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Uterine rupture without previous caesarean delivery: a population-based cohort study

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ABSTRACT

Objective: To determine incidence and patient characteristics of women with uterine rupture during singleton births at term without a previous caesarean delivery.
Study design: Population based cohort study. Women with term singleton birth, no record of previous caesarean delivery and planned vaginal delivery ($n = 611,803$) were identified in the Danish Medical Birth Registry (1997–2008). Medical records from women recorded with uterine rupture during labour were reviewed to ascertain events of complete uterine rupture. Relative Risk (RR) and adjusted Relative Risk Ratio (aRR) of complete uterine rupture with 95% confidence intervals (95% CI) were ascertained according to characteristics of the women and of the delivery.
Results: We identified 20 cases with complete uterine rupture. The incidence of complete uterine rupture among women without previous caesarean delivery was about 3.3/100,000 deliveries. Multiparity (RR 8.99 (95% CI 1.86–43.29)), induction of labour (RR 3.26 (95% CI 1.24–8.57)), epidural analgesia (RR 10.78 (95% CI 4.25–27.39)), and augmentation by oxytocin (RR 9.50 (95% CI 3.15–28.63)) were associated with uterine rupture. Induction of labour was not significantly related to uterine rupture when adjusted for parity, epidural analgesia and augmentation by oxytocin.
Conclusion: Although uterine rupture is rare, its association with epidural analgesia and augmentation of labour with oxytocin in multipara should be considered. Thus, vigilance should be exercised when labour is obstructed and there is need for epidural analgesia and/or augmentation by oxytocin in multiparous women. Due to the rare occurrence of uterine rupture caution should be exerted when interpreting the findings of this study.

Introduction

In high-income countries, uterine rupture occurs overwhelmingly among women with previous caesarean delivery who attempt a trial of labour in a subsequent pregnancy. The incidence varies from 0.22% to 0.78% [1–3]. In a nationwide prospective cohort study from the Netherlands an incidence of uterine rupture among women without a history of caesarean delivery of 0.007% was reported [4]. Similar incidence was reported from the United Kingdom [5] and the United States [6].

Clinically, uterine rupture is usually defined as either a complete rupture with a direct communication between the uterine cavity and the peritoneum, or a partial rupture (dehiscence) in which a defect in the myometrium is covered by the visceral leaf of peritoneum with no involvement of fetal membranes and no intra-abdominal haemorrhage. While the former is associated with very high perinatal mortality and morbidity, the latter is often an incidental finding at elective caesarean delivery and usually without medical complications [7,8].

The aim of our study was to estimate the incidence and describe the characteristics of women with complete uterine rupture (as defined above) during labour in Denmark in singleton births at term without previous caesarean delivery.

Materials and methods

The Danish Medical Birth Registry (DMBR) contains data on all deliveries in Denmark among women who were Danish citizens at the time of delivery. Since 1995, data in the DMBR have been retrieved electronically from the Danish National Patient Registry,

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in which virtually all discharge diagnoses for hospitalizations in Denmark are recorded [9]. Diagnoses regarding pre-pregnancy risk factors, medical diseases, and complications and interventions during pregnancy and delivery are recorded by codes according to the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) [10] and the Nordic Medico-statistical Committee (NOMESCO) classification of surgical procedures [11].

This retrospective population based cohort study was based on data from the DMBR from January 1, 1997 to December 31, 2008. During the study period, 705,871 women had a singleton birth in hospital, among them 643,346 women had no record of a previous caesarean delivery, and 611,803 women planned a vaginal delivery.

During the study period 100 women without a history of caesarean delivery and a singleton birth at term had an ICD-10 diagnosis of uterine rupture during labour in the DMBR. Medical records with information on both the current labour and all previous pregnancies (if any) from all women were requested from the relevant gynaecologic and obstetric departments in Denmark. The medical records were reviewed, and cases in which the diagnosis of uterine rupture and no previous caesarean delivery was confirmed were included in the study.

From the sample of women with a confirmed uterine rupture and no history of caesarean delivery individual information on pre-pregnancy risk factors, complications during pregnancy and delivery and information on subsequent pregnancies (if any) was entered into a database by Dorthe Thisted and validated by Lone Krebs. Subsequently the data were compared to the cohort of women in the DMBR with singleton term deliveries without previous caesarean delivery. The background population was all women with a singleton delivery at term, no history of caesarean section, planned vaginal delivery and no complete uterine rupture during the study period. Data on the background population were collected from the DMBR and regarding ethnicity from the publically available data from STATBANK, provided by *Statistics Denmark* (www.dst.dk) [12].

