Risk of Uterine Rupture Following Locked Vs Unlocked Single-layer Closure

Igor Hudic¹, Emmanuel Bujold², Zlatan Fatusic¹, Stéphanie Roberge², Amer Mandzic¹, Jasenko Fatusic¹
Clinic for Gynecology and Obstetrics, University Clinical Center, Tuzla, Bosnia and Herzegovina¹
Department of Obstetrics and Gynecology & Department of Social and Preventive Medicine, Faculty of Medicine, Université Laval, Quebec, Canada²

Objective: To compare the rate of uterine scar disruption after a locked versus an unlocked single-layer closure of the hysterotomy incision at a previous cesarean. Methods: A retrospective cohort study in a population where both locked and unlocked single-layer closure are commonly used. All singleton pregnancies at 24 weeks' gestation or more with a previous single cesarean were included. Rate of uterine scar disruption (complete uterine rupture and uterine scar dehiscence) were compared between women with a previous locked and those with a previous unlocked single-layer closure of the uterus. Results: Out of 388 women included in the study, 272 had a previous unlocked single-layer closure and 116 had a locked single-layer closure. We found no significant difference in the rate of uterine scar disruption between the two groups (5.9% vs 8.6%, p=0.32). Conclusion: Locking a single-layer closure was not associated with an increase rate of uterine scar disruption at the next pregnancy in our retrospective analysis. A randomized trial should be performed. Key words: Uterine, Risk, Rupture.

Corresponding author: Igor Hudic, MD. University Clinical Center Tuzla, Clinic for Ob/Gyn, Trnovac bb, 75000 Tuzla, Bosnia and Herzegovina. E mail: i.hudic@bih.net.ba

1. INTRODUCTION

Uterine rupture is a serious and potentially fatal complication of attempting a vaginal birth following cesarean delivery (1). Symptomatic (complete) uterine rupture typically refers to nonsurgical complete disruption of all uterine layers, usually with bleeding and sometimes with extrusion of part of the entire fetal-placental unit. Asymptomatic uterine rupture (incomplete rupture) is a uterine defect that has no maternal/fetal consequences (2).

In developed countries, most uterine rupture occur during labor in women with previous uterine scar. A previous classical or T-incision are associated with as much as 4-9% of uterine rupture and constituted a contraindication to a trial of labor (TOL) and vaginal birth after cesarean (VBAC). Other factors commonly described to be associated with uterine rupture include the absence of a previous vaginal delivery, more than one cesarean delivery, induction of labor, nonprogressive labor, and a thin prelabor lower uterine segment (3). Ascertainment of the precise role of each factor is complicated by the interrelated nature of the factors and our lack of understanding of the pathophysiology of uterine rupture.

The type of closure of the previous incision has been associated with the risk of uterine rupture. Single-layer closure has been associated with higher rates of uterine rupture than double-layer closure in some studies (4, 5, 6) while other studies did not confirm such findings (1, 2, 3, 4, 5, 6, 7). Reports from ultrasound evaluation of the thickness of the lower uterine segment suggest also that single-layer technique is associated with thinner scar, but whether this impact on the future pregnancies remains undetermined (8, 9). However, a recent systematic review and meta-analysis demonstrated that this discrepancy could be explained by the differences in the techniques of single-layer closure (10). Roberge et al. found that a locked single-layer closure of the uterus is probably associated with greater risk of uterine rupture in the next pregnancies than an unlocked single-layer closure (10). We aimed to evaluate the impact of a unlocked versus locked single-layer closure of the previous lower transverse uterine segment incision on the rate of uterine rupture.

2. METHODS

The study was conducted at the Clinic of Gynecology and Obstetrics, University Clinical Center, Tuzla, Bosnia and Herzegovina, a tertiarycare hospital, with an assigned obstetrician and anesthesiologist present in the labor and delivery area at alltimes. We collected data from all delivery after...
24 weeks’ in women with a prior, single, low-transverse cesarean delivery, irrespective of the final mode of delivery between January 2003 and December 2011. Only women with an available operative report of the previous cesarean and with a previous continuous locked/unlocked single-layer technique were included in the study. Exclusion criteria included multiple gestation, greater than one previous cesarean section, previous incision other than low transverse, prior myomectomy and lack of previous operative report.

