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Neonatal respiratory morbidity in twins versus singletons after elective prelabor caesarean section

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ABSTRACT

Objective: To compare the rate of neonatal respiratory morbidity in singletons versus twins delivered by pre-labour caesarean section.
Study design: Uncomplicated pregnancies delivered by prelabor caesarean section at 34 + 0 to 37 + 6 weeks' gestation were retrospectively selected. For both singletons and twins caesarean delivery was undertaken electively only after amniocentesis and if the lecithin/sphingomyelin ratio was ≥2. Neonatal respiratory morbidity was compared in twins versus singletons.
Results: 241 singletons and 100 twin neonates were included. Overall neonatal respiratory morbidity was comparable between the two groups (25/241 (11.7%) versus 7/100 (7%), $p = .331$). Between 34 + 0 and 36 + 6 weeks, however, the risk was higher among singleton than twins (15/46 (32.6%) versus 6/72 (8.3%), $p < .001$). At multiple regression, dichorionicity, gestational age at delivery ≥37 weeks and female sex independently decreased the risk of neonatal respiratory morbidity.
Conclusion: The risk of neonatal respiratory morbidity after elective caesarean section seems lower among twins, especially prior to 37 + 0 weeks.

1. Introduction

A high incidence of neonatal respiratory morbidity in singleton infants born by prelabor elective caesarean section has been widely reported in recent years [1–4]. The risk of respiratory disorders seems to be strictly influenced by gestational age at delivery, being consistently described if abdominal delivery is performed prior to 39 completed weeks of gestation [2,3,5,6].

The pathogenic mechanism is still unclear but the risk of respiratory disorders does not seem to be related only to the achievement of surfactant production, as significant morbidity is reported to occur among foetuses electively delivered after 34 weeks despite demonstration of an adequate lecithin/sphingomyelin (L/S) ratio (≥2).

In the light of these findings, the policy of deferring the timing of elective caesarean section up to 39 weeks is now strongly recommended for uncomplicated singleton pregnancies, whereas the option of betamethasone administration for elective abdominal deliveries before that stage is suggested by many and is under investigation [7].

Among twin pregnancies the prevalence of planned caesarean deliveries prior to 39 weeks is usually high, and particularly for the monochorionic subtype the option of a preterm scheduled delivery is preferred by some [8,9]. The incidence of respiratory morbidity, however, among twins delivered by preterm elective caesarean section has not been thoroughly investigated. The purpose of our study is to compare the rate of neonatal respiratory morbidity in singletons versus twins delivered by preterm prelabor caesarean section.

2. Materials and methods

The archives of our university hospital were retrospectively searched for all uncomplicated singleton and twin gestations delivered by elective prelabor caesarean section from 34 + 0 to 37 + 6 completed weeks of gestation in the period 2006–2010.

Cases were excluded from the study group with any of the following: triplet or higher order pregnancy, spontaneous occurrence of labour or premature rupture of membranes prior to caesarean section; chronic hypertension, obstetric complications including preeclampsia, gestational hypertension, diabetes,

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Table 1
Indication for caesarean section in singletons.

	N = 241 (%)
Previous uterine surgery	140 (58)
≥2 caesarean section	52 (21.5)
Classical caesarean section	35 (14.5)
Transmural myomectomy	53 (21.9)
Asymptomatic placenta previa or vasa previa	44 (18.2)
Maternal anxiety or neurologic disorders	35 (14.5)
Previous intrauterine foetal death	9 (4)
Maternal neoplasm	13 (5.3)

cholestasis, antepartum haemorrhage due to placenta previa or placental abruption, smoking habit or drug consumption, birthweight below the 10th centile or birthweight discordance ≥20% in twins, twin to twin transfusion syndrome in monochorionic twins, congenital anomalies or neonatal disease confirmed after birth, and monoamniotic pregnancy.

The following variables were considered for each case in the study group: gestational age at delivery, assisted conception, maternal exposure to betamethasone. Betamethasone administration had been carried out by the treating physician as a preventive measure, in the absence of clinical evidence of impending delivery. For twins, chorionicity was also considered and was ascertained from the first trimester ultrasound report

The indications for elective prelabor caesarean section in singletons are listed in Table 1. For twin gestation the indication for elective abdominal delivery was represented by the twin gestation itself, in accordance with parental request and irrespective of foetal presentation. In this series, both for singleton and twin gestation, the documentation of foetal lung maturity by amniocentesis was carried out only when elective caesarean section was scheduled prior to 37 + 0 weeks. In twins, a single amniotic sac was sampled. An L/S ratio ≥2 was used as the threshold value of foetal lung maturity. If the L/S ratio was <2 amniocentesis was repeated after 7 days if gestational age was below 37 weeks and caesarean delivery was performed only if the L/S ratio was above the threshold value.

