Original Research Article

A Cross-Sectional Study ~~For~~for ~~The~~the Impact ~~Of~~of Primary Caesarean Section ~~On~~on Future Pregnancy Outcome ~~At~~at Rural Based Tertiary Care Centre, Gujarat, India~~.~~

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ABSTRACT

Aim: To investigate the maternal and ~~fetal~~foetal outcomes of caesarean, including the prevalence of adhesions in secondary CS & the comparison of emergency versus elective procedures.

Study design: Retrospective cross-sectional study

Place: Shree Krishna Hospital, Karamsad, Anand, Gujarat.

Duration of Study: March 2023 to December 2023

Methodology: This study analysed data from 811 patients who underwent caesarean delivery, of which 501 were caesarean sections. We examined indications, operative risk factors, intraoperative findings, postoperative management, complications, and neonatal outcomes. Data were compared between primary and secondary caesarean sections, as well as elective and emergency caesarean sections, to identify significant differences in maternal and neonatal outcomes. Statistical analysis was performed to evaluate the findings. Detailed data were collected using Epi Info 7.2.5.0.

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Results: Of 811 deliveries, 61.77% were caesarean sections, with 43.71% being secondary. While primary and secondary CS did not differ significantly in ICU admission, PCV, prolonged antibiotics, or total hospital stay, secondary sections were associated with prolonged catheterization. Multiple previous CS increased the incidence of organ adhesions & scar dehiscence. Obesity was linked to denser adhesions & poorer fetal-maternal outcomes. Emergency CSs exhibited significantly higher rates of ICU admission, PCV requirement, antibiotic use, and longer hospital stays compared to elective procedures. Of 501 new-borns, 35.92% required NICU admission, with a higher rate after emergency CS. Emergency CS was also associated with increased fetal complications such as RDS, TTN, birth asphyxia, sepsis, and antibiotic use compared to elective procedures. Primary sections also showed more fetal complications than secondary CS.

Conclusion: Secondary CS posed significant maternal challenges, while ~~fetal~~foetal outcomes did not differ significantly between primary and secondary CS. The risk of adhesions increased with subsequent caesarean sections. Emergency CS was associated with higher rates of maternal & ~~fetal~~foetal complications.

Key ~~words :~~words: *Caesarean; Adhesions; Secondary caesarean; Scar dehiscence; Caesarean morbidity*

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INTRODUCTION

One of the most frequent procedures performed worldwide, in any department of obstetrics and gynaecology department is a caesarean section. This becomes more complicated in cases of high-risk pregnancy and its rate is increasing day by day**.** Once a CS, always a CS, is questionable however it is being followed by different set ups due to various reasons. Caesarean section is a surgical technique of delivery that frequently saves the life of both the mother and the baby. According to WHO, CS rate in the world is continuously rising, now accounting for more than 1 in 5 (21%) of all childbirths and these rates are projected to continue increasing over the next decade (1). In India, the prevalence of C-sections was 8.5% in NFHS-3; however, data from NFHS-4 and NFHS-5 indicate an increased rate of 17.2% and 21.5%, respectively (2). Hence, over the past 15 years, there has been a rise of about three times. Although many women, particularly in the Western world, only have one or two children and there are many nations and societies where larger families are the norm and effective contraception is less readily available. Recent data from the World Health Organization (WHO) on the prevalence of caesarean sections reveal that caesarean sections have drastically grown globally during the past 20 years. This rise is independent of the stage of development of a country. However, there are no signs that the rate of caesarean sections will stop rising. Although the ~~phenomena has~~phenomena have not yet been fully understood, there are at least two main causes for this rise: the rise in primary caesarean sections and the sharp decline in vaginal delivery after caesarean sections (VBAC). An increasing rate of caesarean sections results inevitably in a rise of multiple repeat caesarean deliveries. It is known that multiple caesarean sections are associated with short- and long-term risks for both the mother and the baby. There are several significant maternal complications such as Adhesions, Obliterated Uterovesical fold, thinned out lower segment scar dehiscence, Caesarean hysterectomy, Broad ligament hematomas, visceral injury, uterine rupture, abnormal placentation, hysterectomy, bleeding and transfusions, etc, most of which increases with an increasing number of repeated caesarean sections apart from maternal complications There are also neonatal risks; babies born via multiple repeat caesarean section are more likely to experience breathing difficulties and to require admission to neonatal intensive care. All these complications mentioned are associated with increase in rate of caesarean section is significant and it increases the morbidity and mortality of both mother and the newborn. Therefore, we aim to assess mother and

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foetal outcomes and contrast the results of primary and secondary caesarean sections as the rate of these procedures rises (3-6).

