

Interval Laparoscopic Transabdominal Cervical Cerclage (ILTACC) Using Needleless Mersilene Tape for Cervical Incompetence

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Abstract

Interval Laparoscopic Transabdominal Cervical Cerclage (ILTACC) has become a procedure of choice for many laparoscopic surgeons in nonpregnant patients diagnosed with cervical incompetence (CI) due to the inherent advantages it offers. The study was conducted to describe the feasibility of performing a three-step approach of ILTACC using a needleless mersilene tape in patients diagnosed with CI. A case series of three patients diagnosed with CI who underwent ILTACC using needleless mersilene tape referred at a tertiary hospital for cerclage. Women diagnosed with CI who underwent ILTACC using a needleless mersilene tape were included in the study, and surgical outcomes were measured. Descriptive statistics were used to describe the demographic profile and surgical outcomes of the patients. Three patients with a mean age of 31 (standard deviation [SD] = 4.96) years with a gravidity of 2.67 (SD, 0.82) and parity of 0.33 (SD, 0.47) were selected. The cervical length was 1.98 (SD, 0.76) cm. The average operative time was 149 (SD, 43.87) minutes. All patients had minimal blood loss (≤ 60 ml) without intraoperative blood transfusion. The hospital stay was 1.33 (SD, 0.47) days with a median of 1 and a range of 1–2 days. No intraoperative or postoperative complications were noted. No cases were converted to laparotomy. The result of this article shows the safety and feasibility of ILTACC using needleless mersilene tape. However, it should be evaluated in more cases.

Keywords: Cervical incompetence, interval cerclage, mersilene tape, transabdominal cervical cerclage

INTRODUCTION

Transabdominal cervical cerclage is a procedure that allows the placement of a nonabsorbable suture at the cervicoisthmic junction to prevent preterm births secondary to cervical incompetence (CI), which complicates 0.1%–1% of pregnancies.^[1-7] This procedure is indicated in women with failed vaginal cerclages, extremely short or absent cervix, and in whom, conventional management of preterm births has failed, which can be carried out by laparotomy or laparoscopy and can be performed preconceptionally (interval) or during

pregnancy.^[2-6] The advantages of this procedure include higher placement of the suture relative to the level of the internal os, decrease the incidence of slippage, and the ability to leave the stitch in place between pregnancies.^[8] Moreover, this approach offers the potential benefit of reducing the morbidity associated with laparotomy, the cosmetic advantage of having a less surgical scar, fewer adhesions, less hospital stay, and faster recovery time.^[2-6,8,9]

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Abdominal cerclage is associated with excellent results as the treatment of CI, with high fetal survival rates and minimal complications during surgery and pregnancy.^[2-5,9,10] The reported success rate of the laparoscopic route of abdominal cerclage is comparable to laparotomy (79%–100% vs. 85%–90%).^[2,10-13]

At present, due to the advancement of technology and skills acquired by surgeons, the laparoscopic interval approach is preferred due to its inherent advantages and the ability to mobilize a small, less vascularized nonpregnant uterus.^[3-5,8,14] Here, we describe the feasibility of a new technique of ILTACC utilizing a needleless mersilene tape performed in three women with CI. Descriptive statistics were used to describe demographic profiles and surgical outcomes.

SUBJECTS AND METHODS

This study was approved by Chang Gung Medical Foundation Institutional Review Board (IRB) with Approval No. 202000344B0 and informed patient consent was waived by IRB. Three patients diagnosed with CI were referred by their respective obstetrician-gynecologists at our institution, a tertiary referral center, for interval laparoscopic cervical cerclage. The corresponding author and the primary surgeon (CLL) had acquired patients' consent before the surgery. All surgeries were performed by a single experienced gynecologic endoscopist (CLL) who is known presently to perform laparoscopic cerclage in the hospital. In this report, the needleless ILTACC was a modification only of the existing surgical techniques of cerclage, known as the standard approach in the management of CI.

Case 1

A 40-year-old woman, G4P1 (1031), diagnosed with recurrent CI with failed two Mc Donald cerclages, was admitted for ILTACC. All her pregnancies were conceived through assisted reproductive technology with only one successful live birth. She had no history of any surgical procedures (e.g., loop electrocautery excision procedure or conizations) except for two failed Mc Donald cerclages and two cesarean sections. Her cervical length before surgery was 1.0 cm. She underwent ILTACC with no complication and had an estimated blood loss of 50 ml. She was discharged 1 day postsurgery.

