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*Dr. Vinutha M. Sharma, Ummu Kulsum, Divya Babu, Govinda Raju & Sandhya babu*

## INTRODUCTION

The human cervix is a complex structure that undergoes extensive changes throughout pregnancy and parturition to support the fetus and facilitate its expulsion. Cervical insufficiency is defined as the inability of the cervix to retain fetus, in the absence of uterine contractions owing to a functional or structural defect<sup>1</sup>. The term “Cervical insufficiency” is now replaced by “cervical incompetence”. Epidemiologic studies suggest an approximate incidence of 0.5% in the general obstetric population and 8% in women with a history of previous mid-trimester miscarriages.

Cervical incompetence may be congenital or acquired. The most common congenital cause is a defect in the embryological development of Mullerian ducts. Ehlers-Danlos syndrome and Marfan syndrome are due to deficiency in collagen leading to incompetence. The most common acquired cause is cervical trauma such as cervical lacerations during childbirth, cervical conization, LEEP (loop electrosurgical excision procedure), or forced cervical dilatation during uterine evacuation<sup>2</sup>.

*Keywords:* cervical cerclage, cervical insufficiency, mid-trimester pregnancy, preterm birth prevention, second trimester miscarriage, high- risk pregnancy.

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# Cervical Encirclage – A Boon for Mid-Trimester Pregnancy with Cervical Insufficiency

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## I. INTRODUCTION

The human cervix is a complex structure that undergoes extensive changes throughout pregnancy and parturition to support the fetus and facilitate its expulsion. Cervical insufficiency is defined as the inability of the cervix to retain fetus, in the absence of uterine contractions owing to a functional or structural defect<sup>1</sup>. The term “Cervical insufficiency” is now replaced by “cervical incompetence”. Epidemiologic studies suggest an approximate incidence of 0.5% in the general obstetric population and 8% in women with a history of previous mid-trimester miscarriages.

Cervical incompetence may be congenital or acquired. The most common congenital cause is a defect in the embryological development of Mullerian ducts. Ehlers-Danlos syndrome and Marfan syndrome are due to deficiency in collagen leading to incompetence. The most common acquired cause is cervical trauma such as cervical lacerations during childbirth, cervical conization, LEEP (loop electrosurgical excision procedure), or forced cervical dilatation during uterine evacuation<sup>2</sup>.

Incompetence often manifests silently, without uterine contractions or overt symptoms, and may rapidly progress once the internal os loses its competency.

The first report of cervical incompetence was done in 1658 by Cole, Culpetter and Rowland and a surgical approach of treatment emerged nearly 300 years later<sup>3</sup>. Indications of cervical encirclage are:

1. History indicated cervical encirclage is done in patients with history of one or more mid trimester pregnancy losses due to cervical incompetence.
2. An ultrasound indicated encirclage is done in patients with cervical length less than 25 mm before 24 weeks of gestation.
3. Rescue or emergency encirclage (physical examination indicated cerclage) is done in patients with silent cervical dilatation in the absence of uterine contractions<sup>4</sup>.

Cervical encirclage can be done by either transvaginal or transabdominal route. The Shirodkar suture is a transvaginal purse string suture inserted after bladder mobilization anteriorly and the rectum posteriorly above the level of the cardinal ligament, while the Mc Donald suture is inserted lower at the cervicovaginal junction, but without bladder mobilization. Transabdominal cerclage is usually done in patients with previous failure of transvaginal encirclage or anatomic limitations. Transabdominal cerclage is placed abdominally at the level of the cervico-isthmic junction and is consequently higher in the cervix than vaginally placed cerclages. It can be inserted laparoscopically or by laparotomy and can be placed pre-pregnancy or in the first trimester<sup>2</sup>.

Prevention of preterm birth remains a significant challenge, especially in women with cervical incompetence.

This study aims to assess the obstetric and neonatal outcomes following history indicated, ultrasound indicated and rescue encirclages incorporating both singleton and twin pregnancies in a hospital setting, thus providing data to optimize intervention and enhance perinatal outcomes in cervical insufficiency.

