

COMPARISON OF FETOMATERNAL OUTCOMES IN SECOND STAGE VERSUS
FIRST STAGE CAESAREAN SECTIONS

Dr. Musarrat^{1*}, Anjali Mantri², Latika Sahu³, Preeti Singh⁴, Shalini Shakarwal⁵ and Nasreen Fatima⁶

- ¹Senior Resident, Department of Obstetrics & Gynaecology, Maulana Azad Medical College & Associated Lok Nayak Hospital, New Delhi.
- ²Former Post Graduate Student, Department of Obstetrics & Gynaecology, Maulana Azad Medical College & Associated Lok Nayak Hospital, New Delhi.
- ³Director Professor, Department of Obstetrics & Gynaecology, Maulana Azad Medical College & Associated Lok Nayak Hospital, New Delhi.
- ⁴Professor, Department of Obstetrics & Gynaecology, Maulana Azad Medical College & Associated Lok Nayak Hospital, New Delhi.
- ⁵Assistant Professor, Department of Obstetrics & Gynaecology, Maulana Azad Medical College & Associated Lok Nayak Hospital, New Delhi.
- ⁶Senior Resident, Department of Obstetrics & Gynaecology, Maulana Azad Medical College & Associated Lok Nayak Hospital, New Delhi.



***Corresponding Author: Dr. Musarrat**
Senior Resident, Department of Obstetrics & Gynaecology, Maulana Azad Medical College & Associated Lok Nayak Hospital, New Delhi.

Article Received on 25/03/2024

Article Revised on 15/04/2024

Article Accepted on 05/05/2024

ABSTRACT

Background: The second stage caesarean section delivery occurs at the full dilatation of cervix, which is associated with more risk of maternal and fetal complications. **Purpose:** To study the fetomaternal outcomes in second stage caesarean sections and comparing them with first stage caesarean sections. **Material and methods:** This cross sectional study was conducted in Department of Obstetrics and Gynaecology at Lok Nayak Hospital, New Delhi for a period of one year, after approval from Institutional Ethical Committee. Sixty women after applying the inclusion and exclusion criteria were included from those women undergoing first and second stage caesarean sections respectively from operation theatres and post-operative wards. Informed written consent was taken. Most of the second stage caesarean sections were done in the emergency hours by the residents. Various maternal and fetal complications were compared between the two groups. Impact of method of delivery of baby and surgical time on maternal and neonatal complications were also seen in second stage caesarean sections separately. **Results:** In the present study, indications for second stage caesarean sections were arrest of descent of head (73.33%), fetal distress (23.33%), and CPD (3.33%) while indications for first stage caesarean were meconium stained liquor with fetal distress (88.33%), failed inductions (8.33%) and primi breech (3.33%). Most of the labour was induced and augmented. Labour only augmented had higher chances of second stage caesarean sections. Maternal complications such as extension of uterine angles, PPH, pyrexia, bladder injury, postoperative stay, haematuria, wound sepsis, blood transfusion, features of obstructed labour, all were more in second stage caesarean section. Neonatal complications such as having GCA in baby, NICU admissions, need for resuscitation, having APGAR<7, hyperbilirubinemia and HIE were more in second stage caesarean sections. Among various delivery methods used in second stage caesarean sections, breech extraction technique was associated with more Maternal and fetal complications. Similarly more surgical time taken leads to more complications. **Conclusion:** Second stage labour caesarean section showed more Maternal and fetal complications as compared to first stage caesarean sections.

KEYWORDS: Second stage caesarean section, labour, fetomaternal complication.

INTRODUCTION

Caesarean delivery is defined as the delivery of a fetus through surgical incisions made through the abdominal wall (laparotomy) and the uterine wall (hysterotomy). Caesarean is the most commonly performed operation in

women worldwide. Globally, caesarean section (CS) rates have significantly increased from around 7% in 1990 to 21% today surpassing the ideal acceptable CS rate which is around 10%–15% according to the WHO.^[1] The rapid increase in caesarean birth rates without clear

evidence of concomitant decrease in maternal or neonatal morbidity or mortality raises significant concern that caesarean delivery is overused. Caesarean can be performed before labour, or during first and second stage of labour. Second stage caesarean (CSs) are found to be associated with more complications as compared to first stage caesareans. CSs done at full dilation of cervix is a potential risk factor for various maternal and fetal injuries, genital trauma, perinatal morbidity, bleeding, peripartum hysterectomy.^[2] This increase in the second stage caesarean deliveries has been observed due to the decrease in the operative vaginal delivery rates.^[3] There is a recent trend to go to caesarean section in the second stage without due consideration of operative vaginal delivery. Incidence of second stage caesarean section has increased from 0.9% to 2.2%.^[4] The American College of Obstetricians and Gynaecologists (ACOG) and the Society for Maternal-Fetal Medicine (SMFM) released joint guidelines for the safe prevention of primary caesarean delivery. These include the following^[5,6]

