

Materno-Foetal Morbidity in the Second Stage of Labour: A Cohort Study in Primiparous Women in Yaounde

Félix Essiben^{1,2*}, Khadidja Bayero^{1,2}, Hapsatou Ahmadou Djoulatou^{1,2}, Maye Ange Ngo Dingom³, Julius Sama Dohbit^{1,4}, Clifford Ebontane Ebong^{1,2}, Pascal Foumane^{1,4}

¹Faculty of Medicine and Biomedical Sciences, the University of Yaoundé I, Yaoundé, Cameroon

²Department of Obstetrics and Gynecology, Faculty of Medicine and Biomedical Sciences, Yaoundé Central Hospital, Yaoundé, Cameroon

³Central Maternity, Yaoundé Central Hospital, Yaoundé, Cameroon

⁴Department of Obstetrics and Gynecology, Yaounde Gyneco-Obstetric and Pediatric Hospital, Yaoundé, Cameroon

Email: *essibenx@yahoo.com

How to cite this paper: Essiben, F., Bayero, K., Djoulatou, H.A., Ngo Dingom, M.A., Dohbit, J.S., Ebong, C.E. and Foumane, P. (2021) Materno-Foetal Morbidity in the Second Stage of Labour: A Cohort Study in Primiparous Women in Yaounde. *Open Journal of Obstetrics and Gynecology*, 11, 1725-1734.

<https://doi.org/10.4236/ojog.2021.1112161>

Received: September 27, 2021

Accepted: December 19, 2021

Published: December 22, 2021

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Abstract

Introduction: Prolonged Second Stage of Labor (SSL) is known to increase maternal and foetal morbidity. We, therefore, aimed to assess for the occurrence of complications of the SSL in relation to its duration in primiparous women in Yaounde. **Methods:** It was a cohort study carried out at the Yaounde Gynaeco-Obstetric and Paediatric Hospital over a period of 6 months, from December 19, 2018 through May 3, 2019. We included for the study nulliparous pregnant women with singleton pregnancies and normal uteri. Data collected were analysed using EPI info 7 and SPSS version 2.0 software. **Results:** Amongst 327 nulliparas, the SSL lasted more than one hour in 120 (36.7%), and more than two hours in 42 (12.8%). The most common maternal complications observed were genital lacerations (23.6%; 28/120), instrumental deliveries (20.2%, 24/120), post-partum haemorrhage (8.9%). Foetal complications included caput succedaneum (15.2%; 18/120) and perinatal asphyxia (7.5%; 9/120). Maternal complications were significantly increased in women with an SSL lasting 1 - 2 hours (44.9% versus 22.7%; $p < 0.001$) and >2 hours (42.9% versus 22.7%; $p = 0.007$). Similarly, for foetal complications 23.1% occurred with SSLs between 1 - 2 hours (versus 6.3%; $p < 0.001$) and 19.0% for SSLs > 2 hours (versus 6.3%; $p = 0.007$). **Conclusion:** Maternal and foetal complications increase when the SSL exceeds 1 hour in primiparas. Identifying factors that predispose to a prolonged SSL and indicating appropriate interventions could help prevent morbidity.

Keywords

Second Stage of Labour, Duration, Primiparas, Morbidity, Yaounde

1. Introduction

Many authors define the Second Stage of Labour (SSL) as the interval between full cervical dilatation and the delivery of the foetus [1]. There is no universal consensus regarding the acceptable maximum duration of this stage of labour. Various factors may influence the length of the SSL including maternal factors such as the size and shape of the pelvis, the intensity of the expulsive effort, and especially, the history of past deliveries [2]. The duration of the SSL also depends on a woman's parity, and the use or non-use of epidural analgesia. The SSL tends to last longer in primiparas or following the administration of peridural analgesia [1]. These aspects are therefore factored into the acceptable duration of the SSL. The SSL is said to be protracted when it lasts longer than 2 hours in nulliparas or longer than 1 hour in multiparas absent epidural anaesthesia. Following the administration of epidural anaesthesia, however, the threshold is 3 hours in nulliparas and 2 hours in multiparous women [3].