Case 2

A 35-year-old woman, G2P0 (0020), diagnosed with CI and endometrial polyp was admitted for ILTACC and hysteroscopic resection of the polyp. All her pregnancies were conceived spontaneously and not assisted. All her pregnancy losses occurred during the second trimester. She had no history of Mc Donald cerclage. Her ultrasound revealed thickened endometrium and a cervical length of 2.0 cm. She underwent diagnostic hysteroscopy, where

multiple endometrial polyps were noted. She underwent ILTACC and transcervical resection (TCR) of the polyp with no complication and had an estimated blood loss of 60 ml. She was discharged 1-day postsurgery.

Case 3

A 24-year-old woman, G2P0 (0020), diagnosed with CI and had one failed Mc Donald cerclage during her second pregnancy, was admitted for ILTACC. All her pregnancies were conceived spontaneously and not assisted. All her pregnancy losses occurred during the second trimester. Her cervical length was 2.85 cm. She underwent ILTACC with no complication. The estimated blood loss was 20 ml. She was discharged 2 days postsurgery.

Surgical technique

After induction of general anesthesia through endotracheal intubation, 10 mm primary trocar is inserted transumbilically. Two accessory ports are inserted. Uterine manipulation is carried out using uterine manipulator.

Step 1: Creation of a window

A window of approximately two-fingerbreadth space is created bilaterally in the broad ligament lateral to the uterine arteries at the level of the internal os using the suction tip and bipolar PK instrument [Figures 1-3].

Step 2: Placement of mersilene tape

A Mersilene tape, 5 mm breadth and 30 cm long is introduced in the pelvic area. The needle is cut to prevent the likelihood of possible vessel injury. A needleless mersilene tape is passed through the created window on the left side lateral to the left uterine artery in a posterior-anterior direction circumventing the vesicouterine fold and then passing the tape into the created window in the right side anteroposteriorly lateral to the right uterine artery [Figures 4 and 5]. For patients 2 and 3 the mersilene tape is passed underneath the vesicouterine fold [Figure 6]. Care must be taken to make certain that the tape is flat all the way around and not twisted.

Step 3: Securing the tape

The tape is loosely tied and secured with a two-fingerbreadth space using the extracorporeal knot for seven times at the level of the internal os and 1 cm above uterosacral ligaments. Caution must be taken not to tie the knot too tight and just enough to be hugging the internal os of the cervix. Clips are then applied to the knot to prevent slippage of the tape [Figure 7]. The remaining distal end of the tape is cut. The procedure is completed.

RESULTS

Three patients diagnosed with CI with a mean age of 31 (standard deviation [SD] = 4.96) years with gravidity of 2.67 (SD, 0.82) and parity of 0.33 (SD, 0.47) underwent

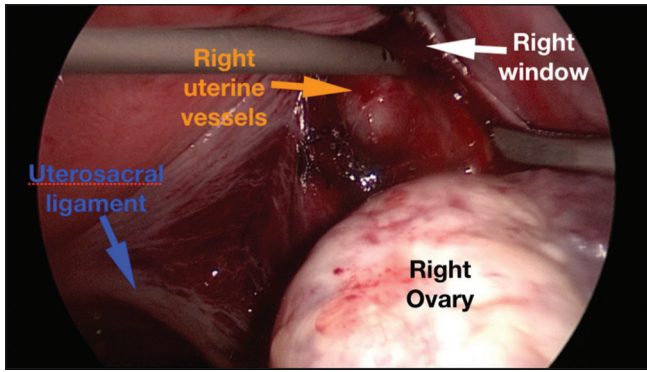


Figure 1: Creation of right window (white arrow) lateral to right uterine vessel (orange arrow)