- Prolonged latent (early)-phase labour should be permitted.
- The start of active-phase labour can be defined as cervical dilation of 6 cm, rather than 4 cm.
- In the active phase, more time should be permitted for labour to progress.
- Multiparous women should be allowed to push for 2 or more hours and primiparous women for 3 or more hours; pushing may be allowed to continue for even longer periods in some cases, as when epidural anaesthesia is administered.
- Techniques to aid vaginal delivery, such as the use of forceps, should be employed.
- External cephalic version should be performed for breech presentation.
- Women with twin gestations should, if the first twin is in cephalic presentation, be permitted a trial of labour.

In the current obstetrics practise, correct decision making for CSs in second stage of labour, is the greatest challenge, but with the involvement of skilled obstetricians, efficient and trained working staff, expert opinions can influence the maternal and neonatal complications, minimizing morbidity and mortality. This study aims to explore and compare various fetomaternal outcomes in second stage CSs vs first stage CSs also to study the impact of method of delivery of baby and surgical time on maternal and neonatal complications in second stage caesarean sections so that new recommendations can be laid that might reduce this drastic scenario.

MATERIALS AND METHODS

This cross sectional study was conducted in Department of Obstetrics and Gynaecology at Lok Nayak Hospital, New Delhi for the time period of one year. After approval from Institutional Ethical Committee, 60 women were included from those women who landed in both first and second stage caesarean respectively from

operation theatres and respective post caesarean wards of Lok Nayak Hospital, New Delhi. Most of the second stage caesarean sections were done in the emergency hours by the residents.

Sample size: The sample size in each group was taken to be 60 as per the convenient time available. So, total sample size of two groups came out to be 120.

Inclusion criteria consisted of singleton Pregnancy with cephalic presentation and gestation age >36 weeks, while exclusion criteria consisted of previous caesarean delivery, severe fetal growth restriction and antepartum haemorrhage. Both groups of first and second stage caesarean were compared under demographic characteristics which included age, educational qualification, various maternal characteristics such as parity, gestational age, indications of caesarean, method of induction and intraoperative features such as method of delivery of baby, maternal complications such as intraoperative extension of uterine angles, bladder injury, PPH, broad ligament haematoma, difficulty in extraction of baby, haematuria, features of obstructed labour, postoperative complications such as pyrexia, wound sepsis, blood transfusion, length of urinary catheterization, longer postoperative stay.

Various neonatal complications such as having GCA in baby, NICU admissions, need for resuscitation, APGAR<7, hyperbilirubinemia in baby, birth weight, fetal academia, cephalhaematoma, ICH, lacerations on face of neonate, facial nerve palsies, HIE and subaponeurotic haemorrhage were compared between the two groups. Impact of method of delivery of baby and surgical time on maternal and neonatal complications was seen in second stage caesarean separately. There are four delivery methods which was used in second stage caesarean sections to deliver deeply engaged head in which most common method used is patwardhan technique in which incision is made in the lower uterine segment, shoulders are present usually at incision level, the anterior shoulder is delivered out by hooking the arm first, with gentle traction on this shoulder, the posterior shoulder is also delivered out, Next the surgeon holds the trunk of the baby gently with both thumbs parallel to spine and with fundal pressure given by the assistant, the buttocks are delivered followed by leg, lastly the baby head is delivered. Second method is Modified Patwardhan technique which is used in case of occipito-posterior position with the head deeply into the pelvis, the anterior shoulder is delivered of first followed by delivering the same side leg. In other side leg is then delivered gently followed by same side arm. By gently pulling baby legs buttocks and the trunk of baby and are delivered lastly followed by head of the baby. In the reverse breech extraction method, after opening the uterus, the surgeon introduces a hand through the uterine incision towards the upper segment, grasps both feet, and gently pulls the fetus up to extract it. In the present study

these delivery methods were compared with the fetomaternal outcomes.

Data was stored in MS Excel spreadsheet and statistical analysis performed using 'R' programming language in SPSS version 25.

RESULTS

In this study, majority of women in second stage caesarean group were between 26 -30 years and in first stage caesarean group were between 21-25 years of age. The mean age in second stage caesarean group was 25.98±3.5 years and in first stage caesarean group was

24.83±3.75 years. Majority of women undergoing first stage and second stage caesarean had completed their secondary education but number of graduates were found to be statistically significantly higher in second stage caesarean group (p value < 0.05). Post graduates had two times (Relative risk [RR]=2.034) higher risk of undergoing 2nd stage caesarean. Among all, 75% were primigravida and 25% were multigravida in second stage caesarean group and 81.67% were primigravida and 18.33% were multigravida in first stage caesarean group but multigravida had 1.2 times (RR=1.2) higher risk of undergoing 2nd stage caesarean. (Table 1)

Table 1: Demographic details.