## II. AIM AND OBJECTIVES

The aim of the study is to determine maternal and fetal outcomes following history indicated, ultrasound indicated and rescue encirclages.

## III. MATERIALS AND METHODS

This is a retrospective study conducted at Sandhya fertility and maternity hospital, Vellore, Tamil nadu. Details of patients who underwent cervical encirclage between November 2023 and October 2024 were collected and followed up upto 6 weeks postpartum.

### *Inclusion Criteria:*

1. Pregnant women >18 yrs.
2. Pregnant women who underwent Mc Donald's cervical encirclage due to previous history of mid-trimester spontaneous miscarriage and/or preterm birth.
3. Pregnant women who underwent Mc Donald's cervical encirclage due to Transvaginal ultrasound showing cervical length <2.5 cm.
4. Pregnant women who underwent rescue Mc Donald's cervical encirclage due to silent and painless dilatation of the cervix with or without membrane bulging through the external cervical os through per speculum examination/ultrasound.

### *Exclusion Criteria*

1. Prophylactic cervical encirclages.
2. Pregnant women who presented with active vaginal bleeding, preterm prelabour rupture of membranes, active labour.
3. Incomplete data.
4. Not willing to be a part of our study.

Informed written consent was obtained from all the women before encirclage. The study included 44 pregnant women and details on age, mode of conception, parity, single/twin gestation, previous history of mid-trimester miscarriages, preterm birth and h/o preterm prelabour rupture of membranes, other risk factors, history of any cervical surgery; indication for cervical cerclage, gestational age at cervical cerclage were obtained. Gestational age of delivery, interval between cervical encirclage and delivery, mode of delivery, neonatal survival, birth weight, APGAR score, NICU admission and postpartum complications was studied.

## IV. RESULTS

Our study includes 44 antenatal patients who met the inclusion criteria. The median age group is found to be 29.5 years (20-39 years). 14 patients (31.8%) were primigravida & 30 (68.2%) were multigravida. Of these 30, 10 were grand multiparous (>gravida 3).

History indicated cervical encirclage was done in 15 patients (34.1%). Of this 4(26.7%) had previous 1 mid-trimester miscarriage, 8 (53.3%) had previous 2 mid-trimester miscarriage, 2 (13.3%) had previous 3 mid-trimester miscarriage, 1 (6.7%) had previous history of preterm birth at 30 weeks of gestational age. Ultrasound indicated cervical encirclage was done in 22 patients (50%). 3 patients (6.9%) had both history & ultrasound indicated encirclage. Of this all the 3 had previous 1 mid-trimester miscarriage. So, 18 of our patients had previous mid-trimester miscarriage (40.9%). 6 patients had previous miscarriage at around 16-20 weeks (33.3%) & 12 had at around 20-24 weeks (66.7%) of gestational age. 4 patients under went rescue encirclage at 18+1 to 22+2 weeks of gestational age. 1 patient in our study had cervical length less than 1.5 cm, 3 patients had 1.5 to 2 cm length & 25 patients had 2.1 to 2.5 cm length. The rest 15 patients had their cervical length > 2.5 cm but were included in our study as they had to undergo history indicated cervical encirclage. 10 patients had internal OS opened (2-4mm) & 4 patients (28%) had wide opened OS.

32 (72.7%) of our patients had their cervical encirclage electively done between 12-20weeks & we had 1 patients (2.3%) who underwent rescue encirclage at 18+1 weeks. 8 patients (18.2%) underwent elective encirclage between 20-26 weeks & 3 (6.8%) patients underwent rescue encirclage at 20+2,20+3, 22+2 weeks. Of the 4 rescue encirclage in our study 3 patients underwent spontaneous miscarriage at 26w, 21+2 weeks, 24+5 weeks of gestational age respectively & 1 patient who had encirclage at 20+3 weeks delivered vaginally at 36+5 weeks of gestational age. Of the total population 4 patients (10.5%) had early preterm delivery, 15 patients (39.5%) had late preterm delivery & 19patients (50%) had term delivery. Out of these 44 patients who underwent cervical encirclage, 5 (11.4%) had spontaneous miscarriage at 18 to 26weeks of gestational age, out of which 1 was ultrasound indicated encirclage, 1 was history indicated encirclage and 3 were rescue encirclages. All these women with failed cervical encirclage were advised abdominal encirclage before planning future pregnancies.

