

Incidence and outcomes of uterine rupture in women with unscarred, preterm, or prelabour uteri: data from the International Network of Obstetric Survey Systems.

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Running title: INOSS study of atypical uterine rupture.

1 **Abstract**

2 **Objective**

3 Analysis of atypical cases of uterine rupture, namely uterine rupture occurring in unscarred,
4 preterm or prelabour uteri.

5 **Design**

6 Descriptive multi-country population-based study.

7 **Setting**

8 Ten high-income countries within the International Network of Obstetric Survey Systems.

9 **Population**

10 Women with unscarred, preterm or prelabour ruptured uteri.

11 **Methods**

12 We merged prospectively collected individual patient data, in ten population-based studies of
13 women with complete uterine rupture. In this analysis, we focussed on women with uterine
14 rupture of unscarred, preterm or prelabour ruptured uteri.

15 **Main Outcome Measures**

16 Incidence, women's characteristics, presentation and maternal and perinatal outcome.

17 **Results**

18 We identified 357 atypical uterine ruptures in 3,064,923 women giving birth. Estimated incidence
19 was 0.2 per 10,000 women (95% CI 0.2-0.3) in the unscarred, 0.5 (95% CI 0.5-0.6) in the preterm,
20 0.7 (95% CI 0.6-0.8) in the prelabour and 0.5 (95% CI 0.4-0.5) in the no-previous-caesarean group.

21 Atypical uterine rupture resulted in peripartum hysterectomy in 66 women (18.5%, 95% CI
22 14.3%-23.5%), three maternal deaths (0.84% (95% CI 0.17%–2.5%)) and perinatal death in
23 62 infants (19.7%, 95% CI 15.1%-25.3%).

24 **Conclusions**

25 Uterine rupture in preterm, prelabour or unscarred uteri is extremely uncommon, but associated
26 with severe maternal and perinatal outcome. We found a mix of risk factors in unscarred uteri,
27 most preterm uterine ruptures occurred in caesarean-scarred uteri and most prelabour uterine
28 ruptures in 'otherwise' scarred uteri. This study may increase awareness of clinicians and raise
29 suspicion of the possibility of uterine rupture under these less expected conditions.

30

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33 **Keywords**

34 Uterine rupture, preterm uterine rupture, prelabour uterine rupture, unscarred uteri,
35 pregnancy, dehiscence, scar, caesarean, hysterectomy

36 **Tweetable abstract**

37 In this large international study, we show uterine rupture is extremely rare in women without a
38 previous uterine scar; however, consequences were severe with high rates of hysterectomy and
39 poor perinatal outcomes.

Introduction

Complete uterine rupture is a rare but potentially devastating complication of pregnancy. It is the complete disruption of the uterine muscle and serosa during pregnancy or childbirth. Immediate intervention is needed to prevent severe asphyxia and perinatal death, while it can necessitate massive transfusion or hysterectomy to save the mother's life.¹⁻³

Uterine rupture typically occurs during labour in women at term (≥ 37 weeks) with a previous Caesarean Section (CS).^{1, 4, 5} There is a high awareness of clinicians of the risk of uterine rupture when undertaking Trial Of Labour after Caesarean (TOLAC), with an estimated incidence of uterine rupture during TOLAC of 35 to 50/10,000 women based on a firm body of evidence in the literature.⁴⁻⁹ Clinicians may not expect uterine rupture in an unscarred uterus, prelabour or preterm. However, rupture occurs in 0.3 to 0.7/10,000 women with unscarred uterus and these ruptures are associated with more severe perinatal and maternal outcome than in scarred uteri.^{4, 6, 10-12} Uterine rupture may occur before the onset of labour, mostly in scarred uteri, with an estimated incidence of 0.1 to 0.5/10,000 women based merely on case reports.^{6, 13-16} And rupture may occur preterm for various reasons, which never received separate focus in literature.

