Laparoscopic Cerclage for Twins at 11 Weeks Gestation

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ABSTRACT

Introduction: Preterm labor and cervical insufficiency are significant health problems in obstetrics. They can lead to devastating outcomes for families and significant costs. Cervical and abdominal cerclages can improve outcomes in appropriately selected patients.

Case Report: This is a case of a 31-year-old woman (Gravida 8, Para 1-2-4-1) who presented at 11 weeks with a diamniotic–dichorionic twin gestation. A laparoscopic abdominal cerclage was placed and she successfully carried her pregnancy to 35 weeks, when she was delivered for obstetric indications.

Discussion: Despite convincing literature suggesting increased morbidity with cerclage placement in twin gestations, in properly selected patients, a cerclage may in fact be beneficial. Growing evidence has shown effectiveness of laparoscopically placed cerclages, and should be considered an alternative to laparotomy. Laparoscopic abdominal cerclage can safely be performed for twin gestation. Multispecialty approach can improve outcomes and increase safety. Gentle tissue handling is important in all laparoscopic surgery, but especially during pregnancy.

Key Words: Abdominal cerclage, Laparoscopic cerclage, Twin pregnancy.

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INTRODUCTION

The incidence of spontaneous preterm births has increased,[1] with occurrence in ~12% of all pregnancies.[2] Beyond the financial cost, prematurity is associated with psychosocial costs, specifically increased parental anxiety and depression.[3] One significant cause of preterm delivery is cervical insufficiency, defined as the inability of the cervix to maintain a pregnancy in the second trimester.[4] Pelvic rest and bedrest have proven unsuccessful and have been shown only to increase preterm delivery and maternal morbidity.[4–6]

Today's most common transvaginal cerclages were first introduced by Shirodkar[8] in 1955 and McDonald[9] in 1963. A McDonald cerclage is a purse string stitch placed proximal on the cervix near the cervicovaginal junction.[9] A Shirodkar cerclage involves dissecting the bladder and vaginal mucosa off the cervix to place a stitch through the cervix at the level of the internal os.[8] These types of cerclage generally have had successful outcomes, but do occasionally fail. Women who have had failure of a cervical cerclage via a transvaginal approach are candidates for a transabdominal cerclage. This procedure was first introduced in 1965 by Benson and Durfee and has a 90% success rate.[7] It was originally performed via laparotomy, but with surgical advances, can now be performed laparoscopically. The surgery may occur before or after con-

ception, via laparoscopy or laparotomy, with excellent results. There may even be some benefit to preconception placement of the cerclage.[10] Typically, placement for laparoscopic abdominal cerclage after conception occurs less than 13 weeks into the pregnancy because of the size of the uterus and the inability to manipulate it. A recent systematic review has shown a 90% success rate of laparoscopic placement of abdominal cerclages during singleton pregnancy, comparable to the success rates of that performed via laparotomy.[11]

The following case report was exempt from Institutional Review Board approval at Baylor University. Patient on this case report had signed consent for publication.

CASE REPORT

The patient was a 31-year-old (Gravida 8, Para 1-2-4-1) at 11 weeks 3 days with a spontaneous diamniotic–dichorionic twin gestation. She presented as a referral for possible laparoscopic abdominal cerclage. Her history was significant for a 24-week loss in 2003 with painless cervical dilation followed by a full-term delivery in 2006 after vaginal cerclage placement in that pregnancy. The next four pregnancies all resulted in mid second-trimester losses. The first 3 of these were complicated by transvaginal cerclage failure. The sixth pregnancy was lost after development of chorioamnionitis at 20 weeks, with an abdominal cerclage in situ, which was subsequently removed. During the seventh pregnancy, advanced cervical dilation prohibited cerclage placement at 16 wk. She was counseled about her options during the pregnancy in which she presented to us, focusing on the fact that even though a cerclage is not typically recommended in twin gestations, because of her poor obstetrical history (6 pregnancy losses with 3 vaginal cerclages and 1 abdominal cerclage), it might be her only chance for a live birth, as a few studies suggest benefit in carefully selected cases of dichorionic–diamniotic twins. We discussed that there are data to suggest that a cerclage would increase her chances of preterm labor and premature membrane rupture[4] and that cesarean delivery would be necessary with an abdominal cerclage. We also discussed the increased surgical risk because of increased uterine size due to the twin pregnancy. She ultimately elected to have placement of another abdominal cerclage. She was also counseled on the surgical route and expressed a preference for minimally invasive surgery. A material–fetal medical (MFM) specialist was consulted and was actively involved with the process of management of this patient.