Variables of interest included method of the uterine incision closure at the previous cesarean delivery, maternal age and maternal weight at the time of delivery, parity, previous normal spontaneous vaginal delivery, date of the prior cesarean delivery, birth weight, date of the current delivery and uterine scar disruption. All uterine scar disruptions, including symptomatic uterine rupture (complete rupture) and asymptomatic dehiscence (incomplete rupture) diagnosed at cesarean or at post-partum laparotomy, were analyzed. The rate of uterine scar disruption was compared between women with a previous locked and those with a previous unlocked single-layer closure of the uterus. Proportions were compared using Chi-Square test and performed with SPSS 17.0 software (SPSS Inc., Chicago, IL, USA). The threshold for statistical significance was set at the 5% level (p<0.05).

3. RESULTS

During the 9-year study period, we identified 388 women who met inclusion criteria, including 272 (70.1%) who had an unlocked single-layer closure and 116 (29.9%) who had a locked single-layer closure of the uterus at their previous cesarean. There was no difference between groups in maternal age, mean gestational age, time interval between delivery and previous normal spontaneous vaginal delivery, induction or augmentation of labor (Table 1).

Uterine scar disruption was observed in 18 (13.6%) women out of 132 who underwent a TOL and in 8 (3.1%) women out of 256 during elective cesarean. We found no significant difference in the rates of the different type of uterine scar disruption between the two groups (Table 2). Of note, 7 additional women had a diagnosis of incomplete scar dehiscence using vaginal exam after successful VBAC (4 and 3 in each group, respectively). They were not included in the analyses. Even after considering those cases, there was still no difference in terms of uterine scar disruptions between the two groups (7.4% vs 11.2%, p=0.21; relative risk: 0.66; 95% confidence intervals: 0.34-1.27).

4. DISCUSSION

In a retrospective analysis of our population, we did not find a significant difference in the rates of uterine scar disruption after locked and unlocked single layer uterine closure at previous cesarean. We did not find other studies that compared the effect of locking vs not locking the suture of the uterus.

Jelsema et al. (11) hypothesized that an unlocked single-layer closure leads to better uterine scar healing. Sutures are placed for three purposes: a) to obtain coaptation, b) to assist in hemostasis, and c) to resist the stresses and strains to which the wound is exposed until it has reacquired its own intrinsic strength. Locking suture could cause increased pressure at the suture-tissue interface and cause ischemic necrosis, impairing coaptation. Hemostasis of the incision is primarily dependent upon uterine tone and the coagulation system. Should the wound be exposed to additional pressure, an unlocked suture would provide more strength than a locked suture. On the other hand, a single-locked uterine closure has been proposed by for a potential better hemostasis and shorter operative time when compared to double-layer closure (12, 13).

The precise pathophysiology of uterine rupture is unknown at this time; it is likely to be multifactorial and further complicated by a complex interaction of factors during labor, which itself is a variable process. If the problem is approached with a biomechanical model, the factors can be grouped into those that produce strain on the scar and those that give strength to the scar. Examples of the former are induction of
labor, use of oxytocin, and nonprogressive labor. The inherent strength of the scar may be related to its position in the uterus (vertical vs transverse), prelabor thickness of the lower uterine segment, and the technique used for the previous closure (3).

Our study has several limitations. It is a retrospective analysis and we could not examine several potential confounding variables such as clinical complications or level of the surgeon’s expertise at the time of the first cesarean delivery and several aspects of management during labor. Of note, we observed a much higher rate of uterine scar disruption, and mainly uterine scar dehiscence in women who underwent a trial of labor. We believe that labor can lead to a certain stretching and thinning of the uterine scar and therefore to additional diagnoses of asymptomatic uterine scar dehiscence, that is a subjective diagnosis to a certain point. Finally, the relatively small number of women included in the study limited its power. However, the fact that we did not observe significant differences in the rate of uterine scar disruption between the two groups with a relatively low rate of complete uterine rupture can reassure both obstetricians and women that both techniques remain acceptable options for uterine closure and they should not constitute a contra-indication to VBAC unless proven otherwise. On the other hand, we believe that randomized trials comparing both type of closure are definitively required.

This information could be very important because cesarean delivery is a very common procedure, with more than 1 million cesarean deliveries being performed every year in the USA and with approximately as many women with a previous cesarean delivery having to make a decision between an elective cesarean section and a trial of labor with the risk of uterine rupture (14).

REFERENCES