Atypical ruptures –hereafter referred to as those occurring in unscarred, preterm or prelabour uteri – are very uncommon complications of pregnancy. A multi-country collaboration is the key to facilitate the study of uncommon severe complications by gathering a larger number of cases in a shorter timeframe. The International Network of Obstetric Survey Systems (INOSS) merged prospective data of women with complete uterine rupture (disrupted myometrium and serosa) from nine population-based studies.^{6-9, 18-20} Based on the data of 864 complete uterine ruptures in 2,625,017 deliveries, the INOSS reported an overall incidence of complete uterine rupture of 3.3 (95% CI 3.1-3.5) per 10,000 deliveries, 22 (95% CI 21-24) in women with and 0.6 (95% CI 0.5-0.7) in women without previous CS.⁵ The current study focuses on the women with uterine

rupture of unscarred uteri, preterm or prelabour uteri only. This unique collection of atypical uterine ruptures over ten European countries, enables the calculation of the estimated incidence of atypical uterine rupture and the description of characteristics and medical factors of these women. This study complements the previously published INOSS study of uterine rupture and together they give a complete overview of all uterine ruptures.

Methods

Research design and data collection

This study is part of a descriptive multi-country population-based study, of which research design and data collection were previously described.⁵ Briefly, we merged individual data of women with complete uterine rupture collected prospectively in nine population-based studies: Austria, Belgium, Denmark, Finland, France, Germany, the Netherlands, Sweden, and the United Kingdom. We included extra data from Italy (ItOSS) for this study.⁸

Definitions

We defined uterine rupture as the complete disruption of the uterine muscle and serosa, irrespective of the condition of the fetal membranes, for the purposes of this study. Women with asymptomatic dehiscence (intact uterine serosa) noted incidentally during caesarean section (CS) were excluded. Definitions of uterine rupture used by the participating countries were previously described and listed in **Supporting Table S1**.⁵

Cases of atypical uterine rupture were subclassified as unscarred, preterm or prelabour: Unscarred was defined as no previous CS nor any other uterine surgery prior to the current pregnancy; preterm was defined as gestational age less than 37⁺⁰ weeks; prelabour was defined as uterine rupture before onset of labour. Labour was defined as having regular uterine contractions and ≥ 4 cm cervical dilatation (ItOSS) or the diagnosis of labour based on clinical

assessment of the reporting physician (other countries). Therefore, women who had induction of labour but not considered in labour by their physician, were included in this prelabour group (e.g. the woman has no regular contractions and there is no change in cervical dilatation).

We created an extra group: the no-previous-caesarean-section group, defined as women without previous CS regardless of their history of other uterine surgery.

Neonatal asphyxia was defined as umbilical artery pH ≤ 7.00 and/or Apgar score at 5min < 7 and/or therapeutic cooling and/or hypoxic ischemic encephalopathy described as complications.

Perinatal death was defined as intrapartum stillbirths and early neonatal deaths (up to seven days of life), excluding immature births (gestational age < 24 weeks) and termination of pregnancies (due to congenital anomaly or stillbirth prior to uterine rupture).

Registered variables

An extensive list of 56 variables was used to make a composite database of all registered variables of atypical cases of uterine rupture. The set of 56 variables and codebook are listed in **Supporting Table S2**. Not every variable was available in all databases. All missing values were coded as not known.

Statistical analysis

Data were analysed using statistical software package IBM SPSS statistics for Windows, Version 26.0 (IBM, Armonk, NY, USA). Most variables were expressed as relative frequencies and statistical analysis was confined to descriptive analyses. Estimated incidences of the different groups were calculated using the estimated total number of women giving birth in the background population during the study period as denominator.

