

Original Article

Transabdominal cervical cerclage

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Background: Transabdominal cervical cerclage has been performed via laparotomy for over four decades. A laparoscopic approach has recently been developed and offers the potential for lower morbidity.

Aims: The experience of one operator with transabdominal cervical cerclage via laparotomy is reviewed to establish a baseline with which to compare results from the laparoscopic approach.

Methods: Transabdominal cervical cerclage was performed with Mersilene tape. The pregnancy outcome prior to transabdominal cervical cerclage was compared with the outcomes after its insertion.

Results: Prior to transabdominal cervical cerclage, there were 58 pregnancies of which 18 ended with a first trimester pregnancy loss. Twenty-eight of the 36 pregnancies delivering between 13- and 26-week gestation resulted in a pregnancy loss. Three of the four children delivered after 26-week gestation survived. Following transabdominal cervical cerclage, there were no first trimester pregnancy losses. Of the 23 pregnancies after transabdominal cerclage, one was terminated at 18-week gestation for spina bifida and the remaining 22 babies were delivered at a mean gestation of 36.2 weeks. Maternal morbidity was limited to a single wound infection. Respiratory distress was the only significant neonatal morbidity with all babies recovering completely.

Conclusions: Transabdominal cervical cerclage via laparotomy is a safe and successful method of treating women who need a cervical cerclage but are unable to have a vaginal suture. A baseline has been established with which to compare the results from laparoscopic transabdominal cervical cerclage in the future.

Key words: cervical incompetence, cervico-isthmic cerclage, transabdominal cerclage.

Introduction

Cervical incompetence has been treated by cervical cerclage for over 50 years. Lash and Lash,¹ Shirodkar² and McDonald³ were the first to report techniques for the transvaginal placement of a cervical suture to prevent recurrent mid-trimester pregnancy loss. In 1965, Benson and Durfee⁴ described a transabdominal approach for women in whom a vaginal approach was deemed impossible. This approach has been shown to be highly successful in several series.^{5–8}

The transabdominal approach is a more complicated procedure than the transvaginal approach and has greater potential for significant morbidity. It is reserved for a select group of women who have either failed attempts at transvaginal cervical cerclage or have such altered cervical anatomy that the placement of a transvaginal suture would be very difficult or impossible.

In recent years, the laparoscopic approach to transabdominal cervico-isthmic cerclage has been introduced and compares favourably with the traditional approach via

laparotomy.^{9,10} The purpose of this study was to create a baseline at our institution with which to compare results of laparoscopic transabdominal cervical cerclage. The results of one operator's (MU) complete series are presented and in the future will be used to compare the results from a single operator (AA) using the laparoscopic approach.

Methods

All patients who had a transabdominal suture inserted by one operator over a 14-year period were included. A complete database was kept on all of these patients, including their past obstetric history, gynaecological history, previous cervical surgery, history of previous cervical cerclage and their complete obstetric outcome. Table 1 presents the characteristics of these patients prior to the transabdominal cervical cerclage. As many patients are referred from other obstetricians, these doctors were contacted directly to ensure the accuracy of the obstetric data, including outcome after transabdominal cervical cerclage.

Twenty-two patients were deemed eligible for the placement of a transabdominal cervical cerclage. The first seven transabdominal cervical sutures were placed during the first trimester of pregnancy, all between 10- and 12-week gestation. The subsequent 15 were placed in the pre-pregnancy state.

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Table 1 Patient characteristics prior to transabdominal cervical cerclage

Case	Previous cervical surgery	TV sutures	Live children	Pregnancies			
				<13W	13–26W without TV	13–26W with TV	>26W†
1	No	1	0	0	3	3	0
2	ECD x1; Laser x1	1	0	0	1	1	0
3	Cone x1	2	0	4	0	2	0
4	Cone x2	0	0	0	0	0	0
5	ECD x2	2	0	0	1	2	0
6	ECD x1; Laser x1	1	0	0	1	1	0
7	Cone x1; LLETZ x1	1	1	1	0	1	1
8	Cone x1	1	0	0	0	3	0
9	Repair of cervicouterine rupture	0	0	1	2	0	0
10	Repair of cervical tear	1	0	0	0	1	1
11	No	1	2	1	0	1	1
12	Cone x1; Laser x5	1	1	3	1	1	0
13	Laser x1	1	0	0	1	1	0
14	Cone x1	0	0	1	0	0	0
15	ECD x1; Laser x1	1	2	1	1	1	0
16	Cone x2	1	1	2	0	1	0
17	Trachelorrhaphy	0	0	0	0	0	0
18	Cone x1; LLETZ x1	2	1	0	0	2	0
19	No	0	0	3	1	0	0
20	ECD x2	1	1	1	0	1	0
21	Laser x2	1	1	0	0	0	1
22	No	1	1	0	1	1	0

†All had transvaginal cervical suture.