In general, the proportion of spontaneous vaginal births without major complications drops significantly as the SSL prolongs, irrespective of the parity and/or the use of epidural analgesia [4]. Evaluating for complications after a certain duration should be considered and the ensuing management should depend on the patient and the technical plateau of the care setting, even though the tendency is to allow labour to continue to achieve vaginal delivery, especially in nulliparas [5]. Although the optimum duration for the SSL is not known, the diagnosis of prolonged SSL should only be made after 2 and 3 hours of expulsive effort for nulliparas and multiparas, respectively [6]. However, this approach depends on the availability of adequate maternal and foetal monitoring. Prolonged SSL is associated with high rates of vaginal delivery but also an increased risk of maternal and foetal complications including post-partum haemorrhage, infections, and perineal trauma, poor Apgar scores, perinatal asphyxia and increased neonatology admissions [7] [8] [9] [10].

We aimed to observe clinical practices and outcomes in our setting, where the tendency is to intervene after 1 hour. In one meta-analysis, Abolos *et al.* [1] found that the median SSL with good maternal and perinatal prognosis varied between 14 to 66 minutes, and 6 to 12 minutes for nulliparas and multiparas respectively. While there is no consensus for such an empirical approach in our setting it could nonetheless be justified by the need for timely referrals to appropriate health facilities. The objective of this study is to assess the incidence of maternal and foetal complications when the SSL lasts longer than 1 hour.

2. Research Method

The study was a prospective cohort study carried out at the maternity of the Yaounde Gynaeco-Obstetric and Paediatric Hospital (YGOPH) over 6 months, between December 19 2018 and May 3 2019. We recruited all nulliparas admitted in labour with a singleton term pregnancy (37 completed weeks and above) and with foetus in cephalic presentation. Parturients who presented with mater-

nal complications (preeclampsia/eclampsia, uterine malformations, scarred uteri), foetal complications (intrauterine growth restriction, foetal malformations, intrauterine foetal demise), or placental anomalies were excluded. The parturients were distributed into 3 groups: group I was for parturients whose SSL lasted less than 1 hour; group II for those whose SSL lasted between 1 and 2 hours and group III was for those whose SSL lasted >2 hours. We carried out random sampling.

The variables of interest included demographic characteristics (age, marital status), clinical characteristics (gestational age, body mass index, mode of delivery, duration of SSL), maternal outcomes (vaginal and perineal lacerations, postpartum haemorrhage, puerperal sepsis) and foetal outcomes (APGAR scores at the 5th minute, admission into the neonatal care unit). The SSL was timed beginning from when the diagnosis of full cervical dilatation was made and the parturient asked to bear down.

After obtaining administrative authorisation and ethical clearance from the YGOPH, we collected data from all eligible parturients following direct interviews and physical examination onto pre-existing data collection forms.

After we obtained the patients' consent, we consulted their antenatal care records to verify for any non-inclusion criteria. All those who fulfilled the inclusion criteria were followed up during labour and delivery, and through the first 3 days (72 hours) following delivery in the maternity wards. Regarding the neonates, we collected information on their anthropometric measurements and APGAR scores in the delivery room, and information concerning their progress and outcome during their mothers' stay in the maternity ward.

Data collection was done on an individual basis, using a standardised questionnaire. We analysed the data using Epi Info 7 and the Statistical Package for Social Sciences (SPSS) software version 20.0. We estimated the frequency of complications in each of the groups formed and we compared the frequencies of the aforementioned complications in groups II and III with that of group I (reference group). The Chi-square test and Fisher's exact test were used to compare the frequencies with a significance level α set at 5%. P values < 0.05 were considered statistically significant.

