

Effect of duration of second stage of labour on maternal and neonatal morbidity

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Introduction

The second stage of labor is the most critical period for the mother and fetus and requires expertise and vigilance. A prolonged second stage is generally responsible for maternal and neonatal morbidities.

Maternal morbidities can be in the form of postpartum hemorrhage, third or fourth degree perineal tears and a higher incidence of instrumental or operative modes of deliveries.

Regarding neonatal risks with a prolonged second stage there is increased risk of Apgar score less than 7,⁽¹⁻³⁾ neonatal intensive care unit(NICU) admission,^(3,4) birth depression and minor trauma.⁽²⁾

The purpose of this study is to assess maternal and neonatal morbidities associated with a prolonged second stage of labor.

Aims and Objectives

Primary Objective: To study the maternal and neonatal morbidities in relation to duration of second stage of labour.

Maternal morbidity in terms of: Operative delivery, Perineal trauma, Postpartum hemorrhage.

Neonatal morbidity in terms of: APGAR score, Meconium stained liquor, NICU admission, Intubation.

Secondary Objective: To examine certain factors influencing the duration of second stage of labour.

Materials and Method

This is a prospective, observational study conducted at department of Obstetrics and Gynaecology at Gandhi Medical College, Secunderabad, Telangana, from March 2017 to April 2017. Size of the sample is 199 women who have completed their 37 weeks of gestational age, with expected normal delivery. Written informed consent was taken from all the patients. The necessary permission and approval from institutional ethics committee was taken.

Inclusion Criteria:

- Uncomplicated primipara and multipara
- Single viable pregnancy
- Fetus in vertex position
- Gestational age >37 weeks
- Any pregnancy with medical and obstetric complications

Method of Collection of Data

- The patients who fulfilled the inclusion criteria were evaluated and enrolled in the study at the labour room and the procedure and purpose of the study was explained to them.
 - Patient's detailed history, including age, parity, gestational age, clinical examination, including general physical examination, per abdomen examination, per speculum, per vaginal examination, and investigations, were recorded on a pre-designed proforma.
 - The patients were carefully watched for progress of labour and were strictly monitored for FHR.
 - Duration of second stage was calculated from the cervical examination.
 - Duration of the second stage was considered prolonged if the duration was > 2hours in nulliparous women and > 1hour in multiparous women.
 - Decision regarding Artificial rupture of membranes and Induction of labor were followed according to labor room protocol. Where needed, augmentation with oxytocin was done.
 - Continuous monitoring of FHR and contractions was done every 5 min during 2nd stage. Delivery was expedited, when FHR abnormalities were detected by the safest possible method (Instrumental Delivery or Caesarean section).
 - Maternal morbidity in relation to the duration of the second stage of labour was measured in terms of mode of delivery, presence of 3rd degree perineal tear (anal sphincter involved) or 4th degree perineal tear (anal sphincter and anal epithelium involved), postpartum haemorrhage.
 - Postpartum hemorrhage was defined as estimated blood loss > 500 ml for vaginal deliveries, and >1000 ml for caesarean deliveries.
 - A paediatrician was present for all deliveries and attended to the babies. Foetal outcomes like low Apgar score, meconium stained liquor, birth asphyxia and need for intubation and Neonatal Intensive Care Unit (NICU) admission for more than 48 hours were evaluated and documented.
- Statistical Analysis:** Statistical analysis was performed using chi-square test and p- value. The probability

value <0.05 was considered significant.

Results

Distribution of cases according to parity (n=199):

Out of total 199 patients, 120(60.30%) were nulliparous women and 79(39.69%) were multiparous women.

Distribution of cases as per duration of labour: Out of 120 nulliparous women, 99(82.5%) members delivered with in 2hours and 21 (17.5%)members took more than 2hours, among 79 multiparous women 68(86.07%) delivered with an hour and 11(13.92%) of them delivered after 1hour.

Effect of age on the duration of second stage of labour: Out of 199 patients, 31 belong to >35years age group, 14 of them had prolonged second stage of labor with significant p value <0.05.

Effect of gestational age on duration of second stage of labour: Out of 199 patients, 165 patients had gestational age between 37-40 weeks, and 34 of them crossed 40 weeks of gestational age. Among those 34 patients, 16 (7.03%) had second stage labour duration with in normal limits and 18 (9.04%) had prolonged second stage labour duration.