OBJECTIVES

To study the feto-maternal outcomes in patients undergoing caesarean section (both primary and secondary), including the prevalence of adhesions among women undergoing secondary caesarean section, and comparing the outcomes of emergency caesarean sections versus elective caesarean sections.

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Materials and Methods

A cross-sectional study was conducted in the department of Obstetrics and Gynaecology from March 2023 to December 2023, all physical and EHR data of patients including OT note, Discharge summary, labour room record registers of the department of Obstetrics and Gynaecology, Pramukh Swami Medical College, tertiary care centre in Anand, Gujarat. For all caesarean sections, including primary and secondary caesarean sections, detailed demographic and clinical information—such as indications, operative risk factors, intraoperative findings, and maternal and neonatal outcomes was recorded in the Case Record Form (CRF) using Epi Info 7.2.5.0.

Descriptive statistics [mean (SD), frequency (%)] were used to depict the baseline characteristics of the study population. Pearson chi squared test / Fisher's exact were used to find association between categorial variables.

The analysis was performed using STATA version 14.2.A p-value of less than 0.05 was considered significant.

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Result and Discussion

In our study period of 10 months, with 811 deliveries analysed, our hospital's caesarean section (CS) rate stands at a striking 61.77%. Out of these, 310 deliveries were normal vaginal deliveries, while 501 were caesarean sections. We found that out of the 501 Caesarean sections, 282 were categorized as primary CS, whereas 219 were classified as secondary CS. This reveals that secondary Caesarean sections constituted about 43.71% of all Caesarean deliveries. This high rate may be attributed to our status as a tertiary care centre and medical college, leading to a significant influx of referrals, accounting for approximately 37% of our patient population and in our institution we have implemented Robson's classification and VBAC but still the rate of caesarean section is high because the referrals often present with complex obstetric conditions, necessitating surgical

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intervention and Indications for CS varied in different patients which includes ~~fetal~~foetal distress, cephalopelvic disproportion, and previous caesarean delivery.

To understand the impact of surgery on various maternal and fetal parameters, we conducted a comparative analysis between primary caesarean sections and secondary caesarean sections, where ICU admission rates between primary and secondary CS, which showed 12% and 9% admission rates in primary and secondary CS respectively. However, this difference was not statistically significant, owing to ICU admission criteria related to complications like eclampsia, severe preeclampsia, severe anemia, AKI, multi-organ failure, and peri-partum cardiomyopathy. We then assessed intraoperative or postoperative packed cell volume (PCV) transfusion requirements, and noted that the requirements were 21% in primary CS and 18% in secondary CS. This substantial PCV requirement may be attributed to factors such as patient's lack of antenatal care which resulted in anemia, and referrals with conditions like placenta previa, placenta accreta spectrum, abruptio placenta, and uterine rupture necessitating massive blood transfusions.

Additionally, we compared additional antibiotic requirements post-CS between primary and secondary CS, finding similar needs in both groups which indicated dependency on other factors. Furthermore, we analysed postoperative catheterization duration, revealing a statistically significant difference. While 68% of primary CS patients had their catheters removed within 48 hours and 38% of secondary CS patients required catheterization for 2-5 days. This discrepancy was may be due to bladder adherence to the uterus in secondary CS, necessitating postoperative bladder rest through catheterization. Notably, 17 secondary CS patients required catheterization for more than 5 days. Four of which experienced intraoperative bladder rupture, requiring extended catheterization for up to 21 days.