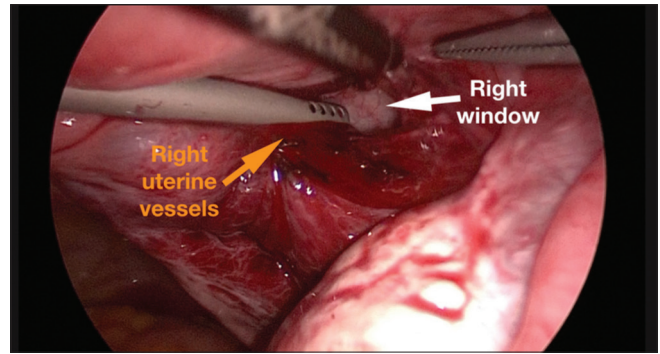


Figure 2: Right window orifice (white arrow) lateral to uterine vessel

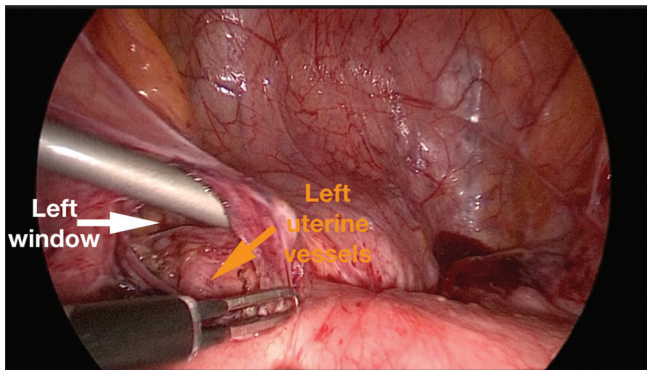


Figure 3: Left window orifice (white arrow) lateral to uterine vessel

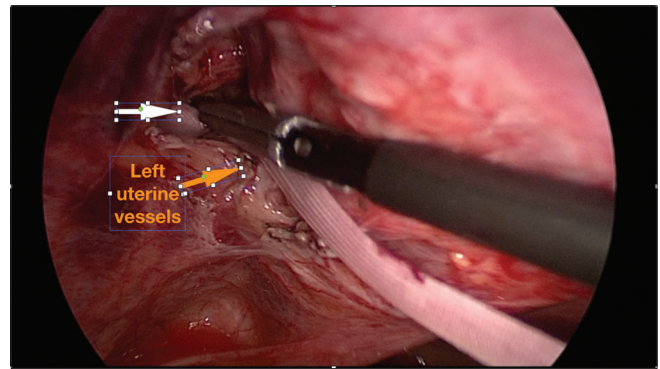


Figure 4: Mersilene tape (white arrow) passed in a posteroanterior manner lateral to the uterine vessel

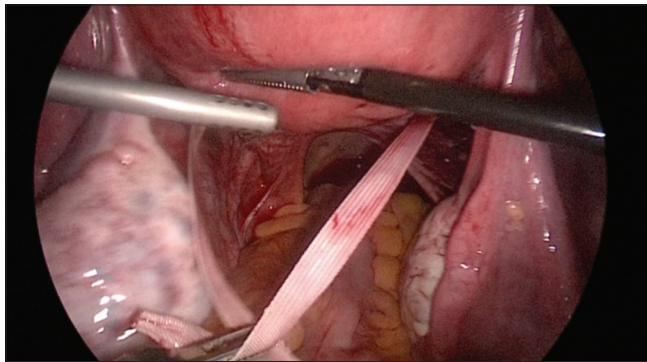


Figure 5: Mersilene tape successfully placed in the uterine isthmus lateral to the uterine vessel

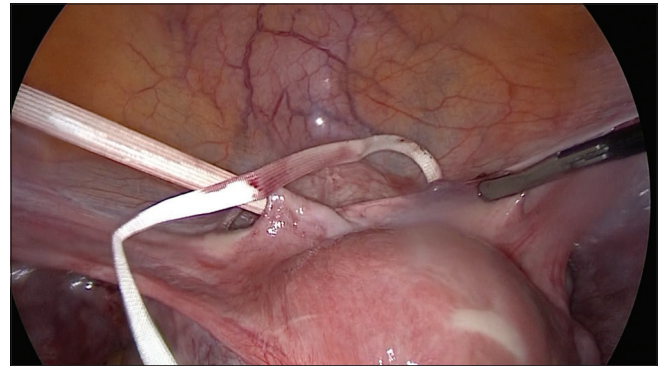


Figure 6: Mersilene tape passed beneath the vesicouterine fold for case 2 and 3

ILTACC. One of them (case 2) underwent TCR of polyp due to findings of endometrial polyp on hysteroscopy. All three patients had second-trimester abortion (median 2, range, 2 or 3). Pregnancies were conceived spontaneously except for the first case where it was made possible through assisted reproductive technology through intrauterine insemination and *in vitro* fertilization. There was no history of abdominal surgeries except for one of them (case 1) who had cesarean section. All of them denied any history of hypertension, diabetes mellitus, and heart diseases. The mean cervical length was 1.98 (SD, 0.76) cm. Two of them had a history of failed Mc Donald cerclages. One of them (case 2) did not

have vaginal cerclage because she was not worked up during her previous pregnancies. She was only diagnosed with CI when she consulted for abnormal uterine bleeding where a thickened endometrium and a shortened cervical length were noted. This patient underwent hysteroscopy where polyps were noted and subsequently undergo ILTACC and TCR of polyp. The detailed demographic profile, intraoperative, and postoperative surgical outcomes of the cases discussed are shown in Tables 1 and 2, respectively.