Effect of induction on the duration of second stage of labour: Out of 199 women, 32 had prolonged duration of second stage of labour, of which 21 (10.55%) were induced and 11(5.52%) had spontaneous onset of labor. (p value< 0.05)

Effect of ARM on the duration of second stage (n=199): Among 199 patients, 32 had prolonged second stage of labour, of which 16(8.04%) patients had ARM done and 16(8.04%) did not undergo ARM.(p value=0.5967)

Effect of Oxytocin augmentation on the duration of second stage: Among 199 women oxytocin augmentation was done in 96 patients, of which 84 (42.21%) had second stage with in normal limits, 83(41.70%) had second stage had prolonged second stage of labour. (p value = 0.18)

Mode of delivery in relation to the duration of second stage of labour: Among 199 patients 167 had normal duration of second stage of labour, of these 91.6% had normal vaginal delivery, 4.19% had instrumental delivery 4.19% had emergency caesarean sections. And 32 had prolonged second stage of labour, of these 28.12% had normal vaginal delivery, 34.37% had instrumental delivery and 37.5% had emergency caesarean section.(p value <0.05)

Perineal trauma in relation to the duration of second stage of labour: Among 199 women, 15 patients had perineal trauma of which 3(1.50%) had normal second stage labour duration, and 12(6.03%) had prolonged duration of second stage of labour. (p value<0.05) (Table 1)

Out of 120 nulliparous patients 21 had prolonged second stage of labour, of which 8 (6.66%) patients had perineal trauma. Perineal trauma was also seen 2 patients who delivered with in 2hours, one of them had

precipitate labour and had instrumental delivery(p value<0.05)

Out of 79 multiparous women 11 had prolonged labour, of which 4 had perineal trauma out of 68 patients who had delivered with in 1hour 1 had perineal trauma, she had precipitate labour.(p value<0.05)

Post Partum Hemorrhage in relation to duration of second stage of labour: Among 199 patients 16 had post partum hemorrhage, 12 (6.03%)of them had prolonged duration of second stage of labour and 4(2.01%) delivered with in normal duration(p value <0.05) (Table 2)

Among 120 nulliparous patients 21 had prolonged labour, of which 7 had postpartum hemorrhage(5.8%), it included both atonic postpartum hemorrhage and traumatic postpartum hemorrhage. 2 patients who delivered with in normal duration had post partum hemorrhage (p value<0.05).

Out of 79 multiparous women 7 had postpartum hemorrhage, of which 5(6.33%) had prolonged duration of second stage of labour, and 2 had delivered within an hour (p value<0.05).

5 min Apgar score in relation to duration of second stage of labour: Among 199 patients delivered, 38 babies had low apgar score, of which 23(11.55%) had prolonged second stage of labour, and remaining 15(7.53%) had second stage duration with in normal limits(p value<0.05) (Table 3).

Among 120 nulliparous patients, 23 had Apgar score <7 at 5min, of these 15(12.5%) had second stage > 2hours, and 8 (6.6%) had second stage with in normal limits (p value <0.05).

Among 79 multiparous women, 15 had 5min Apgar score <7, of which 8(10.12%) had second stage labour duration >1hour, and remaining 7(8.8%) had second stage with in normal limits.(p value <0.05).

Incidence of meconium passage in relation to duration of second stage of labour: Among 199 patients delivered, babies of 46 mothers passed meconium, of which (9.54%) had prolonged second stage of labour, and 13.56% had normal duration of second stage(p value <0.05) (Table 4)

Among 120 nulliparous women delivered, babies of 28 patients passed meconium, of which 12(10.0%) had second stage >2hours, and 16(13.33%) had second stage with in normal limits. (p value <0.05.)

Among 79 multiparous women delivered, babies of 18 women had passed meconium, of which 7(8.18%) had second stage >2 hours, and 11(13.92%) had second stage with in normal limits (p value<0.05)

Need for intubation in relation to duration of second stage: Among 199 patients delivered, intubation was done for 5 babies, of which 4(2.01%) were born to mothers who had prolonged second stage (p value <0.05) (Table 5)

Among 120 nulliparous women delivered, intubation was done for 4 babies, of which 3(2.5%)

women had second stage > 2hours and 1(0.83%) had second stage with in normal limits(p value <0.05)

Among 79 multiparous women delivered, only 1(1.26%) had intubation done, and the patient had prolonged duration of second stage of labour(p value <0.05)

NICU admission >48 hours in relation to duration of second stage of labour: Among 199 babies born, 33 required NICU care >48 hours, of which 19(9.5%) babies were born to mothers with prolonged second stage of labour(p value <0.05) (Table 6)

Among 120 babies born to nulliparous women, 21 required NICU care >48 hours, of which 12(10%) were born to mothers with prolonged second stage (p value <0.05).

Among 79 born to multiparous women, 13 required NICU care > 48 hours, of which 7(8.86%) were born to mothers with second stage > 1hour (p value < 0.05).

