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Emergency Cervical Cerclage Following Laparoscopic Abdominal Cerclage with Cervical Dilatation

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Keywords: Cerclage, cervical; Emergency cervical cerclage; Laparoscopic abdominal cerclage

To editor:

Cervical insufficiency, or cervical incompetence, is characterized by painless cervix dilatation during the second trimester without contractions.[1] It is found in 0.1%–1% of all pregnancies and in up to 8.0% of women with recurrent second-trimester miscarriages.[2–4] Cervical insufficiency is associated with premature birth, which is a leading cause of neonatal and perinatal mortality and morbidity. The standard approach is vaginal cervical cerclage, prolonging pregnancy duration and mitigating prematurity risks. In some cases, however, transvaginal cerclage failure or technical non-feasibility of placing a vaginal suture due to a short length or scarred cervix render abdominal cerclage a viable choice. This can be achieved via laparoscopic or open abdominal approaches.[5–7]

Laparoscopic abdominal cerclage (LAC) has emerged as a primary approach with comparable effectiveness to open abdominal cerclage, and fewer complications.[7–10] LAC reportedly has a 70.0%–83.3% success rate for third-trimester delivery, and a live birth rate exceeding 90.0%,[10] but failure still occurs.[9] In cases of cervix dilatation after LAC failure laparoscopic cerclage removal may be suggested, but consensus on management is lacking. Emergency cervical cerclage (ECC) is recommended for women with cervical dilatation and exposed fetal membrane between 16^{+0} and 27^{+6} weeks of gestation, without bleeding, infection, or uterine activity.[11,12] Accordingly, ECC may also be an effective way to prolong the duration of pregnancy, and reduce pregnancy loss in women with failed LAC. Whether ECC prolongs pregnancy in women with LAC failure has not been fully clarified, however, and neither have the potential complications of ECC in such women.

The current study assessed the prolongation of pregnancy associated with ECC after LAC failure during the second trimester of pregnancy and evaluated the safety of ECC after LAC failure.

Materials and methods

The present retrospective observational study included women who underwent ECC during the second trimester of pregnancy between October 2016 and May 2020. Women exhibiting cervical dilation, both with or without exposed unruptured fetal membranes following LAC were included. The study was conducted as part of a broader ongoing retrospective investigation involving pregnant women receiving antenatal care at the First Affiliated Hospital of Sun Yat-sen University and approved by ethical committees of the First Affiliated Hospital of Sun Yat-sen University (2022-458).

Women who showed cervical dilation after LAC were initially identified in one of two ways: (1) those who were found to have a dilated cervix on ultrasound and (2) those who were identified by sterile speculum and digital cervical examination performed because of subjective complaints of pressure or discharge. Women who were confirmed cervical dilation with and without exposed unruptured fetal membranes after LAC in the absence of bleeding, uterine activity, or chorioamnionitis in the second trimester of pregnancy were included.

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Maternal-Fetal Medicine (2023) 5:4

Received: 29 June 2023 / Accepted: 17 August 2023

First online publication: 20 October 2023

http://dx.doi.org/10.1097/FM9.0000000000000202

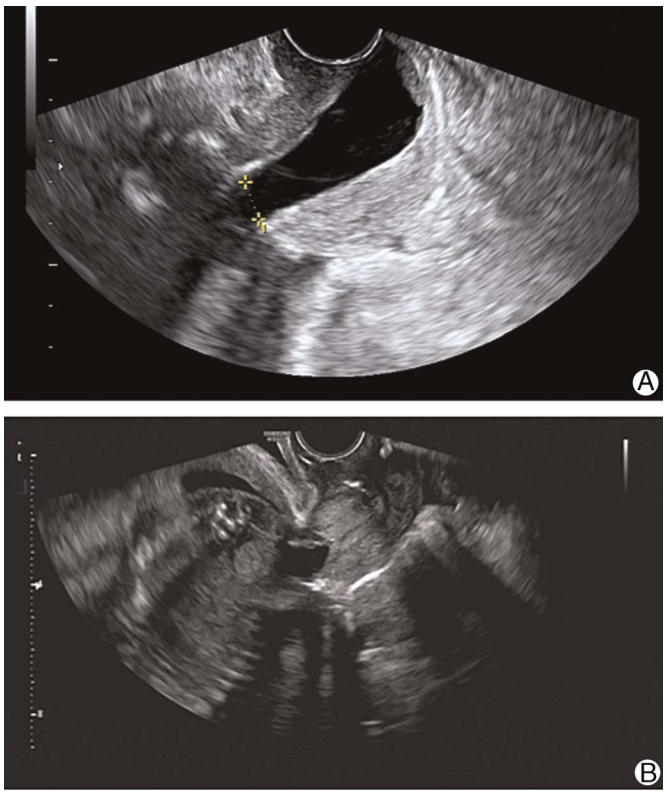

Figure 1. Emergency cervical cerclage outcome. Ultrasound imaging of the cervix before (A) and after (B) ECC in women with LAC failure, who presented at 17^{+2} weeks of gestation. The yellow symbol indicates the width of the internal os of the cervix. ECC: emergency cervical cerclage; LAC, laparoscopic abdominal cerclage.

