



Are active labour and mode of delivery still a challenge for extremely low birth weight infants? Experience at a tertiary care hospital

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ABSTRACT

Objective: This study was to evaluate the impact of mode of delivery and timing of caesarean section in extremely preterm births, below 28 weeks of gestation, on long-term survival and psychomotor outcomes.

Study design: This was a single-centre retrospective cohort study of 84 cases of extremely low birth weight infants with complete maternal, obstetrical and neonatological information. Mortality and survival with neurological disabilities at 18 months of life were considered outcome measures.

Results: Forty percent of deliveries were at or less than 25 weeks of gestation and birth weight was ≤ 500 g in 14% of all infants. The overall survival rate was 54.8% with a prevalence of neuromotor impairment with disability among the survivors of 26.1%. After adjustment using multiple logistic regression, only extreme prematurity (≤ 25 weeks) and birth weight below 500 g had significant effects on survival ($p < 0.05$), regardless of mode and timing of delivery.

Conclusions: Mode of delivery and labour seem not to play a significant role in adverse neonatal outcomes, either mortality or neuro-developmental impairment, in extremely low birth weight infants.

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1. Introduction

One of the major concerns in modern obstetrics is the mode of delivery in extremely preterm births. Should the obstetrician opt for a vaginal or a caesarean delivery? The neonatal survival at extremely low gestational ages (between 24 and 27 completed weeks of gestation) has been reported to have increased over the past decades, though it has been associated with greater morbidity and long-term disability [1,2]. Several perinatal risk factors have been correlated with survival rates and long-term psychomotor outcomes in extremely low birth weight infants (ELBW). Conversely, the role of active labour and the mode of delivery remain controversial and not yet clearly established. While some studies demonstrated a significant beneficial effect of the caesarean section (CS) [3–5], other authors reported that the mode of delivery affected very little psychomotor outcomes after adjustment for perinatal risk factors [6,7]. Furthermore, the possible positive effect of a CS for the fetus has to be balanced with the increased risk for the mother of post-

surgical morbidity, especially at very early gestational ages [8,9]. This single-centre study was to evaluate the specific role of active labour and mode of delivery on long-term perinatal outcomes.

2. Patients and methods

All ELBW infants born at our tertiary referral centre at less than 28 completed weeks of gestation between January 1999 and December 2004 were considered for this retrospective cohort study. All cases of stillborns and infants with evidence of structural or genetic anomalies were excluded from the analysis. Inclusion criteria were [1] gestational age at birth below 28 completed weeks of gestation (195 days) as confirmed or corrected by a first-trimester ultrasound scan [2]; availability of complete clinical and obstetrical maternal records, including labour and delivery details promptly collected soon after birth [3]; all newborns received neonatal resuscitation techniques when necessary [4]; details of complete neonatological follow-up of at least 18 months.

All included cases were classified according to the mode of delivery (vaginal, either spontaneous or assisted, and caesarean section). A further sub-classification was made for caesarean deliveries as [1] “not in labour” (defined as absence of regular contractions) [2], “labour in latent phase” (presence of a regular pattern of at least three valid contractions in 10 min with cervical

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dilatation ≤ 2 and ≤ 3 cm in primiparous and multiparous women, respectively), and [3] “active labour” defined as the presence of regular contractions ($>3/10$ min) and progressive cervical dilatation and effacement.

All infants were followed up for 18 months by a dedicated group of neonatologists/paediatricians. Paediatric assessment included growth evaluation, respiratory and psychomotor development. Psychomotor development was defined as “normal” (no neurological signs) or “impairment without disability” (neuromotor impairment without functional consequences with development delay >2 months, high-tone hearing loss without requirement for aiding, language disorders) or “neuromotor impairment with disability” (cerebral palsy or severe neuromotor impairment with functional consequences and/or sensory neural hearing loss requiring aiding, and/or blindness).

Mode of delivery (vaginal versus caesarean) and timing of caesarean section (during “absent”, “latent” or “active” labour) were correlated with neonatal survival and long-term neuromotor impairment with disability in an univariate analysis. Neonatal neuromotor impairment without disability was not considered a primary outcome of this study as it usually requires a longer follow-up [10]. The univariate analysis was carried out to assess the following variables: maternal age, type of premature birth (spontaneous or as result of medical decision), maternal pathology (hypertension, diabetes, sepsis, etc.), maternal corticosteroids, tocolysis and antibiotic therapy, preterm premature rupture of membranes (pPROM), intrauterine infection, fetal growth restriction, abruptio placentae, placenta previa, multiple pregnancy, fetal malpresentation, non-reassuring or pathologic cardiotocography [11], gestational age at birth, birth weight, sex and small-for-gestational-age infants [12]. Only those variables that showed a $p < 0.20$ at univariate assessment were entered into the model for the multivariate logistic regression analysis.