19 patients underwent vaginal delivery of which 9 had spontaneous onset of labour (8 late preterm & 1 early preterm). 3 patients underwent assisted vaginal delivery (2 late preterm & 1 term) the indication behind maternal exhaustion. 17 patients in our study underwent LSCS of which 9 were preterm & the rest were term.

Out of the 14 twin pregnancies, 4 (28.5%) had spontaneous onset of preterm labour and delivered normally, 3 (21.5%) had undergone term lower segment cesarean section due to failed induction, 7 (50%) underwent preterm lower segment cesarean section. The indication for preterm LSCS would go as 4 patients twin 1 with non- cephalic presentation with PROM, 1 patient each for severe preeclampsia , iugr with abnormal doppler and previous cesarean with PROM.Of the 25 singleton pregnancies 7 underwent LSCS and the indication were 2 patients with failed induction, 2 patients with breech with PPRM, 1 each for previous cesarean section , breech and severe pre eclampsia. All patients who delivered before 34 weeks of gestational age received atleast 1 dose of steroid before delivery. We didn't

encounter any cases of PPH, chorioamnionitis or eclampsia in our samples.

All the babies born to the women included in our study had APGAR score>7 at 1 minute and 5 minutes after birth. All the babies with birth weight >1.8 kg , <2.5kg were admitted in NICU in view of observation for few hours.

## V. DISCUSSION

Our study analysed 44 antenatal patients, who underwent encirclage, including 14 twin pregnancies, we found a distribution of outcomes that highlights the importance of timing and indication of cervical cerclage. Out of the 44 women, 79.5% were between 20-35 years, similar to shilpi et a <sup>[5]</sup>, sandhyashree pk et al,<sup>(6)</sup> Lu et al,<sup>(7)</sup> where majority belonged to 20-35 years. 68.2% of encirclages were done in multigravida similar to Golbasi C et al, <sup>(8)</sup> which included 68.3%of multiparous women and Indhu et al, <sup>(9)</sup> where 64% were multigravida. In our study 40.9% women had previous mid-trimester miscarriage and 9% had previous preterm birth, 2 women had both mid-trimester miscarriage and preterm birth. A retrospective study conducted by Joanna, had 35% patients with history of preterm delivery, and 53% with previous mid-trimester losses. In our study, majority had ultrasound indicated encirclages followed by history indicated encirclages, only 4 patients underwent rescue encirclage. 72.7% of the encirclages were done electively between 12-20 weeks and 18.2 % underwent encirclage between 20-26 weeks. Early cerclage gave successful results for us. But none of the earlier studies demonstrated the effectiveness of early encirclage over delayed encirclages. A prospective observational study by Shruthi et al did history indicated encirclage at 12-14 weeks, ultrasound indicated encirclages at 14-24 weeks, rescue encirclage within 24 weeks<sup>10</sup>. Previous studies indicate that gestational age at the time of encirclage placement does not appear to impact the likelihood of preterm deliveries<sup>11,12</sup>. But a study by Diamant H et al says that late mid-trimester cervical encirclages were still effective in prolonging the duration of pregnancy<sup>13</sup>.

Majority of the patients in our study (56.8%) had cervical length between 2.1 to 2.5 cm, only 1 patient had cervical length <1.5 cm. A meta analysis to determine the effectiveness of cervical encirclage depending on cervical length states that cerclage when done in women with cervical length <25 mm, with prior preterm birth reduced the chances of preterm birth <35 weeks<sup>14</sup> and, post encirclage cervical length <25 mm need to be followed by serial ultrasound measurements, as it helps in predicting preterm labour<sup>15,16</sup>.

