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Effect of Prolonged Second Stage of Labour on Fetomaternal Outcome

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ABSTRACT

Background: Prolonged second stage of labor can be defined as the prolongation of the pushing phase of labor thus posing various challenges for the mother and the baby. It is linked with uterine exhaustion, possible hemorrhage, perineal tears and baby distress. The awareness about its effects on fetomaternal outcomes is very essential for the improvement of healthcare management of conditions like the prolonged second stage of labor which still exists in Abbottabad. **Objective:** To determine the frequency of fetomaternal outcome in patients with prolonged second stage of labour. **Study Design:** Descriptive study. **Duration and Place of Study:** Conducted from 1st March 2024 to 1st September 2024 at Ayub Teaching Hospital Abbottabad. **Methodology:** This trial involved 134 patients aged 18-40 years, who suffered from the prolonged second stage of labor. The variables recorded include the secondary outcome, which comprised the intensity of postpartum hemorrhage of ≥1000mL, third-degree perineal lacerations, occurrence of chorioamnionitis, admission of the newborn baby to the NICU, and non-reassuring fetal heart rate. The analysis of the variables was carried out using the SPSS software version 26. The variables were analyzed using the percentage, frequencies, and standard deviation. **Results:** The mean age of participants was 27.34 ± 5.24 years, and the mean duration of labor was 3.95 ± 0.98 hours. Postpartum hemorrhage was observed in 9.70% of cases, third-degree perineal laceration in 14.90%, chorioamnionitis in 11.90%, NICU admission in 9.70%, and non-reassuring fetal heart rate pattern in 8.20%. **Conclusion:** Prolonged second stage of labor is associated with several serious complications for both mother and fetus, including hemorrhage, perineal lacerations, infection, and fetal distress.

INTRODUCTION

Prolonged second stage of labor refers to a situation where the woman remains for a prolonged time in pushing stage without delivering the baby.[1] This prolonged time starts to cause stress for both mother and baby. Here, due to prolonged contraction of uterine muscle action for several hours and with constant pressure of fetal head again and again towards pelvic structures, fatigue starts in mother along with dehydration and edema.[2] As pushing action continues for a long time, energy levels of women decrease along with exhaustion of uterine muscle.[3] So, effectively uterine muscle fails to contract properly in future. Also, due to prolonged second stage of labor, more chances exist for increased staff and instrument actions along with potential chances for possible delivery assistance such as using forceps/vacuum extractor.[4]

In prolonged second stage of labor, the fetomaternal outcome tends to be poor because several complications occur together and potentiate each other.[5] As far as mother and baby are concerned, hemorrhage develops because of the exhausted uterus being unable to constrict adequately the blood vessels of the placental bed.[6] Additionally, because of prolonged labor, there would be uterine distension and/or placental retention and/or genital injury with resultant severe hemorrhage potentially leading to shock and/or transfusion.[7] Third degree tears of the perineum would also be more because prolonged pressure exerted by the fetal scalp would lead to distension and loss of elasticity in tissues.[8] Subsequently when prompt delivery with forceps/vacuum extraction or extended episiotomy is attempted because of prolonged labor and distension of tissues with poor elasticity, then tears could occur leading to damage to anal sphincter muscle. This would later give rise to severe chronic pain in the vulva and vagina.[9]

From the fetal side, prolonged second stage of labor is linked with non reassuring fetal heart rate pattern and NICU admission due to more chances of repeated episodes of fetal hypoxia with Mechanical stresses.[10] As a consequence of compression of the head for a prolonged period of time, umbilical cord blood flow may decrease with inadequate placental oxygen delivery resulting in late decelerations, bradycardia, and variable decelerations in cardiotocography.[11] As a consequence of such changes in the fetus, if delivery is not accomplished within a short span of time, low Apgar scores, respiratory distress,

metabolic acidosis, meconium aspiration syndrome, and even Hypoxic-ischemic encephalopathy occur.[12] Here again, admission to NICU for observation and management with oxygen and ventilation would be considered. [13]

In a study by Laughon SK, et al. has shown that frequency of postpartum hemorrhage was 5.9%, third degree perineal laceration 10.1%, chorioamnionitis 11.1%, NICU admission 8.2% and non-reassuring fetal heart rate pattern 7.2% in patients with prolonged second stage of labour.[14]

It is very important to study the impact of the prolonged second stage of labor on the fetomaternal outcome in the area of Abbottabad. There are numerous hospitals and healthcare facilities present in Abbottabad, but the situation regarding the outcome of prolonged labor is not satisfactory. This topic of study will help make healthcare practices better and give a better insight into the risks that include postpartum hemorrhage, perineal laceration, and admissions in the NICU. This study will also make doctors more conscious about the problems faced by women during the said stage, hence improving maternal and fetal management.