The MFM specialist was called before the surgery. We preformed an obstetric ultrasonography (US) before surgery (**Figure 1**). Intraoperative (**Figure 2**) and postoperative US scans were performed by the MFM specialist. We entered the abdomen through a 1.5-cm incision in the umbilicus, using an open technique. We tagged each fascial edge to facilitate closure. A gel-point, mini–single-site platform (Applied Medical, Rancho Santa Margarita, California, USA) was placed through the umbilicus because we could use multiple 10-mm ports through a single incision. To minimize uterine manipulation during pregnancy and allow adequate visualization, 2 additional lateral 5-mm ports were placed. The uterus was noted to fill the entire pelvis and posterior cul-de-sac. The procedure was started by creating an anterior bladder flap to expose the anterior cervix and uterine vessels. Next, a laparoscopic fan was introduced through the single-site port to elevate the uterus and allow visualization of the posterior cul-de-sac (**Figure 3**). Despite adequate uterine elevation to attempt a posterior to anterior placement, there were no clear external uterine landmarks to identify the necessary trajectory to avoid the intra-amniotic sacs and the uterine vessels.

Although laparoscopic cerclage placement for singleton pregnancy can be performed without US guidance; because of the presence of twin gestations, it was difficult to place the needle in a suitable location. Intraoperative transvaginal ultrasonography (TVUS) (**Figure 4B**) was performed by the MFM specialist and was used to identify the uterine vessels, fetuses, and amniotic cavities and the needle. Intraoperative TVUS (**Figure 2**) was performed by the specialist, whereas the internal cervical os and the

Figure 1. Preoperative transvaginal ultrasound.

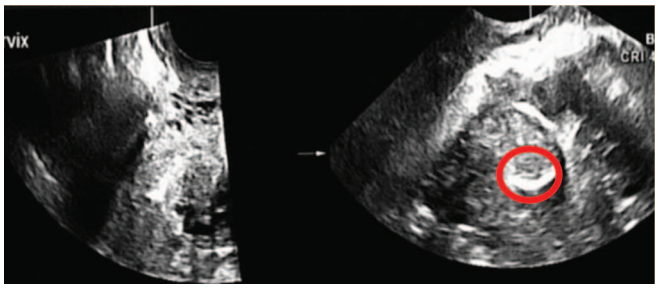

Figure 3. Intraoperative Ultrasound Picture showing the cervix with cerclage in situ (red circle).

needle-entry point between the cervix and uterine artery were identified by the surgeons laparoscopically.

The needle trajectory was simultaneously monitored continuously with TVUS and laparoscopically until it was completely through the anterior portion of the cervix. **Figure 4** shows the 2 monitors used, allowing for safe passage of the needle through the uterine isthmus.

We then guided the needle anteriorly on the left and right sides of the cervix with a Mersilene tape suture (Ethicon, Somerville, New Jersey, USA). Each needle was carefully guided medial to the uterine arteries and pulled through until the suture was tight. The needle tip was continuously identified by US, and its location compared with that of the uterine artery. It was slowly advanced, millimeter by millimeter, continually identifying the structures to safely pass the needle from posterior to anterior. The suture was tied down anteriorly. Simultaneously the MFM specialist evaluated the cerclage and noted it to be at the internal os. She then evaluated fetal well-being. Six ties were performed with the Mersilene tape. Next 2-0 silk was used to perform a stay suture. The peritoneum was closed and an

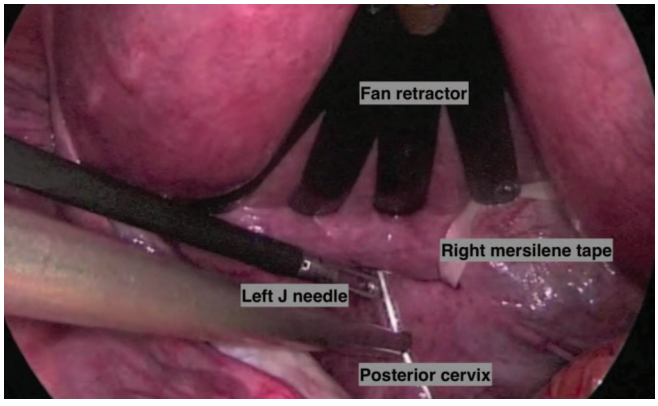

Figure 4. Intraoperative laparoscopic image, showing placement J-Needle in relation to Cerclage/Mersilene Tape.

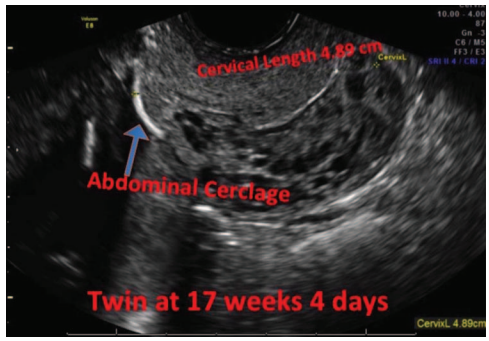

Figure 5. Pelvic ultrasound at 17 weeks 4 days showing cervical length 4.89 cm.

absorbable adhesion barrier (Gynecare Interceed; Ethicon) was placed on the dissected peritoneum. At the end of the procedure, the cervix was confirmed via TVUS to be long, with the stay suture present within the proximal portion of the cervix at the level of the internal os.

