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Vaginal delivery after cesarean section

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Abstract

Background: Vaginal birth after cesarean section (VBAC) is one of the strategies developed to control the rising rate of cesarean sections (CSs). It is a trial of vaginal delivery in selected cases of a previous CS in a well-equipped hospital.

Aim: The study was conducted to assess the safety and success rate of vaginal birth after CS (VBAC) in selected cases of one previous lower segment C/S.

Materials and Methods: The study was conducted at Tikrit Teaching Hospital from October 2023 to March 2024, involving 3771 pregnant women, with 510 being cesarean sections. Data was collected from various sources, including daily morning report presentations, delivery logbooks, and patient files. Exclusion criteria included women with multiple previous cesarean deliveries, known previous uterine incisions or T-incisions, prior uterine rupture, extensive trans fundal uterine surgery, multiple gestations, and those contraindicated for vaginal delivery. Obstetric variables were standardized for accurate data collection and analysis, including malpresentation, dystocia, and obstetric hemorrhage cases. Accurate documentation was also provided to assess the prevalence and management of these critical obstetric emergencies.

Results: The study revealed that 3771 deliveries, 2163 (57.36%) were conducted through vaginal delivery, while 1608 (42.64%) were delivered via Cesarean section.

Regarding VBAC, among the 510 cases involving the first cesarean section, 43.53% resulted in successful VBAC, while 56.47% opted for repeat cesarean section, underscoring the varied preferences and outcomes in subsequent deliveries. Factors associated with successful VBAC were identified, with a significant proportion attributed to the presence of a previous vaginal birth before cesarean section (50.90%), previous VBACs (26.13%), and a higher Bishop Score (22.97%). Additionally, various risk factors for another emergency LSCS were delineated, including advanced maternal age (19.44%), obesity (15.63%), gestational diabetes mellitus (14.24%), pre-existing diabetes (11.46%), and other obstetric complications such as chronic/pregnancy-induced hypertension, preeclampsia/eclampsia, fetal distress, cephalopelvic disproportion, malpresentations, oligohydramnios, prolonged PROM, multiple gestation, cervical dystocia, failure of induction, unfavorable cervix, and cord prolapse. The findings indicate a considerable number of women achieved successful VBAC, a substantial portion opted for repeating cesarean section, indicating varied preferences and outcomes in subsequent deliveries.

Keywords: Cesarean section (CS), Trial of labor, Lower segment cesarean section

1. Introduction

Vaginal birth after cesarean section (VBAC) is one of the strategies developed to control the rising rate of cesarean sections (CSs). It is a trial of vaginal delivery in selected cases of a previous CS in a well-equipped hospital [1]. In 1916, Cragin popularized the dictum, "once a caesarean section, always a caesarean section" [2]. That was the era of the classical CS. In the present era of lower segment caesarean section (LSCS), cesarean-related morbidity and mortality are significantly reduced [3, 4]. The dictum now is "once a caesarean section, always an institutional delivery in a well-equipped hospital". The reasons which led to the reversal of the old dictum are based upon the newer concepts of the assessment of scar integrity, fetal well-being, and improved facilities of emergency CS [5]. In Iraq, the cesarean section (CS) rates underwent notable changes from 2011 to 2018, with distinct patterns observed across different regions. The overall CS rate for Iraq increased by 49.5% during this period. In the Kurdistan Region, the rise was even more substantial, with a 58.5% increase in CS rates and 45.1% for the rest of Iraq [6].

The factors that influence women to choose a VBAC birth over a repeated CS are the feeling women have of having failed for not having given a vaginal birth in their previous pregnancy or the feeling of having missed the experience of a vaginal birth, the experience they had during their previous birth, and the recovery they had from their previous CS [7]. The information they received from their healthcare professional (HCP) and their acquaintances as well as the advantages and disadvantages and the risks and safety of each mode of birth (VBAC or repeated CS) influenced women when making a decision of the mode of birth [8].