Table 1: Perineal trauma in relation to the duration of second stage of labour (n=199)

Perineal trauma	Normal	Prolonged	Total
Present	3(1.50%)	12(6.03%)	15
Absent	164(82.41%)	20(10.05%)	184
Total	167	32	199

$X^2=49.117$; p value<0.05

Table 2: Post Partum Hemorrhage in relation to duration of second stage of labour (n=199)

Postpartum Hemorrhage	Normal n=167(%)	Prolonged n=32(%)	Total
Present	4(2.01%)	12(6.03%)	16
Absent	163(81.90%)	20(10.05%)	183
Total	167	32	199

$X^2= 44.759$; p value <0.05

Table 3: 5 min Apgar score in relation to duration of second stage of labour (n=199)

5 Min APGAR	Normal n(%)	Prolonged n(%)	Total
≤7	15(7.53%)	23(11.55%)	38
>7	152(76.38%)	9(4.52%)	161
Total	167	32	199

$X^2= 68.757$; p value<0.05

Table 4: Incidence of meconium passage in relation to duration of second stage of labour (n=199)

Meconium Passage	Normal n(%)	Prolonged n(%)	Total
Present	27(13.56%)	19(9.54%)	46
Absent	140(70.35%)	13(6.53%)	153
Total	167	32	199

$X^2= 28.209$; p value <0.05.

Table 5: Need for intubation in relation to duration of second stage (n=199)

Intubation	Normal n(%)	Prolonged n(%)	Total
Done	1(0.5%)	4(2.01%)	5
Not Done	166(83.42%)	28(14.07)	194
Total	167	32	199

$X^2= 15.528$; p value <0.05

Table 6: NICU admission >48 hours in relation to duration of second stage of labour(n=199)

NICU Admission >48 hrs	Normal n(%)	Prolonged n(%)	Total
Present	14(7.03%)	19(9.5%)	33
Absent	153(76.88%)	13(6.53%)	166
Total	167	32	199

$X^2= 50.477$; p value <0.05.

Discussion

The data, which was collected and analysed above showed that, the increase in the duration of second stage of labor is associated with adverse maternal and neonatal outcomes. Risk of both maternal and neonatal adverse outcomes rise with increased duration of the second stage, particularly for duration longer than 2hours in nulliparous women and >1hour in multiparous women.

Data in our study confirms the result of previous studies that increased maternal age is associated with prolonged labor.

Incidence of prolonged labor in patients of age >35 years is 7.03% which is similar to 10.8% of Allen VM et al⁽²⁾ and 8.9% of Nystedt et al.⁽⁵⁾ Similar findings were also reported by Laughon SK et al,⁽⁶⁾ that women who delivered after a prolonged second stage on an average tend to be older (with significant p <0.001).

Percentage of prolonged labor in nulliparous in the present study is 17.75% and in multiparous is 13.92% (with significant p value <0.001), it is similar with prevalence that Kjaegaard⁽⁷⁾ reported in her study, where 37% of nulliparas are diagnosed with prolonged labor, and in the study by Selin⁽⁸⁾ the prevalence was 33% in nullipara and 7% in multipara. Similar findings were reported by Nystedt et al⁽⁵⁾ where the prevalence of prolonged labour in nulliparous women was 35.6% and in multiparous women was 10.2%, he reported that the only difference women with and without prolonged labour was parity, with more primiparas belonging to the prolonged labour group. Therefore the present study shows that nulliparous has more incidence of prolonged labour than when compared with multiparous women, also confirmed by other studies.

Incidence of prolonged labor in gestational age >40weeks is 9.04% in the present study which is similar with 10.73% of Allen VM et al,⁽²⁾ and the incidence of prolonged labour in patients with 37-40

weeks gestational age is 7.03% it is similar with 9.01% of Allen VM et al.⁽²⁾ Hence it indicates that increase in gestational age is associated with prolonged second stage of labour and there is increased incidence of instrumental deliveries and cesarean section in these cases.

Induction of labor prolonged the duration of second stage, women who were spontaneously set into labor were delivered with in normal duration (5.52%) than when compared to induced women(10.55%).

A similar effect is found by Leeuw JW et al⁽⁹⁾ that induction of labor is associated with increase in the duration of second stage, also induction is associated with increase in the incidence of perineal tears.

Oxytocin augmentation had no influence on the duration of second stage of labor, similar findings were reported by Nystedt et al.⁽⁵⁾

Amniotomy (Artificial Rupture of Membranes) did not influence the duration of second stage of labour duration, similar findings were confirmed by Li et al,⁽¹⁰⁾ in his study reported the decrease in the duration of first stage by amniotomy rather than second stage.