Continuous variables were compared using the one-way analysis of variance between groups (ANOVA) as all data followed a Gaussian distribution (confirmed by Kolmogorov–Smirnov test). Differences among subgroups were assessed using Tukey–Kramer multiple comparisons test. Categorical variables were compared with two-tailed Chi-square test with Yates correction or Fisher’s exact test, as appropriate. A p value <0.05 was considered significant. Multicollinearity between significant variables included in logistic regression analyses (IUGR, preeclampsia, abruptio placentae) was tested as hidden mutual dependence between explanatory variables could cause unreliability of results. The possibility of multicollinearity was evaluated by calculating Dillon and Goldstein condition number C from eigenvalues of the correlation matrix and testing the threshold condition $C > 30$. Data were analysed using SPSS 11.0.1 statistical software for Windows (SPSS Inc., 2001), with a significance set at $p < 0.05$. Graphs were plotted using the GraphPad Prism software system (version 4.00 for Windows, GraphPad Software, San Diego, CA, USA).

3. Results

One hundred five deliveries occurred before 28 weeks of gestation at our department in the study period (0.9% of all births). Twenty-one cases were excluded from the analysis (9 stillborns, 4 structural or genetic anomalies and 8 no complete records). The remaining 84 cases fulfilled all inclusion criteria and were considered for this study (Table 1).

The primary causes of premature birth were idiopathic preterm labour with intact membranes (36.9% of cases), preterm premature rupture of membranes (25%) and maternal or fetal indications in 38.1% of cases. Vaginal birth occurred in 39 cases (46.4%) whereas CS was performed before labour in 19 cases (22.6%) for fetal/maternal indication. Twenty-six CS were performed during labour

Table 1

Demographic and clinical outcomes of the study population.

	Vaginal delivery	Caesarean section		
		Before labour	Latent phase	Active phase
Number of patients	39	19	14	12
Age (years; mean and SD)	33.6 4.9	32.5 5.6	30.5 6.0	31.8 5.4
Gestation (weeks; mean, median, and SD)	25.4 26 1.7	26.2 26 1.3	25.9 26 1.1	26.7 26 1.0
Birth weight (g; mean and SD)	873.2 241.1	710.5 272.4	763.9 194.4	918.2* 224.1

* $p < 0.05$.

Table 2

Indication for caesarean section. In some cases, multiple indications were reported.

	Before labour	Latent phase	Active phase
Number of patients	19	14	12
Abnormal CTG	3	7	3
Abruptio placentae	1	3	1
Anhydramnios	3	1	1
HELLP syndrome	3	–	–
IUGR	4	–	1
Placenta previa	1	–	1
Preeclampsia	4	1	1
Other indications	1	2	4

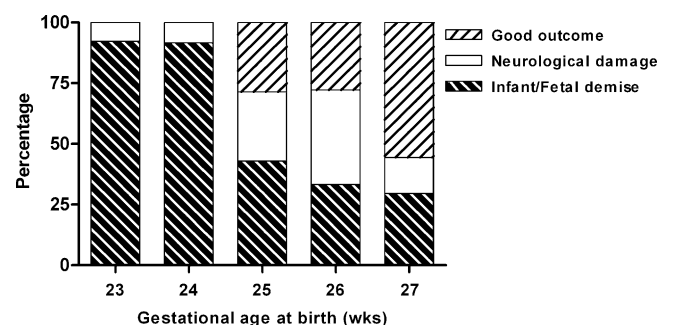


Fig. 1. Clinical outcomes at 18 months of life according to gestational age (complete weeks of gestation) at birth. Cases with impairment without disability were enclosed in good outcomes.

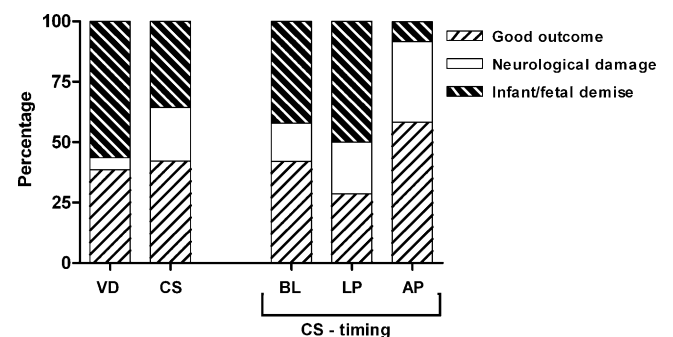


Fig. 2. Clinical outcomes at 18 months of life after stratification by mode of delivery (on the left-hand side) and timing of cesarean section (on the right-hand side). Cases with impairment without disability were enclosed in good outcomes. List of abbreviations: VD, vaginal delivery; CS, cesarean section; BL, before labor; LP, latent phase of labor; AP, active phase of labor.

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