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Laparoscopic emergency cervicoisthmic cerclage in second trimester of pregnancy: A case series report

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ABSTRACT

Purpose: The aim of this study was to evaluate the feasibility and safety of Laparoscopic emergency cervicoisthmic cerclage in second trimester of pregnancy.
Methods: Between November 2015 and March 2019 5 patients underwent Laparoscopic emergency cervicoisthmic cerclage. All women had showed cervical insufficiency with dilation in the second trimester due to extensive conisation (3 patients) or re-conisation (2 patients) and failed transvaginal cerclage (5 patients) due to a short vaginal cervix. Patients' characteristics were obtained from hospital's medical record and we evaluated surgical data, intra, postoperative complications, and perinatal outcome. All operations were performed by the same surgeon.
Results: The average operation time was 88 min (ranging from 80 to 95 minutes), the average estimated blood loss during the procedure was less than 100 mL and there were no perioperative or postoperative complications. The mean gestational age at surgery was 14.4 (ranging from 14.2 to 16) weeks. All women underwent an elective CS after 38 weeks of gestation. The overall pregnancy survival rate was 100 %, the mean gestational age at delivery was 38.1 weeks (ranging from 38.0 to 38.5 weeks) and the mean birth weight was 3190 g (g) (ranging from 2980 g to 3350 g).
Conclusion: Laparoscopic cervicoisthmic cerclage might be an alternative approach even in the early second trimester of pregnancy. Our study's success rates compare favourably to the laparotomy approach and the laparoscopic cervicoisthmic cerclage showed a relatively high success rate in women who are at risk of poor obstetric outcomes. Of course, the surgeon's experience and competence plays a key role and this approach should only be attempted in well-organized units.

Introduction

Cervical insufficiency occurs in 0.5–1 % of all pregnancies [1] and can cause preterm labour that result in significant neonatal morbidity or mortality [2]. It has a recurrence risk up to 21 % [3] and it is associated with vaginal bleeding, uterus contractions, intrauterine infection or rupture of membranes in the second or early third trimester and adverse perinatal outcome [4].

Among the proposed treatment options is cervical cerclage: transvaginal or abdominal. The transvaginal cerclage was introduced by Shirodkar and McDonald, while the transabdominal cerclage is regarded an alternative treatment to the vaginal approach [5]. Benson and Durfee in 1965 [6] were the first to describe the transabdominal approach for a cerclage placement above the cervix, around the uterine isthmus. In the coming years there have been extensive reports of improved outcomes with the fetal survival rates around 90 % [6,7].

The transabdominal cerclage at the cervical isthmus is a suture that is positioned around the cervical isthmus, after finding the avascular space above the cardinal and uterosacral ligaments [7]. This technique is mainly used when a vaginal cerclage is not feasible. The main reason for that is an altered cervical anatomy, that is attributed to congenital anomalies and scarring, which is associated with conisation, cervical myomectomy, trachelectomy or laceration at delivery [8].

However, in the transabdominal approach two open laparotomies are necessary: the first for the cerclage placement and the second for the Caesarean Section (CS). In addition formation of postoperative bowel adhesions is another problem that is associated with the open method.

Laparoscopic approach of cervicoisthmic cerclage allows the patients to avoid all these side effects and other complicating factors [9–12]. On the other hand, the laparoscopic method has several limitations including an inability to manipulate the uterus adequately as no manipulator can be used. Furthermore the high

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vascularisation of the area near the parametrial vessels and ureters leads to an increased bleeding risk, while it is also reported a higher risk of preterm labour and rupture of membranes. As a consequence the operation time and risk of morbidity are increased [12].

In the existing literature data on the surgical and perinatal outcome of laparoscopic cervicoisthmic cerclage during pregnancy are inadequate, especially after the end of first trimester, based on small case series or case reports. In this study, we present the outcomes of five patients who underwent an emergency placement of a laparoscopic cervicoisthmic cerclage in the second trimester, as well as their operative and perinatal outcomes, along with a short literature review.