Incidence of normal vaginal delivery in the present study is 28.12% and is similar with 31% of Nystedt et al,⁽⁵⁾ 34.7% of Allen VM et al.⁽²⁾ But the incidence of normal vaginal delivery is 59.1% in the study done by Rouse DJ et al,⁽⁴⁾ the incidence is high in that study because the sample size was very high in that study.

Incidence of instrumental delivery in the present study is 34.37% and is similar with 33.36% of Nystedt et al,⁽⁵⁾ 43.6% of Allen VM et al⁽²⁾ and 28.2% of Rouse DJ et al.⁽⁴⁾

Incidence of caesarean section for prolonged second stage in the present study is 37.5%, which is similar with 35.4% of Nystedt et al,⁽⁵⁾ 21.7% of Allen VM et al.⁽²⁾

Le Ray C⁽¹¹⁾ et al found that the rate of assisted vaginal delivery increased (24.0%) with increase in the duration of expulsive efforts of second stage.

Therefore as the duration of second stage of labour increases there is decreased incidence of normal vaginal delivery, and increased incidence of instrumental delivery and emergency cesarean section.

Incidence of perineal trauma is 6.03% in the present study, which is comparable with 7.77% of Leeuw JW et al,⁽⁹⁾ 8.7% of Rouse DJ et al⁽⁴⁾ and hence it shows that increase in duration of second stage is associated with instrumental delivery that is responsible for perineal trauma. Leeuw JW et al⁽⁹⁾ found in his study that there is a significant increase in the third degree perineal tears with increase in the duration of duration of second stage of labor. Stretching of the perineum for a longer period of time may lead to ischemia, which may increase the risk of rupture of the perineum. He analysed various factors and their association with third degree perineal tears. Primiparity (2.69%) was found to be significantly associated with an increased risk of third degree perineal tears. Higher

parity (1.35%) appeared to be a protecting factor. All types of assisted vaginal delivery were associated with an increase in risk of third degree perineal tears. Forceps delivery, of all forms of assisted vaginal delivery, appeared to carry the strongest risk for the occurrence of third degree tears. Combined types of assisted vaginal delivery appeared to increase the risk of third degree perineal tears in comparison with the use of one type. Therefore increase in the duration of the second stage is associated with increase in the incidence of perineal trauma.

Incidence of postpartum hemorrhage is 6.03% in the present study which is comparable with 6.5% of Balki M et al,⁽¹²⁾ 4.9% of Rouse DJ et al⁽⁴⁾ and 4.51% of Laughon SK et al.⁽⁶⁾ This indicates that increase in the duration of second stage of labour is associated with increased incidence of postpartum haemorrhage that may be due to atony of uterus or cervical and vaginal laceration as due to instrumental extractions, which is also proved by other studies. Le Ray C et al,⁽¹¹⁾ showed that there is increase in the rate of operative vaginal delivery (24%) with the duration of second stage of labour, proved the association between severe PPH and the duration of active second stage with significant pvalue<0.006, he also proved that caesarean section during the second stage of labour is associated with an increased risk of PPH. Shamsha et al⁽¹³⁾ proved that there is significant association between PPH and operative delivery, 2.8% with forceps delivery and 2.5% with vacuum delivery.

Incidence of 5min apgar<7 in present study is 9.04% which is similar with 8.3% of Salustiano et al⁽¹⁴⁾ and 6.9% of Shamsha et al.⁽¹³⁾

Incidence of intubation in prolonged second stage is 1.50% in the present study and is similar with 0.8% of Rouse DJ et al.⁽⁴⁾ Incidence or need for NICU admission or care for > 48 hrs in the present study is 9.5% which is similar with 7.30% of Laughon SK et al,⁽⁶⁾ and 8.1% of Rouse DJ et al⁽⁴⁾ this indicates that prolonged second stage labour duration is associated with increase in the incidence of intubation and increase in the need for NICU admission.

Conclusion

The maternal and perinatal morbidities increase with prolonged duration of the second stage of labour which is taken as the duration longer than 2hours in nullipara, and more than 1 hour in multiparous women.

Mode of delivery is influenced by increase in the duration of second stage of labour, the incidence of normal vaginal deliveries decrease and the need for instrumental delivery and LSCS increased with prolonged second stage of labour.

The significant maternal complications with prolonged labor include Postpartum hemorrhage and perineal trauma (3rd and 4th degree perineal tear).

Neonatal complications associated with increase in the duration of second stage of labour include low

Apgar i.e., 5min Apgar score <7, increased incidence of passage meconium, need for intubation in the delivery room and need for NICU admission >48 hours.

In this study specific factors that were found to influence the duration of second stage of labour are maternal age, parity, and gestational age. Increased maternal age increases the duration of second stage, nulliparous women have higher incidence of prolonged labour, and gestational age >40weeks increases the duration of second stage

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