3. Results

We recorded 1023 deliveries amongst which we had 354 deliveries by primiparas. We however excluded 27 primiparas from the study because, in these parturients, the duration of the second stage of labour could not be ascertained. Thus, we retained 327 primiparas for the study.

3.1. Duration of Labor

The SSL lasted < 1 hour (group I) in 63.3% (207/327) of the parturients, between 1 - 2 hours (group II) in 23.9% (78/327) of the parturients and >2 hours (group III) in 12.8% (42/327) of the parturients.

3.2. Frequency of Maternal and Fetal Complications

Maternal complications were significantly higher in group II compared to group I (44.9% (35/78) versus 22.7% (47/207); $p < 0.001$) and in group III compared to group I (42.9% (18/42) versus 22.7% (47/207); $p = 0.007$). The same was true of foetal complications which were significantly higher in group II compared to group I (23.1% (18/78) versus 6.3% (13/207); $p < 0.001$) and in group III compared to group I (19% (8/42) versus 6.3% (13/207); $p = 0.007$).

3.3. Types of Complications

Table 1 shows the maternal and foetal complications found in groups I, II and III. When the duration of SSL was between 1 - 2 hours, the most common maternal complications were episiotomies (44.9% (35/78) and instrumental deliveries (12.8%; 10/78); while the foetal complications were asphyxia (11.5%; 9/78) and the presence of caput succedaneum (23.1%; 18/78). When the duration of the SSL was greater than 2 hours, additional maternal complications included genital tract lacerations (38.1%; 16/42), postpartum haemorrhage (16.8%; 7/42) and caesarean deliveries (12.6%; 5/42). For the foetus, foetal asphyxia (23.8%; 10/42) and caput (19.0%; 8/42), occurred frequently.

3.4. Comparison of Frequency of Complications in the Different Groups

Table 2 shows the comparison of maternal and foetal complications between groups I and III. Episiotomies were more frequently performed when the SSL lasted between 1 - 2 hours ($p < 0.001$), with increased frequencies of birth asphyxia ($p = 0.002$), and caput succedaneum ($P < 0.001$) amongst the newborn in this group. **Table 3** reveals the comparison between maternal and foetal complications in groups I and III. When the SSL was greater than 2 hours, the following

Table 1. Maternal and foetal complications.

Variables	Group I N = 207 (%)	Group II N = 78 (%)	Group III N = 42 (%)
Maternal complications			
Lacerations	42 (24.3)	12 (15.4)	16 (38.1)
Episiotomy	47 (25.9)	35 (44.9)	18 (42.8)
Sphincter involvement	7 (3.2)	1 (1.3)	4 (10.1)
Post-partum haemorrhage	11 (5.1)	4 (5.1)	7 (16.8)
Instrumental delivery	24 (11.7)	10 (12.8)	14 (34.1)
Caesarean deliveries	11 (5.4)	6 (7.7)	5 (12.6)
Post-partum pyrexia	8 (3.8)	2 (1.6)	2 (4.7)
Foetal complications			
Birth asphyxia	5 (2.4)	9 (11.5)	10 (23.8)
Caput succedaneum	13 (6.3)	18 (23.1)	8 (19.0)

Table 2. Comparison of the frequency of complications between groups I and III.

Variables	Group III N = 42 (%)	Group I N = 207 (%)	p value
Maternal complications			
Genital tract lacerations	16 (38.1)	42 (20.3)	0.013
Episiotomies	18 (42.8)	47 (22.7)	0.007
Sphincter involvement	4 (10.1)	7 (3.4)	0.058
Post-partum haemorrhage	7 (16.8)	11 (5.3)	0.009
Instrumental delivery	14 (34.1)	24 (11.6)	0.000
Caesarean deliveries	5 (12.6)	11 (5.3)	0.082
Post-partum pyrexia	2 (4.7)	8 (3.9)	0.811
Foetal complications			
Birth asphyxia	10 (23.8)	5 (2.4)	0.000
Caput succedaneum	8 (19.4)	13 (6.3)	0.006

Table 3. Comparison of the frequencies of complications between groups I and II.