Materials and methods

This is a retrospective observational study of 5 women who underwent an emergency laparoscopic cervicoisthmic cerclage in the second trimester of pregnancy between November 2015 and March 2019. The study was approved by the local institutional review board (Ethics Committee of the St. Luke's hospital, Thessaloniki, Greece).

All patients had either a history of at least one second-trimester pregnancy losses or preterm births prior to the 34th week of gestation, as shown in Table 1. A failed transvaginal cercalge was attempted during the first trimester of pregnancy and a conservative treatment was decided.

All five patients showed cervical insufficiency with dilation in the second trimester due to extensive conisation (3 patients) or re-conisation (2 patients) and failed transvaginal cerclage (5 patients) due to a short vaginal cervix. All five patients underwent a first trimester ultrasound screening at 12–14 weeks of gestation, where they showed no abnormal findings in the fetus. A vaginal examination and a measurement of cervical length was performed in all cases: cervix was shorter that 10 mm and membranes were just visible by inspection. The fetal viability was confirmed before, during and after the surgery using a transvaginal ultrasonography. None of the patients had abnormal uterine contraction, preterm rupture of the membranes or uterine bleeding before the operation until the CS. All women were informed in detail for the risks and benefits of the procedure and after an extensive counselling a consent form was signed. The decision to proceed in a laparoscopic cervicoisthmic cerclage was multidisciplinary and involved the referring obstetrician, the operating surgeon, a fetomaternal specialist and the patient.

An experienced laparoscopic surgeon, AK, performed all the surgeries, under continuous transvaginal ultrasound control. All women received general anaesthesia and were placed in a modified dorsal lithotomy position.

Surgical procedure

A 10 mm skin incision was made in the umbilicus and a Veress needle was carefully inserted. After performing the safety test, CO2 was insufflated into the abdomen to obtain a pneumoperitoneum with intraabdominal pressure of 12 mm [mm] Hg and then the 10 mm trocar was inserted. After that, the laparoscope was inserted and under direct vision another 10 mm trocar was introduced in the Palmer's point. Finally three additional five-mm trocars were introduced in the right and left lower quadrant and suprapubic.

A laparoscopic bipolar diathermy and a scissors were used to dissect the vesicouterine peritoneum transversely, very carefully in order to minimize the diathermy use and the areas of blleding. The bladder was pushed downward as possible, to identify the vesico-cervicoisthmic space and revealing the course of the uterine vessels anteriorly.

Polyester five-mm, non–absorbable white tape and a double-armed curved needle that was 40 cm in length was used (MERSILEN, ETHICON, Somerville, NJ). We straightened extra-corporeally the curved needle and then we inserted it through the ten-millimetre accessory port. The uterus was mobilised using a ten-millimetre atraumatic articulating retractor to enable the stitch placement in the Douglas space dorsal to the cervix. Each end of the needle was introduced medial to the uterine vessels and broad ligaments in a dorsal-to-ventral direction and bluntly placed through the paracervical tissue under the transvaginal ultrasound view (Fig. 1a,b). The tape was knotted intra-corporally five times on the ventral cervicoisthmic segment. Following that, the peritoneum was sutured to cover the knots where possible.

Table 1
Patients' data, operative and perinatal outcome.

Age	History of conisation	GA (weeks + days)	G / P	Pregnancy loss (1 st or 2nd trimester)	Preterm birth before 34 w	BMI (kg/m^2)	Previous abdominal surgery	Operation time (minutes)	Hospital stay	EBL (ml)	Gestational age at delivery (weeks + days)
29	extensive	14 + 2	2/1		1	22.2	yes	95	3	<100	38 + 0
34	reconisation	14 + 3	2/1	1		24.1	yes	84	4	<100	38 + 0
36	reconisation	14	2/0	1		31.1	no	90	3	<100	38 + 5
31	extensive	14 + 4	3/0	2		29.4	yes	80	3	<100	38 + 0
37	extensive	16	3/1		1	26.8	no	91	4	250	38 + 0

Abbreviations: GA – Gestational Age, G/P - Gravida / Para, EBL – Estimated Blood Loss, BMI – Body Mass Index.

Table 2
Studies evaluating Laparoscopic cervicoisthmic cerclage in pregnancy.