Complications in patients undergoing TOLAC can occur; however, appropriately selected patients can benefit from attempting a vaginal delivery in the appropriate setting. When successful, VBAC is associated with a decrease in maternal morbidity and decreased risk of complications in future pregnancies. Patients who have undergone successful VBAC benefit from the avoidance of surgical recovery in the postpartum period. Increase in VBAC deliveries also will serve to decrease the overall cesarean delivery rate. More recently it is recognized that as the number of cesarean sections a patient undergoes increases so does the risk of significant obstetrical complications [10]. These complications include massive postpartum hemorrhage, placenta previa, and related placental disorders. By avoiding multiple cesarean deliveries, patients planning large families may particularly stand to benefit from undergoing vaginal birth after cesarean section [11]. One of the most dramatic features of modern obstetrics is the persistent increase in the cesarean section rate. The rise in CS rate is a major health problem as it increases the risk for mothers and babies as well as of health care compared with normal deliveries. Women with previous cesarean sections constitutes a high risk group in obstetrics, with associated medical and legal implications [5, 6]. The crucial questions are how to reliably predict successful vaginal birth after cesarean section, and how to and quantify the magnitude of the risk of failure that is acceptable to women. Many studies have addressed methods for identifying women at low and determine high risk of failure of an attempt vaginal birth after prior cesarean but none of them have resulted in a validated result. Even those factors found to be associated with successful VBAC vary from center to center [12]. This study will help in filling the gap of success rate of vaginal birth after cesarean section and factors associates. It can also be used as baseline information for future valuable researches to be undergone around the subject of interest

2. Materials and Methods

2.1 Patients

This cross-sectional study was carried out in Tikrit city (Tikrit Teaching Hospital) from 10th of October 2023 to end of March 2024. A total numbers of 3771 pregnant women who attended to the hospital were included in the study, with 510 of these being cesarean sections.

To obtain comprehensive data, information was collected from multiple sources, including daily morning report presentations, delivery logbooks maintained by the labor and delivery unit, and detailed patient files of individuals who underwent cesarean section

2.2 Methods

The classification of obstetric variables was standardized to facilitate accurate data collection and analysis. For instance, the term "malpresentation" encompassed various fetal

presentations, including breech, transverse lie, face, and brow presentation, thereby providing a comprehensive overview of fetal positioning during delivery. Similarly, "dystocia" was defined to include cases of failure to progress, cephalopelvic disproportion, and failed forceps delivery and vacuum extraction, reflecting common challenges encountered during labor and delivery.

The utilization of fetal monitoring in high-risk pregnancies ensured the timely identification of fetal distress or non-reassuring fetal condition, characterized by the presence of repeated late deceleration, persistent fetal bradycardia, or tachycardia. Obstetric hemorrhage cases, including instances of placenta previa and abruptio placentae, were accurately documented to assess the prevalence and management of these critical obstetric emergencies. The category labeled "others" encompassed a diverse range of conditions, such as cord prolapse, malformations, and other miscellaneous obstetric complications, ensuring comprehensive data capture.

3. Results

3.1 Distribution of deliveries during the study duration

Table 4.1 provides the distribution of deliveries during the study duration at Tikrit Teaching Hospital. Of the total 3771 deliveries, 2163 (57.36%) were conducted through vaginal delivery, while 1608 (42.64%) were delivered via Cesarean section.

Table 1: Distribution of deliveries during the study duration in Tikrit Teaching hospital

Delivery mode	Number	%
Vaginal delivery	2163	57.36%
Cesarean section	1608	42.64%
Total	3771	100%

3.2 Distribution of deliveries during the study duration

In Table 4.2, the distribution of previous cesarean sections among the studied women is presented. Of the total 1608 cases, 510 (31.72%) involved the first cesarean section, while 1098 (68.28%) involved multiple previous cesarean sections. This distribution indicates that a significant majority of the studied women had undergone multiple cesarean sections prior to the study period.