Variables	Group II N = 78 (%)	Group I N = 207 (%)	p value
Maternal complications			
Genital lacerations	12 (15.4)	42 (20.3)	0.348
Episiotomies	35 (44.9)	47 (22.7)	0.000
Sphincter involvement	1 (1.3)	7 (3.4)	0.341
Post-partum haemorrhage	4 (5.1)	11 (5.3)	0.946
Instrumental delivery	10 (12.8)	24 (11.6)	0.781
Caesarean deliveries	6 (7.7)	11 (5.3)	0.446
Post-partum pyrexia	2 (1.6)	8 (3.9)	0.331
Foetal complications			
Birth asphyxia	9 (11.5)	5 (2.4)	0.002
Caput succedaneum	18 (23.1)	13 (6.3)	<0.001

complications increased significantly: genital tract lacerations ($p = 0.013$), episiotomies ($p = 0.007$), postpartum haemorrhage ($p = 0.007$), instrumental deliveries ($p < 0.001$), birth asphyxia ($p < 0.000$) and caput ($p < 0.001$).

4. Discussion

The duration of the second stage of labour in a parturient whose pelvis has no prior exposure to the process of childbirth is an important topic, and its determinants are still to be identified. By observing the outcome in a population of nulliparas during the SSL, this study showed that 36.7% of them gave birth more than 1 hour after full cervical dilatation. The proportion of women whose SSL lasted over 1 hour is variable. Several factors could influence the duration of the

SSL. These include foetal factors such as weight and position, or maternal factors such as the type of maternal pelvis, the quality of expulsion efforts, the existence of comorbidities such as high blood pressure or diabetes and the history of previous deliveries [2]. Le Ray *et al.*, in 2009 in Canada [11] reported a similar frequency to ours at 34.2%. Conversely, other authors have observed a lower proportion of parturients in whom the SSL exceeded 1 hour [7]. After 1 hour in SSL, maternal and foetal complications become more frequent as labour lasts longer. Many authors have reported similar results [10] [12] [13] [14].

The fact that the duration of the SSL considered normal in our context is set at less than 1 hour often leads practitioners to intervene after this duration by carrying out either an episiotomy, or instrumental delivery when vaginal delivery is possible. Episiotomies are indicated either to facilitate delivery of the foetal head or prior to instrumental deliveries. The distress caused by labour pains, especially considering the systematic unavailability of epidural analgesia in our context favours these interventions during the SSL. Our results show that when the SSL lasts more than an hour, the frequency of instrumental and caesarean deliveries increase two to three-fold. It appears clearly from our results that the frequency of instrumental and caesarean deliveries increases with increasing time spent at full dilatation and markedly so after 2 hours. In the literature, many authors have reported results similar to ours [11] [15] [16] [17]. According to Le Ray *et al.* [11], the rate of instrumental and caesarean deliveries increased 2-fold for SSL durations between 1 - 2 hours, 9-fold between 2 - 3 hours, and 30-fold after 3 hours.

It seems obvious that a certain number of unnecessary interventions and/or caesarean deliveries are induced by limiting the duration of the second stage to 1 hour. This is because a good proportion of women still give birth beyond 1 hour of waiting time without complications. However, there should be adequate maternal and foetal monitoring and due consideration must be given to referral considerations (time, challenges) towards the adequate health facilities.

Epidural analgesia tends to prolong the duration of the SSL [18]. It creates a sensory and motor blockade, which affects the rotation of the foetal head and the quality of the expulsive effort. Epidural analgesia, therefore, would have an impact on the frequency of normal deliveries, given the practitioners' tendency to over intervene when faced with a protracted SSL rather than by the objective confirmation of maternal or foetal complications.