Sr. No.	Age (years)	Second Stage CS group		First Stage CS group		Relative Risk	95% CI for RR	
		N	%	n	%		Lower	Upper
1.	≤ 20	3	5.0	4	6.67	-	-	-
2.	21 – 25	26	43.33	33	55.00	-	-	-
3.	26 – 30	27	45.00	18	30.00	-	-	-
4.	31 – 35	4	6.67	5	8.33	-	-	-
	Educational Qualification							
1.	Primary	5	8.33	5	8.33	1.000	1.000	1.000
2.	Secondary	31	51.67	37	61.67	0.817	0.571	1.169
3.	Higher secondary	10	16.67	14	23.33	0.800	0.495	1.292
4.	Graduate	12	20.00	4	6.67	1.625	1.043	2.531
5.	Post Graduate	2	3.33	0	0.00	2.034	0.767	5.397
	Parity							
1.	Primi	45	75.00	49	81.67	0.830	0.550	1.253
2.	Multi	15	25.00	11	18.33	1.205	0.798	1.820
	TOTAL	60	100	60	100			

Most common indication of second stage caesarean was arrest of descent of presenting part with 73.33% and of first stage caesarean was MSL (meconium stained liquor) with fetal distress with 88.33%. In this study, 45% women were induced and augmented undergoing second stage caesarean and 76.67% women were induced and augmented undergoing first stage caesarean section. The

above-mentioned methods of induction were found to be statistically significant in second stage caesarean group over first stage caesarean group (p < 0.05). Those women who were only augmented had 1.8 times (RR=1.798) higher risk of undergoing 2nd stage caesarean section compared to 1st stage caesarean section. (Table 2)

Table 2: Indication of caesarean and methods of induction.

Sr. No.	Indication of Caesarean	Second Stage CS group		First Stage CS group		Relative Risk	95% CI for RR	
		N	%	N	%		Lower	Upper
1.	MSL with Fetal Distress	-	-	53	88.33	-	-	-
2.	Failed Induction	-	-	5	8.33	-	-	-
3.	Primi breech	-	-	2	3.33	-	-	-
4.	Arrest of descent	44	73.33	-	-	-	-	-
5.	Arrest of descent with Fetal distress	14	23.33	-	-	-	-	-
6.	CPD	2	3.33	-	-	-	-	-
	Methods of labour induction							
1.	Spontaneous	20	33.33	11	18.33	1.435	0.984	2.092
2.	Induced	0	0.00	0	0.00	-	-	-
3.	Augmented	13	21.67	3	5.00	1.798	1.172	2.759
4.	Induced+ Augmented	27	45.00	46	76.67	0.527	0.370	0.750
	TOTAL	60	100	60	100			

In this study, 60% women in second stage caesarean group were delivered by Patwardhan technique and 85%

women were delivered by cephalic technique in first stage caesarean group. (Table 3)

Table 3: Methods of delivery of baby.

Method of delivery of baby	2nd Stage CS group		1st Stage CS group		p-value	95% CI for RR	
	n	%	n	%		Lower	Upper
Patwardhan Technique	36	60.00%	2	3.33%	<0.001	2.292	4.571
Modified Patwardhan Technique	1	1.67%	0	0.00%	0.158	0.513	7.933
Breech extraction technique	3	5.00%	7	11.67%	0.093	0.257	1.302
cephalic	20	33.33%	51	85.00%	<0.001	0.240	0.496
TOTAL	60	100%	60	100%			

Maternal and neonatal complications were found to be higher in second stage caesarean group. Extension of uterine angles, longer post-operative stay and features of intraoperative obstructed labour were found to be statistically significant in second stage caesarean group over first stage caesarean group. NICU Admission, need for resuscitation and Apgar <7 were found to be statistically significant in second stage caesarean group over first stage caesarean group ($p<0.05$). Second stage caesarean group had 2 times ($RR=2.017$) higher risk of having GCA, hyperbilirubinemia and HIE in baby. In this study, pyrexia, longer post-operative stay, blood

transfusion and NICU admission were more in primigravida and rest of complications were more in multigravida. Bladder injury was not observed in any women of first stage caesarean section group. Hyperbilirubinemia, GCA, HIE and were not observed in babies of women in first stage caesarean section group. Hematuria and PPH were statistically significant ($p<0.05$) in second stage caesarean group over first stage caesarean group. Hematuria had 6 times ($RR=5.900$) higher risk of being developed in second stage caesarean section group. (Table 4)

Table 4: Comparison of fetomaternal complications in 1st vs 2nd stage caesarean section and between primigravida and multigravida.