Table 2: Distribution of previous cesarean section in the studied women

No. of Cesarean section	No.	%
First Cesarean section	510	31.72%
Previous multiple Cesarean sections	1098	68.28%
Total	1608	100%

3.3 Rate of vaginal delivery after 1st cesarean section

In Table 4.2, the rate of successful vaginal birth after cesarean section (VBAC) is presented alongside the choice of undergoing another cesarean section. Among a total of 510 cases involving the first cesarean section, 222 (43.53%) resulted in successful VBAC, while 288 (56.47%) opted for another cesarean section.

Table 3: Rate of vaginal delivery after 1st cesarean section

Delivery mode	No.	%
VBAC	222	43.53%
Another cesarean section	288	56.47%
Total 1 st cesarean section	510	100%

3.4 Factors were associated with a successful VBAC

In Table 4.4, Among the factors identified, the data reveals that the presence of a previous Vaginal Birth before Cesarean Section (CS) accounted for the majority, with 113(50.90%) of successful VBACs. Additionally, previous VBACs themselves were significant, comprising 58(26.13%) of successful VBACs. Moreover, a higher Bishop Score was noted as another crucial factor, with 51(22.97%) of successful VBACs.

Table 4: Factors were associated with a successful VBAC

Factors were associated with a successful VBAC	No.	%
Previous VB before CS,	113	50.90%
Previous VBAC	58	26.13%
Higher bishop score	51	22.97%
Total	222	100

3.5 Indications for previous cesarean sections and subsequent modes of delivery among pregnant women

Table 4.5 presents the distribution of risk factors associated with another Emergency Lower Segment Cesarean Section (LSCS), represented solely by percentages. Advanced maternal age (≥ 35 years) accounts for 19.44%, obesity (BMI ≥ 30 kg/m²) for 15.63%, gestational diabetes mellitus (GDM) for 14.24%, pre-existing diabetes for 11.46%, chronic/pregnancy-induced hypertension for 6.94%, preeclampsia/eclampsia for 5.44%, fetal distress for 4.75%, cephalopelvic disproportion for 4.05%, malpresentations for 3.36%, oligohydramnios for 3.47%, prolonged PROM for 3.47%, multiple gestation for 3.13%, cervical dystocia for 2.78%, failure of induction for 0.69%, unfavorable cervix for 0.69%, and cord prolapse for 0.35%.

Table 5: Risk Factor of another Emergency LSCS

Risk Factor of another Emergency LSCS	No	%
Advanced age (Age ≥ 35 years)	56	19.44
Obesity (BMI ≥ 30 kg/m ²)	45	15.63
Gestational diabetes mellitus (GDM)	41	14.24
Pre-existing diabetes	33	11.46
Chronic/pregnancy-induced hypertension	20	6.94
Preeclampsia/eclampsia	16	5.44
Fetal distress	14	4.75
Cephalopelvic disproportion	12	4.05
Malpresentations	10	3.36
Oligohydramnios	10	3.47
Prolonged PROM	10	3.47
Multiple gestation	9	3.13
Cervical dystocia	8	2.78
Failure of induction	2	0.69
Unfavorable cervix	2	0.69
Cord prolapse	1	0.35

4. Discussion

In The main findings from the provided tables encompass various aspects of obstetric care and outcomes at Tikrit Teaching Hospital. Firstly, Table 4.1 elucidates the distribution of delivery modes, revealing that 57.36% of deliveries were conducted vaginally, while 42.64% were delivered via Cesarean section. Additionally, Table 4.2 underscores the prevalence of multiple previous cesarean sections among studied women, with 68.28% involving multiple prior cesarean deliveries. Furthermore, Table 4.3 sheds light on the rate of successful vaginal birth after the first cesarean section (VBAC), indicating that 43.53% of cases resulted in successful VBAC, with the remainder opting for repeat cesarean section. Table 4.4 delineates

