Interval laparoscopic abdominal cerclage for recurrent pregnancy loss

Devika Gunasheela, Rajsekhar Nayak, Priyankur Roy, Vasanth Kumar and Jyothi Menon

Abstract
Abdominal cerclages are necessary when the standard trans-vaginal cerclages fail or anatomical abnormalities preclude the vaginal placement. In 1965, Benson and Durfee described an abdominal approach to cerclage, a procedure that was applied to congenitally short or surgically amputated cervices. Thirty-eight women with history of either recurrent mid-trimester pregnancy losses, short cervix or failed vaginal cerclage had trans-abdominal cerclage, of which 30 were done laparoscopically. A 5-mm non-absorbable needled polyester fibre tape (Mersilene) suture was placed laparoscopically at the level of the internal os as an interval procedure. All the procedures were successful. All women were discharged on post-operative day 2 and none of them required blood transfusions. There were no intraoperative or post-operative complications. Subsequently, 15 patients conceived and the foetal survival rate recorded was as high as 85.71%. Some patients manifest severe cervical injuries, and others have apparent congenital absence of the cervix, rendering Shirodkar or McDonald cerclage technically difficult or impossible. The main interest of this technique is to avoid a laparotomy; thus, reducing the morbidities of a laparotomy and also the recovery time post-surgery.

Keywords
Abdominal cerclage, interval procedure, laparoscopy

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Introduction
Cervical incompetence is estimated to complicate approximately 0.1–1.0% of all pregnancies (Ludmir, 1988). Cervical incompetence may be defined as the inability of the uterine cervix to retain a pregnancy, in the absence of the signs and symptoms of clinical contractions, or labour, or both in the second trimester due to a functional or structural defect of the cervix (Golan et al., 1989; Jennings, 1972; Shortle and Jewelewicz, 1989). Most of the affected women have a classic history of acute, painless cervical dilatation followed by premature rupture or prolapse of the membranes without any warning signs (Van Dongen and Nijhuis, 1991).

Various approaches and surgical techniques have been used to try prolong pregnancy and improve the perinatal outcomes (Lash and Lash, 1950; Denis Gallot and Denis Savary, 2003; Van Dongen and Nijhuis, 1991). Most cerclage operations for cervical incompetence are performed trans-vaginally (McDonald, 1957; Shirodkar, 1955). However, a small subset of patients with cervical incompetence cannot be adequately managed with a trans-vaginal cerclage operation because of extremely short, deformed and/or scarred cervix and they benefit from the trans-abdominal cerclage operation (Scibetta et al., 1998).

The trans-abdominal approach to cerclage placement above the cervix and around the uterine isthmus was originally described by Benson and Durfee (1965). Subsequently, improved outcome has been extensively reported with foetal survival rates approaching 90% (Herron and Parer, 1988;

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Mahran, 1978; Novy, 1982). The specific criteria to evaluate the indications for a trans-abdominal cerclage are congenitally short or extensively amputated cervix, marked scarring of the cervix, subacute cervicitis, wide or extensive cervical conisation, and one or more previous trans-vaginal cerclage failures (Cammarano et al., 1995). The contraindications for trans-abdominal cerclage are bulging membranes, ruptured membranes, intrauterine infections, vaginal blood loss, intrauterine foetal death, labour, and life-threatening maternal condition.

Laparotomy is required for the placement of the band and for delivery of the baby and this is the obvious disadvantage of this approach (Lesser et al., 1998). In 1998, for the first time, laparoscopic trans-abdominal cerclage was performed successfully (Lesser et al., 1998; Scibetta et al., 1998).

We will hereby describe our experience with laparoscopic trans-abdominal cerclage operation in 30 cases and their subsequent obstetric outcomes.

Materials and methods

Study design: Retrospective analytical study.

Study population: All women who required interval trans-abdominal cerclage in Gunasheela IVF Centre, Bangalore, Karnataka, India, were enrolled for the study.

Study period: 1 January 2006 to 30 June 2014.

Sample size: 38 women (30 preconceptional by laparoscopy).

Approval: The study was approved by the Institutional Ethical Committee. All the patients gave written informed consent after understanding the need of the procedure and its pros and cons.

Inclusion criteria

1. Pregnancy loss attributable to incompetent cervix
2. Failed trans-vaginal cerclage
3. Scarred and short cervix

Exclusion criteria

1. Pregnancy indicated – then trans-abdominal cerclage operation by laparotomy was done (eight cases).
2. Normal cervix and trans-vaginal cerclage operation not performed previously.

All the procedures were performed under general anaesthesia as an interval procedure. The women were placed in the dorsal lithotomy position and a Foley’s catheter was inserted into the urinary bladder. The anterior lip of the cervix was grasped with a vulsellum anteriorly and a Hegar’s dilator no. 8 was placed into the cervix for uterine manipulation and calibration of the os.