METHODOLOGY

This descriptive study was conducted from 1st March 2024 to 1st September 2024 at the Department of Obstetrics and Gynaecology, Ayub Teaching Hospital, Abbottabad. A total of 134 patients were included, with the sample size calculated using the WHO sample size software at a 95% confidence level, 4% margin of error, and an expected frequency of postpartum hemorrhage of 5.9% in patients with a prolonged second stage of labour.[14]

Ethical approval for the study was obtained from the institutional ethical committee. Informed consent was taken from all patients, explaining the purpose, risks, and benefits of the study prior to data collection. Demographic information, including age, gestational age, BMI, duration of the second stage of labour, parity and residential status, was recorded at the time of inclusion. A detailed medical history was taken, followed by general physical and obstetric examinations of each patient. The inclusion criteria were women aged 18 to 40 years, with singleton pregnancies confirmed by ultrasound, gestational age greater than 37 weeks based on the last menstrual period (LMP), any parity, and a second stage of labour lasting more than two hours for multipara or more than three hours for primigravida with epidural anesthesia. Exclusion criteria included a history of any previous uterine surgery, a uterine scar on ultrasound, diabetes, and pregnancy-induced hypertension.

During the course of the study, all patients were monitored through to delivery, and fetomaternal outcomes were recorded. Postpartum hemorrhage was considered when estimated blood loss was greater than or equal to 1000 mL within 24 hours after cesarean section or 500 mL after vaginal delivery. Blood loss was measured using soaked gauzes, pads, and blood clots, with one milliliter of blood equaling one gram. Third-degree perineal laceration was identified when the perineum was torn through the skin and subcutaneous tissues, extending to the anal sphincter muscle. Chorioamnionitis was diagnosed if intrapartum temperature exceeded 100.4°F on two occasions more than one hour apart, accompanied by tachycardia (>120 bpm), fetal tachycardia (>160-180 bpm), foul-smelling vaginal discharge, and maternal leukocytosis (total white blood cell count >15,000-18,000 cells/μL). NICU admission was noted when the neonate was admitted due to fetal distress, and a non-reassuring fetal heart rate pattern was characterized by a fetal heart rate greater than 160 bpm or less than 120 bpm, recorded more than twice during intrapartum monitoring. Data analysis was carried out using the SPSS statistical software (Ver. 26). Categorical variables were analyzed in terms of frequencies and percentages. For quantitative variables mean ± standard deviation (SD) was applied.

RESULTS

The patient demographics are presented with age showing mean value of 27.34 ± 5.24 years, gestational age was 39.21 ± 1.22 weeks, BMI was recorded as 28.35 ± 2.87 kg/m^2, and duration of labour was 3.95 ± 0.98 hours. Regarding education status, 28 patients being 20.9% was uneducated, 27 patients that is 20.1% had primary education, 34 patients making 25.4% had secondary education, and 45 patients being 33.6% had higher education. For residential status, 47 patients that is 35.1% was from rural areas while 87 patients being 64.9% was from urban areas (as shown in Table-I).

Table I

Patient Demographics

Demographics	Mean ± SD
Age (years)	27.34 ± 5.24
Gestational Age (weeks)	39.21 ± 1.22
BMI (kg/m^2)	28.35 ± 2.87
Duration of Labour (hours)	3.95 ± 0.98
Education	
Uneducated n (%)	28 (20.9%)
Primary n (%)	27 (20.1%)
Secondary n (%)	34 (25.4%)
Higher n (%)	45 (33.6%)
Residential Status	
Rural n (%)	47 (35.1%)
Urban n (%)	87 (64.9%)

Regarding maternal and neonatal complications in prolonged second stage of labour, postpartum hemorrhage was observed in 13 cases which is 9.70% while 121 cases that is 90.30% did not have postpartum hemorrhage. Third degree perineal laceration was present in 20 patients making 14.90% of cases and 114 patients being 85.10% did not have this complication. Chorioamnionitis was found in 16 patients which accounts for 11.90% whereas 118 patients that is 88.10% was free from chorioamnionitis. NICU admission was needed for 13 neonates representing 9.70% and 121 neonates being 90.30% did not require NICU admission. Non-reassuring fetal heart rate pattern was observed in 11 cases making 8.20% while 123 cases that is 91.80% showed no such pattern (as shown in Table-II).

