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ORIGINAL ARTICLE

Prospective Observational Study to Assess the Caesarean Section Complications in Second Stage of Labour in the Maternity Hospital

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ABSTRACT

Background: Cesarean section in second stage with full cervical dilation is linked to an increased risk of maternal and fetal problems because of the thinned-out, edematous lower segment and the highly impacted fetal head in the pelvis, which make the procedure technically challenging. The current study aimed to evaluate the maternal and neonatal complications of caesarean section in second stage of labour. **Patients and methods:** Prospective Observational study conducted in Maternity Hospital at Zagazig University. Included 24 patients with a singleton fetus in cephalic presentation and pregnancy ≥ 37 weeks gestation who underwent emergency CS in second stage of labour. All women were subjected to complete history taking, General examination and Laboratory investigation. **Results:** This study results showed that most common intraoperative complications were bladder injury, uterine artery ligation and hemorrhage. The most common postoperative maternal complications were wound infection and Postpartum hemorrhage (PPH) while fetal complications were meconium aspiration, Apgar score ≤ 7 and respiratory distress. There was no statistically significant difference between maternal complicated cases and non-complicated cases regarding demographic data or history or labour data. Moreover, there was no statistically significant difference between fetal complicated and non-complicated cases in demographic data or history or labour data. **Conclusions:** We concluded that CS in the second stage of labour showed a higher risk of maternal complications either intraoperative or postoperative, in addition, risk of fetal complications also rise with CS in the second stage of labour. **Keywords:** Caesarean section; Second Stage; Labour

INTRODUCTION

In daily obstetric practice, the most common major operation carried out globally is the cesarean section. In many countries, it makes up as much as 60% of all births**[1]**.Egypt reportedly has the third-highest CS rate (54%) worldwide **[2]**, after Brazil (55.6 percent) and the Dominican Republic (56.4 percent). Egypt has

considerably higher rates of CS than any other Arab nation in the region **[3].**

In Egypt, it was calculated that the greatest rate was 67.8% in Behira and the lowest was 49.0% in Assiut; nevertheless, there was no statistically significant difference in the CS rates between rural and urban areas. greater social class and fewer children were substantially correlated with greater CS rates (≤ 3) **[4].**

Second-stage CS happens when the mother needs to deliver the fetus at full dilation of the cervix, which puts both the mother and the fetus in danger. In contemporary obstetrics, the rising tendency of CS at the second stage is extremely concerning. From 0.9 to 2.2%, the incidence of second-stage CS has increased**[5].**

In the second stage of labor, non-progressing labor, labor obstruction, deep transverse arrest, cephalopelvic disproportion, compound presentation, or fetal distress were all indications of a cesarean section **[6].**

According to data from the Royal College of Obstetricians and Gynecologists (RCOG), approximately 6% of cesarean sections (CS) are performed on average because of inadequate supervision from junior staff members or a lack of training, particularly during the critical decision-making phase of this second stage. Newborn and maternal morbidity are caused by a lack of knowledge of some difficulties associated with vaginal delivery as well as those associated with disputed tissues**[7].**

Compared to first-stage cesarean operations, second-stage cesarean sections are linked to higher problems. A complete dilation of the cervix and a head deeply engaged in the pelvis during a cesarean section may increase the risk of harm to both the mother and the fetus. A second-stage C-section is linked to higher rates of neonatal morbidity and genital damage. There are potential links between peripartum hysterectomy, trauma, hemorrhage, and second-stage cesarean sections **[8].**

A significant prevalence of neonatal morbidity and complications, such as poor Apgar scores, birth injuries, NICU admissions, birth asphyxia, hypoxia ischemic encephalopathy, or even infant mortality, have been linked to carbon scissors (CS) in the second stage of labor **[9].**

Making decisions for CS during the second stage of labor continues to be one of the fundamental problems facing modern obstetric practice. To ascertain related fetal and maternal morbidity following emergency cesarean sections at full dilatation, the current study was conducted. This study aimed to evaluate the maternal and neonatal complications of cesarean section in the second stage of labour.

