The influence of the mode of anaesthesia in the incidence of neonatal morbidity after an elective caesarean section

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Summary

Purpose of investigation: We conducted a study of all the cases of elective caesarean section over a three-year period from 1 July 2001 to 30 June 2004, with the aim to compare general, epidural and spinal anaesthesia in respect to the incidence of neonatal respiratory morbidity.

Methods: It is an area-based retrospective study of all mothers who underwent elective caesarean section and delivered singleton infants at term gestation. Neonatal respiratory morbidity was recorded and compared between infants delivered with different anaesthetic techniques for caesarean section and those delivered vaginally.

Results: The rates of documented respiratory morbidity did not relate significantly to the anaesthesia mode (p > 0.05). Infants who were delivered at term by elective caesarean section were more likely to have respiratory problems than those who were delivered vaginally (8.1% vs 1.3%), p < 0.001.

Conclusion: The different anaesthesia techniques in elective caesarean section do not seem to influence neonatal respiratory morbidity.

Key words: General, epidural, spinal anaesthesia; Neonatal respiratory morbidity; Elective caesarean section.

Introduction

There has been an increase in caesarean section rate in developed countries over the past 20 years. The World Health Organisation estimates that the rate of caesarean section is between 10% and 15% of all births in developed countries compared to 22% (2003) in the United Kingdom and 23% in the United States; in 2003 the Canadian caesarean section rate was 21% with regional variations. This may be the result of changing practice in the management of previous caesarean and breech presentation as well as an increased choice for women. This increase includes some women who opted for caesarean section at socially convenient times, without medical reasons [1].

Significant respiratory morbidity is reported after elective caesarean section (ECS) delivery even if at term, reflecting the importance of labour in neonatal adaptation [2, 3]. Various mechanisms have been proposed to explain neonatal respiratory distress after ECS delivery including retained lung fluid and lack of the catecholamine surge that occurs during labour and by surfactant deficiency [4, 5].

Over the last two decades the quality and the choice of general and regional anaesthesia for caesarean section have improved significantly. In the past, general anaesthesia was the best technique of choice due to its relatively rapid onset [6]. In modern practice, general anaesthesia for caesarean section is becoming increasingly rare. Spinal and epidural techniques have been found to provide effective anaesthesia for caesarean section. Both techniques are associated with moderate degrees of maternal satisfaction. Spinal or epidural anaesthesia allows the mother to be awake, minimizes maternal aspiration problems and significantly prevents neonatal depression associated with general anaesthesia [7]. There are however concerns regarding this mode of regional anaesthesia about foetal safety because of sympathetic blockade-induced hypotension leading to sometimes dangerously lower uteroplacental perfusion. In contrast to regional anaesthesia, general anaesthesia has the advantages of faster induction, less hypotension, less cardiovascular instability, and better control of the airway and ventilation [8]. The incidence of respiratory distress, at term, is much higher in elective caesarean than in vaginal delivery [9]. Other risk factors for respiratory distress include gestational age, mode of delivery, male sex, foetal asphyxia, maternal asthma or diabetes, and type of anaesthesia given during delivery (general, regional) [9-12].

The purpose of this study was to assess the possible consequences of different anaesthetic techniques in elective caesarean sections that may affect neonatal respiratory outcome.

Population and Methods

The population included 209 mothers and their term infants born by elective caesarean section between July 1st 2001 and June 30th 2004. The gestational age was carefully cross-validated against antenatal information including at least one ultrasound assessment in the first half of pregnancy.
Entrusted in our study were all cases of elective caesarean section (ECS) with uncomplicated singleton cephalic pregnancies by obstetric estimate and clinical maturation assessment after 37 weeks of gestation and birth weight ≥ 2500 g. Pregnancies with foetal malformations or chromosomal aberrations were excluded. Also excluded were mothers with any obstetric or medical complications such as ruptured membranes, precluding labour, hypertension, preclampsia, foetal distress, signs of maternal infection, diabetes or asthma. During the three-year study period, mothers who delivered by elective caesarean section and delivered singleton infants at term gestation were identified.

Anaesthesia was performed by qualified anaesthetists. Three techniques of anaesthesia were used: general, spinal and epidural. Maternal request for general anaesthesia and/or refusal of regional anaesthesia was the main reason for general anaesthesia. General anaesthesia was also performed when intraoperative haemorrhage and/or prolonged surgery was anticipated.

A qualified neonatologist attended each delivery and assessed Apgar’s scores. The diagnosis of respiratory morbidity included Respiratory distress syndrome (RDS) and transient tachypnoea (TT), and was based on the presence of clinical symptoms of respiratory distress such as tachypnoea (more than 60 breaths per minute with grunting, recession, or nasal flaring, and cyanosis). CXR findings included the radiological features of transient tachypnoea of the newborn or the reticular glandular pattern of RDS. To provide baseline rates of neonatal respiratory problems and interventions within our practice, a cohort of 1,083 mothers and their infants delivered in the same study period, by routine singleton, uncomplicated vaginal deliveries at ≥ 37 weeks of gestation by obstetric estimate, was selected. (control group). Assessment of the severity of neonatal respiratory morbidity was based on length of hospital stay in the Neonatal Internal Care Unit (NICU), need for oxygen therapy or greater respiratory support (mechanical ventilation).