	Pts (total)	Pts (during pregnancy)	Gestational age at delivery(Weeks + days)	Fetal Survival rate	Gestational ages at time of procedure
Zeybek et al. [15]	6	6	37.5	83%	12.1
Chen et al. [13]	101	26	36.2	95 %	1st trimester
Shin et al. [12]	80	80	36.3	90 %	12.1
Ades et al. [9]	64	3	37		8.2
Whittle et al. [14]	65	31	33	77.5%	<16 weeks
Cho et al. [16]	20	20	14 pts >36 weeks, 5 pts <36 weeks	95 %	12.1

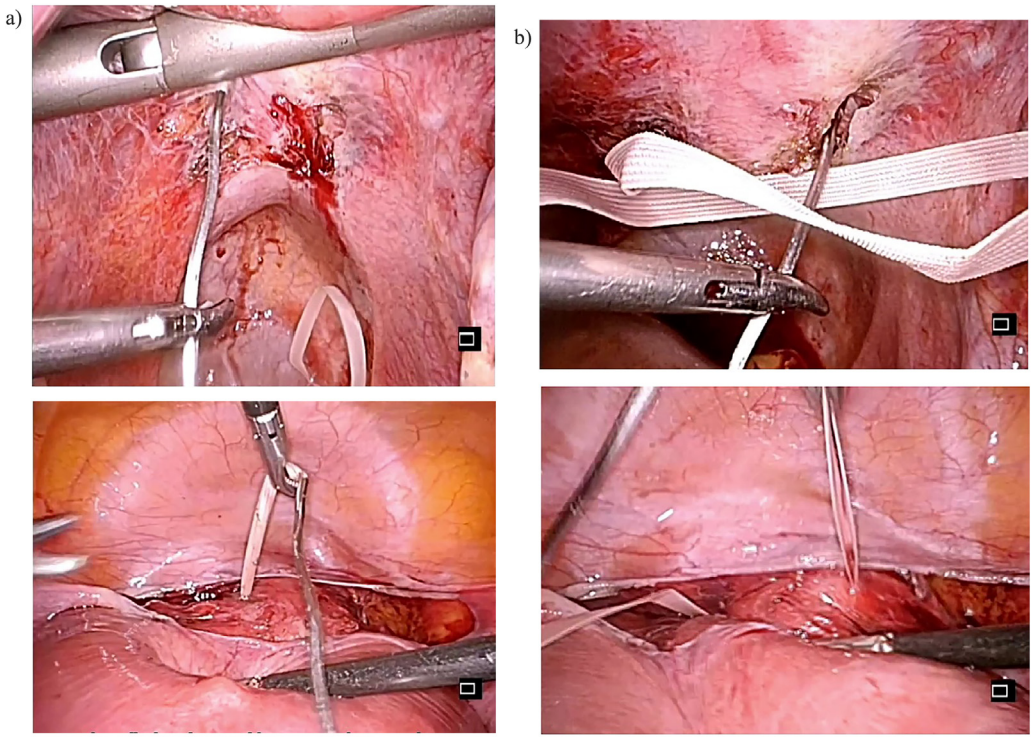

Fig. 1. Laparoscopic placement of the cerclage tape (a: left side, b: right side).

