Obstetric outcome of cervical cerclage among pregnant women in Mansoura University Hospital

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Abstract

Objective: To evaluate the obstetric outcome of pregnancies managed by cervical cerclage at Mansoura University Hospital (MUH).

Methods: Observational study of 50 pregnant women with cervical cerclage in the index pregnancy who attended to MUH during the period from July 2019 through December 2021.

Results: The mean gestational age at cerclage insertion was approximately 13 weeks and the mean gestational age at cerclage removal was approximately 31 weeks. Twin pregnancy was the most common indication of cerclage placement (34%), followed by previous MTM (26%), triplet pregnancy (16%), congenital malformation of uterus (14%) and previous PTB (10%). The commonest causes of cerclage removal was spontaneous PTB (38%) followed by PPROM (30%), planned removal at term (22%) and spontaneous miscarriage (10%). Twin pregnancies have more incidence of complications (40.9%) than singletons (26.3%) and triplets (11.1%). Twin gestations were found to have significant correlations with termination of pregnancy before 28 weeks (P = 0.016). Birth weight was found to have a significant relations with mode of conception (P = 0.001) and type of pregnancy (P = 0.001).

Conclusion: Planned placement of cervical cerclage in MUH is mainly either history-indicated and/or prophylactic, especially in multifetal gestations. It appears to be effective in reducing the incidence of MTM and PTB in high risk cases.

Keywords: Cervical cerclage, Preterm labor, Miscarriage.

Introduction

Cervical cerclage is an obstetric surgical procedure that involves insertion of a purse-string suture around the uterine cervix attempting to give mechanical support for the cervix in order to maintain its closure during pregnancy. It was first described by Shirodkar in 1955 and was modified by McDonald in 1957 (1, 2), and since then, this procedure has been widely used for management of women who are at high risk of midtrimester miscarriage

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(MTM) and/or spontaneous preterm birth (PTB) as a result of many factors such as cervical insufficiency, multifetal gestations, uterine anomalies, and short cervix seen on transvaginal sonography (TVS) scan (3).

Cervical cerclage is mostly inserted as a planned procedure in response to either a prior history or a short cervical length detected by TVS. Cerclage can be also inserted as an emergency procedure for women at risk of MTM (4). Prophylactic placement of cervical cerclage has been also suggested as a way to prolong pregnancy in unselected multifetal gestations (5, 6).

Controversies concerning the use of cervical cerclage include safety and efficacy as well as maternal and fetal/neonatal risks and benefits. There is no evidence of any favourable effects of history-indicated or ultrasound-indicated cerclage in women with singleton pregnancies (7, 8). Moreover, there is no evidence that cerclage is effective for preventing PTB and reduction of perinatal morbidity or mortality in multifetal gestations (9). Despite controversies, cervical cerclage remains a commonly performed prophylactic intervention used by most obstetricians (10). Consequently, the purpose of this study was to evaluate the indications and obstetric outcome of cervical cerclage among pregnant women attending to Mansoura University Hospital (MUH).

Materials and Methods

Study design:
This was an observational study of 50 pregnant women with cervical cerclage who attended to MUH during the period from July 2019 through December 2021. The study protocol was reviewed and approved by the Mansoura Faculty of Medicine Institutional Research Board (Code No. MSc.19.11.913). The main inclusion criterion was pregnant women with cervical cerclage in the index pregnancy. Women with any of the following criteria were excluded from the study: 1) age is < 18 or > 38 years; 2) major structural fetal malformations; 3) co-existing medical disorder with pregnancy; 4) obstetric problem that may affect the obstetric outcome or timing of termination of pregnancy (as placenta previa, fetal growth restriction, pregnancy induced hypertension, gestational diabetes and Rh isoimmunization); or 5) unclear details about the type, timing and indication of cervical cerclage.

Methods:
Women's clinical data was collected by reviewing their hospital and perinatal records. The following clinical characteristics were evaluated: maternal age, previous gestations, parity, indication of performing cerclage, gestational age at performing cerclage, gestational age at termination of pregnancy, mode of delivery, birth weight and Apgar score. The pregnancy and delivery complications were assessed and included premature rupture of membrane (PROM), chorioamnionitis, vaginal bleeding, cervical laceration, low birth weight (LBW) (< 2500 gm), prematurity, neonatal intensive care unit (NICU) admission and early neonatal death (END). In multifetal pregnancies, neonatal outcomes were evaluated on pregnancy level (i.e. for each multifetal gestation, the variables LBW, NICU admission, END and take home baby were considered evident when there was at least one neonate expressing the characteristic).