Complications	2nd Stage CS group		1st Stage CS group		p-value	Relative Risk	95% CI for RR	
	n	%	n	%			Lower	Upper
Extension of uterine angles	9	15.00	2	3.33	0.013	1.749	1.066	2.869
Bladder injury	1	1.67	0	0.00	0.158	2.017	0.513	7.933
PPH	8	13.33	3	5.00	0.057	1.524	0.904	2.569
Pyrexia	6	10.00	4	6.67	0.254	1.222	0.674	2.215
Longer post-operative stay	33	55.00	6	10.00	<0.001	2.538	1.794	3.591
Hematuria	4	6.67	1	1.67	0.085	1.643	0.808	3.342
Blood Transfusion	5	8.33	3	5.00	0.232	1.273	0.667	2.430
Features of obstructed labor (intraoperative)	17	28.33	4	6.67	<0.001	1.864	1.261	2.755
GCA	1	1.67	0	0.00	0.158	2.017	0.513	7.933
NICU Admission	9	15.00	3	5.00	0.034	1.588	0.967	2.609
Need for resuscitation	10	16.67	3	5.00	0.020	1.646	1.024	2.647
Apgar <7	9	15.00	3	5.00	0.034	1.588	0.967	2.609
Hyperbilirubinemia	1	1.67	0	0.00	0.158	2.017	0.513	7.933
HIE	1	1.67	0	0.00	0.158	2.017	0.513	7.933
Complications (for 1st stage CS group)	Multi		Primi		p-value	Relative Risk	95% CI for RR	
	n	%	n	%			Lower	Upper
Extension of uterine angles	1	9.09	1	2.04	0.120	2.900	0.493	17.073
PPH	2	18.18	1	2.04	0.013	4.222	1.184	15.061
Pyrexia	0	0.00	4	8.16	0.163	-	-	-
Longer post-operative stay	1	9.09	5	10.20	0.456	0.900	0.141	5.763
Hematuria	1	9.09	0	0.00	0.017	5.900	1.151	30.249
Blood Transfusion	0	0.00	3	6.12	0.200	-	-	-
Features of obstructed labor (intraoperative)	1	9.09	3	6.12	0.361	1.400	0.220	8.895
NICU Admission	0	0.00	3	6.12	0.200	-	-	-
Need for resuscitation	1	9.09	2	4.08	0.245	1.900	0.306	11.799

Apgar <7	1	9.09	2	4.08	0.245	1.900	0.306	11.799
Complications (for 2nd stage CS group)								
Extension of uterine angles	3	20.00	6	13.33	0.266	1.417	0.476	4.218
Bladder injury	1	6.67	0	0.00	0.040	4.214	0.839	21.168
PPH	2	13.33	6	13.33	0.500	1.000	1.000	1.000
Pyrexia	1	6.67	5	11.11	0.310	0.643	0.113	3.670
Longer post-operative stay	9	60.00	24	53.33	0.327	1.227	0.503	2.994
Hematuria	2	13.33	2	4.44	0.116	2.154	0.612	7.581
Blood Transfusion	3	20.00	2	4.44	0.030	2.750	0.962	7.861
Features of obstructed labor (intraoperative)	4	26.67	13	28.89	0.434	0.920	0.343	2.471
GCA	0	0.00	1	2.22	0.280	-	-	-
NICU Admission	2	13.33	7	15.56	0.417	0.872	0.241	3.155
Need for resuscitation	1	6.67	9	20.00	0.115	0.357	0.066	1.920
Apgar <7	1	6.67	8	17.78	0.148	0.405	0.074	2.211
Hyperbilirubinemia	0	0.00	1	2.22	0.280	-	-	-
HIE	0	0.00	1	2.22	-	-	-	-

In this study, the decision delivery interval (the time taken between decision of caesarean to delivery of baby) was 105.38±47.37 (hrs) in second stage caesarean group and 108.50±68.79 (hrs) in first stage caesarean group. The interval between skin incision to delivery of baby (time from start of skin incision of caesarean till delivery of baby) was 7.02±0.62 (min) in second stage caesarean group and 4.32±0.91 (min) in first stage caesarean group. The length of urinary catheterisation was 4.82±3.22

(days) in second stage caesarean group and 1.28±1.12 (days) in first stage caesarean group. The birth weight was 2889.58±441.35 (gm) in second stage caesarean group and 2833.40±344.01 (gm) in first stage caesarean group. The interval between skin incision to delivery of baby and length of urinary catheterisation was found to be statistically significant in second stage caesarean group ($p < 0.05$). (Table 5)

Table 5: Interval between skin incision to delivery of baby, decision delivery interval, length of urinary catheterisation and birth weight.