The following outcome variables were considered for each case and compared between singleton and twin neonates: gender, birthweight (BW), 1- and 5-min Apgar score (AS), umbilical artery pH and base excess, occurrence of respiratory distress in delivery room, admission to neonatal intensive care unit (NICU), occurrence of composite respiratory morbidity including respiratory distress syndrome (RDS), neonatal transient tachypnoea (TTN) or persistent pulmonary hypertension of the newborn (PPHN); hours on nasal continuous positive airway pressure (nCPAP), days from birth until discharge, and complications (air leak syndromes).

Respiratory distress was defined by the presence of at least one of the following symptoms beyond primary stabilisation in delivery room: persisting tachypnoea or dyspnoea, nasal flaring, retraction, grunting, need of oxygen supplementation to reach a peripheral saturation of 94–99%. RDS was defined by the requirement for respiratory support such as nCPAP or mechanical ventilation (MV) and surfactant administration. TTN was defined as the requirement of oxygen therapy and/or respiratory assistance after birth without clinical, laboratory and radiologic signs of any other cause of respiratory distress. PPHN was defined as the presence of a supra-systemic pulmonary vascular resistance causing right-to-left shunting through the ductus arteriosus and/or foramen ovale documented by echocardiography and need for 100% oxygen and/or inhaled nitric oxide.

The present study was planned with the aim of comparing the rate of respiratory morbidity between singleton and twin neonates delivered by elective prelabor caesarean section. For an expected overall incidence of composite respiratory morbidity of 30% among twins [10] and 10% among singleton [11], we needed to study at least 92 subjects in each arm to be able to reject the null hypothesis that the failure rates for experimental and control subjects are equal with probability (power) .9. The type 1 error probability associated with the test of this null hypothesis was .05. We used a continuity-corrected chi-squared or Fisher's exact test to evaluate this null hypothesis.

Continuous variables are reported as means and standard deviations (SD) or median with range if not normally distributed. Differences between normally distributed data were evaluated by Student's *t*-test, whereas not-normally distributed data were compared with the Mann–Whitney test. A two-tailed value of P less than .05 was considered significant. The significance of proportional differences in frequencies was determined by using chi-squared statistic or Fisher's exact test as appropriate. The statistical analysis was undertaken using SPSS™ for Windows version 13 software (SPSS, Chicago, IL, USA).

Univariate and multivariable logistic regression analysis were performed to define independent predictor factors and also to identify the relative effect in increasing this risk (odd ratio).

3. Results

In the study period, 241 singleton and 50 twin pregnancies submitted to elective prelabor caesarean section were selected from the archives of our delivery room using the above-mentioned inclusion criteria. In two twin and six singleton gestations, amniocentesis was repeated after 7 days because the first L/S ratio was <2 and gestational age was still below 37 completed weeks. In all cases, the new L/S ratio turned >2 and elective caesarean delivery was performed on the following day.

Demographic and pregnancy characteristic of the singleton and twin gestations are summarised in Table 2. Patients were comparable for all variables with the exception of a lower parity, a higher incidence of assisted reproduction (17/50 (34%) versus 18/241 (7.5%), $p < .0001$) and antenatal betamethasone administration (7/50 (14%) versus 11/241 (4.6%), p .002) among twin gestations. Overall gestational age at prelabor elective delivery (36.0 ± .9 weeks versus 36.8 ± .5 weeks, $p < .0001$) and birthweight

Table 2
Demographic and pregnancy characteristic of singleton and twin gestations.

	Singleton gestation (N = 241)	Twin gestation (N = 50)	P
Maternal age (mean ± SD)	35.3 (4.9) year	35.7 (4.4)	.483
Maternal BMI (mean ± SD)	27.5 (6.1)	28.2 (4.3)	.152
Caucasian ethnicity	221 (91.7)	45 (90%)	.255
Nulliparity	54 (22.4%)	21 (42.0%)	.000
Medical assisted reproduction	18 (7.5%)	17 (34.0%)	.000
Antenatal steroids administration	11 (4.6%)	7 (14%)	.002
Gestational age (±SD) at delivery	36.8 (.5) weeks	36.0 (.9)	.000
Male sex	118 (48.9%)	55 (55%)	.310
Birthweight (mean ± SD)	3034 (388) g	2572 (307)	.009