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Effect of Duration of Second Stage of Labor on Maternal and Neonatal Outcomes A Prospective Study

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Abstract

This prospective descriptive study was conducted in Obstetrics and Gynecology Department, Makkah medical centre Hospital from May 2016 to December 2017. The study included 204 primiparous singleton term pregnant women with vertex presentation. They were classified into two groups according to second stage of labor duration. Group 1 lasted ≤ 1 hour & group 2 lasted more than 1 hour but less than < 2 hours.

Main outcomes measures: *Maternal outcomes were assessed by mode of delivery (spontaneous vaginal delivery, operative vaginal delivery or cesarean section, occurrence of post-partum hemorrhage (PPH), need for blood transfusion, perineal lacerations, vaginal lacerations, cervical lacerations, and extension in the uterine incision during cesarean section). Neonatal outcomes were assessed by 5- minutes Apgar score and admission to the Neonatal Intensive Care Unit (NICU) and need for intubation in delivery room.*

Results: *Rate of the spontaneous vaginal delivery was 82.4% and 56.9% in the first and second hour of the second stage respectively. This decrease is statistically significant. Rate of cesarean section was 15.7% and 39.2% in the first and second hour of the second stage respectively. This increase is also statistically significant. Rate of operative vaginal delivery was only 2.9%. There was an increasing rate of 3rd degree pernieal lacerations from 1.96% during the first hour to 5.88% during the second hour. There was an ocurrance of 4th degree pernieal lacerations in the second hour. The rate of post-partum hemorrhage increased from 3.92% during the first hour to 7.8% in the second hour. Blood transfusion rate increased from 3.92 % during the first hour to 5.88% during the second hour of labor. The incidence of extension of the scar of the uterus increased during the second hour cesarean section. However, this increase was not statistically significant. Regarding neonatal outcomes, there was no significant statistical difference between 5- minute Apgar scores between the first and the second hour. The babies who were admitted to the NICU were 5.89% in the first hour but were 11.76% in the second hour and the occurrence of intubation in delivery room increased in the second hour, but this increase was not statistically significant.*

Conclusions: *There was increased cesarean section rate about two times if the second stage exceeds the first hour in primiparous women. It could be recommended that the attending obstetrician should be alert and ready for this. Because of absence of significant maternal or neonatal morbidities if the second stage enters the second hour in primiparous women, no need to hurry to intervene by cesarean section or instrumental delivery in the presence of reassuring maternal and fetal status.*

Introduction

Labor is defined as uterine contractions that result in progressive dilation and effacement of the cervix by which fetus, placenta and membranes are expelled through the birth canal after 24 weeks of gestation. By following thousands of labors resulting in uncomplicated vaginal deliveries, time limits and progress milestones have been identified that define normal labor. Failure to meet these milestones defines abnormal labor, which suggests an increased risk of an unfavorable outcome. Thus, abnormal labor alerts the obstetrician to consider alternative methods for a successful delivery that minimize risks to both the mother and the infant [1].

Friedman's original research in 1956 defined the following 3 stages of labor: The first stage starts with uterine contractions leading to complete cervical dilation and is divided into latent and active phases. In the latent phase, irregular uterine contractions occur with slow and gradual cervical effacement and dilation. The active phase is demonstrated by an increased rate of cervical dilation and fetal descent. The active phase usually starts at 3-4 cm cervical dilation and is subdivided into the acceleration,

maximum slope, and deceleration phases [2]. The second stage of labor is defined as complete dilation of the cervix to the delivery of the infant. The third stage of labor involves delivery of the placenta but now some called the first two hours after the third stage fourth stage [3].

Both maternal and fetal mortality and morbidity rates increase with abnormal labor. This is probably an effect-effect relationship rather than a cause- effect relationship. Nonetheless, identification of abnormal labor and initiation of appropriate actions to reduce the risks are matters of some urgency [4].

The second stage of labor duration imposes a critical dilemma upon the obstetrician. On one hand, it is believed that a prolonged duration of the second stage is associated with increased maternal and fetal hazards, and frequently leads to physical and mental fatigue of mother, midwife and obstetrician. On the other hand, limiting the duration of the second stage inevitably leads to a higher incidence of vaginal operative deliveries or cesarean sections. Furthermore, the concept of 'normal duration of second stage' has greatly changed in obstetrical history, which has left unclear what upper limit should be considered optimal [5].