In our study, 98.50% of cases undergoing primary caesarean section showed no adhesions, while 1.5% exhibited adhesions. For those with one previous CS, 73.90% displayed no adhesions, whereas adhesions were detected in 26.10% of cases. Regarding individuals with two previous CS, 48.2% were devoid of adhesions while 51.8% manifested adhesions. Comparatively, Mercy et al.'s study reported no adhesions in 97.2% of primary CS cases with adhesions present in 2.8%**.** Similarly, in the context of one previous CS,48% of cases were devoid of adhesions while 52% exhibited adhesions. For those with two previous CS, 35% were adhesion-free while the remaining 65% displayed some form of adhesions (7). Categorization of adhesions into four groups was done into: no adhesion, flimsy, dense, and very dense adhesion. Conversely, Mercy et al. classified adhesions as none, mild, and severe. Additionally, our analysis maintained distinct data distributions for adhesions between the abdominal wall and uterus, unlike Mercy et al., who combined analysis for various adhesion sites (7). In patients with a history of one previous CS in our study, adhesions between the abdominal wall and uterus were reported as follows: flimsy 3.18%, dense 19.11%, and very dense 3.82%. For patients with a history of two previous CS, adhesion rates were: flimsy 7.14%, dense 19.64%, and very dense 25%. Regarding adhesions between the uterus and bladder, our study found that 97.8% of cases in the primary CS group had no adhesion. In patients with one previous CS, adhesion rates were: no

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adhesion 63%, flimsy adhesion 2.55%, dense adhesion 26.11%, and very dense adhesion 8.28%. In patients with two previous CS, rates were: no adhesion 37.5%, flimsy adhesion 3.57%, dense adhesion 25%, and very dense adhesion 33.93%. In our study, data from patients with a history of three previous caesarean sections were also collected, comprising a small sample size of six patients. Among these four patients exhibited adhesions while two patients had no adhesions. However, due to the limited sample size, the findings from this subgroup were not applicable to the general population and thus should be interpreted with caution. According to Ghazala et al. study dense adhesion were found in 22% in previous 2 CS, 33% in previous 3 CS and 39% in previous 4 CS (8).

Although adhesions are typically not expected in primary caesarean sections, our study revealed an approximate 2% incidence of adhesions. This occurrence could be attributed to various factors, including past abdominal surgeries, pelvic inflammatory disease, and other infections. These predisposing factors may contribute to the formation of adhesions despite the absence of prior uterine surgeries. The presence of adhesions during caesarean section can lead to several disadvantages, including prolonged operation time, increased surgical difficulty, elevated blood loss, heightened risk of bladder or bowel injury, and potential for infection.

In our study, scar thinning or dehiscence, characterized by lower uterine segment thickness <2 mm, was noted in 25% of patients with a history of one previous caesarean section (CS) and 35% of those with two previous CS. This contrasts significantly with the findings reported by Mohamad et al., where the incidence was 4.6% in secondary CS. The notable difference can be attributed to the tertiary care status of our hospital, which receives a high volume of referrals, often from patients who have undergone a trial of labour or have existing complications, potentially predisposing them to scar thinning or dehiscence (9).

In our study, 399 cases were emergency CS (80%) and 102 were elective CS (20%). Since our institute is a tertiary care centre, all high-risk patients are referred here for multidisciplinary consultation, combined care, ICU availability, and an onsite blood bank. Consequently, our emergency CS rate is notably high. We compared maternal intraoperative and postoperative complications between emergency CS and elective CS. Scar dehiscence rates were 29% in emergency CS and 24% in elective CS, which was statistically insignificant. This suggests that scar dehiscence is influenced by other factors. In emergency CS, 12% required ICU admission, while only 4% of elective CS cases needed ICU care. That suggests ICU requirement increases 3 times in emergency CS. This indicates that thorough preoperative monitoring and investigations could significantly reduce ICU admissions. Similarly, PCV requirement was 22% in emergency CS and 11% in elective CS and that suggests double requirement of PCV in emergency CS. Thus, adequate antenatal care visits and investigations could decrease anemia and PCV requirements. When comparing days of catheterization between CS types, no statistically significant difference was found, as it is more dependent on factors like bladder-uterus adhesions and bladder injury. In emergency CS, 17% required antibiotic therapy upon admission due to previous labour trials at peripheral centres, multiple PV examinations, and poor hygiene maintenance. Prolonged hospitalization was significantly

