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Use of epidural analgesia and its relation to caesarean and instrumental deliveries—a population-based study of 94,217 primiparae

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Abstract

Objectives: To investigate the association between epidural analgesia for labour-pain relief and mode of delivery.
Study design: The Swedish medical birth register covers 99% of all births and contains prospectively collected information from all delivery units in Sweden. The present population-based cohort study includes singleton births among nulliparae during 1998–2000, excluding deliveries with elective caesarean section, giving study population of $n = 94{,}217$.

The frequencies of epidural block in this population were estimated for each delivery unit. The outcomes studied were non-elective caesarean section and instrumental delivery.
Results: There was no clear association between frequency of epidural block and caesarean section and instrumental delivery, respectively. Delivery units with the lowest (20–29%) and the highest (60–64%) relative frequencies of epidural block had the lowest proportion of caesarean section (9.1%). For the other groups the proportion varied between 10.3 and 10.6%. Instrumental deliveries were most common, 18.8%, in delivery units with 50–59% frequency of epidural block use. The lowest incidence (14.1%) was in units using epidurals in 30–39% of cases. In the other groups (20–29, 40–49 and 60–64%) the proportion varied between 15.3 and 15.7%.
Conclusions: This investigation shows no clear association between epidural use and caesarean section or instrumental delivery, indicating that there is no reason to restrict the epidural rate to improve obstetric outcome.

Keywords: Epidural; Caesarean section; Instrumental delivery; Obstetric outcome

1. Introduction

Ever since epidural analgesia was introduced in labour-pain relief there has been controversy about the relation between its use and the incidence of caesarean section and instrumental delivery. Epidural analgesia has increased over the last 10 years in Europe and the United States. The rates of caesarean section and instrumental delivery have also escalated over the same period. The relationship between epidural analgesia and mode of delivery is, however, complex.

The epidural technique has developed tremendously over the past decade. Early studies show a prolonged course of labour when using epidural [1,2]. The introduction of low-dose techniques has reduced this influence on obstetric outcome [3–6].

Epidural is the only analgesic method with a proven positive effect on the intensity of labour-pain. We postulate that the modern epidural technique is now becoming safe enough to allow it to be considered as the method of choice for parturients in need of pain relief. A randomised clinical study giving the final answer to this question is however problematic to perform, because of risk of selection bias, cross-over, 'blinding' problems and non-comparable analgesic methods [7].

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An alternative approach is a population-based study.

The unique population-based Swedish medical birth register, covering 99% of all deliveries in Sweden, include prospectively collected information on labour analgesia and mode of delivery for every parturient. Use of this register has enabled us to perform a large population-based study seeking to examine the association between the frequencies of epidural block and mode of delivery. By investigating the different epidural frequencies at institutional level, instead of an individual level, the risk of selection bias is avoided. We also studied the level of care at the delivery hospital.

No presentation of this approach to this issue has been published elsewhere.

2. Methods

2.1. Study population

The Swedish medical birth register held at the National Board of Health and Welfare, covers 99% of all births in Sweden [8,9]. The register is based on copies of the medical records used at all antenatal care clinics, delivery units and at neonatal examinations. Starting with the first antenatal visit, information is collected prospectively for all births and includes pain relief and complications during delivery.

Between 1998 and 2000, 261,414 births were recorded. We restricted the present study to singleton live births among nulliparae in Sweden. Deliveries with elective caesarean section were excluded, as were preterm deliveries (before 37 completed weeks of gestation), because of uncertainty regarding the coding of elective versus non-elective caesarean sections. The study population included deliveries after 37 weeks of gestation starting spontaneously or with induction ($n = 94{,}217$).

This study was approved by the local ethics committee at the Karolinska Institute.

2.2. Definition of variables

Information on pain relief during delivery is recorded in the register from check-box information in the delivery record. The frequencies of epidural block in this population were estimated for each delivery unit ($n = 52$) and the information was categorised in five groups (percentage intervals 20–29, 30–39, 40–49, 50–59 and 60–64). Each delivery hospital was also categorised according to level of care [10]: level III – tertiary hospitals with full resources for obstetric and neonatal intensive care; level IIa – county hospitals with full resources for neonatal intensive care; level IIb – hospitals with resources for basic neonatal care; level I – hospitals with obstetric services, but without paediatric departments.

The outcomes studied were non-elective caesarean section and instrumental delivery. Information on caesarean section, vacuum extraction and use of forceps is also recorded as a diagnosis and an operation according to the Swedish version of the International Classification of Diseases and the Classification of Surgical Procedures. All deliveries starting spontaneously or with induction that ended with a caesarean section according to the check-box information were categorised as caesarean. All deliveries with information from diagnoses or operations indicating instrumental delivery were coded as such unless the delivery ended with a caesarean section.

2.3. Statistical analysis

The independent variable, relative frequency of epidural block, was treated categorically. We also combined information on this variable with information on level of care. All deliveries were grouped according to the frequency of epidural block used at each specific hospital and also to care level. For each subgroup we calculated the proportion of caesarean sections and instrumental deliveries, respectively, with 95% confidence intervals.

Odds ratio with 95% confidence limits for caesarean section and instrumental delivery were estimated with delivery wards giving 40–49% of the women epidural block as the reference group.

3. Results

Between 1998 and 2000, 94,217 deliveries, starting with induction or spontaneously, to nulliparae giving birth to a single term infant, were reported to the Swedish medical birth register. About 70% of the deliveries took place on delivery units giving at least 40% of the women epidural block. Another 24% were delivered at clinics giving epidural block to 30–39% of the women. Less than 6% of the women gave birth at a delivery unit giving less then 30% epidural block. Most deliveries, 40%, took place at delivery units giving 40–49% of the women epidural block ($n = 37{,}985$) (Table 1). In all, 9699 (10.3%) of the deliveries ended in a non-elective caesarean section. Instrumental delivery was performed in 14,599 (16%).

There is no association between hospital relative frequency of epidural block and non-elective caesarean section. The lowest proportions of caesarean sections (9.1%) were found in delivery units with the lowest (20–29%) and the highest (60–64%) relative frequencies of epidural block, with odds ratio (OR) of 0.84 (95%CI = 0.77–0.93) and 0.85 (95%CI = 0.77–0.93), respectively. For the other groups (30–39, 40–49 and 50–59%) the proportion of deliveries ending in non-elective caesarean section varied between 10.3 and 10.6%, with no statistical difference.

There was no clear relationship between hospital relative frequency of epidural block and instrumental delivery. Instrumental deliveries were most common, 18.8%, in delivery units with 50–59% of the deliveries having epidural block, with an OR = 1.23 (95%CI = 1.18–1.29) compared to