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Prediction of scar integrity and vaginal birth after caesarean delivery

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A statistically significant association with uterine rupture during a trial of labour after caesarean delivery was found in at least two studies for the following variables: inter-delivery interval (higher risk with short interval), birth weight (higher risk if 4000 g or over), induction of labour (higher risk), oxytocin dose (higher risk with higher doses), and previous vaginal delivery (lower risk). However, no clinically useful risk estimation model that includes clinical variables has been published. A thin lower uterine segment at 35–40 weeks, as measured by ultrasound in women with a caesarean hysterotomy scar, increases the risk of uterine rupture or dehiscence. No cut-off for lower uterine segment thickness, however, can be suggested because of study heterogeneity, and because prospective validation is lacking. Large caesarean hysterotomy scar defects in non-pregnant women seen at ultrasound examination increase the risk of uterine rupture or dehiscence in subsequent pregnancy, but the strength of the association is unknown. To sum up, we currently lack a method that can provide a reliable estimate of the risk of uterine rupture or dehiscence during a trial of labour in women with caesarean hysterotomy scar(s).

Introduction

Uterine rupture is a rare but serious complication of a trial of vaginal birth after caesarean delivery.[1–3] Therefore, vaginal birth after caesarean delivery should be proposed only to women who are likely to have a low risk of uterine rupture. Is it possible to identify these women? A number of clinical factors might be important as well as the integrity of the hysterotomy scar and the thickness of the lower uterine

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segment assessed by imaging techniques. A simple and easily available imaging technique to use for this purpose is ultrasound. Possibly, ultrasound assessment of the hysterotomy scar or of the whole lower uterine segment could be used alone or in combination with clinical factors to estimate the likelihood of uterine rupture or dehiscence occurring spontaneously or during a trial of labour. Current evidence on our ability to predict uterine rupture or dehiscence using ultrasound or clinical variables is limited, and is summarised below.

Frequency of uterine rupture after caesarean delivery

We do not know for sure how common uterine rupture is after caesarean delivery. In retrospective studies, the rate of uterine rupture during a trial of labour after caesarean delivery is around 1%.[3–10] These studies seem to have included only symptomatic uterine rupture. In prospective studies in which women, who had the thickness of their lower uterine segment measured with ultrasound, were followed up with regard to pregnancy outcome, the rate of uterine rupture or dehiscence is on average 6.6% (range 1–46%).[11] The prospective studies include complete uterine rupture, uterine dehiscence, and diagnoses made at elective caesarean, not just rupture occurring during a trial of labour. In an ordinary clinical setting, it is unlikely that all these cases would have been assigned an International Classification of Diseases code indicating uterine dehiscence or rupture. In a prospective observational study by Rozenberg et al.,[12] uterine rupture and uterine dehiscence were diagnosed either at caesarean section or by uterine exploration after vaginal delivery; the latter was carried out in all women who gave birth vaginally. The frequency of uterine rupture after caesarean delivery was 2.3% and that of uterine dehiscence 1.6%, for a total frequency of 'uterine defect' of 3.9%.

Some might argue that only symptomatic uterine rupture (in all likelihood resulting in an International Classification of Diseases code in the patient's record) is clinically important, whereas asymptomatic dehiscence or rupture diagnosed at emergency caesarean delivery is clinically unimportant. I disagree. Whether a uterus with a dehisced caesarean hysterotomy scar (or with an extremely thin myometrium in the scar area) will proceed to rupture is likely to depend on the management of labour and on the timing of caesarean delivery.

Uterine rupture before start of labour is extremely rare.[13] Vaknin et al.[13] reported uterine rupture to occur before start of labour in seven of 120,636 (i.e. in one in 17,234) pregnancies 22 gestational weeks or over. In five of the seven cases, the woman had a caesarean hysterotomy scar. Rupture of an unscarred uterus is also rare.[14] Miller et al.[14] reported rupture of an unscarred uterus during labour in 10 out of 168,491 (i.e. in one of 16,849) deliveries.

Clinical factors associated with uterine rupture after caesarean delivery

Researchers have attempted to determine the clinical factors associated with uterine rupture after caesarean delivery in retrospective cohort studies[4–8,10,15–24] or case-control studies,[3,25–30] including women who underwent a trial of labour after caesarean delivery. These studies seem to have included only symptomatic uterine rupture. The following factors have been examined to assess their ability to predict uterine rupture during a trial of labour after caesarean delivery: gestational age,[4,19] maternal age,[15] inter-delivery interval[5,16] inter-pregnancy interval,[7] suture technique for closing the hysterotomy,[31] birth weight,[18,24] previous vaginal delivery,[3,6,21] induction of labour,[10,28] ethnicity,[22] pre-eclampsia or gestational hypertension,[20] twin pregnancy,[23] labour progress,[27] and number of epidural doses.[29] A statistically significant association with uterine rupture was found in more than one study for the following variables: inter-delivery or inter-pregnancy interval (higher risk with short interval, short inter-delivery interval being defined as 24 months or less[16] or 18 months or less,[5] and short inter-pregnancy interval as less than 6 months[7]), birth weight (higher risk if 4000 g or more),[18,24] induction of labour (higher risk),[10,32] oxytocin dose (higher risk with higher doses),[8,30] and previous vaginal delivery (lower risk of rupture if the woman ever delivered vaginally).[3,6] In addition, a systematic review that included 12 studies showed that locked single layer closure of the caesarean hysterotomy increased the risk of uterine rupture compared with double layer closure.[31]

Two research teams tried to create multivariate logistic regression models that include clinical data to estimate the individual risk of uterine rupture (dehiscence not included) during a trial of labour after