Statistical analysis:
Using SPSS 22.0, the data were analyzed. Data for quantitative variables were expressed as mean $\pm$ SD and median (min-max). Categorical variables were described as counts and percentage. Continuous variables were analyzed with the Student t test or the Mann Whitney U test. The categorical variables were tested using the Chi-squared or Fisher's exact tests. The logistic analysis was used to investigate the link between cerclage operations and pregnancy outcome when maternal and operation characteristics were controlled for. The statistical significance was determined using a $P \leq 0.05$ criterion.

Results

The demographic and clinical characteristics of the study cohort was shown in table 1. History of previous MTM was found in 17% of women and 11% of them had history of previous PTB. The index pregnancy was achieved naturally in 44% of women, by ovarian stimulation (OS) with timed intercourse in 24% of women, and by IVF/ICSI in 32% of women. The index pregnancy was singleton in 38% of women, twin in 44% of women and triplet in 18% of them.

Table 2 shows the cervical cerclage characteristics. The mean gestational age at cerclage insertion was approximately 13 weeks and the mean gestational age at cerclage removal was approximately 31 weeks. Twin pregnancy was the most common indication of cerclage placement (34%), followed by previous MTM (26%). Other indication included triplet pregnancy (16%), congenital malformation of uterus (14%) and previous PTB (10%). The commonest causes of cerclage removal was spontaneous PTB (38%) followed by PPROM (30%), planned removal at term (22%) and spontaneous miscarriage (10%).

Tables 3 and 4 display the pregnancy outcomes. Twin pregnancies have more incidence of complications (40.9%) than singletons (26.3%) and triplets (11.1%). Twin gestations were found to have significant correlations with termination of pregnancy before 28 weeks (P = 0.016).

Table 5 displays the neonatal outcomes of cases delivered after 24 weeks among the study cohort, excluding the 9 cases of miscarriage. Admission to NICU was evident in all triplet gestations, in 57.1% of twins and in 38.9% of singletons; however, END was more common in twins (42.9%) than in triplets (33.3%) and singletons (22.2%) and tack home baby was comparable between the 3 types of gestations. Table 6 illustrates the relation of birth weight to demographic, clinical and obstetric characteristics among cases delivered after 24 weeks. LBW was found to have a significant relations with mode of conception (P = 0.001) and type of pregnancy (P = 0.001).

Table 1: Demographic and clinical characteristics of the study cohort (n=50)

Variable	Mean ± SD	Median (Min-Max)	Number (%)
Age (years)	26.34 ± 4.88	25 (18-37)	
Occupation			
Student			11 (22%)
House wife			33 (66%)
Employee			6 (12%)
Gravidity	2.92 ± 1.95	2 (1-10)	
Parity	0.68 ± 0.82	0.5 (0-3)	
Prev MTM			17 (34%)
Previous PTB			11 (22%)
Mode of conception			
Natural			22 (44%)
OS with timed intercourse			12 (24%)
IVF/ICSI			16 (32%)
Type of pregnancy			
Singleton			19 (38%)
Twin			22 (44%)
Triplet			9 (18%)

ICSI, intracytoplasmic sperm injection; **IVF,** in vitro fertilization; **MTM,** midtrimester miscarriage; **OS,** ovarian stimulation; **PTB,** preterm birth.

Table 2: Cervical cerclage characteristics among the study cohort (n=50)

Cerclage characteristics	Mean ± SD	Median (Min Max)	Number (%)
Indication of cerclage			
Prev MTM			13 (26%)
Previous PTB			5 (10%)
Twin			17 (34%)
Triplet			8 (16%)
Congenital malformation of uterus			7 (14%)
Gestational age at performing cerclage (weeks)	13.20 ± 0.76	13 (12-16)	
Gestational age at cerclage removal (weeks)	30.71 ± 6.14	32.4 (15.6-39.0)	
Indication of cerclage removal			
Spontaneous miscarriage			5 (10%)
Spontaneous PTB			19 (38%)
PPROM			15 (30%)
Planned removal at term			11 (22%)

MTM, midtrimester miscarriage; **PPROM,** preterm premature rupture of membranes; **PTB,** preterm birth.