Results

Incidence

We identified 357 women who had uterine rupture in an unscarred, preterm or prelabour uterus in 3,064,923 women who gave birth in ten European countries. Many of the unscarred ruptures occurred preterm and prelabour. Overlap between the unscarred, preterm and prelabour groups is shown in **Figure 1**. The overall incidence of atypical uterine rupture was 1.2 (95% CI 1.1-1.3) per 10,000 women who gave birth. The incidence of uterine rupture per 10,000 women who gave birth was 0.2 in the unscarred group (95% CI 0.2-0.3), 0.5 (95% CI 0.5-0.6) in the preterm group, 0.7 (95% CI 0.6-0.8) in the prelabour group and 0.5 (95% CI 0.4-0.5) in the no-previous-CS group. Estimated incidence per country and per group of atypical cases of uterine rupture are shown in **Supporting Table S3**.

Women's characteristics

Insert Table 1

Table 1 provides details of surgical and medical history and obstetrical characteristics of women who had an atypical uterine rupture, specified per group of atypical uterine rupture. Three flowcharts presenting women's characteristics per group of atypical uterine rupture further demonstrate the heterogeneity of cases in every group (**Supporting Figures S1-S3**).

There were 75 of 357 women (21%) who had a uterine rupture in an unscarred uterus (no previous CS and no other uterine surgery); 141 women did not have a previous CS but had a history of other uterine surgery; 44 women had both previous CS and other uterine surgery. The most common types of other uterine surgery were myomectomy, septal resection, tubectomy, resection of cornual pregnancy, polypectomy, curettage and B-lynch suture. There were seven confirmed uterine perforations during dilatation and curettage (D&C) or hysteroscopy. Two-

hundred fifteen women (60.4%) had at least one previous CS; 55 of them had more than one previous CS; 41 had their previous CS preterm: 8 extreme (24-27weeks), 10 very (28-31 weeks) and 23 moderate (32-36 weeks) preterm (23). There were three women with recurrent uterine rupture, all three occurred preterm and prelabour.

Most women with unscarred uteri had induced or spontaneous labour in combination with other, mostly obstetric risk factors (**Supporting Figure S1**). Only six women with unscarred uteri ruptured prelabour: one woman with a ruptured horn of a uterus bicornis at gestational age of 18 weeks, the others had no reported risk factors.

Twelve women with atypical uterine rupture had Placenta Accreta Spectrum (PAS). None of them had unscarred uteri, eight had previous CS and five had other uterine surgery. Ten of these ruptures associated with PAS occurred preterm (range of gestational age 17-35 weeks). They presented with abdominal pain (n=6), CTG abnormalities (n=3), vaginal bleeding (n=3), and altered contractions (n=2).

There was one woman with connective tissue disease, namely osteogenesis imperfecta type 1. Eight women (3.8%) were known with adenomyosis/endometriosis.

One hundred sixty-six women of 357 (46%) had a uterine rupture before 37 weeks. Table 2 is showing uterine ruptures stratified per sub-category of preterm birth. Twenty women had a complete uterine rupture at previable gestational age, in 14 uterine rupture occurred during termination of pregnancy (TOP).

Presentation

The clinical presentation per type of atypical uterine rupture is demonstrated in **Figure 2**. The most frequently reported symptoms were abdominal pain (61.6%), abnormal CTG (55.1%) and vaginal bleeding (20.4%).

Maternal outcome

Figure 3 shows maternal outcomes per group of atypical uterine rupture. Three maternal deaths occurred, resulting in a case fatality rate of 0.84% (95% CI 0.17-2.5). (**Supporting Table S4**)

Sixty-six of 357 women (18.5%) underwent hysterectomy. Reasons for hysterectomy were massive haemorrhage in 36, severe uterine damage in seven and unclear in 23 women. In 19 women (5.8%) the bladder was damaged, 17 (5.6%) had damage to other organs.

One hundred nine women (30.5%) were admitted to intensive care units (ICU), with a median stay of 1.7 days (range 1-7), 188 women (55.3%) received any type of blood (packed cells, platelets or plasma), 114 (32.2%) women were transfused with ≥ 4 units of packed cells. Fourteen women required intubation and ventilation, one suffered from aspiration pneumonia. Three women had renal dysfunction (one nephrostomy, two renal failures).