Table II

Frequency of Maternal and Neonatal Complications in Prolonged Second Stage of Labour

Complications	Frequency	%age
Postpartum Hemorrhage		
Yes	13	9.70%
No	121	90.30%
Third Degree Perineal Laceration		
Yes	20	14.90%

No	114	85.10%
Chorioamnionitis		
Yes	16	11.90%
No	118	88.10%
NICU Admission		
Yes	13	9.70%
No	121	90.30%
Non-Reassuring Fetal Heart Rate Pattern		
Yes	11	8.20%
No	123	91.80%

DISCUSSION

The findings of this study shows that postpartum hemorrhage was observed in 13 cases (9.70%) which can be explained by the fact that prolonged second stage leads to uterine muscle fatigue and atony due to exhaustion of myometrial contractility after extended period of contractions. Third degree perineal laceration was present in 20 patients (14.90%) and this occur because prolonged pressure of fetal head on perineal tissue causes tissue ischemia and weakening of pelvic floor muscles making them more susceptible to severe tears during delivery. Chorioamnionitis was found in 16 patients (11.90%) which is attributed to the increased duration of membrane exposure and multiple vaginal examinations during prolonged labour that allows ascending infection from vaginal flora into amniotic cavity. NICU admission was needed for 13 neonates (9.70%) as prolonged second stage causes fetal distress due to intermittent cord compression and reduced placental perfusion leading to hypoxia and metabolic acidosis requiring intensive care. Non-reassuring fetal heart rate pattern was observed in 11 cases (8.20%) because prolonged labour causes progressive fetal hypoxia from repeated uterine contractions that compromises uteroplacental blood flow and reduces oxygen delivery to fetus resulting in abnormal heart rate patterns.

The present study findings shows postpartum hemorrhage in 13 cases (9.70%) which is considerably lower than rates reported by Yamuna M *et al.* who observed atonic PPH in 42.64% of second stage caesarean sections[15] and Latheef F *et al.* who documented 40% atonic PPH.[16] This difference can be attributed to the fact that current study included vaginal deliveries with prolonged second stage while these studies specifically examined operative deliveries where uterine incision and manipulation further compromises myometrial contractility. However, the finding is comparable to Bibi N *et al.* who reported 6.2% PPH in obstructed labour cases[17] suggesting that when delivery is achieved vaginally despite prolonged labour, the risk of severe hemorrhage remains relatively controlled. Third degree perineal laceration was present in 20 patients (14.90%) in current study which is significantly higher than 0.75% reported by Jabeen N *et al.* for instrumental deliveries[18] because instrumental assistance provides controlled delivery of fetal head whereas spontaneous delivery after prolonged second stage subjects perineal tissue to uncontrolled stretching and ischemic damage from sustained pressure. The chorioamnionitis rate of 16 cases (11.90%) in present study aligns with concept of ascending infection during prolonged labour though direct comparison is difficult as most cited studies focused on caesarean complications rather than infectious morbidity. NICU admission was needed for 13 neonates (9.70%) which is lower than 23.88% reported by Khanam A *et al.*[19] 26.4% by Yamuna M *et al.*[15] and 20% by Latheef F *et al.*[16] in second stage caesarean deliveries. This disparity occurs because operative delivery at full dilatation involves more fetal trauma, difficult extraction and prolonged anesthesia exposure whereas vaginal delivery even after prolonged labour allows physiological adaptation. However, Patel S *et al.* reported 68.42% NICU admission for second stage beyond 30 minutes[20] which is markedly higher and this variation may be explained by their specific cutoff criteria and institutional protocols. Non-reassuring fetal heart rate pattern was observed in 11 cases (8.20%) which shows fetal compromise can occur but remains manageable when appropriate monitoring is maintained during prolonged second stage.

There are several limitations of the current study. Being a single institution study, it is not clear how well the results can be extrapolated in other healthcare settings. Also, the sample size of 134 cases was not very large, and hence, the study could not detect any significance of the associations between the variables. It must also be admitted that the study did not take into consideration the potential variables, that is, the quality of intrapartum care, the time of administration of these interventions, and personal differences in the management of labor, which could affect the results. The design of the study also could not give any insight into the causality between the prolongation of the second stage of labor and the observed results.

CONCLUSION

The current study has found that the prolongation of the second stage of labor is linked with various fetomaternal morbidity events, including postpartum hemorrhage, third degree perineal laceration, chorioamnionitis, admission of the newborn baby to the Neonatal Intensive Care Unit, and non-reassuring fetal heart rate. The events are developed because of the tissue pressure, uterine exhaustion, higher chances of the puerperal infection, along with the danger of fetal hypoxia that exists with the prolongation of labor.

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