Prolonged SSL was associated with a significant increase in the frequency of perineal lacerations even though there was no increase in the frequency of sphincter damage compared to women in the reference group (SSL duration of less than one hour). The frequency of these tears increased steadily for each hour spent beyond 2 hours following complete dilatation [15]. According to Laughon *et al.* [7] the frequency of perineal lacerations increases significantly after 3 hours in the SSL.

Postpartum haemorrhage could result not only from birth canal trauma but

also and especially from uterine atony. Prolonged labour could lead to uterine atony due to the failure of uterine muscles to contract after foetal expulsion, leading to critical blood loss. In our study population, postpartum haemorrhage increased significantly beyond 1 hour of the SSL and even more after 2 hours. Some authors reported that the rate of postpartum haemorrhage increased from 4.2%, when the second stage lasts between 1 hour and 2 hours, to 14.8% after 3 hours [19]. Postpartum haemorrhage is a major cause of maternal death in our setting [20] [21].

The foetal complications such as caput succedaneum and birth asphyxia, appear as soon as the duration of the SSL exceeds 1 hour and tend to increase over time. These complications can compromise perinatal survival. Prolongation of the SSL beyond 3 hours leads to an increase in foetal acidosis with no real impact on the neurological prognosis of the newborn [22]. Limited access to quality newborn care is a limiting factor for extending the SSL.

Foetal asphyxia is a major cause of morbidity and mortality [23]. It is responsible for about 16% of perinatal deaths in Cameroon [24]. Chiabi *et al.* reported an incidence of 80.5 per 1000 livebirths in the urban setting [25]. Prolonged labour increases the risk of birth asphyxia [25] [26] since it is associated with foetal acidosis [27]. The requirements for newborn resuscitation in cases of birth asphyxia in terms of trained personnel and appropriate equipment and consumables, are quite significant, thus preference is given to measures that prevent prolonged labour. Birth asphyxia is also associated with instrumental and caesarean deliveries [28]. Caesarean deliveries increase the risk of foetal asphyxia compared to vaginal deliveries, especially amongst primigravidas [29]. This may be explained by the fact that caesarean deliveries usually follow prolonged labour or the advent of other complications. Therefore, limiting the duration of the second stage of labour could consequently avert additional morbidity.

Caput succedaneum is a subcutaneous swelling caused by the collection of blood and serum in the scalp of the neonate. It is caused by the pressure of the head against the uterine cervix or the bony pelvis. It resolves within a week from delivery. It may lead to anaemia or exacerbate neonatal jaundice if it is very severe. Jaundice requires special medical care as the risk of death and irreversible neurological complications are considerable [30].

Our study presented some limitations. First, we were not always certain as to the exact time when the parturient achieved complete cervical dilatation. Next, some women began bearing down prior to full cervical dilatation. Furthermore, maternal challenges due to fatigue, prolonged fasting and dehydration could influence maternal bearing down efforts and hence our overall findings, this especially considering the fact that a significant proportion of our parturients were referred to us from health facilities where obstetrical practices do not reflect WHO recommendations. Finally, the variability of pain threshold across different women could have influenced our results as the subjective appreciation of a woman's pain is key to the clinical diagnosis of the SSL.

5. Conclusion

There is an increased frequency of maternal and foetal complications when the SSL exceeds 1 hour in primiparous women. The frequency of SSL complications increases proportionally with time, with potentially severe maternal morbidity occurring after 2 hours. Identifying factors that predispose to a prolonged SSL and intervening appropriately could help to reduce such morbidity.

Authors' Approval

All authors agree to the submission of this article.

Authors' Contribution

Bayero Khadidja designed the study and undertook data collection. Essiben Félix, Dohbit Julius and Foumane Pascal participated in the study design, performed data edits and statistical analyses, wrote the draft, and reviewed and finalized the manuscript. Djalatou Hapsatou, Ngo Dingom Madye and Ebong Clifford participated in statistical analyses, and edited and reviewed the final manuscript. All authors read and approved the final manuscript.

Competing Interest

The authors declared no competing interests.

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