Variables	2nd Stage CS group		1st Stage CS group		p-value
	Mean	±SD	Mean	±SD	
Decision delivery interval (hrs)	105.38	±47.37	108.50	±68.79	0.387
Interval between skin incision to delivery of baby (mins)	7.02	±0.62	4.32	±0.91	<0.001
Length of urinary catheterisation (days)	4.82	±3.22	1.28	±1.12	<0.001
Birth weight (gms)	2899.58	±441.35	2833.40	±344.01	0.181

In second stage caesarean sections breech extraction was found statistically significant and 14 times (RR=14.286) higher risk in causing more uterine extensions, PPH, bladder injury, need for blood transfusion, days of

urinary catheterization, need for NICU admissions, need for resuscitation, APGAR <7 as compared to other techniques while cephalic technique had higher chances of developing hyperbilirubinemia in baby. (Table 6)

Table 6: Comparison of fetomaternal complications in second stage caesarean sections in various delivery methods.

Extension of uterine angles→	Yes		No		p-value	Odds Ratio	95% CI for Odds Ratio	
Method of delivery of baby↓	n	%	n	%			Lower	Upper
Patwardhan Technique	3	33.33%	33	64.71%	0.038	0.273	0.065	1.149
Modified Patwardhan Technique	0	0.00%	1	1.96%	0.336	-	-	-
Breech extraction technique	2	22.22%	1	1.96%	0.005	14.286	1.882	108.451
Cephalic	4	44.44%	16	31.37%	0.222	1.750	0.419	7.314
Total	9	100%	51	100%				
Bladder injury→								

Patwardhan Technique	0	0.00%	36	61.02%	0.108	-	-	-
Modified Patwardhan Technique	0	0.00%	1	1.69%	0.448	-	-	-
Breech extraction technique	1	100.00%	2	3.39%	0.000	-	-	-
Cephalic	0	0.00%	20	33.90%	0.238	-	-	-
Total	1	100%	59	100%				
PPH →								
Patwardhan Technique	2	25.00%	34	65.38%	0.015	0.176	0.037	0.845
Modified Patwardhan Technique	0	0.00%	1	1.92%	0.346	-	-	-
Breech extraction technique	2	25.00%	1	1.92%	0.003	17.000	2.320	124.581
Cephalic	4	50.00%	16	30.77%	0.141	2.250	0.512	9.881
Total	8	100%	52	100%				
Pyrexia →								
Patwardhan Technique	3	50.00%	33	61.11%	0.299	0.636	0.118	3.417
Modified Patwardhan Technique	0	0.00%	1	1.85%	0.368	-	-	-
Breech extraction technique	1	16.67%	2	3.70%	0.083	5.200	0.502	53.871
Cephalic	2	33.33%	18	33.33%	0.500	1.000	1.000	1.000
Total	6	100%	54	100%				
Blood transfusion →								
Patwardhan Technique	2	40.00%	34	61.82%	0.170	0.412	0.066	2.552
Modified Patwardhan Technique	0	0.00%	1	1.82%	0.381	-	-	-
Breech extraction technique	1	20.00%	2	3.64%	0.054	6.625	0.660	66.452
Cephalic	2	40.00%	18	32.73%	0.371	1.370	0.211	8.889
Total	5	100%	55	100%				
Features of obstructed labor (intraoperative) →								
Patwardhan Technique	11	64.71%	25	58.14%	0.320	1.320	0.413	4.224
Modified Patwardhan Technique	1	5.88%	0	0.00%	0.054	-	-	-
Breech extraction technique	2	11.76%	1	2.33%	0.065	5.600	0.600	52.270
Cephalic	3	17.65%	17	39.53%	0.053	0.328	0.085	1.263
Total	17	100%	43	100%				
NICU Admission →								
Patwardhan Technique	5	55.56%	31	60.78%	0.384	0.806	0.193	3.364
Modified Patwardhan Technique	0	0.00%	1	1.96%	0.336	-	-	-
Breech extraction technique	1	11.11%	2	3.92%	0.181	3.063	0.277	33.904
Cephalic	3	33.33%	17	33.33%	0.500	1.000	1.000	1.000
Total	9	100%	51	100%				
Need for resuscitation →								
Patwardhan Technique	6	60.00%	30	60.00%	0.500	1.000	1.000	1.000
Modified Patwardhan Technique	0	0.00%	1	2.00%	0.326	-	-	-
Breech extraction technique	1	10.00%	2	4.00%	0.213	2.667	0.237	29.959
Cephalic	3	30.00%	17	34.00%	0.403	0.832	0.191	3.627
Total	10	100%	50	100%				
Apgar <7 →								
Patwardhan Technique	5	55.56%	31	60.78%	0.384	0.806	0.193	3.364
Modified Patwardhan Technique	0	0.00%	1	1.96%	0.336	-	-	-
Breech extraction technique	1	11.11%	2	3.92%	0.181	3.063	0.277	33.904
Cephalic	3	33.33%	17	33.33%	0.500	1.000	1.000	1.000
Total	9	100%	51	100%				
Hyperbilirubinemia								
Patwardhan Technique	0	0.00%	36	61.02%	0.108	-	-	-

