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A Systematic Review of Elective, Urgent and Emergency Cervical Cerclage and Pregnancy Outcomes

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Authors' contributions

This work was carried out in collaboration between both authors. Author SD designed the study and managed literature searches. Author AS managed literature searches, performed statistical analysis and wrote the first draft of the manuscript. Both authors agreed to the manuscript.

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Systematic Review Article

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ABSTRACT

Introduction: Different cervical cerclage namely elective, urgent and emergency are in practice and they aim to improve the maternal and perinatal outcomes.
Methods: The aim of this systematic review and analysis is to assess the difference in the outcomes of the three different cerclages. Randomized or quasi randomized controlled studies from last 15 years were considered in this study. The relative risk was calculated with 95% confidence interval and the maternal and perinatal outcomes were compared.
Results: A total number of 923 patients were analyzed from the nine studies. Out of these 923 patients, 783 patients had adverse maternal outcome whereas all the patients had some form of adverse perinatal outcome. The urgent cerclage was comparable with the elective cerclage in most of the outcomes except having 3-4 folds higher pregnancy loss but 75% lower neonatal deaths. The emergency cerclage showed poor outcomes when compared to both urgent and elective cerclage with a very high risk of chorioamnionitis and less term births

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with high risk of neonatal deaths.
Conclusion: Elective cerclage seems to have an overall better outcome when compared to the other two cerclages. The urgent cerclage is comparable to elective cerclage with lesser risk of neonatal death but a threefold higher risk of pregnancy loss. The emergency cerclage has shown poor outcome when compared to the other two types of encerclage. Therefore it can be recommended to evaluate the cervical length after one previous preterm delivery and if would to be less than 25 mm then a cervical cerclage should be considered.

Keywords: Cerclage; elective; emergency; urgent; perinatal; pregnancy; cervical insufficiency.

1. INTRODUCTION

Almost six decades back, Shirodkar introduced cervical cerclage in 1955 [1] which was further modified by McDonald two years later [2] and this technique has contributed significantly in reducing perinatal morbidity and mortality in the field of obstetrics. Cervical cerclage is a surgical technique which is indicated when there is painless cervical dilatation which predisposes to second-trimester pregnancy losses, preterm labor and maternal infections [3].

The cervical cerclages were done mainly based on history of previous pregnancy losses (elective cerclage), ultrasound findings of length of cervix less than 25 mm indicating short cervix (urgent cerclage) and speculum or physical examination where there is bulging of fetal membrane (emergency cerclage) [4]. Elective cerclage is offered only based on history of three or more preterm births or second trimester pregnancy losses. It is usually done between 13 to 16 weeks. A randomized controlled trial conducted by Royal College of Obstetricians and Gynecologists (RCOG) and Medical Research Council (MRC) involving 647 women to elective cerclage group and 645 women to expectant management group. The study revealed that there were 13% and 17% deliveries before 33 weeks in the cerclage and expectant groups respectively. This study suggested the efficacy of elective cerclage in preventing preterm deliveries [4].

Urgent cerclage is done based on ultrasound findings where the patient will cervix shorter than 25 mm. They need not necessarily have history of previous preterm birth or second trimester pregnancy losses [5].

Emergency cerclage or also known as rescue cerclage which is done at 20-24 weeks based on cervical dilatation of more than 4 cm or prolapsing membrane at external os. The main aim of this cerclage is to prolong the pregnancy by 5 weeks. In the recent times, amniocentesis is done before proceeding to this cerclage [6].

There are many clinical trials done comparing these three types of cerclages based on different indications and timing with regards to the maternal and perinatal outcome. These trials showed varied opinion on the maternal and perinatal outcome. In our study, we have reviewed the trials and performed a meta-analysis to address the differences in opinion. The objective of this review was to compare the outcome of three different cervical cerclage namely elective, urgent and emergency with the maternal and perinatal outcomes.