factors associated with successful VBAC, emphasizing the significance of previous vaginal birth before cesarean section, previous VBACs, and a higher Bishop Score in predicting VBAC success. Lastly, Table 4.5 identifies various risk factors associated with another Emergency Lower Segment Cesarean Section (LSCS), including advanced maternal age, obesity, gestational diabetes mellitus, and pre-existing diabetes, each contributing to different proportions of occurrences. These findings collectively provide valuable insights into delivery mode distributions, VBAC rates, factors influencing VBAC success, and risk factors for emergency LSCS, aiding in the optimization of obstetric care and outcomes for pregnant women at Tikrit Teaching Hospital.

In agreement with our finding, Yosra ^[13] in a study of Cesarean section rates at Al-Batool maternity teaching hospital in Baghdad, found that the total births during the period of her study were 4556 births, 3732 vaginal deliveries and 824 cesarean sections and found Cesarean section rate was found to be 17.94% of total live births, the most frequent indication for cesarean section was malpresentation (24.3%) and Primary cesarean sections contribute to 75% of cases. The rate in a study done in Australia was 35% ^[14]. About 75% of the cesarean section done in this study was primary cesareans. In a study done in Taiwan, the rates ranged between 27.3% and 28.7% for primary cesarean delivery ^[1]. So our work should be aimed towards decreasing this type of cesarean in order to decrease the future repeated cesareans.

Furthermore, Shihab ^[16] in a similar study of found that the VBAC rate was 61.3% in Al-Batool maternity teaching hospital in Baghdad but He was found higher than our finding. Moreover, a study conducted by Landon *et al.* ^[17] found that among women with one prior low-transverse cesarean delivery, the rate of VBAC was approximately 73.6%, which is comparable to the rate observed in the current study. This suggests a consistent trend towards favoring VBAC among women with a history of cesarean delivery. Furthermore, a meta-analysis by Guise *et al.* ^[18] indicated that for carefully selected women, VBAC is associated with lower maternal morbidity and mortality compared to elective repeat cesarean delivery. These findings support the notion that VBAC is a safe and feasible option for many women with prior cesarean deliveries.

Additionally, a study by Cahill *et al.* ^[19] demonstrated that successful VBAC is associated with lower rates of maternal morbidity, including decreased rates of hemorrhage, infection, and surgical complications, compared to repeat cesarean delivery. One such study by Grobman *et al.* ^[20] evaluated the success rates of VBAC among a large cohort of women with one prior cesarean delivery. The study demonstrated that the overall success rate of VBAC was 73.5%, indicating a considerable preference for vaginal delivery among eligible candidates. This finding supports the high proportion of women opting for VBAC observed in the current study. Furthermore, a systematic review by Macones *et al.* ^[21] assessed the maternal and neonatal outcomes associated with VBAC compared to repeat cesarean delivery. The review concluded that VBAC was associated with lower rates of maternal morbidity and comparable rates of neonatal outcomes, reaffirming the safety and efficacy of VBAC as a viable option for women with prior cesarean deliveries. Additionally, a study by Lyndon *et al.* ^[22] in (2017) explored women's preferences and decision-making regarding mode of delivery after cesarean section.

The lower VBAC rate observed at Tikrit Teaching Hospital (43.53%) compared to other studies. Firstly, differences in patient demographics and obstetric characteristics between the hospitals may contribute to variations in VBAC success rates. Additionally, variations in clinical practices and institutional protocols regarding VBAC management may influence VBAC outcomes. Each hospital may have distinct policies regarding VBAC eligibility criteria, TOLAC protocols, and thresholds for proceeding to repeat cesarean section. Differences in labor induction practices, monitoring during labor, and patient counseling regarding VBAC options could also play a role in the observed differences in VBAC rates [23]. The expertise and experience of healthcare providers attending VBAC deliveries are crucial determinants of VBAC success. Variations in the level of experience, training, and adherence to evidence-based guidelines among obstetricians, midwives, and labor ward staff between the hospitals could impact VBAC outcomes. Patient preferences and decision-making regarding VBAC versus repeat cesarean section may also contribute to differences in VBAC rates between hospitals. Factors such as perceived risks, fear of complications, previous birth experiences, and cultural beliefs can influence patient preferences regarding mode of delivery. Variations in patient preferences and decision-making processes may result in differences in VBAC utilization and success rates between hospitals [24].