Patients and methods

Prospective Observational study was conducted in Maternity Hospital at Zagazig University unit from July 2022 to August 2023. Included 24 patients with a singleton fetus in cephalic presentation and pregnancy ≥ 37 weeks gestation who underwent emergency CS in second stage of labour. The study was authorized by our local ethics commission (IRB # 10860-6-6-2023). After the selection of all patients, informed consent was obtained from the entire patients participating in the study. The protocol for the study complied with the Helsinki Declaration (1975), which is the World Medical

Association's guideline of ethics for research involving human subjects.

Inclusion Criteria were; all patients who underwent emergency cesarean section in the second stage of labour either already admitted orreferred, and women with a singleton fetus in cephalic presentation, ≥ 37 weeks gestation. Exclusion Criteria were; medical disorder with pregnancy (Diabetes Mellitus, liver and heart disease, hypertensive disorder, PET). Fetal distress or intrauterine fetal death. Antepartum hemorrhage. Congenital fetal malformation. Fetal malpresentation. Uterine myomas.

Operative procedures:

Following anesthesia, urethral catheterization was done under complete aseptic conditions. scrubbing the skin with a betadine-based antiseptic solution. P fannenstiel abdominal incision opening the abdomen. Subcutaneous tissue is exposed, the rectus sheath is opened via a transverse incision, and the rectus muscles are separated after that. Optimal exposure of the lower uterine segment for a C-shaped incision opening. Delivery of the baby & clamping of the cord, followed by administration of oxytocin. The baby was examined by a neonatologist with an assessment of neonatal complications if happened. Complete delivery of the placenta with assisted spontaneous delivery of the placenta with controlled cord traction and uterine message. Closure of the uterus in two layers ensures good hemostasis. Closure of subcutaneous fat if more than 2cm thickness and closure of the skin by subcuticular sutures.After the procedure, cover any surgical incisions with a suitable sterile pad dressing. Applying a non-touch, aseptic method when replacing or extracting surgical wound dressings.

Postoperative evaluation:

The included patients were subjected to the standard follow-up for the first 24 hours, which included monitoring vital signs, abdominal laxity, uterine contractions, and vaginal bleeding.

Estimated blood loss (EBL) **[10]**:

Estimated blood loss (EBL) = EBV × Hi (Initial hematocrit) – Hf (Final hematocrit) / Hi (Initial hematocrit)

Step 1: Calculate the Estimated Blood Volume (EBV)

EBV = Weight (kg) × Blood volume (age and gender)

Step 2: Decide the tolerated decrease in hematocrit from initial hematocrit by the patient.

Postoperative fever was recorded using an oral route every six hours**.**

After seven to ten days following cesarean delivery, patients were checked in and followed up with at the outpatient clinic. When there was erythema, indurations, and a serous or purulent discharge from the skin incision with or without a fever a wound infection was diagnosed.

Outcomes:

Maternal outcomes were measured in terms of postpartum hemorrhage.uterine incision extension, postoperative complications like febrile illness, and wound infection.

Neonatal outcome; Apgar score at one and five minutes. Fetal injuries during delivery. Neonatal morbidity and mortality**.** NICU admission.

Statistical analysis:

Using the Statistical Package for Social Science (IBM Corp., Released 2017), the

gathered data was updated, coded, tabulated, and brought onto a PC. IBM SPSS Statistics for Windows, Version 25.0; Armonk, NY: IBM Corp. The Shapiro test was employed to determine whether the data distribution was normal. The Independent T-Test was used to assess the statistical significance of the difference between the means of the two research groups. The Chi-Square test was used to look at the relationship between two qualitative variables. Fisher's exact correction was used to examine the association between two qualitative variables when the anticipated count was less than 5 in more than 20% of the cells. It is considered significant if p is less than 0.05 at the 95% confidence interval.