It is also reported that prolonged labor can increase the risk of danger in mothers, including perineal laceration, postpartum hemorrhage, and childbed infection. Besides, it also increases the incidence of disease and caesarean section, extension of caesarean incision [6].

Aim of the Work

Evaluation of the short term's effects of second stage of labor duration on maternal and neonatal outcomes in primiparous women at Obstetrics and gynecology Department, Makkah medical centre Hospital.

Patients and methods

Patients:

This prospective descriptive study was conducted from May 2016 until December 2017 at Makkah medical Centre Hospital. Eligible primiparous women were at least 18 years and not more than 35 years with singleton term (37 to 41w weeks) pregnancies and vertex presentation. They were divided into two groups according to the second stage duration. First group those in whom the second stage was one hour. The second group included women in whom the second stage lasted more than one hour but not exceed two hours.

Exclusion criteria:

- Women whom second stage lasted more than 2 hours.
- Multiparity.
- Multiple pregnancies.
- Fetuses with congenital malformation.
- Non-cephalic presentation.
- Cases of maternal diseases such as hypertension and diabetes.

Methods

Complete history was reviewed by researcher
General examination
Local examination was done and the women were followed up till delivery according to delivery room protocol by partogram

1. Fetal heart monitoring.
2. Revision of women's files as antenatal reports, laboratory reports, and ultrasound scan reports when was available.

Short term maternal outcomes measured by mode of delivery (spontaneous vaginal delivery, operative vaginal delivery or CS). Occurrence of post-partum hemorrhage (PPH) need for blood transfusion and perineal lacerations. Women were followed up 2 hours after delivery.

Short term neonatal outcomes were judged by 1- and 5-minutes Apgar scores and admission to the Neonatal Intensive Care Unit (NICU).
Scores 7 and above are generally normal (good), 4 to 6 fairly low, and 3 and below are generally regarded as critically low (bad).
Neonates were examined by neonatologists.

Sample Size:

According to 95% confidence interval, power 80% and incidence of cesarean section among women with second stage <1 h. is 21.7% and risk ratio 10, so sample size = 204 patients (102patients for each group).

Statistical methods
All data were analyzed using SPSS 15.0 for windows (SPSS Inc., Chicago, IL, USA).

Ethical considerations
Informed consents were obtained from each subject before participation in the study. They were informed about the nature and the purpose of the study, they had the right to refuse participation or withdrawn at any time.

Results

This prospective descriptive study was conducted in Obstetrics and Gynecology Department, Makkah medical centre Hospitals from May 2016 to December 2017. The study included 204 nulliparous singleton term pregnant women with vertex presentation. They were classified into two groups according to second stage of labor duration. Group 1 lasted ≤ 1 hour & group 2 lasted more than 1 hour but less than < 2 hours.

Main outcomes measures:
Maternal outcomes were assessed by mode of delivery (spontaneous vaginal delivery, operative vaginal delivery or CS). Occurrence of post-partum hemorrhage (PPH), need for blood transfusion, perineal lacerations, vaginal lacerations, cervical lacerations, and extension in the uterine incision during CS.

Neonatal outcomes were assessed by 5- minutes Apgar score and admission to the Neonatal Intensive Care Unit (NICU) and need for intubation in delivery room.

Rate of the spontaneous vaginal delivery was 82.4% and 56.9% in the first and second hour of the second stage respectively. This decrease was statistically significant. Rate of CS was 15.7% and 39.2% in the first and second hour of the second stage respectively. This increase was also statistically significant. Rate of operative vaginal delivery was only 2.9%.

There was an increasing rate of 3rd degree pernieal lacerations from 1.96% during the first hour to 5.88% during the second hour. The ocurrance of 4th degree pernieal lacerations in the second hour also increased. The rate of post-partum hemorrhage increased from 3.92% during the first hour to 7.8% in the second hour. The blood transfusion rate increased from 3.92 % during the first hour to 5.88% during the second hour of labor. The incidence of extension of the scar of the uterus increased during the second hour CS. However, this increase was not statistically significant.

