1</sup>. In the last few decades a rapid increase in the rate of emergency cesarean sections done in advanced labor has been observed. One reason for this increase is preferential use of vacuum over forceps and its higher failure rate as compared to forceps. The other reason is fear of litigations and cesarean section is thought to be a safer option in the modern world due to widespread use of antibiotics, availability of blood transfusion and use of regional anesthesia as compared to a difficult instrumental delivery in second stage of labor. Overall intraoperative complications rate associated with cesarean section is 12%.<sup>2</sup> Majority of complications are due to emergency cesarean section (15%).<sup>2</sup> The complication rate of elective cesarean section is almost equal to vaginal delivery (6%).<sup>2</sup> The main intra-operative complications of emergency cesarean section done in advanced labor mentioned in different studies<sup>1-3</sup> are increased risk of cervico – uterine lacerations, excessive intra-operative hemorrhage and fetal trauma.

The incidence of cervico – uterine tears in emergency cesarean section quoted in different studies is 4 to 5% while it is < 1%<sup>4</sup> in elective cesarean section. The cervico – uterine lacerations are associated with increased maternal mortality and morbidity due to massive blood loss, difficulty in repairing them, increased risk of infection and operation time.<sup>5</sup> The main causes of increased incidence of cervical and uterine tears along with excessive hemorrhage in emergency cesarean section done in advanced labor are deeply

impacted fetal head, good size baby and inexperienced operator.<sup>5</sup>

In advanced labor, pelvic tissues are edematous and vary friable. The cervical tears<sup>6</sup> that occur are mostly vertical in the midline, may extend to involve whole length of cervix and may extend to the bladder. The uterine incision may extend laterally while trying to extract a good size baby. The major difficulty is noticed when the fetal head is deeply impacted in the pelvis. Many a times, an assistance has to push the head vaginally to disimpact it from the pelvis and deliver it. During this process, the friable tissues of pelvis are traumatized with resultant cervical and uterine tears. Uterine tears are associated with excessive bleeding and broad ligament haematoma. Cervical tears may also result in excessive bleeding and are really difficult to repair if they involve full length of cervix. In such situations separation of bladder from already torn friable cervix<sup>6</sup> is difficult.

Cesarean sections done in 2<sup>nd</sup> stage of labor<sup>3</sup> with deeply impacted fetal head in the pelvis with absent liquor are especially prone to be associated with cervical and uterine tears, excessive bleeding, increased need for blood transfusion and increased hospital stay.

The obstetrician needs to anticipate the possibility of difficult delivery of the fetal head during caesarean section. Different techniques<sup>7-9</sup> are described in literature to deliver the deeply impacted fetal head. Using an assistant to push the fetal head can cause trauma, as the force required to push is uncontrolled. The Fetal Dissipating System seems to be effective in elevating the fetal head when it is deeply engaged but its use in clinical practice is still under trial.<sup>7</sup>

Abdominovaginal delivery has been described by Landsman. In this technique, female is placed in Whitmore<sup>9</sup> position (a modified lithotomy position where thighs are moderately abducted and flexed to an angle of approximately 135 degree relative to the trunk) and an assistant introduces hand into vagina to push fetal head up, the surgeon at the same time places an upward traction on the shoulders to help in dislodging the head.

Emergency cesarean section done in advanced labor should be taken as a high risk procedure. Use of prophylactic antibiotics, arrangement of fresh blood and involvement of senior obstetrician to operate on laboring mother and use of modified techniques<sup>7,8</sup> to deliver deeply impacted fetal head is important to reduce complications. The National Sentinal Cesarean section Audit Report,<sup>11</sup> published by the Royal College of Obstetricians and Gynecologists recommends a

consultant presence when cesarean section is performed at full dilatation of cervix.

There are few planned studies regarding intra-operative complications of emergency cesarean section done in advanced labor. So we plan a research to study these complications in a tertiary care hospital so that risk factors for these complications can be identified and strategies may be planned to reduce these complications and thus to reduce maternal mortality and morbidity.

## Materials and Methods

This prospective study was carried out in Obstetrics and Gynecology Unit 11 of Services Institute of Medical Sciences Services Hospital, Lahore from 1<sup>st</sup> January 2007 to 31<sup>st</sup> December 2007. The sample included 402 cesarean sections done on laboring mothers. It was divided into two groups; emergency C-section done in advanced labor (241) as the study group and emergency C-section done in early labor (161) as the control group. All cesarean sections were done by the on duty emergency post graduate trainees. Senior registrars and consultants were involved where needed to handle the complications.

## Inclusion Criteria

All the patients with emergency cesarean section done on laboring mothers with singleton cephalic live pregnancies at term without previous scar were included in the study.

## Exclusion Criteria

The following patients were excluded from study.

1. Emergency cesarean section done on patients not in labor for indications like placenta previa, eclampsia, etc.
2. All cesareans done on mothers with previous scar, multiple pregnancies and breech presentation.