Table 3: Pregnancy outcomes among the study cohort according to the type of pregnancy (n=50)

Pregnancy outcomes	Singleton (n=19)	Twin (n=22)	Triplet (n=9)
Gestational age at termination of pregnancy (weeks)	34.26 ± 4.48	28.23 ± 6.81	32.00 ± 3.28
Miscarriage (at < 24 weeks)	1 (5.3%)	8 (36.4%)	0 (0%)
Delivery at < 28 weeks	2 (10.5%)	3 (13.6%)	2 (22.2%)
Delivery at < 34 weeks	6 (31.6%)	9 (40.9%)	7 (77.8%)
Delivery at < 37 weeks	11 (57.9%)	12 (54.5%)	9 (100%)
Delivery at ≥ 37 weeks	7 (36.8%)	2 (9.1%)	0 (0%)
Mode of delivery			
Vaginal delivery	5 (26.3%)	4 (18.2%)	1 (11.1%)
Caesarean section	13 (68.4)	10 (45.5%)	8 (88.9%)
Maternal complications	5 (26.3%)	9 (40.9%)	1 (11.1%)

Table 4: Relation of gestational age at termination of pregnancy to the type of pregnancy among the studied cohort (n=50)

Type of pregnancy	Gestational age at termination of pregnancy		P value
	< 28 weeks (n=16)	> 28 weeks (n=34)	
Singleton	3 (18.8%)	16 (47.1%)	0.068
Twin	11 (68.8%)	11 (32.4%)	**0.016**
Triplet	2 (7.7)	7 (24.3)	0.699

Table 5: Neonatal outcomes of cases delivered after 24 weeks among the study cohort according to the type of pregnancy (n = 41)

Neonatal outcomes	Singleton (n=18)	Twin (n=14)	Triplet (n=9)
Admission to NICU	7 (38.9%)	8 (57.1%)	9 (100.0%)
END	4 (22.2%)	6 (42.9%)	3 (33.3%)
Take home baby	14 (77.8%)	10 (71.4%)	7 (77.8%)

END, early neonatal death; **NICU,** neonatal intensive care unit.

Table 6: Relation of birth weight to demographic, clinical and obstetric characteristics among cases delivered after 24 weeks (n = 41)

Variable	Birth weight		Test of significance
	< 2500 gm (n=28)	> 2500 gm (n=13)	
Age (years)	25.36 ± 4.44	27.46 ± 5.43	t = 1.316 P = 0.196
Occupation			
Student	9 (31.1%)	1 (7.7%)	χ^2 = 3.148 P = 0.207
House wife	17 (60.7%)	10 (76.9%)	
Employee	2 (7.1%)	2 (15.4%)	
Gravidity	2 (1-7)	3 (1-10)	Z = 1.820 P = 0.075
Parity	0.5 (0-2)	1 (0-3)	Z = 1.215 P = 0.272
Mode of conception			
Natural	9 (32.1%)	12 (92.3%)	χ^2 = 13.051 P = 0.001
OS with timed intercourse	9 (31.1%)	0 (0.0%)	
IVF/ICSI	10 (35.7%)	1 (7.7%)	
Type of pregnancy			
Singleton	7 (25.0%)	11 (84.6%)	χ^2 = 13.328 P = 0.001
Twin	12 (42.9%)	2 (15.4%)	
Triplet	9 (32.1%)	0 (0.0%)	
Mode of delivery			
Vaginal delivery	9 (32.1%)	1 (7.7%)	χ^2 = 2.878 P = 0.090
Caesarean section	19 (67.9%)	12 (92.3%)	

t: Student t test , Z: Mann Whitney U test, χ^2 :Chi-Square test.

ICSI, intracytoplasmic sperm injection; **IVF,** in vitro fertilization; **OS,** ovarian stimulation.

Discussion

Cervical cerclage is a well-known surgical procedure in obstetrics and it involves insertion of a stitch around the cervix, attempting to give mechanical support for the cervix in order to maintain its closure during pregnancy. Cervical cerclage is effective in preventing cervical incompetence-related MTM and PTB, and the procedure appears to be effective in 85-90% of cases when true cervical insufficiency is present. However, cervical cerclage is not a procedure without risks because surgical cervical manipulation can initiate uterine contractions and may cause infection or bleeding which may lead to miscarriage or PTB; therefore; risks of cerclage must be carefully balanced against its benefits (11, 12).