2. METHODS

A search for all randomized and quasi-randomized clinical trials comparing the various cerclages and their outcomes were carried out in the PubMed, Embase, Lippincott and Williams Journals and the Cochrane Library for articles published in English language in the last 15 years between 1998 and 2013. The search was conducted using the following keywords: ‘cerclage’, ‘rescue’, ‘emergent’, ‘urgent’, ‘therapeutic’, ‘cervical insufficiency’ ‘cervical shortening’. 14 studies were found which compared either maternal, perinatal or both outcomes followed by these cerclage. All the trials which compared either maternal or perinatal outcome were considered for meta-analysis. From the 14 studies, only nine studies were included for analysis. MS To et al. B.V. Parilla et al. Samina Memom et al. Maria Bisuli et al. Terkildsen were the studies that were excluded. M.S To et al was excluded due to usage of Shirodkar technique and B.V Parilla et al. was excluded as patients with multiple gestation were included in the trial. Samina Memom et al. was excluded due to grouping of elective, urgent and emergency cerclages under one group. Since maternal and perinatal outcome was not given Maria Bisuli and

Terkildsen was excluded. All the studies which had maternal outcome, perinatal outcome or both were included for the analysis. McDonald's cervical cerclage done via vaginal approach was the standardised procedure for all the nine studies in the analysis.

The studies were critically appraised based on their basic design with their randomization techniques. The outcome variables in the studies were analyzed. The relative risk with 95% Confidence Interval (CI) and standard error of mean were calculated. Epi Info version 3.5.1 was used to analyze the data. A comparison was made to determine the association between elective cerclage, urgent and emergency cerclage and their respective perinatal and maternal outcome.

3. RESULTS

A total number of 923 patients were analyzed from the nine studies. Out of these 923 patients, 783 patients had adverse maternal outcome whereas all the patients had some form of adverse perinatal outcome. The prolongation of pregnancy which is a favorable maternal and perinatal outcome was seen in 626 patients.

The average age of the three groups of patients who underwent the various cerclages was elective cerclage (30.3 years±0.12), urgent cerclage (27.1 years±0.13) and emergency cerclage (26.5 years±0.54). The average period of gestation for cervical cerclages procedure was elective cerclage (14.3 weeks±0.06), urgent cerclage (20.0 weeks±0.06) and emergency cerclage (21.4 weeks±0.14). Both the urgent and emergency cerclages were done with 6–7 weeks lag from elective cerclage. The average prolongation of pregnancy for elective, urgent and emergency cerclages were 149.80 days±0.18, 107.80 days±0.512 and 51.08±3.11 days respectively. The following tables (Tables 1, 2 and 3) shows the overall profile of the studies and their outcomes namely for elective, urgent and emergency cerclages.

The Tables 4 and 5 compares the various cerclages with the maternal and perinatal outcome respectively.

4. DISCUSSION

Cervical cerclage has been practiced over six decades now and it broadly based into three categories based on various indications.

McDonald and Shirodkar techniques are the two commonly practiced encerclage methods. Usually they are performed via transvaginal route. However if difficulty is encountered through the vaginal route, transabdominal approach is undertaken. In McDonald cerclage, a purse string suture is placed at cervico-vaginal junction with Prolene No 1 suture material and bladder mobilization is not required [16]. This procedure is done under regional anesthesia. At 37 weeks, the stitch is removed. In case of true onset of preterm labor or prelabor rupture of membranes, the stitch is usually removed to avoid cervical tear or infection. High transvaginal cerclage (Shirodkar) the suture is placed using mersilene tape which is a permanent suture and bladder mobilization is required. Shirodkar stitch is permanent and the patient will require cesarean section.

In analysis of the various studies, we have compared the cerclages. The risk of preterm birth, operative delivery (Cesarean delivery) and PPROM/ PROM were not significantly different in both urgent and elective cerclages. Similar findings were seen when emergency and elective cerclages were compared with the exception that mothers were 3.5 times more at risk of developing PPROM/ PROM with emergency cerclage (relative risk 3.51; 95% CI 2.13-5.77). In a RCT conducted by Cockwell HA and Smith GN, it was reported that an average of 29% (range 1% to 58%) of pregnancies with emergency cerclage were complicated by PPROM and concluded emergency cerclage can only be beneficial under ideal situations [17].