An ECC was placed using a 5-mm Mersilene tape after careful replacement of the membranes into the uterine cavity using the Trendelenburg position. The stitch was placed around the remaining cervix at the level as close as possible to the internal os. Postoperatively all women were placed on prophylactic antibiotics and tocolysis, and were observed for any pain, contraction, or other complications. In women with no complications, transvaginal cerclage removal was planned at 36–37 weeks of gestation. Delivery was recommended when bleeding, uterine activity, ruptured fetal membranes, or chorioamnionitis occurred.

Descriptive statistics medians and interquartile ranges) were calculated for demographic covariates, prolongation of pregnancy, neonatal outcomes, and maternal complications. All analyses were performed using R version 4.0.2 (R Foundation for Statistical Computing, Vienna, Austria).

Results

ECC was exhibited in nine women who showed cervical dilation with or without exposed fetal membranes after LAC (Fig. 1). The median age was 33 years, and cerclage was performed at 15^{+2} to 25^{+0} weeks of gestation. The median internal cervical os dilation before cerclage 10.0 mm (range 7.3-30.0 mm). The median undilated cervical length was 5.6 mm and three patients exhibited a dilated cervix. There were no intraoperative surgical complications of the cerclage, and all surgeries were performed expeditiously (mean operative time, 23 minutes) and low estimated blood loss (Table 1).

The median interval from cerclage to delivery was 5.86 weeks (range 0.29–8.43 weeks). Indications for termination of pregnancy were PPROM, chorioamnionitis, treatment-resistant uterine contractions, and suspected uterine rupture. Six patients had live births, and three had fetal loss. The median gestation age for delivery was 26.71 weeks (18^{+3}–31^{+5}). The rate of < 28 weeks of gestation was 5/9 (55.6%), and all neonates were transferred to the Neonatal Intensive Care Unit (Table 2).

Six women delivered via cesarean section, of which five had live births. Three women undertook vaginal delivery after removal of the stitches by laparoscopy, of which one had a live birth. Chorioamnionitis was detected in seven women, including five cases of Gram-negative bacillus or *Enterococcus faecalis* infection cultured from either cervical secretion or the placenta. PPROM occurred in six women, two women underwent cervical laceration, and one woman suffered an incomplete uterine rupture and postpartum hemorrhage. The incomplete uterine rupture was diagnosed when the abdominal suture was removed. There were no cases of maternal sepsis (Table 3).

Discussion

There are no consistent interventions for patients with cerclage failure. It is suggested that cerclage removal should be considered when a woman presents with symptoms of preterm labor or PPROM.[14] However, a dilemma arises with respect to women who present with only cervical dilatation after LAC, and no signs of bleeding, infection, or uterine activity. Previous studies have evaluated the effects of emergency cerclage on pregnancy outcomes in women with cervical insufficiency and exposed membranes, and reported benefits have included significantly prolonged pregnancy, an improved live birth rate, and improved birth weight compared to patients administered expectant management.[15] A recent meta-analysis including 12 studies assessing the effects of ECC in cases of cervical insufficiency with painless cervical dilatation in the second trimester indicated that ECC reduced preterm births, prolonged pregnancy, and reduced fetal loss and neonatal death rates.[16] The current study investigated the placement of ECC in a very specific population with cervical dilatation after LAC, all women experienced favorable prolongation of pregnancy by a median 5.86 weeks, and six had live births.

Table 1

Patient demographics and baseline characteristics.

Characteristic	Median (IQR) n=9
Age, y	33 (7.5)
Prepregnancy BMI, kg/m^2	23.95 (3.87)
Antepartum BMI, kg/m^2	25.80 (4.59)
Gravity	4 (2.5)
Parity	0 (1.5)
EBL, mL	10 (20)
Operative time, min	23 (15)
Preoperative cervical length, mm	4.5 (23)
Preoperative cervical width, mm	10 (20.35)

ECC: Emergency cervical cerclage; LAC: Laparoscopic abdominal cerclage; IQR: Interquartile range.