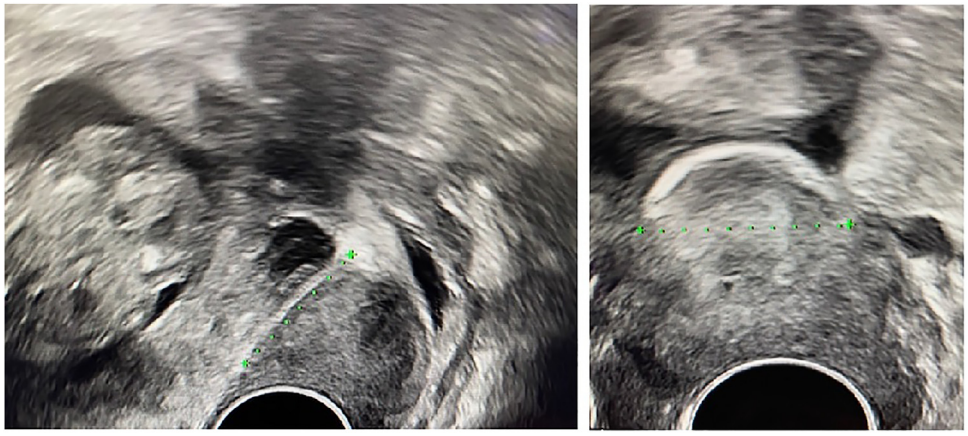

Fig. 2. Ultrasound evaluation of ceclage, 10 days after discharge.

No patient received tocolytics neither during nor immediately after the procedure and in all cases we administered a single dose of prophylactic antibiotics. The patient was observed in the hospital room for two to three days to control both the fetal vitality and cerglage placement using a transvaginal ultrasonography. Ten days after the patient was discharged, we performed a transvaginal ultrasonography to confirm the proper cerclage placement and fetal vitality (Fig. 2).

Results

Five patients underwent an emergency laparoscopic cervicoisthmic cerclage during the second trimester of their pregnancy between November 2015 and March 2019. The perioperative data included the duration of the procedure, the time that the patient spent in hospital, estimated blood loss and surgical complications. The obstetric and neonatal outcomes were collected directly from the obstetricians and pediatricians to provide care, hospital charts and telephone interviews with the patients.

The patient demographics are presented in Table 1. The average operation time was 88 min (ranging from 80 to 95 minutes), the average estimated blood loss during the procedure was less than 100 mL and there were no perioperative or postoperative complications. Three patients had previously experienced at least two pregnancy losses prior to the placement of the cerclage.

The mean gestational age at surgery was 14.4 (ranging from 14.2 to 16) weeks. All women underwent an elective CS after 38 weeks of gestation. The overall pregnancy survival rate was 100 %, the

mean gestational age at delivery was 38.1 weeks (ranging from 38.0 to 38.5 weeks) and the mean birth weight was 3190 g (g) (ranging from 2980 g to 3350 g).

Discussion

In the present study, we included five women that underwent emergency laparoscopic cervicoisthmic cerclage at a gestational age of between 14 and 16 weeks without complications. All patients delivered by caesarean section with an average gestational age of 38.1 weeks and neonatal surviaval rate of 100 %. There were no complications during the caesarean sections.

Several small case series have reported outcomes for laparoscopic cervicoisthmic cerclage in pregnancy, as shown in Table 2.

Shin et al. [12] reported the largest series of 80 women for whom the transvaginal cerclage was unsuccessful, and they underwent a modified laparoscopic transabdominal cervicoisthmic cerclage. The mean gestational age was 12.1 weeks (ranging from 11 to 15 weeks). The operation time was 52 min (ranging from 25 to 100 minutes). The successful pregnancy rate was 90 % (72/80 pregnancies) with a mean gestational age of 36.3 weeks. The mean newborn weight was 2690 g (ranging from 1860 to 3750 g). Although eight pregnancies were lost in the first and second trimesters due to either a spontaneous abortion, premature rupture of the membrane or termination due to an anomaly, no other complications occurred.

Chen et al. [13] reported a series of 26 surgeries during the first trimester of pregnancy. The Mersilene tape was used in all cases, without any complications and they report an average gestational age at delivery of 36.2 weeks. Furthermore, there was a 95 % fetal survival rate.

Whittle et al. [14] reported data for 31 cases using a Prolene suture, of which six cases were converted to open trans - abdominal cerclage (TAC). More specific in 5 cases there was an excessive uterine vessel bleeding and in 2 led in pregnancy loss, as an uterine vessel ligation was required. The other laparotomy was performed for impaired surgical visibility, due to a high BMI. The average gestational age at delivery was 32.9 $\pm$ 8.8 weeks and they report 7 fetal losses.

In another retrospective observational study by Ades et al. [9], 3 women who underwent an insertion of the cerclage at a gestational age of between 6 and 11 weeks without complications. All patients delivered via caesarean section, without any intra-operative complication and the average gestational age was 37.1 weeks. Four women delivered before 37 weeks, two of which due to labour initiaon. The third-trimester delivery rate was 100 %.