During the procedure of laparoscopy, pneumoperitoneum was created through the palmers point and then a 10-mm trocar was inserted infraumbilically. Three 5-mm trocars were inserted under visualization – two in the right and one at left lower quadrants. The peritoneum of the utero-vesical reflection was incised transversely with laparoscopic scissors, and the incision was extended to expose each lateral side of the isthmus. The bladder was advanced downward. The uterine arteries and bifurcation of the ascending branch were identified. A window was then created bilaterally with a laparoscopic dissector through the broad ligament medial to the uterine vessels at the level of the internal os. A 5-mm non-absorbable needle-polyster fibre tape (Mersilene, M/s. Johnson & Johnson) suture was positioned to lie flat around the uterus and tied posteriorly with flat square knots. The peritoneum was not sutured. Peritoneal toileting was done and haemostasis was confirmed. Most of the surgeries lasted 30–45 min and blood loss was approximately 70–100 ml.

Results

The total number of women requiring trans-abdominal cerclage was 38, of which 30 women required a laparoscopic interval procedure. Eight women presented to us with pregnancy between 10 to 14 weeks and prior history suggestive of cervical incompetence and failed vaginal cerclage/deficient cervix. They were taken up for laparotomy and trans-abdominal cerclage. All the eight women subsequently delivered live babies by caesarean section and the cerclage was left in situ.

Thirty women underwent laparoscopic trans-abdominal cerclage prior to pregnancy. Of these, failed trans-vaginal cerclage was the indication for trans-abdominal cerclage in 23 women and the other 7 women underwent the procedure due to scarred/very short cervix.

The previous pregnancy outcomes in these 30 women (102 pregnancies) are mentioned in Table 1. The maximum number of pregnancy losses happened between 13 and 28 weeks (n = 66, 64.7%). The total number of pregnancies with live babies was only five; foetal survival rate was only 4.9%.

These women were suspected/diagnosed to have cervical incompetence and they underwent laparoscopic trans-abdominal cerclage at Gunasheela IVF Centre, Bangalore, Karnataka, India. Subsequently, the obstetric outcomes of these women (15, 21 pregnancies) are mentioned in Table 2. A total of 18 pregnancies of the 21 pregnancies produced live babies.

### Table 1. Pregnancy outcome prior to trans-abdominal cerclage (preconception; 30 patients, 102 pregnancies).

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No. of pregnancies (n = 102)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abortion &lt;12 weeks</td>
<td>21</td>
<td>20.6</td>
</tr>
<tr>
<td>Abortion 13–28 weeks</td>
<td>66</td>
<td>64.7</td>
</tr>
<tr>
<td>PTD &gt;28 weeks (no live baby)</td>
<td>10</td>
<td>9.8</td>
</tr>
<tr>
<td>Pregnancy with live baby</td>
<td>5</td>
<td>4.9</td>
</tr>
<tr>
<td>Total</td>
<td>102</td>
<td>100</td>
</tr>
</tbody>
</table>

Note: PTD: Pattern Delivery.
macrophages and the foetal survival rate was as high as 85.71%. The mean gestational age for delivery of these babies was 35.2 weeks (ranging from 33 to 38 weeks) and the mean birth weight of these babies was 2.83 kg (range from 2.2 to 3.5 kg). One patient in the series complained of backache at 35 weeks gestational age and was taken up for Lower Segment Caesarean Section (LSCS) and intraoperatively an impending posterior wall rupture was detected at the site of the cerclage.

Eight patients were lost to follow-up and the other seven patients have not conceived yet (Table 3).

**Table 2. Obstetric outcome after trans-abdominal cerclage (15 patients, 21 pregnancies).**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No. of pregnancies (n = 21)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abortion &lt;12 weeks</td>
<td>3</td>
<td>20.6</td>
</tr>
<tr>
<td>PTD 33–37 weeks (live baby)</td>
<td>8</td>
<td>64.7</td>
</tr>
<tr>
<td>TD &gt;37 weeks (live baby)</td>
<td>10</td>
<td>9.8</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>100</td>
</tr>
</tbody>
</table>

Note: TD: Term Delivery.

**Table 3. Outcome in non-conceived patients after trans-abdominal cerclage (15 patients).**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No. (n = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death of husband and laparoscopic removal of the stitch</td>
<td>1</td>
</tr>
<tr>
<td>Failure of IVF (no frozen embryo)</td>
<td>2</td>
</tr>
<tr>
<td>Failure of IVM (10 frozen embryo)</td>
<td>1</td>
</tr>
<tr>
<td>Lost to follow-up</td>
<td>8</td>
</tr>
<tr>
<td>Cerclage done recently in 2014</td>
<td>3</td>
</tr>
</tbody>
</table>

IVF: in vitro fertilization; IVM: in vitro maturation.

and the foetal survival rate was as high as 85.71%. The mean gestational age for delivery of these babies was 35.2 weeks (ranging from 33 to 38 weeks) and the mean birth weight of these babies was 2.83 kg (range from 2.2 to 3.5 kg). One patient in the series complained of backache at 35 weeks gestational age and was taken up for Lower Segment Caesarean Section (LSCS) and intraoperatively an impending posterior wall rupture was detected at the site of the cerclage.