Modified Patwardhan Technique	0	0.00%	1	1.69%	0.448	-	-	-
Breech extraction technique	0	0.00%	3	5.08%	0.409	-	-	-
Cephalic	1	100.00%	19	32.20%	0.077	-	-	-
Total	1	100%	59	100%				

In second stage caesarean sections, higher surgical time (hrs) caused higher mean i.e. 1.75 ± 0.83 of developing extension of uterine angles, bladder injury, PPH, pyrexia, significant impact on length of urinary catheterisation, need for blood transfusion, need for NICU admissions. Features showing obstructed labour took higher surgical

time (hrs) with mean of 1.62 ± 0.69 . Higher surgical time (hrs) had negative impact on need for resuscitation of baby and developing hyperbilirubinemia in baby with mean of 1.48 ± 0.57 . Higher surgical time (hrs) had slightly higher mean i.e. 1.47 ± 0.65 of having Apgar < 7 in baby. (Table 7)

Table 7: Mean surgical time vs risk of fetomaternal complications in second stage caesarean sections.

FETOMATERNAL COMPLICATION	Surgical time (hrs)		p-value
	Mean	±SD	
Extension of uterine angles			
Yes	1.75	±0.83	0.114
No	1.42	±0.5	
Bladder injury			
Yes	3.00	±0	0.006
No	1.45	±0.54	
PPH			
Yes	2.00	±0.76	0.004
No	1.39	±0.49	
Pyrexia			
Yes	1.50	±0.84	0.905
No	1.47	±0.54	
Features of obstructed labor			
Yes	1.62	±0.69	0.219
No	1.42	±0.51	
Blood transfusion			
Yes	1.80	±0.84	0.181
No	1.44	±0.54	
NICU admission			
Yes	1.47	±0.65	0.995
No	1.47	±0.56	
Need for resuscitation			
Yes	1.43	±0.64	0.771
No	1.48	±0.56	
APGAR<7			
Yes	1.47	±0.65	0.995
No	1.47	±0.56	
Hyperbilirubinemia			
Yes	1.00	±0	0.405
No	1.48	±0.57	

DISCUSSION

Human labour is a difficult process, and the cephalo-pelvic conflict consequent upon trying to deliver a large head through a small pelvis may lead to maternal and fetal morbidity and mortality. Caesarean delivery (CD) can be performed before or during the first or second stage of labor. CD performed in the second stage is a more challenging surgical procedure than in the first stage or before labor.^[7-9] When performed in the second stage of labor, it is known that CD carries higher risks of maternal and fetal complications, including maternal intraoperative trauma and hemorrhage, prolonged

operation time, a neonatal 5-min APGAR score < 3 or < 7, neonatal intensive care unit (NICU) admission, and other intraoperative complications.^[4,7-12]

Caesarean section (CS) performed at second stage of labor in previous pregnancy carries higher risk for preterm delivery in the subsequent pregnancy as compared to caesarean section in the first stage of labor.^[12] CS has shown to be effective in reducing both maternal and fetal morbidity and mortality significantly if done with due care and under proper indications.

Rates of caesarean section are rising, however, the rates for various indications vary widely. Currently the major indications are repeat caesarean section, dystocia, breech presentation and fetal distress.^[13] The present work was undertaken to study and compare the Maternal and Fetal outcomes in second stage caesarean vs first stage caesarean sections.

In the present study the most common age group for both first stage and second stage caesareans was between 21 years to 30 years out of which 45% women had second stage caesareans between 26 years to 30 years compared to 55% women between 21 years to 25 years of age in first stage caesarean sections. The mean age of presentation was 25.98 ± 3.5 in second stage caesarean which was comparable to studies done by Lurie *et al*^[14] and Ibrahim *et al*^[15] where mean age was 27.9 ± 4.3 and 27.2 ± 3.1 respectively and in first stage caesarean mean age was 24.83 ± 3.75 comparable to studies done by Lurie *et al*^[14] and Ibrahim *et al*^[15] where age was 28.3 ± 4.9 and 26.5 ± 5.2 respectively. Maximum (51.67% and 61.67%) of women underwent second and first stage caesarean had completed their secondary education respectively comparable to Ibrahim *et al*^[15] where 77% women had completed their secondary education. 75% women were primigravida and 25% women were multigravida who underwent second stage caesarean section whereas 81.67% were primigravida and 18.33% were multigravida among women who underwent first stage caesarean section which is comparable to study done by Ibrahim *et al*^[15] where 68.5% women were primi and 27% were multi in second stage caesarean but slightly different in comparison with first stage caesarean where 49.5% were primi and 31.75% were multigravida respectively. Multigravida had 1.2 times greater risk of having second stage caesarean as compared to first stage caesarean sections according to present study.