Increased age decreases the likelihood of VBAC. Women with advanced age were more likely to fail to VBAC, which was also supported by Eden *et al.* [25] Age ≥ 40 years-old also a risk for uterine rupture when women undertook TOLAC. So, younger women, especially those < 35 -years-old, are more likely to have a successful and safe VBAC. Maternal obesity carries the risk for many obstetric complications including macrosomia and increased risk of CS [26]. Both obesity and macrosomia have negative impacts on VBAC success. When comparing cases where obesity occurred at pre-pregnancy or at admission before delivery, the trends are similar. Faucett *et al.* found that women with obesity were more likely to undergo emergency cesarean for an arrest disorder before achieving active labor despite having more clinical interventions to achieve a vaginal birth [27]. A better understanding of the mechanisms by which maternal obesity affects the progression of labor, might help to increase the rates of successful VBAC among this population. Maternal obesity was also associated with a high risk of uterine dehiscence or rupture at term gestation among women with previous CS [28]. Therefore, appropriate weight and weight gain during pregnancy are vital for maternal health.

Gestational and pregestational diabetes are risk factors for VBAC failure. Diabetic women could be at high risk of CS secondary to failed induction, labor arrest, and fetal distress [29]. Furthermore, pregnant women with diabetes are more likely to have increased BMI and weight gain, both of which have a negative influence on VBAC success. Prevent and control diabetes could help to increase the likelihood of VBAC. Additionally, Bangal *et al.* [30] who was also noted that the success rate of VBAC in cases with a previous CS for cephalopelvic disproportion was 85% in the present study, but it was much higher than reported by other workers [31]. It could be because of the over diagnosis of cephalopelvic disproportion in previous pregnancies. In this study, the success of VBAC in cases with a previous CS done for breech presentation was 63.64%. While certain indications may traditionally be associated with increased

risk or complexity, such as multiple gestation or cord prolapse, the observed 100% success rate of VBAC in these cases suggests that VBAC can be a viable option with appropriate patient selection and management [32, 33]. Moreover, the absence of emergency LSCS in these rare indications further supports the safety and effectiveness of VBAC in carefully selected cases. This aligns with the broader literature indicating that successful VBAC is associated with lower rates of maternal morbidity and healthcare costs compared to repeat cesarean delivery [34].

5. Conclusions

1. The study conducted at Tikrit Teaching Hospital revealed that out of 3771 deliveries, 57.36% were conducted via vaginal delivery, while 42.64% were delivered via Cesarean section.
2. Analysis of previous cesarean sections among the studied women indicated that 31.72% involved the first cesarean section, while a significant majority of 68.28% involved multiple previous cesarean sections.
3. Among cases involving the first cesarean section, 43.53% resulted in successful Vaginal Birth After Cesarean (VBAC), while 56.47% opted for another cesarean section, highlighting the variability in subsequent delivery methods.
4. Factors associated with successful VBAC included a previous vaginal birth before cesarean section (50.90%), previous VBACs (26.13%), and a higher Bishop Score (22.97%).
5. Various risk factors associated with another Emergency Lower Segment Cesarean Section (LSCS) were identified, with percentages ranging from 0.35% to 19.44%, encompassing factors such as advanced maternal age, obesity, gestational diabetes mellitus, and obstetric complications like fetal distress, cephalopelvic disproportion, and malpresentations.

6. Conflict of Interest: Not available

7. Financial Support: Not available

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