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associated with emergency CS, with over 13% of patients requiring more than 9 days of hospital stay, compared to only 2% in elective CS cases.

within this cohort, 296 neonates did not necessitate admission to the Neonatal Intensive Care Unit (NICU), while 180 infants necessitated NICU care. Among the latter, 34 neonates required intubation, 82 were managed with Continuous Positive Airway Pressure (CPAP), 30 were placed under an oxygen hood, and 34 were simply observed under room air conditions. Hence, the NICU requirement rate was calculated at 35.92%. Comparing our findings to existing literature, Heidi Al-Wassia et al. reported a NICU admission rate of merely 4.1% (10), while Mark A. Clapp et al. observed a slightly higher rate at 5.6% (11). Among the 180 neonates requiring NICU care in our study, 91 were diagnosed with respiratory distress syndrome (RDS) constituting 50% of NICU admissions. Whereas 22 cases (13%) were identified as Transient Tachypnoea of the Newborn (TTN), and 24 cases (13.5%) were attributed to birth asphyxia.

In our comparative analysis of fetal outcomes and complications between emergency and elective caesarean sections (CS), a notable disparity emerged in the requirement for Neonatal Intensive Care Unit (NICU) admission. Specifically, we observed that 45% of infants delivered via emergency CS necessitated NICU care, contrasting starkly with the 15% incidence among those from elective CS procedures. This discrepancy underscores the meticulous micro-planning undertaken to optimize maternal and fetal well-being in elective CS scenarios. Furthermore, our investigation into the distribution of ventilation modalities revealed significant differences between emergency and elective CS deliveries. Notably, the utilization of invasive measures such as intubation and Continuous Positive Airway Pressure (CPAP) was markedly higher in emergency CS, accounting for 29% of cases, compared to a mere 6% in elective CS, a disparity deemed statistically significant. Expanding our analysis to fetal complications, we observed a strikingly lower incidence in elective CS compared to emergency CS. For instance, the overwhelming majority of cases of birth asphyxia were associated with emergency CS, with only one reported case in elective CS. Similarly, the incidence of Respiratory Distress Syndrome (RDS) was predominantly linked to emergency CS, constituting 97% of cases, with only three cases observed in elective CS. Likewise, Transient Tachypnoea of the Newborn (TTN) was predominantly encountered in emergency CS, representing 82% of cases while elective CS exhibited a significantly lower incidence at 18%. Moreover, antibiotic requirements were notably higher in emergency CS, with 13% of cases necessitating antibiotics, compared to 5% in elective CS. These findings collectively underscore the critical importance of comprehensive risk assessment and meticulous planning in optimizing ~~fetal~~foetal outcomes, particularly in emergency CS scenarios.

In our analysis we have a robust dataset comprising of 501 patients, it is a substantial sample size of our study. Comparative analysis between primary and secondary caesarean section with these multiple parameters were thoroughly assessed. Our study is a retrospective analysis based on existing records, which imposes limitations and precluded the execution of a comprehensive longitudinal study that could have offered more nuanced insights over time. Conversely, a prospective longitudinal design could provide more detailed data. Our analysis reveals that secondary caesarean sections are associated with an increased incidence of maternal complications. In conclusion,

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addressing ways to reduce the rate of primary caesarean sections could potentially lead to a reduction in the rate of secondary caesarean sections, can't it!

Table 1 : Maternal outcome in Primary CS vs Secondary CS

Maternal complication		Primary CS N = 282	Secondary CS N = 219	P-value
Requirement of ICU admission	No	248(87.94%)	200(91.32%)	0.222 Not significant
	Yes	34(12.06%)	19(8.68%)	
Intraoperative PCV requirement	No	221(78.37%)	179(81.74%)	0.352 Not significant
	Yes	61(21.63 %)	40(18.26%)	
Days of catheterization	less than 24 hours	106(37.59%)	42(19.18%)	**<0.001** Significant
	24 to 48 hours	87(30.85%)	77(35.16%)	
	2 to 5 days	81(28.72%)	83(37.90%)	
	more than 5 days	8(2.84%)	17(7.76%)	
Requirement of prolonged additional antibiotics	No	234(82.98%)	190(86.76%)	0.245 Not Significant
	Yes	48(17.02%)	29(13.24%)	