RESULTS

Table 1; showsthat the age of the studied cases ranged from 17 to 35 years with a mean of 24 years. Regarding gravity and parity, 54.2% of them were PG and 41.6% had parity 1 or 2. The frequency of previous abortions was 16.7%.That 58.3% of the cases had induced labour among those induced cases 57.1% were induced by ecbolic. Good progress to 1st stage was found in 91.7% of the cases and to 2nd stage in 50% of the cases. Indicationsfor CS were Poor progress in 58.3% and FD in 41.7 %.

Table 2; showed that only 1 cases had general anesthesia (4.2%) and 95.8% had spinal. 33.3% of the cases had operation duration about 40 to 50 minute and had catheter and no cases had drain.

Table 3; showed that 8.3% of the cases had intraoperative bladder injury, 4.2% had Uterine artery ligation and 4.2% had hemorrhage. No cases had intestinal injury or anesthetic complications. That 8.3% of the cases had PPH and 16.7% had wound infection. Discharge time ranged from 16 to 24 hour with mean 17.75 hour. That 16% of the fetus had Apgar score ≤ 7. Also 33.3% of them were meconium aspiration and 8.4% had respiratory distress.

Table 4; showed that there was no statistically significant difference between maternal complicated and non-complicated cases in demographic data or history.

Table 5; showed that there was no statistically significant difference between maternal complicated and non-complicated cases in Labour data.

Table 6; showed that there was no statistically significant difference between fetal complicated and non-complicated cases in demographic data or history.

Table 7; showed that there was no statistically significant difference between fetal complicated and non-complicated cases in labour data.

Table (1): Demographic, history and Labour data of the studied cases:

Variable		**(*n*=24)**	
Age: (years)	Mean ± SD Range	24±4.39 17-35	
Variable		**No**	**%**
Gravity:	First Second -third Fourth-sixth	13 8 3	54.2 33.3 12.5

Variable		(*n*=24)	
Parity:	PG	13	54.2
	1	5	20.8
	2-3	5	20.8
	4	1	4.2
Previous abortion:	No	20	83.3
	Yes	4	16.7
Labour data			
Method of Labour:	Spontaneous	10	41.7
	Induced	14	58.3
Type of induction:	AROM	6	42.9
	Ecbolic	8	57.1
Progress of 2nd stage of Labour:	Good	12	50
	Poor	12	50
Indication of CS in 2nd stage:	Poor progress	14	58.3
	Fetal distress	10	41.7

SD: Standard deviation

Table (2): Operative data among the studied cases:

Variable		(*n*=24)	
		No	**%**
Type of anesthesia:	Spinal	23	95.8
	General	1	4.2
Time:(minutes)	40-50	8	33.3
	51-60	16	66.7
Drain:	No	24	100
Catheter:	Yes	24	100

Table (3): Complications among the studied cases:

Variable	(*n*=24)	
	No	**%**
Intraoperative complications		
Atonic (PPH)	1	4.2
Uterine artery ligation	1	4.2
Bladder injury	2	8.3
Intestinal injury	0	0
Anesthetic complications	0	0
Post-operative maternal		
Post partum hemorrhage	2	8.3
Wound infection	4	16.7
Hospital stay: (hour) *Mean ± SD*	17.75±2.59	
Range	16-24	
Fetal complications		
Apgar score *<7*	4	16
NICU admission	1	4.2
Respiratory distress	2	8.4
Neonatal jaundice	1	4.2
Still birth	1	4.2
Convulsion	1	4.2
Meconium aspiration	8	33.3

SD: Standard deviation

Table (4): Comparison between cases with maternal complications and cases without in Demographic data and history of the studied cases:

Variable		No complication (n=14)		Had complications (n=10)		t	P
Age: (years)	Mean ± SD	26.64±4.67		23.1±4.04		0.84	0.41 NS
Variable		**No**	**%**	**No**	**%**	**x^2**	**P**
Gravity:	PG	8	61.5	5	38.5		
	G2-3	4	50	4	50	Y	0.83
	G4-6	2	66.7	1	33.3		NS
Parity:	0	8	61.5	5	38.5		
	1	1	20	4	80	Y	0.19
	2-3	4	80	1	20		NS
	4	1	100	0	0		
Previous abortion:	No	12	60	8	40	F	0.99
	Yes	2	50	2	50		NS
GA:	37-	3	50	3	50		
	38-	3	50	3	50		
	39-	3	60	2	40	Y	0.72
	40	5	71.4	2	28.6		NS
US GA:	*Mean ± Sd*	38.59±0.98		37.98±2.13		t=0.94	0.36 NS
EBW:	*Mean ± Sd*	3187.86±710		3223.7±469		t=0.14	0.89 NS

SD: Standard deviation t:Independent t x^2:Chi square test F:Fisher exact correction Y: Yates correction NS: Non-significant (P>0.05)

Table (5): Comparison between cases with maternal complications and cases without in Labour data of the studied cases:

Variable		No complication (n=14)		Had complications (n=10)		x^2	P
		No	**%**	**No**	**%**		
Method of labour:	Spontaneous	5	50	5	50	0.49	0.48
	Induced	9	64.3	5	35.7		NS
Type of induction:	AROM	4	66.7	2	33.3	F	0.99
	Ecbolic	5	62.5	3	37.5		NS
Progress of 2nd stage of Labour:	Good	8	66.7	4	33.3	F	0.68
	Poor	6	50	6	50		NS
Indication of CS:	Poor progress	8	57.1	6	42.9	F	0.89
	FD	6	60	4	40		NS
Type of anesthesia:	General	1	100	0	0	F	0.99
	Spinal	13	56.5	10	43.5		NS
Time:	40-50	5	62.5	3	37.5	F	0.99
	51-60	9	56.2	7	43.8		NS
Hospital stay:	Mean ± SD	17±1.05		17.75±2.59		t=1.21	0.24 NS

SD: Standard deviation t:Independent t x^2:Chi square test F:Fisher exact correction NS: Non significant (P>0.05)

Table (6): Comparison between cases with fetal complication and cases without in Demographic data and history of the studied cases:

Variable		No complication (n=13)		Had complications (n=11)		t	P
Age: (years)	Mean ± SD	24.77±4.59		23.09±4.18		0.93	0.36 NS
Variable		**No**	**%**	**No**	**%**	**x^2**	**P**
Gravity:	PG	6	46.2	7	53.8		
	G2-3	5	62.5	3	37.5	Y	0.69
	G4-6	2	66.7	1	33.3		NS
Parity:	0	6	46.2	7	53.8		
	1	4	80	1	20	Y	0.40
	2-3	3	60	2	40		NS
	4	0	0	1	100		
Previous abortion:	No	10	50	10	50	F	0.73
	Yes	3	75	1	25		NS
GA:	37-	5	83.3	1	16.7		
	38-	1	16.7	5	83.3		
	39-	3	60	2	40	Y	0.14
	40	4	57.1	3	42.9		NS
US GA:	Mean ± Sd	38.07±1.94		38.66±0.93		t=0.92	0.35 NS
EBW:	Mean ± Sd	3294.31±422.4		3094.64±786		t=0.79	0.44 NS

SD: Standard deviation t:Independent t x^2:Chi square test F:Fisher exact correction
Y: Yates correction NS: Nonsignificant (P>0.05)

Table (7): Comparison between cases with fetal complication and cases without in labour data of the studied cases:

Variable		No complication (n=13)		Had complications (n=11)		x^2	P
		No	**%**	**No**	**%**		
Method of labour:	Spontaneous	6	42.9	8	57.1	F	0.24
	Induced	7	70	3	30		NS
Type of induction:	AROM	4	66.7	2	33.3	F	0.31
	Ecbolic	2	25	6	75		NS
Progress of 2nd stage of Labour:	Good	5	41.7	7	56.3	F	0.41
	Poor	8	66.7	4	33.3		NS
Indication of CS:	Poor progress	7	50	7	50	F	0.95
	Fetal distress	6	60	4	40		NS
Type of anesthesia:	General	0	0	1	100	F	0.46
	Spinal	13	56.5	10	43.5		NS
Time:	40-50	4	50	4	50	F	0.99
	51-60	9	56.2	7	43.8		NS
Maternal complications	No	6	42.9	8	57.1	F	0.24
	Yes	7	70.7	3	30		NS
Discharge time:	Mean ± SD	17.69±2.14		17.82±3.16		t=0.12	0.91 NS

SD: Standard deviation t: Independent t x^2:Chi square test F: Fisher exact correction
NS: Non significant (P>0.05)

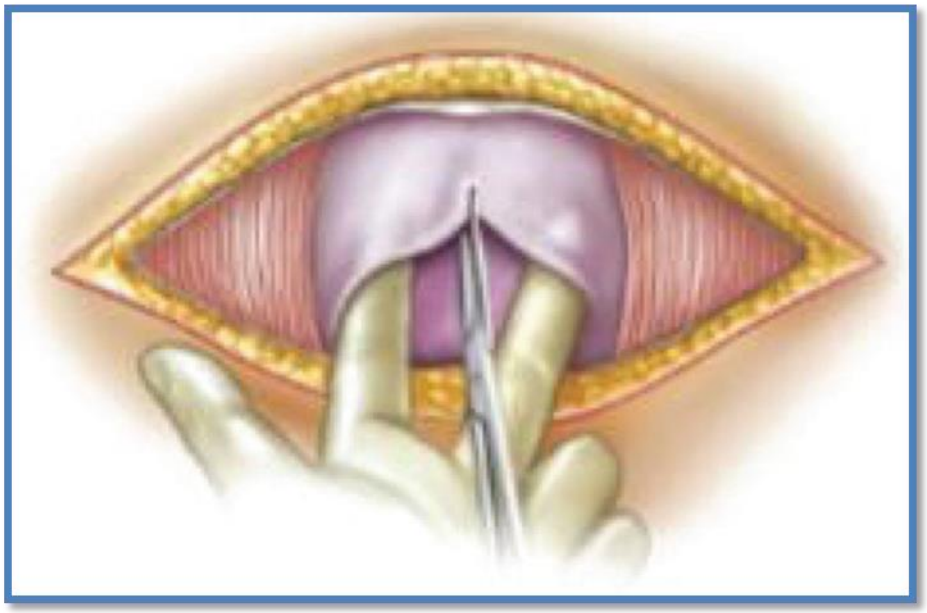

Figure 1: Longitudinal parietal peritoneal incision

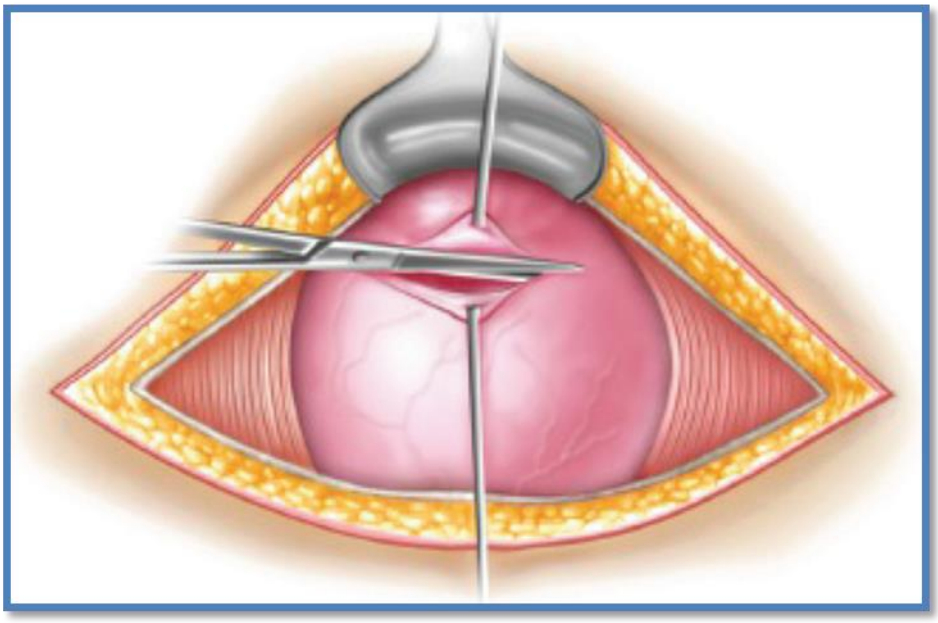

Figure 2: Traverse visceral peritoneal incision on the upper margin of the bladder

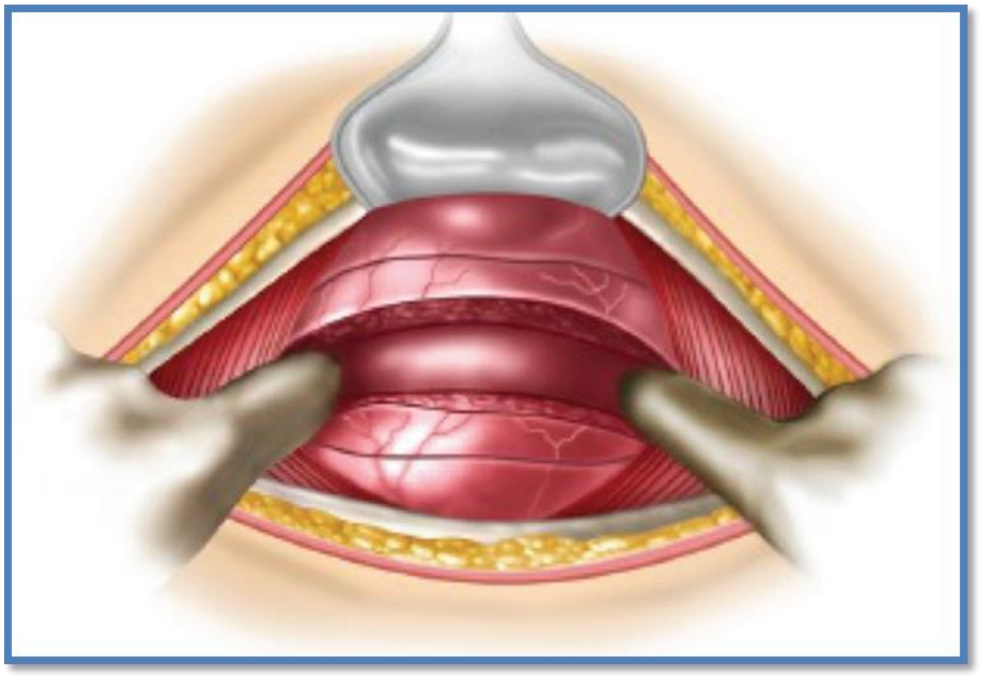

Figure 3: Lower uterine segment hysterotomy by Kocher and Kelly scissors or scalp, followed by bidigital blunt dissection

Figure 4: Delivery of fetal head in cesarean section

DISCUSSION

The most common major abdominal surgery performed on women is a cesarean section. When compared to vaginal delivery, there is a concerning increase in Caesarean sections (CS), which increases the risk of unfavorable outcomes for both the mother and the fetus.

