

# Cervical Encerclage: Transabdominal vs Transvaginal: A Bidirectional Comparative Study

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**Abstract:** **Background:** Cervical insufficiency remains a significant risk factor for preterm birth and adverse neonatal outcomes. Cervical encerclage by transabdominal (LAC) and transvaginal (TVC) approaches have been established as preventive interventions, yet comparative outcome data is limited. **Objective:** To compare pregnancy outcomes between laparoscopic abdominal cerclage and transvaginal cerclage in women with cervical insufficiency. **Methods:** A 24-month observational comparative study was conducted from March 2022 to February 2024 at Sri Ramakrishna Hospital, Coimbatore. Fifty patients (20 LAC, 30 TVC) meeting inclusion criteria underwent cervical cerclage. Primary outcome was gestational age at delivery; secondary outcomes included maternal complications, mode of delivery, and neonatal outcomes including NICU admission, survival rates, and birth weight. **Results:** Mean gestational age at delivery was significantly higher in the LAC group (37±1.21 weeks) compared to TVC group (36±2.43 weeks). Hospital stay duration was comparable (LAC: 3.75±3.30 days vs TVC: 3.75±2.87 days). No intraoperative complications occurred in either group. Notably, NICU survival rates were identical (100%) in both groups. Infants in the TVC group had longer NICU stays (40±2.43 days vs 28±1.32 days) and lower birth weights (2.87±0.85 kg vs 3.00±0.83 kg). APGAR scores at 1 and 5 minutes were significantly better in the LAC group (p=0.000). **Conclusion:** Both cerclage techniques effectively prolong gestation and achieve excellent neonatal survival rates. However, LAC demonstrated superior outcomes in gestational age at delivery, birth weight, and neonatal APGAR scores, while both methods showed comparable safety profiles. Patient selection based on cervical anatomy, history, and individual preferences remains crucial for optimal outcomes.

**Keywords:** Cervical encerclage, transabdominal cerclage, transvaginal cerclage, preterm birth, cervical insufficiency, neonatal outcomes

## 1. Introduction

Cervical insufficiency represents a critical obstetric challenge affecting maternal and fetal health outcomes. During pregnancy, the cervix functions as a protective barrier for the developing fetus, maintaining structural integrity until term [1]. However, identification of short cervix (<25 mm) during prenatal screening raises concerns for potential adverse outcomes, including preterm birth and spontaneous miscarriage [1,2].

Cervical cerclage, a surgical technique involving placement of sutures around the cervix has been established as a preventive intervention for women at risk of preterm birth since its initial description in 1902 [6]. While transvaginal cerclage (McDonald's technique) remains the most commonly performed procedure, transabdominal cerclage has gained recognition for specific indications including prior failed transvaginal cerclage, severe cervical scarring, or extremely short cervix [6,7].

Despite widespread adoption of both techniques, consensus regarding optimal procedural selection, timing, and comparative outcomes remains limited. This comparative study aims to evaluate pregnancy outcomes and neonatal results between laparoscopic abdominal cerclage and transvaginal cerclage, providing evidence-based guidance for clinical decision-making.

## 2. Materials and Methods

### 2.1 Study Design and Setting

An observational comparative study was conducted over 24 months.

### 2.2 Study Population

Women undergoing transabdominal or transvaginal cervical cerclage were prospectively enrolled. Sample size calculation based on prevalence rates yielded 20 patients for LAC group (p=0.79, d=19%) and 30 for TVC group (p=0.80, d=15%).

### 2.3 Inclusion criteria

- History of spontaneous late miscarriage or preterm birth before 28 weeks;
- ultrasound-indicated short cervix;
- previous failed transvaginal cerclage;
- McDonald's transvaginal cerclage.

### 2.4 Exclusion criteria:

- Pregnancy losses due to infection;
- vaginal bleeding; placenta previa;
- PPROM;
- emergency cerclage for open cervix;
- multiple gestation.