## Outcome Measures

Main outcome measures are Intra operative complications like:

1. Cervical tears.
2. Extension of uterine incision.
3. Significant intra operative hemorrhage.

## Early Labor

In our study, we defined early labor as passive phase and active phase of 1<sup>st</sup> stage up to 4 cm cervical dilatation.

## Advanced Labor

Defined as active phase of 1<sup>st</sup> stage up to 5 or > 5 cm cervical dilatation and 2<sup>nd</sup> stage of labor.

## Significant Intra-operative Hemorrhage

Defined as bleeding > 1000cc or bleeding excessive enough to need blood transfusion.

Data were collected regarding age, parity, booked or unbooked status; indications for cesarean section, intra-operative complications and risk factors for these complications, Data were recorded on a structured proforma and compared between the study and control groups.

## Statistical Analysis

Data were analyzed using computer programme SPSS Version 14 for windows applying student t-test for quantitative and chi-square test for qualitative parameters. A p-value < 0.05 was used as statistically significant.

## Results

Out of 2064 total deliveries in the year 2007 in Gyne. Unit 2 Services Hospital Lahore, 1290 (62.5%) were vaginal and 774 (37.5%) were cesarean deliveries. Out of 774, 174 (23%) were elective and 600 (77%) were emergency C. Sections. Out of 600 emergency C. Sections, 402 (59%) were carried on laboring mothers and the rest 198 (41%) for other reasons. Out of 402 emergency C. Sections done on laboring mothers 241 (60%) were done in advanced labor and 161 (40%) in early labor. Out of 241 C. Section done in advanced labor, in 66 (27%) fetal head was deeply engaged in the pelvis as compared to only 8(5%) in the control group.

Both the control and study groups were similar in demographic factors like age and parity. In the study group 40 (17%) patients were booked and 201 (83%) were un-booked, while in the control group, 101 (60%) were booked and 60 (40%) were un-booked as shown in Table 1.

Table 2 shows indications of emergency C-section

done in the study and control groups. Failure to progress in the 1<sup>st</sup> stage of labor was the indication in 19 (7%) and 102 (64%) in the control and study group respectively. Failure to progress in the 2<sup>nd</sup> stage of labor was recorded in 55 (22%) of patients in the study group. Failed vacuum (soft silastic cup) was seen in 32 (60%) and failed forceps 5

**Table 1:** Demographic factors in both groups.

S. No.	Parameters	Study Group	Control Group	p-value
1.	Age (mean years)	27	25	0.1
2.	Parity	3	4	0.3
3.	Booking status			0.01
	Booked	40 (17%)	101 (60%)	
	unbooked	201 (83%)	60 (40%)	

**Table 2:**  
Indications of C-sections in the study and control group.

S. No.	Parameters	Study Group	Control Group	p-value
1.	Failure to progress in 1 <sup>st</sup> stage of labor	19 (7%)	102 (64%)	0.002
2.	Failure to progress in 2 <sup>nd</sup> stage of labor	55 (22%)	0	
	Failed vacuum	32 (60%)		
	Failed forceps	5 (9%)		
3.	Deep transverse arrest	66 (27%)	0	
4.	Fetal distress	101 (44%)	59 (36%)	0.07

**Table 3:**  
Intra-operative Complications noted in study and control group.

S. No.	Parameters	Study Group	Control Group	p-value
1.	Cervical tears	27 (11%)	3 (2%)	0.01
2.	Uterine tears	29 (12%)	4 (3%)	0.02
3.	Intra-operative hemorrhage (blood loss > 1000 cc)	21 (9%)	3 (2%)	0.04
4.	Bladder injury	4 (1.6%)	1 (0.7%)	0.01

**Table 4:**  
Risk factors for intra-operative complications in study and control group.

S. No.	Parameters	Study Group	Control Group	p-value
1.	Station of fetal presenting part (deeply engaged)	66 (27%)	3 (1.8%)	0.002
2.	Weight of baby (kg) > 4 kg	164 (68%)	24 (15%)	0.01
3.	Experience of surgeon 1 <sup>st</sup> and 2 <sup>nd</sup> years post graduate trainees	150 (62%)	121 (70%)	0.04

(9%) of cases in the study group. For fetal distress 101 (44%) and 59 (36%) cesarean sections were done in the study and control group respectively.

Over all intra-operative complication rate was 15.5%. Rate of complications in the study group was 19.8% and 11% in the control group with p-value 0.005. The rate of cervical tears recorded was 11% versus 2% in the study and control group respectively

with p-value 0.01. The rate of tears in body of uterus and extension of uterine incision was 12% versus 3% in the study and control group respectively with p-value 0.02. The rate of intra-operative hemorrhage of > 1000 cc was 9% versus 2% in the study and control group respectively with p-value 0.04. The rate of bladder injury was 1.3% versus nil in the study and control group respectively.