Cone, cone biopsy; ECD, radical cervical diathermy; LLETZ, large loop excision of transformation zone; TV, transvaginal cervical suture; W, weeks' gestation.

The transabdominal cervical cerclages were all placed in a similar fashion using the technique described by Gibb and Salari.⁵ The patients were placed under general anaesthesia and the abdominal cavity was entered via a Pfannenstiel incision. The bladder was reflected by a combination of sharp and blunt dissection; diathermy is utilised to reduce blood loss at this stage. The uterus was elevated superiorly with the aid of Allis forceps on the round ligaments and the cervico-isthmic junction was located. The uterine vessels were identified and retracted laterally to expose the avascular window between the uterine artery and the uterus. A 5-mm Mersilene tape (Ethicon, Somerville, New Jersey, USA) was passed from an anterior to a posterior direction on each side of the cervix. Great care was taken to make sure that the tape was laid flat and the tension was correct. The knot was tied posteriorly in an attempt to relieve the potential bladder irritation associated with an anterior knot. The visceral peritoneum was then closed and the abdomen closed routinely in layers. A single dose of antibiotics was administered perioperatively.

Postoperative analgesia with standard narcotic and anti-inflammatory analgesia was used for the early procedures. Significant issues with postoperative analgesia were encountered and for the latter part of the series, postoperative epidural analgesia for 48 h has been our preferred option.

All viable pregnancies were delivered by caesarean section. The transabdominal cervical suture was left *in situ* at the time of caesarean section.

As this review conformed to the standards established by the NHMRC for Ethical Quality Review,¹¹ ethics approval was not sought.

Results

The patient characteristics are detailed in Table 1. At the time of transabdominal cervical suture insertion the mean age was 33.1 years (SD = 5.2). Ages ranged from 22 to 42 years.

Almost all of the women had a history of cervical surgery. Most had required at least one prior transvaginal cervical suture. One patient (Case 19) had no prior cervical surgery and one previous mid-trimester loss. She had a hypoplastic uterus and virtually absent cervix. Several patients had previously achieved moderately successful outcomes with a transvaginal cervical suture but during the course of labour and delivery had sustained significant further cervical injury, or during pregnancy had spent such a considerable period in hospital that they opted for the transabdominal approach for future pregnancies.

Eleven of the patients required *in vitro* fertilisation to achieve conception. Many of the referrals came directly from the *in vitro* fertilisation specialists on their recognition of the adverse obstetric history combined with clear evidence of significant cervical damage.

The hospital stay ranged from three to seven days with a mean of 4.5 days (SD = 0.9 days).

Table 2 Pregnancy losses before and after transabdominal cervical cerclage

Weeks' gestation	Pre-TA cerclage (pregnancies = 58)	Post-TA cerclage (pregnancies = 23)
<13	18	0
13–19	10	1†
20–26	18	0
>26	1	0

†Hysterotomy at 18-week gestation for spina bifida.

TA, transabdominal.

One wound infection was documented. No patient sustained a bladder or ureteric injury although the surgery was difficult at times. No blood transfusion was required, but two patients did have moderately heavy bleeding related to vascular injury at the time of the suture insertion.

Table 1 further details the pregnancy outcomes prior to transabdominal cervical suture. Of the 58 prior pregnancies, 18 had ended with a first trimester loss. Thirty-six pregnancies delivered between 13- and 26-week gestation with 28 of these resulting in a pregnancy loss. Four pregnancies progressed past 26 weeks with three of these children surviving.

For the pregnancies that passed 12-week gestation, the mean gestation at delivery, prior to the insertion of the transabdominal cervical suture, was 24.4-week gestation (SD = 6.9).

Twenty-three pregnancies have been recorded post-transabdominal cervical cerclage. (Table 2) The only pregnancy loss was a single case that was terminated at 18-week gestation for spina bifida. The termination was by hysterotomy as the patient intended to pursue further pregnancies. Her subsequent three pregnancies were all delivered by caesarean section at 37-week gestation.

The mean gestation at delivery post-transabdominal cervical suture was 35.5-week gestation (SD = 4.0). If the single termination at 18 weeks is excluded the mean gestation is 36.2 weeks (SD = 1.8).

Two pregnancies required delivery prior to 34-week gestation. The first was a patient who developed severe pre-eclampsia at 31-week gestation. The second was a patient who had a twin pregnancy and prematurely ruptured her membranes at 32-week gestation.

The mean birth-weight was 2893 g (SD = 156) with a range between 1070 and 4328 grams. The median Apgar scores were 8 at 1 min (range 3–9) and 9 at 5 min (range 7–10).