### 2.5 Data Collection and Analysis

Retrospective data collection included patient demographics, medical history, gestational age at cerclage, surgical

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technique, intraoperative complications, and pregnancy outcomes. Statistical analysis used SPSS version 20, with chi-square test for categorical variables and Student's t-test for continuous variables. Significance was set at  $p < 0.05$ .

### 3. Results

#### 3.1 Patient Characteristics

Both groups demonstrated comparable demographic profiles. Mean age was  $29.87 \pm 4.33$  years (LAC) versus  $30.20 \pm 3.21$  years (TVC),  $p > 0.05$  (Fig.4.1). Notably, 75% of LAC group were multiparous compared to 23.3% in TVC group ( $p < 0.05$ ), while primigravidas predominated in the TVC group (76.7%) (Fig.4.2)

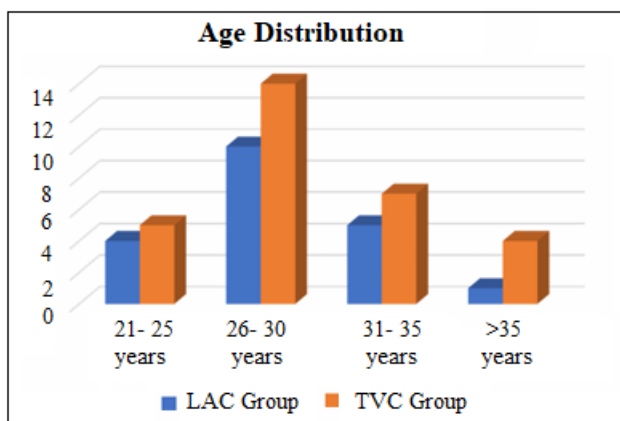


Figure 4.1: Comparison of Age Distribution

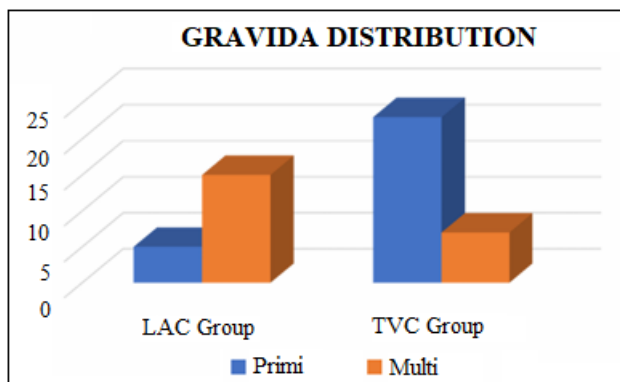


Figure 4.2: Comparison of Obstetrics Score Distribution

#### 3.2 Primary Outcome

Mean gestational age at delivery was significantly higher in the LAC group ( $37 \pm 1.21$  weeks) versus TVC group ( $36 \pm 2.43$  weeks),  $p < 0.001$  (Fig.4.3). Preterm birth ( $< 37$  weeks) occurred in 25% of LAC cases versus 46.7% of TVC cases ( $p < 0.001$ ). Extremely preterm deliveries ( $< 34$  weeks) were more frequent in TVC group (10% vs 5%) (Table.4.1)