There is a troubling rise in the rate of second-stage cesarean sections within this rising prevalence of CS**[11].**

The age of the studied cases ranged from 17 to 35 years, 54.2% of them were PG and 41.6% had parity 1 or 2. The frequency of previous abortions was 16.7%. Indication for CS was poor progress in 58.3% and FD in 41.7 %. The majority of patients had spinal anesthesia, two-thirds of patients had the operative time of 51-60 minutes, had a catheter and no cases had drained.

The most common intraoperative complications were bladder injury, uterine artery ligation, and hemorrhage (8.3%, 4.2%, and 4.2% respectively). On the other hand, the most common postoperative maternal complications were wound infection and PPH (16.7% and 8.3% respectively). Regarding fetal complications were meconium aspiration, Apgar score ≤ 7, and respiratory distress (33.3%, 16%, and 8.4% respectively).

The current study showed that there was no statistically significant difference between maternal complicated cases and non-complicated cases regarding demographic data or history or labour data. Similarly, there was no statistically significant difference between fetal complicated and non-complicated cases in demographic data or history or labour data.

Similar to our results, **Vashi et al[12]**conducted a cross-sectional study to Analyze the obstetric results of 54 women who had second-stage CS. Cephalopelvic disproportion, non-progress of labor, and non-reassuring fetal condition were the key indicators of second-stage CS.The most common intra-operative problems were wound infection and PPH, while the most common postoperative complications were an expansion of the uterine angle. The requirement for admission to the newborn intensive care unit (NICU) due to respiratory distress and an Apgar score of less than seven was the most frequent neonatal consequence.

Gurung et al[13]carried out a retrospective cohort analysis of all Nepali women who had a singleton, cephalic fetus delivered at term via cesarean section during the second stage of labor. 200 deliveries were made during the second stage of labor. Fetal distress and cephalopelvic disproportion were the most frequent indications. Maternal problems included wound infection 7 (4.8%), postoperative fever 27 (18.8%), and atonic postpartum hemorrhage uterine incision extension 18 (12.5%). Meconium-stained amniotic fluid 49 (34.2%), neonatal hyperbilirubinemia 14 (9.7%), and higher nursery admission 2 (15.3%) are examples of perinatal problems. Apgar score ≤ 7 (9%) and perinatal mortality (1.3%) were observed.

Research by **Khaniya et al [14]** found that intraoperative problems affected 55% of patients. The most frequent, occurring in 34% of patients, was blood-stained urine, followed by uterine incision extension in 14% of patients. Concerning fetal difficulties, **Khaniya et al [14]**reported perinatal results in their study, including meconium stain fluid in 28% of cases, Apgar score 7 at 5 min in 14% of cases, and NICU hospitalization in 5.5% of neonates.

Anusha et al[15]Postpartum hemorrhage (PPH) was reported to be the most common complication in 74% of patients, followed by a blood transfusion in 58% of patients, and uterine tear in 16% of patients. Additionally, in a study given by **Goswami et al [16]**extension of uterine angles that involved 16% of patients was the main complication, followed by atonic PPH involving 8% of patients and bladder injuries involving 6% of

patients.

Dahiya et al[17]carried out a retrospective analysis to examine the relationship between the second stage of CS and the outcomes of pregnancy. 56.1% of the patients' indications for CS were arrested during the second stage of labor. The most frequently reported postoperative problem was fever (14.1%), while the most frequent intraoperative problem was expansion of the uterine incision (16.0%). Birth asphyxia (16%), meconium aspiration (14.1%), newborn jaundice (4.7%), and respiratory distress syndrome (11.3%) were the neonatal problems that necessitated NICU stay.

A retrospective study was recently carried out by **Yadav et al[18]** to evaluate the effects of CS on mother and newborn outcomes during the second stage of labor. The arrest of descent and dilatation (40%), meconium-stained liquid (15.38%), occipital-posterior position (12.30%), and obstructed labor (3.17%) were the most frequent causes of CS in the second stage of labor. Prolonged Foley's catheterization (25%), post-partum fever sickness (30%), wound infection, PPH, and blood transfusion were the most frequent complications of second-stage CS. 50% of newborns admitted to the NICU had respiratory distress and 50% had birth asphyxia.