One baby was admitted to the Neonatal Intensive Care Unit with hyaline membrane disease and a further ten were admitted to the Special Care Nursery with respiratory distress syndrome despite the liberal use of antenatal corticosteroids. Admission to the neonatal nurseries was for a mean duration of 16.8 days (SD = 13.5). All babies were discharged home by their original due date.

The only long-term morbidity was a hydrocoele in one infant.

Discussion

Transvaginal cervical cerclage is a highly successful technique for the treatment of classic cervical incompetence and recurrent mid-trimester pregnancy loss. Although the MRC/RCOG Working Party on Cervical Cerclage reported that transvaginal cervical cerclage had an important beneficial effect in only one in 25 cases, it must be recognised that this trial was not a trial of truly high-risk women and many of those in the trial were at moderate risk only.¹²

Cervical surveillance using a combination of transvaginal ultrasound assessment, cervical microbiology and fetal fibronectin assays has been shown to reduce the requirement for transvaginal cervical cerclage and to improve perinatal outcome by limiting the insertion of a cerclage to those situations in which cervical changes are evident.¹³ It is a useful technique when the diagnosis of cervical incompetence is suspected, but not definite. Many patients referred for cervical cerclage have been successfully managed with a programme of cervical surveillance.

Elective transvaginal cervical cerclage is recommended for women with previous mid-trimester pregnancy loss deemed a consequence of classic cervical incompetence. The transabdominal approach is reserved for a select group of women: in the past five years, one author (MU) has performed 125 transvaginal cervical sutures and only ten transabdominal cervical sutures.

Early in the case series, multiple pregnancy losses, often in association with multiple attempts at transvaginal cervical cerclage, were considered indications for the transabdominal approach. In recent years, with the success of the transabdominal approach being evident, the transabdominal approach has been extended to women who have extensive cervical injury. More recently, it has also been offered to those who have had a successful transvaginal suture, but required such a long period of hospitalisation that there was extensive social disruption.

Prophylactic hospitalisation is not required for any pregnancy after transabdominal cervical cerclage.

Opinion is divided as to the appropriate timing of transabdominal cervical cerclage. There are proponents both for pre-pregnancy placement and for insertion at the end of the first trimester. The advantages of placement between 10- and 12-week gestation are that the tissue planes are more clearly delineated, accurate placement at the cervico-isthmic junction is technically slightly easier, and aneuploidy can be excluded prior to the suture insertion. The other advantage is that if a further pregnancy does not occur, the patient has not undergone an unnecessary laparotomy.

In this series, the first seven sutures were placed between 10- and 12-week gestation. Haemorrhage was a concerning feature in two of the patients. The provision of adequate postoperative analgesia was also a major concern. Pregnancy limited the range of options available and a protocol change to pre-pregnancy insertion was trialled. This practice has continued because of the ability to provide better

postoperative analgesia, a reduced risk of bleeding and miscarriage, and the knowledge that first trimester miscarriage can be dealt with by the standard techniques of suction curettage, although this has not been required in this series.

The pre-pregnancy approach is associated with less bleeding, and requires only one laparotomy during pregnancy rather than two. The risk of miscarriage and rupturing membranes at the time of suture insertion are also eliminated.^{4,8}

A concerning feature of the data analysis is the relative lack of pregnancies following the transabdominal cervical suture insertion. There are several possible explanations. First, advancing maternal age may be a contributory factor. Infertility is already a strong association with this group of women and advancing age compounds the situation. Secondly, many women decide to have only one further child given their complex and difficult obstetric history. When they have their first child after the transabdominal suture, many have elected not to try again. Thirdly, there was a short observation period for several of the women who have recently undergone transabdominal cervical cerclage. Finally, the life situation of several of these women has changed following insertion of the transabdominal cervical suture, and unrelated to the procedure. Similar reductions in fertility have been reported in other series.^{8,14}

A surprising element of the analysis is the lack of first trimester miscarriages following transabdominal cervical suture insertion. All of these women have early first trimester ultrasound examinations, given the complex nature of their history and the importance of establishing their dates correctly. Accordingly, if there were first trimester losses, we would be aware of them. In a group of women of this age, we were surprised to see the absence of any first trimester loss. The authors cannot explain the findings except for the small number of pregnancies achieved.

Laparoscopic abdominal cerclage is now possible due to advances in the field of minimally invasive surgery. As with the traditional approach via laparotomy, a laparoscopic abdominal cerclage can be placed as an interval procedure prior to pregnancy or at the end of the first trimester of pregnancy. It has been available for more than a decade, but, as with traditional transabdominal cervical cerclage, there are a limited number of patients for whom it is appropriate and series remain small. Preliminary results suggest that the laparoscopic approach compares favourably with the traditional approach via laparotomy.^{9,10,15,16}

The procedure was introduced in our hospital three years ago and is now being offered to women who are candidates for an abdominal cerclage. The technique we use is the one described by the Toronto group. It is performed as an interval procedure using a 1 Prolene suture. Initial results are very encouraging in terms of both surgical outcomes and subsequent pregnancies.