The recording of augmentation by oxytocin and use of epidural during labour was not valid in the DMBR before year 2000. Useful individual based data from the background population were therefore only available from the time period of January 1, 2000 to December 31, 2008. In that period 450,147 women had planned vaginal delivery of a singleton term infant and no recording of a previous caesarean delivery. Data were analysed using STATA 12.1.

Risk Ratios (RR) with 95% confidence intervals (95% CI) were calculated by use of marginal two-by-two contingency tables. Adjusted Relative Risk Ratios (aRR) were calculated by a multivariable logistic regression analysis adjusting for parity and labour characteristics; use of epidural, augmentation by oxytocin and induction of labour. Two-sided p values <0.05 were considered statistically significant.

The study followed the STROBE guidelines and was approved by the Danish Data Protection Agency (Record number: 2008-41-2256). Initial approval on May 23st 2008, extended approval on July 21st 2014 (Record number: 2014-41-3289). Also approved by the Danish National Board of Health (Record number: 3-3013-168/1). Approval date September 7th 2012.

Results

We received 95 (95%) of the requested 100 medical records from the women recorded in the DMBR with a uterine rupture without previous caesarean delivery. The remaining five records had been destroyed due to either 10 years of inactivity ($n = 3$) or due to damage after a rainstorm ($n = 2$). Of the remaining 95 medical records available, 28 had actually had a uterine rupture without a history of caesarean delivery – 20 complete uterine ruptures, and eight partial uterine ruptures. Among the remaining 67 women, 48 had no uterine rupture and 19 women had a uterine rupture but also a previous caesarean not recorded in the DMBR.

Bearing in mind that not all uterine ruptures may have been reported to the DMBR in the group without a history of previous caesarean section ($n = 611,803$ women), the incidence of complete and incomplete uterine rupture was 4.5/100,000 deliveries, and the incidence of a complete uterine ruptures 3.3/100,000 deliveries.

The perinatal morbidity and mortality were unaffected when a partial uterine rupture complicated labour. All eight children had an Apgar score of ≥ 7 at 5 min. Umbilical artery-pH was available for five of the children and was all above 7.10. None of the children were admitted to neonatal care unit. The maternal and perinatal outcome when a complete uterine rupture complicated labour is presented in Table 1 (Table 1). None of the children were diagnosed with any congenital malformations. All of the children who died either perinatally or within the 1st year of life suffered from severe asphyxia, indicating that the causes of death were related to the uterine rupture.

None of the 20 women with a complete uterine rupture during trial of vaginal delivery at term had a diagnosis of endometriosis. One woman had a bicornual uterus. She had had an uneventful previous pregnancy and vaginal delivery at term. Another woman had had a corneal resection due to an interstitial pregnancy, and in the following pregnancy she had a complete uterine rupture at the site of resection. Mode of delivery, locations of the uterine ruptures and the possible relation to previous surgery are displayed in Table 2.

The analysis of risk factors in pregnancy and in labour (Table 3) includes the 19 women, with a complete uterine rupture during trial of vaginal delivery, and no close relation between site of uterine rupture and prior gynaecological surgery.

As valid data regarding epidural analgesia and augmentation by oxytocin were not available in the DMBR before year 2000 data on the background population include all women from the period of

Table 1
Maternal and fetal outcome in 20 deliveries complicated by a complete uterine rupture in women with a singleton pregnancy at term and no history caesarean delivery. Denmark 1997–2008.

Fetal outcome	Complete uterine rupture	
Short term mortality	$N = 20$	%
Stillborn	1	5.0
Death 1st week	1	5.0
Death 1st year	3	15.0
Alive after 1st year	15	75.0
Short term morbidity	$N = 19$	%
Umbilical artery pH < 7.0	9	47.4
Apgar < 7 at 5 min	6	31.6
Umbilical artery pH < 7.0 or Apgar < 7 at 5 min	11	55.0
Missing data	1	5.0
Long term morbidity (alive after 1st year)	$N = 15$	%
Normal	8	53.3
Disabled	3	20.0
Missing data	4	26.7
Maternal outcome	$N = 20$	%
Mortality	0	0.0
Need for blood transfusion	12	60.0
Need for ≥5 units Red Blood Cells	5	25.0
Hysterectomy	2	10.0