Maternal outcomes are presented per type of atypical uterine rupture in **Supporting Table S4**, showing high rates of hysterectomy (30.5%), admission to ICU (44.7%) and massive blood transfusion (51.8 %) in the no-previous-CS group and in the unscarred group (26.7%, 42.7% and 50%).

Perinatal outcome

This study involved six sets of twins and one triplet, resulting in 365 fetuses. Of which 274 were born alive, because of 20 immature, 8 intra-uterine fetal deaths, 3 TOPs, 24 peripartum stillbirths, 16 perinatal deaths of unknown timing and 20 fetuses with unknown outcome (**Supporting Figure S4**). There were 62 perinatal deaths (10 antepartum stillbirths, 14 intrapartum stillbirths, 22 neonatal deaths, unknown timing in 16 perinatal deaths). Perinatal mortality rate in atypical uterine rupture was 19.7% (95% CI 15.1%-25.3%). Neonatal asphyxia was detected in 35.3% (95% CI 26.9%-45.35). Of the 274 live births, 107 neonates were admitted in neonatal intensive care

units (NICU), 35 required intubation/ventilation and seven required therapeutic cooling. Other neonatal complications were intraventricular bleeding (n=1), necrotising enterocolitis (n=2), hypoxic ischemic encephalopathy (n=3).

Twenty-two neonates died postpartum. Fifteen of them had neonatal asphyxia, two were born extremely preterm (25 and 26 weeks), two at term with an unclear cause of death, two without neonatal asphyxia had very low birthweights (670 and 633 grams) and one with pulmonary hypoplasia caused by anhydramnios.

Figure 4 and **Supporting Table S5** are showing perinatal outcome per group of atypical uterine rupture.

Discussion

Main findings

Rupture of unscarred, preterm or prelabour uteri is extremely uncommon, but is associated with severe maternal and adverse perinatal outcomes. Incidences in this multi-country study were 0.2/10,000 in the unscarred, 0.5/10,000 in the preterm, 0.7/10,000 in the prelabour and 0.5/10,000 in the no-previous-CS group. Atypical uterine rupture commonly resulted in peripartum hysterectomy, ICU admission and massive transfusion in 31%, 45% and 52%, respectively. Although maternal death occurred in only 0.8%, neonatal asphyxia (35%) and perinatal mortality (20%) were common.

Strengths and limitations

The main strength of this study is its multi-country population-based design. Thanks to the INOSS collaboration, we assembled a unique collection of 357 women with complete uterine rupture in unscarred, preterm or prelabour uteri over ten European countries.⁵ This large number of

199 atypical uterine ruptures improves the understanding of obstetricians: in which clinical situations
200 should they be more vigilant for this uncommon complication?

201 The main limitations are the differences in collected variables between countries, especially
202 variables concerning medical history and perinatal outcome. This demonstrates the importance
203 of the set of core outcome measures developed by INOSS for future studies.²¹ Information on
204 type of uterine incision in previous CS and gestational age of the previous CS were largely missing,
205 which could have provided more insight in uterine rupture risk when previous CS was very
206 preterm. Some information, however, is unknown even for reporting physicians, such as previous
207 TOP, uterine perforation during D&C etc.

208 Lack of information existed on the distribution of surgical, medical and obstetric characteristics
209 in the general population of pregnant women. Specific features of women with atypical uterine
210 rupture could not be tested for, therefore we confined to descriptive analysis. Estimated
211 incidence could only be calculated with the total number of women giving birth in the study
212 period as the denominator.

213 An important limitation is lack of an objective definition for labour in most population-based
214 studies. As a consequence, incidence of uterine rupture in the prelabour uterus may be
215 overestimated. Moreover, 76 women in this prelabour group underwent induction of labour,
216 most of them (68) with prostaglandins. If we exclude these, incidence comes down from 0.7 to
217 0.4/10,000 women giving birth.