Different results in some of these studies compared to our results can be attributed to different numbers of included patients in the aforementioned studies.

A technically challenging procedure, a cesarean section performed during the second stage of labor results in pelvic anatomical distortion and frequently profound pelvic damage on the fetus. The risks of obstetric hemorrhage, bladder damage, prolonged uterine tears resulting in broad ligament hematoma, infection, and prolonged hospital stays are increased for women delivered via cesarean section at full dilation**[19].**

Furthermore, it can be quite challenging to identify the bladder and the lower portion of the uterus, and giving birth to comparatively larger babies can be stressful and challenging **[17]**. Conversely, fetal problems may result from deep implantation of the fetal head, prolonged second stage labor, and intra-operative fetal hypoxia brought on by a powerful uterine contraction **[18].**

To evaluate if CS in the second stage of labour had higher maternal risk compared to CS in the first stage of labour, it is important to mention results of **Asıcıoglu et al[20]**. The authors reported that second-stage caesarean deliveries were linked to longer operation times and hospital stays due to an increased risk of intraoperative complications, unintentional extensions, blood transfusion requirements, higher rates of endometritis, and the need for hysterectomy. Severe septicemia, fetal damage, increased infant mortality, admission to the neonatal intensive care unit, and a markedly low Apgar score at five minutes were among the neonatal sequelae. According to the authors, women who had a cesarean delivery in the second stage of labor were at a 4.25-fold higher risk of maternal morbidity than those who had one in the first stage.

Vitner et al[21]compared the morbidity and death rates of CS mothers in the first and second stages of labor. In addition to being more likely to experience unintended uterine incision extension, uterine atony, hemoglobin reduction >2 g/l, and antibiotic treatment for suspected endometritis, second-stage CS was linked to more than double the rate of estimated blood loss >1000 ml.

Lipschuetz et al. [22] found, in line with

earlier research, that mothers delivering larger fetuses (head circumference and body weight ≥ 90 percentile) and those exhibiting persistent occiput posterior (POP) presentation were more likely to undergo CS during the second stage of labor.When CS was done in the second stage, it was significantly linked to severe maternal problems (such as heavy bleeding and fever) in both primiparas and multiparas.

The risk of second-stage CS isn't limited to the present delivery but extends to future deliveries. **Sapir et al[23]**we out a retrospective cohort analysis with women who underwent second stage CS and delivered a baby at least once in a row. Women who were included used assisted reproductive technologies at a higher rate. Furthermore, they spent a lot more time in the hospital. The second delivery had a higher rate of premature births. Furthermore, the authors found that, in contrast to cesarean sections performed during the initial stage of labor, cesarean sections performed during the second stage of labor constitute an independent risk factor for late preterm birth in the subsequent pregnancy.

These finding were consistent with previous results reported by **Raffique et al[24]**who discovered a strong correlation between the second stage of labor at the time of the cesarean delivery in prior pregnancies and the following preterm delivery. This could be explained by higher rates of extended uterine tear, PPH and postpartum wound infection that all lead to increased uterine muscle wall laxity that consequently leads to an increased risk of preterm labour.

CONCLUSIONS

Based on the current study results we concluded that CS in the second stage of labour showed higher risk of maternal complications either intraoperative or postoperative, in addition,the risk of fetal complications also rises with CS in the second stage of labour.

We recommend a study of the risk factors that are associated with CS in the second stage of labour to anticipate and perform CS in the first stage of labour instead.Screening of females that underwent CS in the second stage of labour in the previous pregnancy to avoid common complications such as preterm labour.Larger studies to evaluate the best techniques in CS in the second stage of labour with the least observed complications

Declaration of interest

The authors report no conflicts of interest. The authors are responsible for the content and writing of the paper.

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