Zeybek et al. [15] reviewed case reports of 6 cases of antepartum Robotic Assisted Laparoscopic Abdominal cerclage (RALAC) (including needless). There was no major complication and ni conversion to laparotomy. The live birth rate was 83.3 % (5/6) and the gestational age at the time of placement ranged from 10 to 14 weeks, and the average gestational age at delivery was 37.5 weeks (ranging from 22 to 39).

Cho et al. [16] did a retrospective review of 20 women with a mean gestational age at the time of cerclage placement of 12.1 weeks (ranging from 11 to 14 weeks). The mean operating time was 55 min (ranging from 40 to 75 minutes). There were no operative or immediate postoperative complications. Nineteen women successfully delivered 21 live babies (2 sets of twins with a live birth rate of 95 %). One loss occurred due to a ruptured membrane 19 weeks after the cerclage. Five women delivered prematurely due to a premature rupture of the membrane, severe pregnancy-induced hypertension or premature labour before the gestational week 36.

Another advantage of our laparoscopic cervicoisthmic cerclage procedure was needle guidance under transvaginal ultrasound, avoiding blind manipulations as was publishes previously in similar techniques [17,18].

Finally a meta-analysis published by Tulandi et al. [19] showed live birth rate ranging from 70 % to100 % and 70 % third-trimester delivery for laparoscopic TAC. In cases of open TAC live birth rate was 85 %–100 % and third-trimester delivery 77.5–99.5 %. There was no difference between the live birth rates of patients who had TAC performed either before pregnancy or during. However, some authors found that one advantage of a laparoscopic TAC was reduced morbidity compared to an open TAC, and it also had a reduced hospital stay and faster recovery. The overall outcomes were similar for both groups; however, the surgical complication rate (wound infection, increased blood, loss, and need for transfusion) was much higher for the open approach (18).

We believe that this is the first study that has reported the placement of laparoscopic cervicoisthmic cerclage as an emergency procedure in patients with a dilated cervix in their second trimester of pregnancy.

Laparoscopic cerclage in the second trimester is a demanding surgical procedure compared to the first trimester, which is due to the difficulty in manipulating the enlarged uterus. Many authors regard laparoscopic access of the lower uterine segment particularly demanding without using a uterine manipulator (1–10,14). In our department, we routinely do not use any kind of uterine manipulator for all cases of total laparoscopic hysterectomy [20], and this experience makes it easier for us to manipulate a 14–15-week uterus.

The mean operative time that was reported in the bibliography ranged from 25−100 min [3,5,12,14], whereas in our study, the mean operative time was 88 min. This is significantly higher, as it ranged from 80−95 min. This is because of the increased difficulty of the operation due to both the increased vascularisation and the restrictions on uterine mobility and manipulation.

Conclusion

Laparoscopic cervicoisthmic cerclage might be an effective alternative approach for the treatment of cervical incompetence when a vaginal cervical cerclage is not possible, even in the early second trimester of pregnancy. Our case series revealed a favourable obstetric outcome in women who have a poor obstetric history. Our study's success rates compare favourably to the laparotomy approach and the laparoscopic cervicoisthmic cerclage has a relatively high success rate in women who are at risk of poor obstetric outcomes. Of course, the surgeon's experience and competence plays a key role and this approach should only be attempted in well-organized units. In the future further research and bigger case series are required to prove feasibility and safety of this approach in second trimester of pregnancy.

Author contribution

AK: Project development, Responsible surgeon, Manuscript review.

AG: Data collection, Data analysis, Manuscript.

DZ: Data collection, Data analysis Project development, Assistant surgeon, Manuscript writing.

Ethics approval

Ethical approval was waived by the local Ethics Committee of the two Hospitals in view of the retrospective nature of the study and all the procedures being performed were part of the routine care.

Funding details

No funding was obtained for this study.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Consent to publish

Patients signed informed consent regarding publishing their data and photographs.

Declaration of Competing Interest

The authors report no declarations of interest.

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