Regarding neonatal outcomes; there was no significant statistical difference between 5- minute Apgar scores between the first and the second hour.

The babies who were admitted to the NICU were 5.89% in the first hour but were 11.76% in the second hour. The incidence of intubation in delivery room increased in the second hour but this increase was not statistically significant.

Table 1: Maternal characteristics.

Maternal characteristics	Mean±SD
Age (years) (Mean±SD) Mother weight. o Pre-Pregnant(Mean±SD) o at delivery (Mean±SD) Mother height. Mean±SD Mother BMI at labor. (kg/m2) Mean ±SD Gestational age at labor: Mean ± SD	24.92± 3.21 59.55± 4.15 77.16±5.8 164.85±3.77 28.44±2.13 38.61±1.03

Table 2: Characteristics of first stage of labor.

Characteristics	Cases n (%)
Type of labor • Spontaneous • Induced Duration of 1st stage of labor Mean±SD Use of oxytocin in labor augmentation.	 142(69.61%) 62(30.39%) 11.74±2.67 184 (90.2%)

Table 3: Maternal outcomes.

Characteristics	Cases n (%)
Mode of delivery: • Vaginal delivery. • Operative vaginal (Vacuum). • CS*. Maternal complications: Pernieal Lacerations o 3rd degree o 4th degree Vaginal lacerations Cervical lacerations Postpartum hemorrhage. • Atonic. • Traumatic. Blood transfusion Uterine incision extension during CS delivery	 142(69.61%) 6 (2.94%) 56 (27.45%) 8 (3.92%) 2 (0.98%) 2(1.96%) 2(1.96%) 6 (2.94%) 6(2.94%) 10(4.90%) 2(0.98%)
CS*: Caesarean section.	

Table 4: Neonatal outcomes.

Neonatal outcomes	Measure n (%)
Weight of neonates: Mean±SD	3.43±0.14
Complications of the neonates: Fairly bad 5-minute APGAR score NICU* admission.	18(8.82%)
Intubation in delivery room.	18(8.82%)
Neonatal Sepsis.	2(0.98%)
Brachial plexus injury.	2(0.98%)
Composite'	2(0.98%)
	10(4.90%)
* NICU: neonatal intensive care unit. Composite': any neonate had more than one of NICU admission, sepsis, and intubation in delivery room, brachial plexus injury and admitted in NICU more than 48 hours.	

Varaiable	Duration of second stage of labor		
	Group A (n=102)≤1h (Mean ± SD)	Group B (n=102) >1h (Mean ± SD)	Signficant difference
Age(years): Mean±SD	24.06 ± 2.77	24.39 ± 4.55	NS
Mother weight. (Mean ±SD)			
• Prepregnant	66.08+4.3821	58.490+3.6407	NS
• At delivery	76.706+6.322	77.608+5.2462	NS
Mother height. (Mean ± SD)	167.04+2.71	162.67+3.42	NS
Mother (BMI) at delivery. (kg/m2) Mean ± SD	27.43±1.844	29.439±1.93	NS
Gestational age Mean ± SD	38.647±0.956	38.569±1.1001	NS
(S) Statistical Significance. (NS) not statistically significant. (BMI) body mass index.			

Table 5: Comparison between maternal characteristics in group A and group B.

Table 6: Comparison between maternal outcomes in group A and group B.

	Duration of second stage of labor		
	Group A (n=102)≤1h N (%)	Group B (n=102)>1h N (%)	Signficant difference

Mode of delivery: Vaginal delivery. Operative vaginal delivery. CS. Maternal complications: Pernieal Lacerations • 3rd degree • 4th degree Vaginal lacerations Cervical lacerations Postpartum hemorrhage. • Atonic. • Traumatic. Blood transfusion Uterine incision extension during Cs	 84 (82.35%) 2 (1.96%) 16(15.69%) 2(1.96%) 0 2 (1.96%) 2 (1.96%) 2 (1.96%) 2(1.96%) 4(3.92%) 0	 58(56.86%) 4(3.92%) 40(39.2%) 6(5.88%) 2 (1.96%) 2(1.96%) 2(1.96%) 4(3.92%) 4(3.92%) 6(5.88%) 2(1.96%)	 S NS S
Total	14(13.73%)	28(27.45%)	NS

Table 7: Comparison between neonatal outcomes in group A and group B.