Most common indications for second stage caesarean were arrest of descent of head (73.33%), fetal distress (23.33%) and CPD (3.33%) while for first stage caesarean were meconium stained liquor with fetal distress (88.33%), failed induction (8.33%) and primi breech (3.33%) which was similar to study done by Lurie *et al*^[15] and Dahiya *et al*^[16] Contrary to this, study by Goswami KD *et al*^[17] NPOL with fetal distress was the most common indication (38%) followed by deflexed head (16%) and DTA (14%).

In this study 45% of labour landing into second stage caesarean were induced and augmented, 33.33% were left spontaneous and 21.67% were only augmented as compared to first stage caesarean section where 76.67% of labour were induced and augmented, 18.33% were left spontaneous and 5% were only augmented. This was similar to study done by Samal *et al*^[18] which also showed that second stage caesarean were more in induced and augmented labour.

Patwardhan technique was the most common method of delivery in second stage caesarean section (60%) followed by cephalic (33%), breech extraction (6%) and only 1.67% by modified Patwardhan technique as compared to first stage caesarean sections where 85% of women delivered by cephalic technique, 11.67% by breech extraction, 3.33% by Patwardhan technique and none by modified Patwardhan technique. Patwardhan technique, a modification of 'pull' method was considered best in delivering baby in second stage caesarean causing less maternal complications which was similar to study done by Kumaresan *et al*^[19]

All maternal complications were 1.2 to 2 times higher in second stage caesarean as compared to first stage caesarean section and approximately equal in primi and multi of both stage caesarean section similar to other studies; Samal *et al*^[18], Ibrahim *et al*^[15] On the contrary study done by Lurie *et al*^[14] showed no increased risk for wound infection, postoperative fever or relaparotomy, urinary bladder injury between second stage and first stage caesarean as it was a retrospective study so there could be bias and error in the completion of medical records and the study population was also well matched and homogenous and vast in number in their study.

In present study second stage caesarean had 1.5 to 2 times more risk of neonatal complications as compared to first stage caesarean. NICU Admission, need for resuscitation and Apgar <7 were found to be high in second stage caesarean group over first stage caesarean group. Fetal acidemia, cephalhaematoma, ICH, lacerations on face of neonate, facial nerve palsies and subaponeurotic haemorrhage were seen in none of neonates in any stage of caesarean. Neonatal complications were more in primi in second stage caesarean and equal in primi and multi in first stage caesarean sections. In study done by Vashi *et al*^[20] most common neonatal complication was NICU admission.

In present study comparison was also done between method of delivery of baby and its impact on maternal and neonatal complications in second stage caesarean section. The study showed that deeply impacted head delivered cephalic developed more extension of uterine angles, more PPH, same percentage of blood transfusion as Patwardhan technique and developed more hyperbilirubinemia in neonates.

Breech extraction technique showed more bladder injury and prolonged urinary catheterization. Patwardhan technique showed more pyrexia, required more resuscitation, had low APGAR and required more NICU admissions.

Overall in this study breech extraction technique had greater risk of maternal and neonatal complications. Patwardhan technique was most commonly used method of delivery with minimal maternal complications similar to study done by Kumaresan *et al*^[19] in 2018 but on

contrary neonatal complications had not much improvement in this study since most patients were unbooked, some had GCA in baby and had prolonged labor but in longer outcome neonatal complications were minimal. Then comparison was also done between surgical time and maternal and neonatal complications in second stage caesarean and it was found that more the surgical time taken more were the maternal complications such as more extension of uterine angles, more PPH, Pyrexia, bladder injury, prolonged catheterization, more obstructed labour and more blood transfusion but on contrary had no or minimal impact on neonatal complications since in this study any trial of instrumental delivery was excluded.

CONCLUSION

Caesarean sections done in second stage of labour after full dilatation of cervix have high chances of fetomaternal complications as compared to first stage caesarean sections. In the present study as most of the second stage caesarean sections were done in the emergency hours by the residents, leading to more complications hence better expertise, experience, skilful judgement and selective use of instrument assisted deliveries can reduce the number of second stage caesarean sections. Efficient staff combined with minimum delay between labor room and OTs can reduce the fetomaternal complications of second stage in comparison to first stage in a positive manner and reduction in complications can be seen.