The average operative time was 149 (SD, 43.87) minutes. All patients had minimal blood loss (≤ 60 mL), and none of them required intraoperative or postoperative blood transfusion. The mean

Table 1 Patients' characteristics

| Case | Age | Gravidity | Parity | Abortion | Mode of pregnancy | C/S | Other Abdominal surgery | Mc Donald Cerclage | CL (cm) |
|------|-----|-----------|--------|----------|-------------------|-----|-------------------------|--------------------|---------|
| 1 | 34 | 4 | 1 | 3 | ART | 2 | 0 | 2 | 1.0 |
| 2 | 35 | 2 | 0 | 2 | Spontaneous | 0 | 0 | 0 | 2.1 |
| 3 | 24 | 2 | 0 | 2 | Spontaneous | 0 | 0 | 1 | 2.85 |

ART: Artificial reproductive technology, CL: Cervical length

Table 2: Patients' surgical outcomes

| Case | Surgery performed | Operative time (min) | Blood loss (ml) | Hb change (g/dL) | Blood transfusion | Postoperative stay (day) |
|------|-----------------------|----------------------|-----------------|------------------|-------------------|--------------------------|
| 1 | ILTACC | 116 | 50 | -1.2 | Nil | 1 |
| 2 | ILTACC + TCR of polyp | 120 | 60 | -1.2 | Nil | 1 |
| 3 | ILTACC | 211 | 20 | -2.2 | Nil | 2 |

ILTACC interval laparoscopic transabdominal cervical cerclage, Hb: Hemoglobin, TCR: Transcervical resection

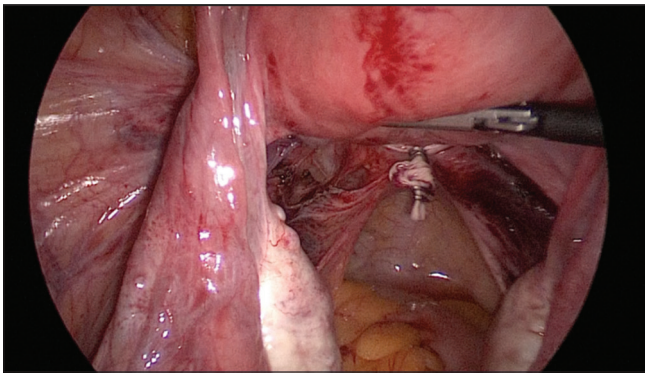


Figure 7: Postcerclage showing clips to secure the knot and prevent slippage of he tape

postoperative hemoglobin decreased 1.53 (SD, 0.47) g/dL on an average, as reflected on the first postoperative day. The postoperative hospital stay was 1.33 (SD, 0.47) days. The median postoperative hospital stay was 1 (range, 1 or 2) day. No intraoperative or postoperative complications were noted. No cases were converted to laparotomy.

DISCUSSION

Several studies have shown the advantages of ILTACC over the abdominal route, which include less perioperative complications, small incision, fewer adhesions, less postoperative pain, shorter hospital stay, and faster recovery period.^[2-6,9-14] In some reports, the procedure was performed as an outpatient procedure with oral analgesia with the patient leaving the hospital on the day of surgery.^[4,5,15] Furthermore, with the aid of a scope, this procedure allows better visualization and access to the paracervical spaces, broad ligaments, and posterior cervical isthmus compared when performed during pregnancy.^[4]