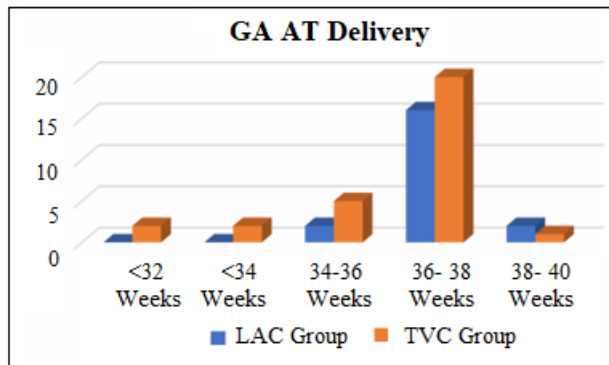


Figure 4.3: Comparison of GA at Delivery

Table 4.1: Comparison of Preterm Birth Distribution

Preterm	LAC Group		TVC Group		P value
	No. of Cases	%	No. of Cases	%	
sPTB < 24 Weeks	-		-		-
sPTB < 28 Weeks	-		-		-
sPTB < 32 Weeks	2	10	3	10.0	-
sPTB < 34 Weeks	1	5	3	10.0	0.980
sPTB < 37 Weeks	5	25	14	46.7	0.000
> 37 Weeks	12	60	10	33.3	0.000
GA at Delivery	37 + 2.43		36 + 1.21		

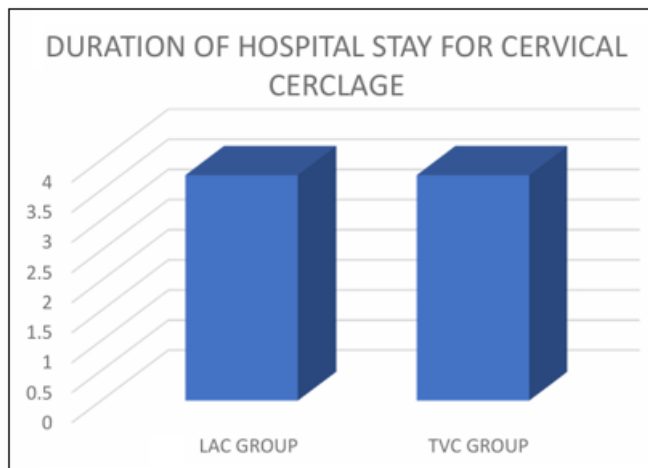
#### 3.3 Maternal Outcomes

**3.3.1 Surgical safety:** Both procedures demonstrated excellent safety profiles with zero intraoperative complications in either group (zero cases of bladder injury, cervical trauma, membrane rupture, or excessive bleeding) (Table 4.2)

Intra OP Complications	LAC Group		TVC Group	
	No. of Cases	%	No. of Cases	%
Intraoperative Bladder Damage	Nil	--	Nil	--
Cervical Taruma	Nil	--	Nil	--
Membrane Rupture	Nil	--	Nil	--
Bleeding During Insertion of Cervical Cerclage	Nil	--	Nil	--
High Vaginal Cerclage	Nil	--	Nil	--

**3.3.2 Delivery modes:** LAC group exclusively delivered via cesarean section (100%), while TVC group achieved 73.3% vaginal deliveries and 26.7% cesarean sections ( $p < 0.001$ ). Among TVC cesarean deliveries ( $n = 8$ ), 2 cases involved cervical dystocia and 2 involved protracted active phase.

**3.3.3 Hospitalization:** Hospital stay duration for cerclage was comparable between groups (LAC:  $3.75 \pm 3.30$  days vs TVC:  $3.75 \pm 2.87$  days,  $p > 0.05$ ) (Fig.4.4)



**Figure 4.4:** Duration of Hospital Stay for Cervical Encirclage

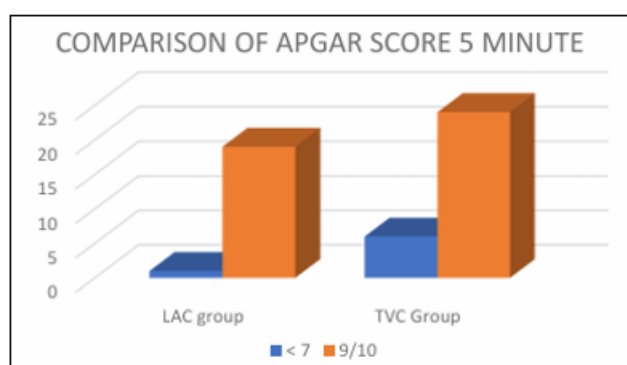
### 3.4 Neonatal Outcomes

**3.4.1 NICU admissions and survival:** Both groups achieved identical 100% neonatal survival among admitted neonates (LAC: 2/2 survived; TVC: 6/6 survived).