The main risk factors for intra operative complications recorded were low station of fetal head (27% versus 1.8%, p-value 0.002), good size baby (68% versus 15%, p-value 0.01) and inexperienced surgeon (62% versus 70%, p-value 0.08) as shown in table 4.

## Discussion

Intra-operative complications of emergency cesarean section done in advanced labor add significantly to maternal mortality and morbidity in terms of increased risk of cervical tears, extension of uterine incision and excessive intra-operative haemorrhage. The results of our study show not only the high rate of emergency cesarean section done on laboring mothers but also high risk of intraoperative complications in such cases. Similar results are mentioned in some other studies<sup>10-12</sup> done on this issue.

Overall rate of cesarean section in our study remained quite high (37.5%). The rate of cesarean section quoted in different studies<sup>11,12</sup> are variable. The rate of emergency cesarean section done in advanced labor in our study was quite high (77%) as most of cases were referred from private clinics and homes. Majority of them were unbooked cases (60%) with mismanaged labors requiring emergency cesarean section on deeply impacted fetal head. In our study we used vacuum as the preferable instrument over forceps. High failure rate of vacuum as compared to forceps (60% versus 9%) was observed leading to increased cesarean section rate in the study. Since RCOG has declared vacuum as the instrument of first choice in the second stage of labor, it has been used increasingly. High failure rate<sup>13</sup> of vacuum as compared to forceps in 2<sup>nd</sup> stage contributed to increase in cesarean section rate done in 2<sup>nd</sup> stage of labor.

In our study the main maternal complications of emergency cesarean section done in advanced labor were cervico-uterine tears and intra-operative hemorrhage. The rate (19.5 versus 11%) of these complications remained significantly high in patients with advanced labor as compared to those in early labor. In a study, Neison<sup>5</sup> recorded rate of complications of emergency cesarean sections done on laboring mothers to be 18.9%. The rate of uterine tears in our study was (12% versus 3%) and cervical tears (11% versus 2%) in the study and control groups respectively. High rate of extension of uterine incision (up to 35%) has been recorded in some studies.<sup>13</sup> The extension occurs due to

excessive manipulation that may be required to deliver the deeply impacted fetal head when the lower uterine segment is already thin, edematous and overstretched.

The main risk factors for cervico-uterine tears and excessive intra-operative bleeding in sections done in advanced labor recorded in our study are deeply impacted fetal head, good size baby and inexperienced operator. Deeply impacted fetal head in advanced labor remained the main risk factor for cervical tears. In our study deeply engaged fetal head was recorded in 27% of cases. A rate of 25% has been recorded in a study by Mandeep.<sup>12</sup> Results of studies<sup>14,15</sup> show that extension of uterine incision was noted mainly in extraction of good size babies. The rate of intraoperative bleeding of > 1000 cc recorded in our study (9%) was also high in the study as compared to the control group (2%). Both cervical and uterine lacerations added significantly to increased risk of intra-operative bleeding.<sup>14</sup>

Overall all intra-operative complications were noted to be more frequently encountered in sections done by inexperienced operators.<sup>13,14</sup> In our study 62% versus 70% cesarean sections were done by 1<sup>st</sup> and 2<sup>nd</sup> year postgraduate trainees in the study and control group respectively. Senior registrars were called in 70% cases to help deliver the fetal head and stitch cervical tears. In 10% cases consultant was called to stitch cervical tears and control intra operative hemorrhage. In 5 cases, an assistant was involved to push the fetal head vaginally to disimpact it from the pelvis. In none of case we used fetal dis-impacting device or abdomino-vaginal<sup>8</sup> approach and Whitmore<sup>9</sup> technique. In laboring mothers, the pelvic tissues are very friable and edematous with increased blood supply. They are easy to injury, bleed profusely and difficult to suture. There is also risk of damage to the surrounding organs especially urinary bladder while trying to repair them due to close proximity of bladder to cervix and uterus. It is difficult for inexperienced operator to deliver deeply impacted fetal head, separate cervix from bladder and repair tears in the cervix and uterus.

Anticipation of complications is important when cesarean section in advanced labor is to be done. It should be taken as high risk operations and be done by experienced surgeons. There should be adequate amount of fresh blood available to manage excessive intra-operative bleeding. Larger scale studies are needed to study complications of emergency cesarean section on laboring mothers so that guidelines and protocols can be to reduce these complications.

## Limitations of Study

This study was restricted to one unit of hospital. There is need of large scale studies under control conditions to bring best results. We also could not include complications of baby due to difficulty to follow them after shifting to neonatology.

## Conclusion

Emergency cesarean section in advanced labor is a high risk operation due to increased risk of intra-operative complications like uterine tears, cervical lacerations and intra-operative haemorrhage. Experienced surgeons should operate on such patients using modified techniques to deliver deeply impacted fetal head from pelvis to reduce these intra operative complications.

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