Although cervical insufficiency has an evident role in in the etiology of PTB in singleton gestations; however, it is role remains unclear in the etiologies of PTB in multifetal gestations. The mechanism for early PTB in multifetal gestations is multifactorial and it seems that excessive mechanical stretching of the uterus is the commonest cause of PTB in multifetal pregnancies (13).

Planned placement of cervical cerclage can be either history-indicated (based on previous history of MTM and/or PRB) or ultrasound-indicated (due to short cervical length detected by TVS examination) (11). In unselected multifetal pregnancies, cervical cerclage has also been suggested to increase pregnancy duration (5, 6). Cervical cerclage placement rates are not uniform worldwide; some sources claim that they are higher in developing nations than in developed ones (14). Systemic reviews and meta-analyses on cervical cerclage placement have certainly differed conclusions on the benefits and effectiveness of this procedure in singleton and multiple gestations (11, 13).

The purpose of this study was to analyze the indications and obstetric outcomes of cervical cerclage-managed pregnancies at MUH.

The median gestational age at performing cerclage was 13 weeks with a range of 12-16 weeks. This is in line with what was settled in most studies which indicated that planned cerclage tend to be performed around 14 weeks (11). In our study, the comments indications for performing cerclage were previous history of MTM and/or PTB and multifetal pregnancy. This was in line with Al-Azemi and his colleagues who analyzed 1021 women with cervical cerclage in their hospital (15).

Since PTB occurs at a different rate and is caused by different mechanisms in singleton and multifetal pregnancies, we thought it was important to assess maternal and neonatal outcomes independently. In singleton gestations in our study, the mean gestational age at termination of pregnancy was approximately 34 weeks and the rates of PTB before 34 weeks and 37 weeks were 32% and 58%, respectively. This came in line with the study by Huang et al (16) who found that history-indicated cervical cerclage had significantly prolonged gestational age of delivery to approximately 35 weeks and reduced the PTB before 34 weeks and 37 weeks to 36% (vs 59% in the non-cervical group) and 50% (71% in the non-cervical group), respectively. The rate of admission to NICU was approximately 39% in singleton gestations which is comparable to what was found by Huang et al (46%), with no significant difference with the rate in the non-cervical group in their study (16).

In twin gestations in our study, the mean gestational age at termination of pregnancy was approximately 28 weeks and the rates of PTB before 28 weeks and 34 weeks were 14% and 41%, respectively. These values were not in concordance with what was reported in the trial by Nicolaides and colleagues on unselected twin pregnancies. They reported that the median gestational age at termination of pregnancy was approximately 36.6 weeks and the rates of PTB before 28 weeks and 34 weeks were 3.2% and 16.7%, respectively.

They concluded that routine cervical cerclage for twin pregnancies do not reduce the rate of spontaneous PTB (5).

In triplet gestations in our study, the mean gestational age at termination of pregnancy was approximately 32 weeks and the rates of PTB before 28 weeks and 34 weeks were 22% and 78%, respectively. This came in agreement with other studies that reported 13% and 80% rates of PTB before 28 weeks and 34 weeks, respectively (17).

In the current study the outcome of cerclage was significantly worse among twin pregnancies than singleton and triplet pregnancies. Our twin gestations had unexplained significant relation with termination of pregnancy before 28 weeks (P = 0.016). We analyzed the relation of LBW (< 2500 gm) to demographic, clinical and obstetric characteristics among cases delivered after 24 weeks. We found that LBW had a significant relations with the mode of conception (P = 0.001) and the type of pregnancy (P = 0.001). The relation of LBW to the type of pregnancy appears logic because multifetal pregnancies have high risk for PTB and prematurity than singletons (13). The LBW were found to be more in pregnancies achieved by OS and timed intercourse, and IVF/ICI. The relation of LBW to the mode of conception may be an indirect relationship because most of pregnancies achieved by OS and timed intercourse, and IVF/ICI are multifetal pregnancies that have high risk for LBW.

A limitation of our study is the small number of participants which limits the strength of our results and another limitation lies in its observational nature with absence of a comparative group which used other interventional method. Therefore, more studies are needed, especially randomized trials, between cervical cerclage and other modalities in conditions like multifetal pregnancies and ICSI pregnancies.

In conclusion, planned placement of cervical cerclage in MUH is mainly either history-indicated and/or prophylactic, especially in multifetal gestations. It appears to be effective in reducing the incidence of MTM and PTB in high risk cases.

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Conflicts of Interest

The authors declare that they have no conflict of interest.

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