There are no randomised controlled trials of transabdominal cervical cerclage either pre-pregnancy, during pregnancy or in comparison with the laparoscopic or

vaginal approach. With any technique such as this, there is the risk that results will be excellent simply because the procedure was not needed. The authors have been very careful in selection of patients and given the considerable experience in transvaginal cervical cerclage, we believe that the only patients who have had a transabdominal cervical cerclage would be unlikely to have achieved a successful outcome by the transvaginal approach or by avoiding surgery completely. Our results compare favourably with other series of transabdominal cervical cerclage.⁵⁻⁸

Transabdominal cervical cerclage is a procedure that offers hope to women with recurrent pregnancy loss related to cervical incompetence and in whom transvaginal cervical cerclage would be difficult or impossible. It has the potential for significant morbidity but, in practice, this is unlikely with experienced operators. This series establishes a baseline for comparison of the laparoscopic approach to abdominal cervical cerclage. Evaluation of this is underway in our institution.

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References

- 1 Lash AF, Lash SR. Habitual abortion: the incompetent internal os of the cervix. *Am J Obstet Gynecol* 1950; **59**: 68–76.
- 2 Shirodkar VN. A new method of operative treatment for habitual abortions in the second trimester of pregnancy. *Antiseptic* 1955; **52**: 299–300.
- 3 McDonald IA. Suture of the cervix for inevitable miscarriage. *J Obstet Gynaecol Br Commonw* 1957; **64**: 346–353.
- 4 Benson RC, Durfee RB. Transabdominal cervico uterine cerclage during pregnancy for the treatment of cervical incompetency. *Obstet Gynaecol* 1965; **25**: 145–155.
- 5 Gibb DM, Salaria DA. Transabdominal cervicoisthmic cerclage in the management of recurrent second trimester miscarriage and early preterm delivery. *Br J Obstet Gynaecol* 1995; **102**: 802–806.
- 6 Anthony GS, Walker RG, Cameron AD, Price JL, Walker JJ, Calder AA. Transabdominal cervico-isthmic cerclage in the management of cervical incompetence. *Eur J Obstet Gynecol* 1997; **72**: 127–130.
- 7 Lotgering FK, Gaugler-Senden IP, Lotgering SF, Wallenburg HC. Outcome after transabdominal cervicoisthmic cerclage. *Obstet Gynecol* 2006; **107**: 779–784.
- 8 Groom KM, Jones BA, Edmonds DK, Bennett PR. Preconception transabdominal cervicoisthmic cerclage. *Am J Obstet Gynecol* 2004; **191**: 230–234.
- 9 Carter JF, Soper DE, Goetzl LM, Van Dorsten JP. Abdominal cerclage for the treatment of recurrent cervical insufficiency: laparoscopy or laparotomy? *Am J Obstet Gynecol* 2009; **201** (1): 111-e1–111-e4.
- 10 Whittle WL, Singh SS, Allen L *et al.* Laparoscopic cervico-isthmic cerclage: surgical technique and obstetric outcomes. *Am J Obstet Gynecol* 2009; **201** (4): 364-e1–364-e7.

- 11 National Health and Medical Research Council. *National Statement of Ethical Conduct in Human Research*, 2007. [Accessed 14 July 2009.] Available from URL: http://www.nhmrc.gov.au/_files_nhmrc/file/publications/synopses/e72-jul09.pdf
- 12 MRC/RCOG Working Party on Cervical Cerclage. Final report of the Medical Research Council/Royal College of Obstetricians and Gynaecologists: multicentre randomised trial of cervical cerclage. *Br J Obstet Gynaecol* 1993; **100**, 516–523.
- 13 Higgins SP, Kornman LH, Bell RJ, Brennecke SP. Cervical surveillance as an alternative to elective cervical cerclage for pregnancy management of suspected cervical incompetence. *Aust NZ J Obstet Gynaecol* 2004; **44**: 228–232.
- 14 Novy MJ. Transabdominal cervicoisthmic cerclage: a reappraisal 25 years after its introduction. *Am J Obstet Gynecol* 1991; **164**: 1635–1642.
- 15 Sheehan P, Ades A, Palma-Dias R. Experience with laparoscopic transabdominal cervico-isthmic cerclage. *Aust NZ Obstet Gynaecol* 2008; **48** (4): 448.
- 16 Lesser KB, Childers JM, Surwit EA. Transabdominal cerclage: a laparoscopic approach. *Obstet Gynecol* 1998; **9**: 855–856.