Conflict of Interest: None to declare.

Source of funding: Nil©

REFERENCES

- Angolile CM, Max BL, Mushemba J, Mashauri HL. Global increased cesarean section rates and public health implications: A call to action. *Health Sci Rep*, 2023; 6(5): e1274.
- Gurung P, Malla S, Lama S, Malla A, Singh A. Caesarean Section During Second Stage of Labor in a Tertiary Centre. *J Nepal Health Res Counc*, 2017; 15(2): 178-81.
- Jayaram J, Mahendra G, Vijayalakshmi S. Fetomaternal Outcome in Cesarean Sections Done in Second Stage of Labor. *Indian J Obstet Gynecol Res*, 2016; 3(1): 51-54.
- Vousden N, Cargill Z, Briley A, Tydeman G, Shennan AH. Caesarean section at full dilatation: incidence, impact and current management. *Obstet Gynaecol*, 2014; 16(3): 199-205.
- Barclay L. Longer labor okay to avoid cesarean, new guidelines say. *Medscape Medical News from WebMD*, 2014.
- Caughy AB, Cahill AG, Guise JM. Safe prevention of the primary cesarean delivery. *Am J Obstet Gynecol*, 2014; 210(3): 179-93.
- Sucak A, Celen S, Akbaba E, Soysal S, Moraloglu O, Danisman N, et al. Comparison of nulliparas undergoing caesarean section in first and second stage of labor: a prospective study in a tertiary teaching hospital. *Obstet Gynecol Int*, 2011; 2: 986-95.
- Vitner D, Bleicher I, Levy E, Sloma R, Kadour-Peero E, Bart Y, et al. Differences in outcomes between cesarean section in the second versus the first stages of labor. *J Matern Fetal Neonatal Med*, 2019; 32(15): 2539-42.
- Lipschuetz M, Cohen SM, Israel A, Baron J, Porat S, Valsky DV, et al. Sonographic large fetal head circumference and risk of cesarean delivery. *Am J Obstet Gynecol*, 2018; 218(3): 339 e1-e7.
- Asicioglu O, Gungorduk K, Yildirim G, Asicioglu BB, Gungorduk OC, Ark C, et al. Second- stage vs first stage caesarean delivery: Comparison of maternal and perinatal outcomes. *J Obstet Gynecol*, 2014; 34(7): 598-604.
- Pergialiotis V, Vlachos DG, Rodolakis A, Haidopoulos D, Thomakos N, Vlachos GD et al. First versus second stage C/S maternal and neonatal morbidity: a systematic review and meta-analysis. *Eur J Obstet Gynecol Reprod Biol*, 2014; 175: 15-24.
- Sapir A, Friedrich L, Gat R, Erez O. Cesarean section in the second stage of labor is associated with early-term and late preterm birth in subsequent pregnancies. *J Matern Fetal Neonatal Med*, 2023; 36(1): 2175658.
- Angolile CM, Max BL, Mushemba J, Mashauri HL. Global increased cesarean section rates and public health implications: A call to action. *Health Sci Rep*, 2023; 6(5): e1274.
- Lurie S, Raz N, Boaz M, Sadan O, Golan A. Comparison of maternal outcomes from primary caesarean section during the second compared with first stage of labor by indication for the operation. *Eur J of Obstet Gynecol*, 2014; 182: 43-7.
- Jaafar B, Jaafar R, Mohammad Y, Alawad A, Handady S. Maternal and perinatal outcomes among women underwent second stage versus first stage caesarean delivery at Ibrahim Malik Hospital in Sudan. *World J Gynecol Women's Health*, 2018; 1(3): 1-4.
- Dahiya P, Agarwal S, Najam R. Retrospective analysis of second stage of cesarean section and pregnancy outcomes: an observational study. *J South Asian Feder Obst Gynae*, 2022; 14(1): 54-58.
- Goswami KD, Parmar MM, Kunjadiya AN. Study of fetomaternal outcome in second stage caesarean section. *Int J Reprod Contracep Obstet Gynecol*, 2019; 8(6): 2169-2171.
- Rupal S, Pallavee P. Fetomaternal outcome of nulliparous women undergoing caesarean section in first and second stage of labor: A prospective study in a tertiary care centre of Puducherry. *Int J Obstet Gynecol*, 2019; 3(5): 166-9.
- Kumaresan S, Loganathan M. Rising rates of second stage caesarean section and its impact on maternal

- outcome. *Int J Reprod Contracept Obstet Gynecol*, 2018; 7(7): 2681-5.
20. Vashi CA, Vijay N, Bhalerao A, Shetty A. Obstetrics Outcomes in Women Undergoing Second-Stage Cesarean Section: A Cross-Sectional Study. *Cureus*, 2023; 15(6): e39911.