Variable	Duration of labor		
	Group A (n=102) ≤1h n (%)	Group B (n=102)>1h n (%)	Significant difference
Weight of neonates: Mean±SD Complications of the neonates:	3.39+0.118	3.47+0.148	NS
Fairly bad 5-minute APGAR score	6(5.88%)	12(11.76%)	NS
NICU admission	6(5.88%)	12(11.76%)	
Intubation in delivery room	0	2(1.96%)	NS
Neonatal Sepsis	0	2(1.96%)	
Brachial pleuxes injury	0	2(1.96%)	
Composite,	4(3.92%)	6(5.88%)	

Discussion

This study was done to assess the effects of second stage duration on short term maternal and neonatal outcomes. 204 women with term singleton pregnancy and vertex presentation that had 2nd stage of labor lasted 2 hours or less were included in the study. There was a significant statistical relation between duration of the 2nd stage of labor and decreasing the rate of spontaneous vaginal delivery and increasing rates of cesarean section. Vaginal delivery decreased from 82.35% to 56.86% while cesarean section rates increased from 15.69% to 39.2% in first and second hours respectively. Similar observations were reported by Cheng et al. (2004) [7]. They noticed that increasing rates of cesarean delivery when the second stage lasted beyond the first hour. Rouse et al. (2009) came to the same conclusion from a prospective study which included fourteen centers. They noticed that the frequency of spontaneous vaginal delivery decreased from 85% in the first hour to 78% when second stage exceeded more than one hour up to two hours [7,8].

There was no significant increase in perineal lacerations, postpartum hemorrhage or blood transfusion if the second stage extended beyond the first hour but didn't extend beyond second hour. Similar observations were reported [9,11].

Regarding the neonatal outcomes, it was observed in the present study, there was no significant increase in low 5-minute Apgar score, admission rates to NICU, sepsis and brachial plexus injury when second stage doesn't exceed 2

hours. According to Allen et al. (2009) there was an increase in risk of low 5-minute Apgar score, birth depression, admission to the neonatal intensive care unit, and composite perinatal morbidity among nulliparous women with increasing duration of the second stage of labor longer than 3 hours [10,6].

One case of brachial plexus injury had encontered in the study which was diagnosed by the pediatrician whom was immediately informed about any case of Shoulder destocia . The initial clinical examination checked for complications, so he suspected brachial plexus injury and refered the baby for further investigations and explanation of events for the mother and the father about what happened to minimize inappropriate blame of themselves or others and so that they may alert their caregivers in the next pregnancy. the baby weight was 4000 gm of a non diabietic mother and the second stage duration was more than one hour and the mother had shoulder dystocia after the head had been deliveried we called for the sienor who followed the RCOG guidelines 2012 and deliveried the shoulders by The McRoberts maneuver, with suprapubic pressure [12,13].

According to Ouzounian (2016) Shoulder dystocia complicates ∼ 1% of vaginal births. Although fetal macrosomia and maternal diabetes are risk factors for shoulder dystocia, for the most part its occurrence remains largely unpredictable and unpreventable.

The strength of this study is that it was done prospectively by the same investigator. The weak points of this study was that the transition between the first and second stages of labor couldn't be precisely established and was dependent on the timing of cervical examination. However, this could occur in the present study as well as similar studies. Another weak point was that all women in this study didnot receive analgesia so the conclusion couldnot be generalized to women who received epidural analgesia [14].

Conclusions

Cesarean section rate increased about two times if the second stage exceeded the first hour in primiparous women. It could be recommended that the attending obstetrician should be alert and ready for this. Because of absence of significant maternal or neonatal morbidities if the second stage enters the second hour in nulliparous women, no need to hurry to intervene by cesarean section or instrumental delivery in the presence of reassuring maternal and fetal status. Increasing the trend of use of operative vaginal delivery in appropriate cases will help to decrease the rate of unplanned second stage CS.

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