In general, abdominal cerclage is associated with excellent results as the treatment of CI, with high fetal survival rates and minimal complications during surgery and pregnancy.^[2-5,9,10] The reported

success rate of the laparoscopic route of abdominal cerclage is comparable to laparotomy (79%–100% vs. 85%–90%).^[2,10-13] Hence, some surgeons with adequate and sufficient skills in laparoscopy now perform the laparoscopic approach of abdominal cerclage. Moreover, the interval approach has been recommended due to its favorable outcomes compared to laparotomy and its ability to easily manipulate a small, less vascularized nonpregnant uterus.^[4,5] The preconception placement eliminates the risk associated with surgery performed on a pregnant uterus such as miscarriage and/or rupture of membranes. The fetal survival rate of this procedure has been reported to be as high as 95% with less peri-operative complications (1.6%).^[4] Available studies on laparoscopic prepregnancy cerclage showed a fetal survival rate of >90% and with less complication.^[2-5,9-11,13,14] The short-term surgical outcomes described in our case series report, namely blood loss (<60 ml), blood transfusion (0), and hospital stay (1 day) are congruent to the findings of other studies as well.^[2-5,9-11,13,14] There is no conversion to laparotomy, similar to the findings of Ades as compared to 0.8% of Burger *et al.*^[4,5,9]

The pregnancy outcomes which are important as part of the surgical outcomes to be described in ILTACC are not included in our report as these data are not readily available since these patients are only referred by their private obstetrician gynecologists for laparoscopic cerclage. After a successful surgery and uneventful course postsurgery, subsequent follow-ups are made through their respective physicians. Burger *et al.* reported, however, that about 75% of patients who underwent interval laparoscopic abdominal cerclage became pregnant after placement of cerclage.

Over time, the concept of abdominal cerclage has never changed, which is placing a nonabsorbable suture in the cervicoisthmic junction to prevent complications of CI. The technique has always been the same with little variations. Some studies report tying the knot anteriorly while others posteriorly.^[2-6,8-13,16-19] A method of opening the broad ligament known as “broad ligament window technique” was reported by Ramesh, whereby

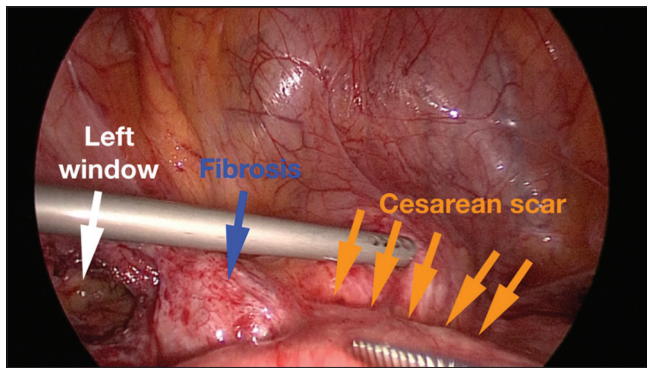


Figure 8: Previous cesarean scar with fibrosis of case 1

passing of needle was made under direct visualization to prevent complications.^[17]

To our knowledge, our article is the first to report the feasibility and safety of ILTACC using needleless mersilene tape in patients with CI. Moreover, this is the first paper to report regarding the placement of mersilene tape, lateral to the uterine vessels, in abdominal cerclage. This is in contrast to what is reported in the literature where the placement of the tape is done medial to the uterine vessels.^[1-6,8-19] Placement of mersilene tape medial to the uterine vessel is believed to prevent possible blockage of blood supply to the uterus from the uterine artery. In this report, the procedure was carried out successfully by utilizing a needleless mersilene tape, which was passed along the broad ligament orifice in a posteroanterior manner lateral to the uterine vessels with a two-fingerbreadth space. This nonconventional technique of passing the tape lateral to the uterine vessels with a two-fingerbreadth space prevents devascularization of the uterus and allows room for expansion of the uterus in the event that pregnancy ensues. Furthermore, the use of a needleless mersilene tape makes the surgery even safer, and the risk of injury to nearby structures (uterine vessels, ureter, and bladder) is reduced. Separation of the vesicouterine fold is not performed for the first case as the patient had two previous cesarean sections, which could possibly injure the bladder during dissection. Although, in this case, the bladder reflection was not pulled up [Figure 8]. The remaining two cases on the other hand, had their vesicouterine peritoneum bluntly dissected due to the absence of uterine scar [Figure 6]. The knots were tied posteriorly due to the extreme shortening of the cervix and prevent adhesions or potential erosions into the bladder. Clips were placed to secure and prevent slippage of the knot.

CONCLUSION

ILTACC is safe and feasible minimally invasive surgery to perform in women with CI. However, a large case series or

even a prospectively randomized controlled trial should be conducted to evaluate the true clinical feasibility, safety, and, most importantly, the long-term obstetrical outcome of this approach.

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Conflicts of interest

There are no conflicts of interest.

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