218 Finally, we cannot provide data on timing of diagnosis and decision-to-delivery interval.

219 **Interpretation**

220 The term unscarred uterus is discordantly used in the literature: for no previous CS, no previous
221 uterine surgery involving myometrial incision or no uterine surgery at all. Therefore, we

222 distinguished between unscarred (without any uterine surgery) and no-previous-CS uteri
223 (without previous CS regardless of other uterine surgery) in this study.

224 Our incidences are in line with the literature. In Norway 65 uterine ruptures (0.45/10,000)
225 occurred in intact uteri among 1,441,712 women giving birth.⁴ In Utah, primary uterine rupture
226 (defined as no history of uterine surgery involving myometrial incision) occurred in 0.45/10,000
227 women giving birth and in Denmark in 0.3/10,000 women without previous CS.^{10,11}

228 Almost half of the women in the no-previous-CS group (44.9%) had other previous uterine
229 surgery. History of myomectomy was reported in 23 women with uterine rupture, most occurred
230 preterm and prelabour. A literature review in 2007 reported previous myomectomy in 11 out of
231 36 primigravid women with uterine rupture.¹² Association of uterine rupture with septal
232 resection, operative hysteroscopy, utero-tubal surgery, D&C, and B-lynch suture is rarely
233 documented. In 2006, 18 women were reported with uterine rupture after operative
234 hysteroscopy.²² Seven uterine perforations occurred during D&C or hysteroscopy in our study,
235 however, uterine perforations may go unnoticed or stay unreported by physicians. We plead for
236 increased carefulness by gynaecologists to detect, document and report uterine perforations at
237 all times.

238 But then, why do unscarred uteri rupture? This large group demonstrated a mix of risk factors
239 previously associated with uterine rupture: grand multiparity, multiple gestation, macrosomia,
240 uterotonics, instrumental birth, manual removal of placenta, PAS, congenital uterine anomaly,
241 adenomyosis and connective tissue disease.^{10, 12, 23-25} Other risk factors not present in our study
242 were external trauma, traffic accidents, previous invasive molar pregnancy, uterine diverticula,
243 chronic corticosteroid use or cocaine abuse. Instrumental vaginal birth could be either
244 management or cause of uterine rupture from trauma, although extremely rare. Especially in
245 cases with fetal distress it may be difficult to distinguish whether rupture occurred before or

246 during birth. The woman with connective tissue disease had osteogenesis imperfecta type 1, with
247 a less known risk of uterine rupture than Ehlers-Danlos. We found four more case reports of
248 uterine rupture in women with osteogenesis imperfecta type 1.²⁷⁻³⁰

249 Why do uteri rupture preterm? The majority had a previous CS and a vast number occurred
250 during labour. Twenty-four occurred during TOP due to antepartum stillbirth or congenital
251 anomaly. Most preterm ruptures occurred in a combination of medical and obstetric risk factors.
252 Only 18 preterm uteri were unscarred. We found no studies addressing preterm uterine rupture
253 in literature.

254 Data on prelabour uterine rupture consist mainly of case reports. In Norway 0.03/10,000
255 occurred in unscarred uteri (8 in 2,334,712) and 1.8/10,000 in scarred uteri (22 in 121,085) giving
256 an incidence of prelabour uterine rupture of 0.1/10,000 women giving birth.¹³ A study of the
257 Netherlands reported a incidence of 0.5/10,000 women giving birth.⁶

258 Why do prelabour uteri rupture? Most women had a previous CS or other uterine surgery,
259 coherent with the literature.^{6, 13-16} All three recurrent uterine ruptures, and the majority of
260 uterine ruptures in women with previous myomectomy (20/23), occurred prelabour. In a review
261 by Uccella et al., 16 of 24 primigravid women with prelabour uterine rupture had previous uterine
262 surgery (mostly myomectomies).¹⁶ A systematic review reported in 2016 that uterine rupture
263 after myomectomy occurred even when the uterine cavity was not opened, mainly before 36
264 weeks and before labour (n=5/330, 1.5%) and only 2/426 (0.47%) during a trial of labour after
265 myomectomy.³¹