Cervical dilatation at the time of encirclage is an important factor in determining the success of encirclage. In our study, the internal os was wide open in 4 patients, all these 4 patients underwent rescue encirclage and out of them, 3 underwent spontaneous miscarriage. It was found in our study that the effectiveness of encirclage was better in patients whose cervix was just open (2-4mm) than in patients whose cervix was wide open with bulging membranes. Several studies state that advanced cervical dilatation at the time of encirclage placement was associated with preterm birth<sup>17,18</sup> and rescue encirclage showed poor outcomes and associated with high risk of chorioamnionitis and membrane rupture<sup>19,20</sup>. The rescue cerclage in our study had notably poor outcomes. This underscores the importance of early screening and intervention.

In our study, 10.5% patients had early preterm delivery at 28-34 weeks, 39.5% late preterm delivery between 34+1 to 37 weeks and 50% had term delivery after 37 weeks. A ten year retrospective cohort on cervical encirclage states that the mean gestational age of delivery was 36.1  $\pm$  3.8 week in elective cerclage group and 31.4  $\pm$  5.6 weeks in emergency cerclage<sup>21</sup>. Another retrospective cohort study in a tertiary centre had 27.9 % preterm birth before 37 weeks and 69.1 % term deliveries with 2.9 % miscarriage<sup>22</sup>.

Previous studies have demonstrated that prophylactic cerclages tend to yield superior results compared to rescue encirclages<sup>10,23,24</sup>.

Out of the 14 twin pregnancies in our study, none of the patients had spontaneous miscarriage or early preterm delivery. 11 patient underwent late

preterm delivery and 3 underwent term labour. A study on twin pregnancies with cervical encirclage had 41.5% patients with delivery before 32 weeks and 27.7% had delivery before 28 weeks<sup>25</sup> unlike our study. Another study on evaluating the impact of cerclage in twin pregnancies stated that 10.4% underwent preterm delivery in cerclage group compared to 28.2% preterm deliveries in group without cerclage<sup>26</sup>. A cohort study on cervical cerclage in twin pregnancies with cervical dilation or shortening states that cerclage appears to prolong the gestational age at delivery and reduces the incidence of preterm birth and adverse perinatal outcome<sup>27</sup>. Twin gestation per se is not an indication for cervical encirclage.

Out of 44 women, 22 women in our study had vaginal birth and 17 underwent LSCS due to obstetrics and fetal indications. A study on emergency cerclage and mode of delivery had 60% patients who delivered vaginally and 40 % delivered by cesarean section<sup>28</sup>. Another descriptive study on mode and success of delivery following cervical cerclage resulted in 63.5% vaginal deliveries and 36.5 % cesarean section<sup>29</sup>. Placement of cervical cerclage does not mandate caesarean section. Many patients with cervical cerclage undergo vaginal delivery with timely stitch removal with no obstetric and fetal complications.

Our neonatal outcomes were reassuring. 100% neonatal survival rate was seen with APGAR > 7, and when indicated newborns received appropriate NICU care. The neonatal survival in our study was more compared to neonatal survival of 78 %, 73.3% and 74% in studies by wafi et al<sup>29</sup>, shalini et al<sup>30</sup>, cecile et al<sup>31</sup> respectively. Managing cerclage in cases of preterm premature rupture of membranes (PPROM) is challenging, as the benefit of prolonging the pregnancy versus the risk of chorioamnionitis should be meticulously thought.

## V. CONCLUSION

Hence, we conclude that prolongation of period of pregnancy was higher in elective cervical cerclage compared to emergency cerclage and is associated

with favourable perinatal outcomes. History indicated cerclage is preventive and yields the best obstetric and neonatal outcome, ultrasound indicated cerclage for short cervix prolongs the gestational age if identified earlier, rescue encirclage has a high failure rate and twin gestations require selective use of cerclage.

Timely and appropriate encirclages can prolong pregnancy significantly and improve neonatal outcomes.

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