Eight patients were lost to follow-up and the other seven patients have not conceived yet (Table 3).

### Discussion

Cervical surgery to prevent recurrent pregnancy loss was introduced in 1902 by Herman (Herman, 1902), when he reported on his experience of three patients treated by Emmet trachelorrhaphy. In 1955, Shirodkar (Shirodkar, 1955) and, later in 1957, McDonald (1957) introduced methods of trans-vaginal cerclage to treat cervical incompetence. Despite minor modifications, these procedures have remained the mainstay of therapy to prevent recurrent pregnancy loss.

The consistent success of the trans-abdominal cerclage is now well established over more than three decades. Many authors have reported a cumulative foetal survival rate of about 80% compared with a rate of 20% in the untreated pregnancies of the same patients (Gibb and Salaria, 1995; Novy, 1982). The results from our study are consistent with the foetal survival rates as mentioned above.

The main advantage of the trans-abdominal cervico-isthmic procedure is the placement of the non-absorbable suture at the level of the internal os, which theoretically represents the most appropriate placement to avoid cervical dilatation (Novy, 1982). The procedure also avoids the placement of a foreign body within the vagina with the subsequent risk of ascending lower genital tract infection (McGregor et al., 1988). The need for multiple laparotomies (cerclage and subsequent caesarean section) was the major drawback of trans-abdominal cervico-isthmic cerclages, despite the ability to leave the band in place between pregnancies (Lesser et al., 1998).

The laparoscopic approach has the advantage of obviating the need for a laparotomy, reducing the morbidity of a laparotomy and the recovery time. Lesser et al. attempted laparoscopic trans-abdominal cerclage in 1998 (11 weeks of gestation), needed 140 min, and was complicated by a small amount of venous bleeding from the right uterine pedicle (Lesser et al., 1998). In a pregnant uterus, contraindication of uterine cannulation and the size of uterus reduce considerably the exposure and make the laparoscopic procedure more difficult. For these reasons, all our procedures were interval ones.

Scibetta et al. first described laparoscopic trans-abdominal cerclage as an interval procedure in 1998 (Scibetta et al., 1998). A review of the literature reveals that over 80% of trans-abdominal cerclage procedures were performed during pregnancy usually after 10 weeks of gestation (Herman, 1902) but the general recommendation is to perform interval procedures (Olsen and Tobiassen, 1982) to avoid additional surgery during pregnancy and to minimize operative blood loss (Cammarano et al., 1995).

A retrospective cohort study by G Davis et al. (2000) compared trans-abdominal and trans-vaginal prophylactic cerclage in a group of women with a prior failed trans-vaginal cerclage in a previous pregnancy. Forty trans-abdominal and 24 trans-vaginal cerclage pregnancies were analysed. The preterm delivery at both <35 and <33 weeks' gestation was significantly reduced in the trans-abdominal cerclage group (18% vs. 42%, p = 0.04; 10% vs. 38%, p = 0.01; respectively) compared to the trans-vaginal cerclage group. The preterm premature rupture of membranes also occurred significantly less often in the trans-abdominal cerclage group (8% vs. 29%, p = 0.03). The trans-abdominal cerclage was done by a laparotomy procedure in this study.

The advantages of a laparoscopic approach compared to laparotomy would be less post-operative pain, a shorter hospital stay, faster post-operative recovery, fewer wound complications and comparable efficacy with regards to the results.

The main disadvantage of an interval procedure is that pregnancy may either never occur or result in an early loss. Moreover, the cervico-isthmic cerclage may contribute to dysmenorrhea or infertility. The use of Hegar’s dilator no. 8 into the cervical canal helps to prevent post-operative cervical stenosis, allowing for a dilatation and curettage procedure to be performed if an early loss does occur (Scibetta et al., 1998). In case of foetal demise, the removal of the cerclage can be performed laparoscopically to allow cervical dilatation and vaginal delivery (Lesser et al., 1998; Scibetta et al., 1998). It may be easier to divide the suture through the pouch of Douglas as described by Gibb and Salaria (Herman, 1902). Thus, it is important to tie the knot posteriorly as per Benson’s first
description but literature search has not revealed any author describing a posterior stitch.

Conclusion
The recovery time is considerably shorter than laparotomy, as it is a minimally invasive surgery. We propose that the laparoscopic approach should replace laparotomy in trans-abdominal cervico-isthmic cerclage. Indications have to be limited to very short or scarred cervices or previous failed trans-cervical cerclage, where the alternative of a high trans-vaginal approach cannot be applied easily.

Declaration of Conflicting Interests
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