**3.4.2 NICU length of stay:** Significantly shorter in LAC group (28±1.32 days) compared to TVC group (40±2.43 days,  $p<0.001$ ), suggesting lower neonatal complexity in LAC cohort.

**3.4.3 Birth weight:** Mean birth weights were higher in LAC group (3.00±0.83 kg) versus TVC group (2.87±0.85 kg,  $p<0.001$ ). Notably, 60% of LAC infants weighed above 3 kg compared to only 20% in TVC group, while 46.7% of TVC infants weighed <2.5 kg.

**3.4.4 APGAR scores:** At 1 minute, 95% of LAC infants scored above 7/10 versus 80% in TVC group ( $p<0.001$ ). At 5 minutes, 95% of LAC infants achieved above 7/10 versus 80% in TVC group ( $p<0.001$ ) (Fig.4.5)



**Figure 4.5:** Comparison of Apgar Score 1 Minute Distribution

## 4. Discussion

This comparative analysis provides valuable insights into outcomes of two established cervical cerclage techniques. Both approaches demonstrated safety, with zero intraoperative complications in either group a finding

consistent with existing literature supporting general safety of cervical cerclage procedures [8,9].

The superior gestational age at delivery in the LAC group (37±1.21 vs 36±2.43 weeks,  $p<0.001$ ) aligns with evidence suggesting earlier cerclage intervention may optimize outcomes [10]. This is particularly evident in preterm birth <37 weeks distribution: LAC group 25% versus TVC group 46.7% ( $p<0.001$ ).

Delivery mode differences represent the most striking distinction between groups. The exclusive cesarean delivery rate in LAC cohort (100%) versus predominant vaginal delivery in TVC group (73.3%) suggests cerclage technique influences labor dynamics. This is clinically significant and should guide patient counseling regarding anticipated delivery mode.

NICU outcomes demonstrate comparable safety but different neonatal complexity. Identical survival rates (100% in both groups) reflect excellent postoperative care and NICU management advances, contradicting earlier concerns about preterm birth translating to poor survival [11]. However, significantly longer NICU stays in TVC group (40±2.43 vs 28±1.32 days) and lower birth weights suggest greater neonatal complexity despite equivalent survival.

The superior APGAR scores in LAC group (95% scoring above 7 at 1 minute vs 80% TVC,  $p<0.001$ ) indicate better neonatal adaptation immediately after birth, potentially reflecting benefits of prolonged gestation and higher birth weights in LAC cohort.

Clinical implications: These findings support individualized cerclage selection based on maternal anatomy, obstetric history, cervical appearance, and patient preference. While both techniques effectively address cervical insufficiency, LAC demonstrates advantages in gestational age prolongation, neonatal maturity, and immediate neonatal adaptation, though requiring planned cesarean delivery. TVC provides vaginal delivery option with comparable safety but slightly earlier delivery timing and increased neonatal morbidity.

## 5. Conclusion

This study demonstrates that both transabdominal and transvaginal cervical cerclage effectively prevent early pregnancy loss and prolong gestation. Transabdominal cerclage achieved superior outcomes in gestational age at delivery (37±1.21 vs 36±2.43 weeks), neonatal birth weights (3.00±0.83 vs 2.87±0.85 kg), and APGAR scores. However, transvaginal cerclage provided vaginal delivery opportunity while maintaining excellent neonatal survival (100% in both groups).

Patient selection remains paramount, balancing individual risk factors, cervical anatomy, obstetric history, and delivery preferences. Both techniques demonstrate comparable safety profiles with zero intraoperative complications. Future research with larger sample sizes and extended follow-up periods is warranted to establish long-term neonatal

outcomes and refine clinical guidelines for cervical insufficiency management.

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