The data were analysed by the chi square test and in particular Fisher’s test. One-way ANOVA and multiple comparisons, Tukey’s and Mann-Whitney U-tests, were used as required. A value of p < 0.05 was considered significant.

Results

During the three-year period 209 elective caesarean sections after 37 weeks of pregnancy and 1,083 vaginal deliveries of singleton uncomplicated pregnancies at term were identified.

General anaesthesia was employed in 166 expectant mothers (79.5%), spinal in 21 (10%) and epidural in 22 (10.5%). Maternal request accounted for the use of general anaesthesia in 87.3% (145/166) and failure of regional anaesthesia (spinal and/or epidural) in 9.0% (15/166) of all elective caesarean sections. Maternal age and mean gestational age were not significantly different among the general anaesthesia, spinal and epidural groups (p > 0.05) (Table 1).

Infants whose mothers received general anaesthesia had similar birth weights (p > 0.05) but lower Apgar’s scores at one and five minutes (p < 0.001). The length of hospital stay was also similar between the three groups (Table 1).

Seventeen newborns (8.1%) were admitted to the NICU for acute respiratory disorders, 14 of them (6.6%) for transient tachypnoea and three (1.4%) for RDS. Of these seven infants (41.2%) received general, four (23.5%) epidural and 6/17 (35.29%) spinal anaesthesia.

There was no difference in respiratory morbidity between neonates born to mothers given general anaesthesia and those born to mothers given regional anaesthesia (spinal, epidural (p > 0.05) (Table 2). Respiratory morbidity in our study was not related to gestational age ($\chi^2 = 0.912$).

Newborns delivered by elective caesarean section at term (17/209) are at increased risk for developing respiratory disorders compare with those born vaginally (14/1083), p < 0.001 (Table 3).

Discussion

Respiratory distress syndrome in term or near-term babies after elective caesarean section has existed in a variety of populations over the last decades [13]. Morrison et al. reported an incidence of respiratory distress with at least oxygen requirement after caesarean section of 0.83% for term babies (> 37 weeks of gestation), which rises to 1.3% when carried out before onset of labour with an odds ratio (OR) of 6.8 compared to the risk after vaginal delivery at term. These authors demonstrated an increase in RDS with decreasing gestational age from 41 to 37 weeks, with a special increase of risk before the 40th week of gestation [9].
Some authors have included general anaesthesia as the risk factor for poorer immediate neonatal outcomes. In 1999, Kolatat et al. evaluated the effects of general and regional anaesthesia on neonates and found that Apgar scores of the infants whose mothers received general anaesthesia were lower than those of infants whose mothers received regional anaesthesia [14]. Respiratory morbidity in our study was defined as any degree of respiratory distress. The majority of the neonates suffered from transient tachypnea (14/17, 82.3%). This neonatal respiratory disorder usually has a benign clinical course; however, more severe complications have been noticed. The results of our study do not confirm the findings of other authors that, respiratory morbidity in term infants is related to gestational age [14-16]. This finding may be due to the prophylactic use of corticosteroids in all elective caesarean sections.

Although our patient population is not large enough to draw definite conclusions about respiratory morbidity our primary results have shown that the clinical short-term outcome of the infants was similar in the neonates born by general, spinal or epidural anaesthesia. Previous studies have also reached the same conclusions suggesting that the technique of anaesthesia did not influence the neonatal short-term outcome [16].

Maternal request accounted for the use of general anaesthesia in 69.4% of all elective caesarean sections. Given the relative safety of epidural and spinal anaesthesia for caesarean delivery, such an indication for general anaesthesia may appear medically unacceptable [17,18]. While it is important to discuss the risks and benefits of all anaesthetic options with patients during their preoperative assessment, the time available for a thorough discussion may be limited. In order for expectant mothers to be better informed, an antenatal education program is clearly needed [19,20]. Previous experiences with childbirth and emotional factors may influence a patient’s choice of anaesthesia. When such patients are encountered during the preoperative assessment, efforts to allay their anxieties and address their concerns may result in better acceptance of epidural or spinal anaesthesia [21,22]. Finally our results document the increased neonatal respiratory morbidity associated with an elective caesarean section [23-25].

In conclusion, our retrospective study suggests that general anaesthesia is not included as risk factor for increased neonatal respiratory morbidity. General anaesthesia still has a significant role in the provision of rapid surgical anaesthesia for urgent deliveries. On the other hand it seems that both spinal and epidural anaesthesia can be used in elective term caesarean sections without any risk for the newborn. Finally, term infants delivered by elective caesarean section continue to be at increased risk for respiratory problems compared with those born vaginally.

References


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