266 Consequences of atypical uterine rupture were severe with high rates of hysterectomy and poor
267 perinatal outcomes, coherent with previous studies reporting more severe outcome associated
268 with uterine rupture in unscarred uteri.^{6, 10} This may be explained by delayed diagnosis and

management due to the unexpectedness. Also, higher risks of massive haemorrhage could be involved in the more vascular unscarred myometrium compared with uterine scar tissue.⁷

Conclusion

Uterine rupture in preterm, prelabour or unscarred uteri is extremely uncommon, but is associated with severe maternal and perinatal outcome. We found a mix of risk factors in unscarred uteri, most preterm uterine ruptures occurred in CS-scarred uteri and most prelabour uterine ruptures in 'otherwise' scarred uteri. Clinicians should carefully document any other uterine surgery and women should be counselled of the potential rare but catastrophic risks of uterine rupture, even at preterm gestational age. This study may increase awareness of clinicians and raise suspicion of the possibility of uterine rupture under these less expected conditions.

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Disclosure of interest

None of the authors have any conflict of interest to declare.

Contribution to authorship

GV designed the study. GV coordinated data collection. AV coordinated data processing and analysis. AV, GV, KB, SB, LC, CDT, SD, MG, MK, JLR, PL, BM, JVR, JZ and KR contributed in the

290 interpretation of the data. AV and GV drafted the article. AV, GV, KB, SB, LC, CDT, SD, MG, MK,
291 JLR, PL, BM, JVR, JZ and KR critically revised the article and approved the final version.

292 Details of ethical approval

293 Because of the character of this study, ethical approval was not required. Each study, from
294 which data were used, was approved by their national or local ethics committee.

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Table 1. Women's characteristics per group of atypical cases of uterine rupture