Although the efficiency of ECC in women with failed LAC was evident in the present study, PPROM and chorioamnionitis are the main reasons for the termination of a pregnancy. In the current study, the prevalence of chorioamnionitis was 66.7%, higher than in those without LAC.[15] Three patients exhibited a dilated cervix, which may increase ascending infection by vaginal organisms. During pregnancy cervical dilation reduces the capacity of the cervix to physically retain the pregnant uterus, and diminishes the cervical mucus plug, which may play an important role in preventing the ascent of vaginal organisms.[17] Reduction of the cervical mucus plug weakens that "immunological gatekeeper", which protects the fetoplacental unit against infection from the vagina. The left suture in the vagina after ECC may reportedly also increase the risk of chorioamnionitis.[18,19] Notably, potential infection or early-stage infection with the potential to develop further after the surgery can not be completely excluded before ECC. There is a growing body of evidence that chorioamnionitis may play a role in preterm birth, PPROM, and adverse pregnancy outcomes.[2,20,21] In the current study all six women diagnosed with chorioamnionitis experienced preterm labor, and five had simultaneous PPROM. It does not necessarily follow that chorioamnionitis plays a role in preterm birth, but the immunological functions of the cervix and the cervical mucus plug with respect to preventing microbial invasion are probably essential preterm.[12]

Cervical laceration and incomplete uterine rupture were other complications after ECC. This may have been due to some patients presenting with active labor after ECC, or LAC and ECC stitch removal may not have been performed quickly enough. Cervical laceration and uterine rupture mainly occurred in women who suffered chorioamnionitis. This implied that infection may also play a role in the development of cervical laceration and incomplete uterine rupture. Close observation for chorioamnionitis after surgery is necessary to facilitate early intervention should it arise, but it is also essential for the prevention of maternal complications. The suture of LAC was at the internal os, which was very close to the isthmus uteri, generally precluding the process of uterine evacuation or vaginal delivery. Furthermore, it may affect the development of the lower uterine segment. The suture may move or embed into the myometrium and cut the cervix. Pregnancy was concluded in all the women in the present study via cesarean section or vaginal delivery after removal of the stitches by laparoscopy. Thus, the surgeon was required to have extensive experience in minimally invasive surgery.

Table 2

Neonatal outcomes after ECC in women with LAC failure.

Characteristic	Median (IQR / frequency) n=9
ECC, wk	20.71 (5.28)
Delivery gestational age, wk	26.71 (7.21)
Admission-to-delivery interval, wk	5.86 (6.07)
Live birth	6 (66.67)*
Delivery gestational age of live birth, wk	28.21 (5.32)*
Preterm	6 (66.67)*
Birth weight, g	1220 (732.5)
Neonatal asphyxia	5 (83.33)*
Apgar 1 min	6.5 (5.75)
Apgar 5 min	8.5 (5)
Apgar 10 min	9 (2.5)

*Frequency %

ECC: Emergency cervical cerclage; LAC: Laparoscopic abdominal cerclage; IQR: Interquartile range.

Table 3

Maternal complications after ECC in women with LAC failure.

Characteristic	Median (IQR or frequency) n=9
Delivery mode	
Vagina	3 (33.33)*
Cesarean section	6 (66.67)*
Bleeding during labor, mL	300 (275)
PPH	1 (11.11)*
PPROM	6 (66.67)*
Chorioamnionitis	6 (66.67)*
Uterine rupture	1 (11.11)*
cervical laceration	2 (22.22)*

*Frequency %

ECC: Emergency cervical cerclage; LAC: Laparoscopic abdominal cerclage; IQR: Interquartile range; PPH: Postpartum hemorrhage; PPROM: Preterm pre-labor rupture of membranes.

The limitations of this study included those generally associated with case series; i.e., the limited sample size, selection bias, and lack of a comparison group. Nonetheless, ECC is the primary subject of research investigating potential methodological interventions in women with LAC failure, and the current study provides valuable information on the maternal-fetal outcome of this procedure in clinical settings. Further limitations include the short follow-up period and the fact that only delivery conditions of neonates were obtained. In the future, more longitudinal studies are needed to clarify the effects of ECC on pregnancy in various contexts.

Conclusion

ECC is a promising alternative for prolonging pregnancy in cases where cervical dilatation occurs after LAC, and there is no concurrent bleeding, infection, or uterine activity. However, chorioamnionitis and PPROM may emerge as the significant complications associated with ECC. Randomized controlled trials should be conducted to determine whether the observed benefits of ECC outweigh the risks of perinatal morbidity and mortality in this specific population.

Funding

This work was supported by the National Key Research and Development Program of China (no. 2021YFC2700700).

Conflicts of Interest

None.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Editor Note

Zilian Wang serves as an Editorial Board Member of *Maternal-Fetal Medicine*. The article underwent the journal's standard procedures, including independent peer review managed separately from both the editor and their research groups.

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Edited By Yang Pan and Jue Li

How to cite this article: Deng S, Liang Y, Wei Y, Shang J, Yao S, Wang Z. Emergency Cervical Cerclage Following Laparoscopic Abdominal Cerclage with Cervical Dilatation. Maternal Fetal Med 2023;5(4):263–266. doi: 10.1097/FM9.0000000000000202.