Table 2 : Adhesions of uterus and anterior abdominal wall or bladder with previous type of delivery

Adhesions		Primi-gravida	All NVD	Prev 1 CS	Prev 2 CS	Prev 3 or more CS	Total	p-value
		N=210	N=72	N=157	N=56	N=6	501	
Adhesions between Uterus and anterior abdominal wall	None	208	70	116	27	2	423	**<0.001** Significant
		99.05%	97.22%	73.89%	48.21%	33.33%		
	Flimsy	0	1	5	4	1	11	
		0%	1.39%	3.18%	7.14%	16.67%		
	Dense	2	1	30	11	1	45	
		0.95%	1.39%	19.11%	19.64%	16.67%		
	Very Dense	2	1	30	11	1	45	
		0.95%	1.39%	19.11%	19.64%	16.67%		
Adhesions between Uterus and Bladder	None	207	69	99	21	2	398	**<0.001** Significant
		98.57%	95.83%	63.06%	37.50%	33.33%		
	Flimsy	1	2	4	2	0	9	
		0.48%	2.78%	2.55%	3.57%	0%		
	Dense	2	1	41	14	3	61	

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		0.95%	1.39%	26.11%	25%	50%	
	Very dense	0	0	13	19	1	33
		0%	0%	8.28%	33.93%	16.67%	

Table 3 : Impact of emergency CS on maternal outcome

Maternal complications		Emergency CS	Elective CS	Total	P-value
Scar dehisence	Yes	44 (29.33%)	17 (24.63%)	61 (27.85%)	0.471 Not Significant
	No	106 (70.67%)	52 (75.37%)	158 (72.15%)	
	Grand Total	150	69	219	
ICU admission	No	351 (87.96%)	97 (95.09%)	448 (89.42%)	**0.037** Significant
	Yes	48 (12.04%)	5 (4.91%)	53 (10.58%)	
	Grand Total	399	102	501	
PCV requirement	No	310 (77.69%)	90 (88.23%)	448 (89.42%)	**0.018** Significant
	Yes	89 (22.31%)	12 (11.77%)	53 (10.58%)	
	Grand Total	399	102	501	
Days of catheterization	Less than 24 hours	111 (27.81%)	37 (36.27%)	148 (29.54%)	0.315 Not Significant
	24 to 48 hours	132 (33.08%)	32 (31.37%)	164 (32.73%)	
	2 to 5 days	134 (33.58%)	30 (29.41%)	164 (32.73%)	
	More than 5 days	22 (5.51%)	3 (2.94%)	25 (4.99%)	
	Grand Total	399	102	501	
Additional antibiotic to mother	No	329 (82.45%)	95 (93.13%)	424 (84.63%)	**0.008** Significant
	Yes	70 (17.55%)	7 (6.87%)	77 (15.36%)	
	Grand Total	399	102	501	
Days of hospitalization	3 to 5 days	217 (54.38%)	81 (79.41%)	298 (59.48%)	**<0.001** Significant
	6 to 8	131 (32.83%)	19 (18.62%)	150 (29.94%)	
	9 to 12	38 (9.52%)	1 (0.98%)	39 (7.78%)	
	More than 12 days	13 (3.25%)	1 (0.98%)	14 (2.79%)	
	Grand Total	399	102	501	

Table 4 : Impact of emergency CS on fetal outcome

Mode of ventilation	Emergency CS	Elective CS	Grand Total	P-value
Room air	30 (7.97%)	4 (4%)	34 (7.14%)	**<0.001** Significant
O2 hood	27 (7.18%)	3 (3%)	30 (6.30%)	
CPAP	79 (21.01%)	3 (3%)	82 (17.22%)	

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Intubated	31 (8.24%)	3 (3%)	34 (71.42%)
No requirment	209 (55.58%)	87 (87%)	296 (62.18%)
Grand Total	376	100	476

*DAMA and IUFD neonates are excluded.

CONCLUSION

Secondary caesarean sections had significant maternal problems, while no significant differences were found in ~~fetal~~foetal outcomes between primary and secondary CS. Adhesions increased with subsequent CS procedures. Emergency CSs had more maternal and ~~fetal~~foetal complications.

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