| | All atypical cases N(%) (n=357) | No-previous-CS N (%) (n=141) | Unscarred N (%) (n=75) | Preterm N (%) (n=166) | Prelabour N (%) (n=206) |
|--|---------------------------------------|------------------------------------|------------------------------|-----------------------------|-------------------------------|
| Surgical history | | | | | |
| Previous other uterine surgery | 105/337 (31.2) | 61/136 (44.9) | 0 | 53/155 (34.2) | 69/196 (35.2) |
| - Curettage (D&C) | 62 | 30 | | 22 | 37 |
| - Myomectomy | 23 | 19 | | 19 | 20 |
| - Septal resection | 4 | 4 | | 2 | 2 |
| - Polypectomy | 2 | 2 | | 1 | 2 |
| - Tubectomy | 6 | 4 | | 4 | 5 |
| - Cornual resection | 1 | 0 | | 1 | 1 |
| - B-Lynch | 1 | 1 | | 0 | 0 |
| - Other | 5 | 3 | | 3 | 3 |
| Previous uterine perforation | 7/311 (2.3) | 5/124 (4) | 0 | 3/136 (2.2) | 6/168 (3.6) |
| Previous CS | 215/356 (60.4) | 0 | 0 | 119/165 (72.1) | 162/205 (79) |
| - 1 | 158 | | | 79 | 118 |
| - 2 | 40 | | | 29 | 28 |
| - 3 | 11 | | | 9 | 10 |
| - 4 | 4 | | | 2 | 4 |
| - Number not known | 2 | | | 0 | 2 |
| Uterine rupture in history | 3/221 (1.4) | 0 | 0 | 3/114 (2.6) | 3/100 (3) |
| Medical history | | | | | |
| Uterine anomaly * | 10/214 (4.7) | 5/103 (4.9) | 1/63 (1.6) | 7/109 (6.4) | 8/115 (7.0) |
| Connective tissue disease ** | 1/212 (0.5) | 0 | 0 | 0 | 1/115 (0.9) |
| Adenomyosis/endometriosis | 8/212 (3.8) | 8/103 (7.8) | 1/63 (1.6) | 4/109 (3.7) | 1/115 (0.9) |
| Obstetrical characteristics | | | | | |
| Labour | 146/352 (41.5) | 98/141 (69.5) | 64/75 (85.3) | 65/161 (40.4) | 0 |
| Induction of labour | 149/357 (41.7) | 73/141 (51.8) | 42/75 (56) | 60/166 (36.1) | 76/206 (36.9) |
| - with prostaglandins | 130 | 66 | 38 | 56 | 68 |
| - mechanical | 6 | 0 | 0 | 3 | 3 |
| Oxytocin used (induction/augmentation) | 52/270 (19.3) | 37/105 (35.2) | 26/53 (49.1) | 11/133 (8.3) | 6/154 (3.9) |
| TOLAC | 104/215 (48.4) | 0 | 0 | 68/119 (57.1) | 56/162 (34.6) |
| TOP | 24/357 (6.7) | 7/141 (2.1) | 5/75 (6.7) | 23/166 (13.8) | 5/206 (2.4) |
| Parity ≥ 3 | 47/354 (13.2) | 14/138 (10.1) | 9/73 (12.3) | 26/164 (15.9) | 24/205 (11.7) |
| Multiple pregnancy | 9/357 (2.5) | 7/141 (4.9) | 3/75 (4) | 8/166 (4.8) | 3/206 (1.5) |
| Placenta accreta spectrum | 12/320 (3.7) | 4/132 (3.0) | 0 | 10/154 (6.5) | 5/181 (2.7) |
| Placenta praevia | 10/320 (3.1) | 1/132 (0.8) | 1/70 (1.4) | 9/154 (5.8) | 9/181 (4.9) |
| Macrosomia (≥ 4000g) | 29/320 (9.0) | 21/132 (15.9) | 17/70 (24.2) | 0 | 11/181 |
| Instrumental vaginal birth | 12/357 (3.4) | 12/141 (8.7) | 7/75 (9.3) | 1/166 (0.6) | 0 |
| CS=caesarean section, GA=gestational age, TOLAC= trial of labour after caesarean, TOP= termination of pregnancy, IUFD= intra-uterine fetal death | | | | | |
| * uterine septum (n=5), uterus arcuatus (n=1), uterus bicornis (n=1), 4 of unknown type | | | | | |
| ** osteogenesis imperfecta type 1 | | | | | |

Table 2. Gestational age per group of atypical cases of uterine rupture

| | All atypical cases N(%) (n=357) | No-previous- CS N (%) (n=141) | Unscarred N(%) (n=75) | Preterm N (%) (n=166) | Prelabour N (%) (n=206) |
|---|---------------------------------------|--|-----------------------------|-----------------------------|-------------------------------|
| Previa (< 24 weeks) | 20/355 (5.6) | 5/141 (3.5) | 4/75 (5.3) | 20/166 (12) | 5/204 (2.4) |
| Extremely preterm (24-27 weeks) | 21/355 (5.9) | 6/141 (4.3) | 2/75 (2.7) | 21/166 (12.7) | 16/204 (7.8) |
| Very preterm (28-31 weeks) | 27/255 (7.6) | 6/141 (4.3) | 1/75 (1.3) | 27/166 (16.3) | 19/204 (9.2) |
| Moderate to late preterm (32-36 weeks) | 98/255 (27.5) | 29/141 (20.6) | 11/75 (14.7) | 98/166 (59) | 56/204 (27.2) |
| Term (≥ 37 weeks) | 189/255 (52.9) | 95/141 (67.4) | 57/75 (76) | 0 | 108/204 (52.4) |
| Not known | 2 | 0 | 0 | 0 | 2 |