Serial USs subsequently demonstrated maintenance of adequate cervical length throughout the pregnancy (**Figure 5**). Magnetic resonance imaging was performed at 30 weeks to evaluate the fetal cranial anatomy by the obstetric team, and which the cerclage was visualized still intact in the proper location (**Figure 6**). At 35 weeks, the patient developed preeclampsia with severe features necessitating delivery. She had a postpartum hemorrhage caused by uterine atony. The cerclage was left in situ.

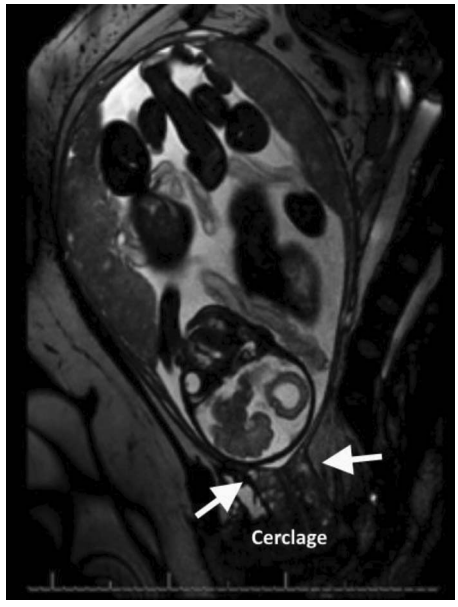

Figure 6. MRI at 30 weeks showing cerclage intact at the level of the internal os.

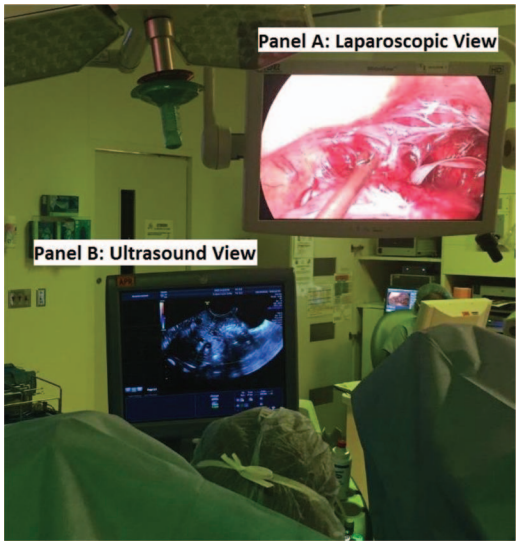

Figure 2. Intraoperative image showing the dual-image projection. (**A**) Laparoscopic view; (**B**) US view.

DISCUSSION

Patients who have a history of recurrent pregnancy loss or spontaneous preterm birth and have had unsuccessful vaginal cerclage are often limited in their options. Abdominal cerclage has a high success rate when placed during an early singleton pregnancy. It also carries increased risk because of the enlarged gravid uterus, which limits uterine manipulation, and the engorged uterine vessels, which enlarge because of increased blood flow to the gravid uterus, especially when compared to interval abdominal cerclage placement between pregnancies. Although cerclages in twins are usually not recommended to prevent preterm birth, there is at least 1 retrospective review that suggests that women with dichorionic–diamniotic twin pregnancies and cervical dilatation or severe shortening may benefit from examination-indicated cerclage.[12] A review of abdominal cerclage in twin pregnancies found 15 reported cases in the literature, 14 by laparotomy, and 1 by laparoscopy before pregnancy. Of the cases in this report, 87% produced healthy infants, with the remaining 13% ending in fetal demise.[13]

We argue that, by using safe surgical techniques, maintaining some surgical creativity, and using other subspecialists, even very difficult high-risk surgeries, such as the one described herein, can be safely performed. In this case, we safely guided the large needle bearing the Mersilene suture using continuous visualization with US. This technique allowed us to confidently pass the suture, decreasing the possibility of an injury and has been described as beneficial in the literature.[14] Although with more experience this procedure may be safely performed without the use of US guidance, we chose to minimize any potential risk given the enlarged uterus in the setting of a twin gestation. We must always consider *primum non nocere*, and we believe that our method allowed us to follow all ethical principles in this case. The result of this surgery was successful, which is consistent with previous literature suggesting a success rate of 90% with abdominal cerclage.[12,13,15,16]

New research has suggested that the uterine muscle at the internal os acts as a sphincter.[17] This discovery, along with radiographic research, suggests that a cerclage placed proximally through the cervix, near the internal os, decreases the odds of preterm birth.[18] With this research, we may see an increase in abdominal cerclages to provide support and strength to this sphincter.

We intend to continue to perform all abdominal cerclages laparoscopically with planned cesarean delivery. This protocol would be beneficial to patients as they would undergo only 1 laparotomy (the cesarean) instead of 2, decreasing complications and associated risks.

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