Both urgent and emergency had two to three folds higher risk of pregnancy loss when compared to elective cerclage. Outcome of a cervical cerclage depends on the cervical length before cerclage done and the presence of membrane at cervical os before cerclage. This has been reported by Katie M Groom et al where the prospective observational study consisting 380 pregnant women with 41 of them having cervical length of ≤15 mm and 69 of them having prolapsed membrane, had 50% and 86% of pregnancy loss rate respectively [18].

Table 1. Elective cerclage; overall profile of the studies and their outcome

Study	N	Average age (years)	POG of stitch (weeks)	Maternal outcome	Perinatal outcome
Nelson L et al. 2009 [7]	89	25.7	14.5	Preterm birth (22.1%) PPROM (19.3%) Chorioamnionitis (1.4%) Prolongation of pregnancy (149.4days)	>36 weeks birth (73.9%) NND (6.8%) BW 2658gms
John F 2012 [8]	56	Not specified	12-13	Preterm birth (39.3%)	>36 weeks birth (55.3%)
Andrea Liddiard et al. 2011 [9]	116	31	14	Not specified	Live birth (92.3%) BW 2696 gms NND 1%
A. Kofinas G. Kofinas (2011) [10]	41	Not specified	15.4	Delivery at 36 weeks (31.7%) Delivery <24 weeks (4.8%) Caesarean section (30.5%) Prolongation of pregnancy(146 days)	Live birth (92.7%) Birth weight(2809.8gms)
E.R Guzman et al. 1998 [11]	81	32	13	Preterm birth (35.8%) Pregnancy loss (9.9%)	Term delivery (54.3%)
J.L Rego et al. [12]	18	33	17	Preterm delivery (64.7%) PPROM (27.3%)	Birth weight(2427.6gms) Term delivery (61.6%)
John Owen et al. 2009 [13]	-	-	-	--	-
Daskalakis et al. 2009[14]	-	-	-	-	-
M. J. Khan et al. 2012 [15]	112	30	13.7	Preterm delivery (20.6%) PROM (7.1%) Caesarean section (26.8%) Prolongation of pregnancy (154 days)	Birth weight(2836 grams) >36 weeks delivery (79.4%)

Table 2. Urgent cerclage; overall profile of the studies and their outcome

Study	N	Average age (years)	POG of stitch (weeks)	Maternal outcome	Perinatal outcome
Nelson L et al. 2009 [7]	26	24.4	20.3	Preterm birth (42.3%) PPROM (38.5%) Chorioamnionitis (18.2%) Prolongation of pregnancy(97.4days)	>36 weeks birth (57.7%) NND (9.5%) BW 2389gms
John F 2012 [8]	-	-	-	-	-
Andrea Liddiard et al. 2011 [9]	24	27	22	-	Live birth (93%) BW 2112gms NND 0%
A. Kofinas G. Kofinas [10]	42	Not specified	19.7	Preterm birth (40.5%) Caesarean section (43%) Prolongation of pregnancy(114days)	Birth weight (2689.9gms) Live birth (97.6%)
E.R Guzman 1998 [11]	57	27	20	Preterm delivery (36.8%) Pregnancy loss (8.8%)	Term delivery (94.4%)
J.L Rego et al. [12]	-	-	-	-	-
John Owen et al. 2009 [13]	148	26.4	19.4	Preterm birth (30.8%) Pregnancy loss (6.1%)	NND (8.8%)
Daskalakis et al. 2009 [14]	-	-	-	--	-
M. J. Khan et al. 2012 [15]	16	30.63	18.6	Preterm birth (26.7%) PROM (6.3%) Caesarean section (18.8%) Prolongation of pregnancy(112 days)	>36 weeks birth (73.3%) Birth weight(2637 grams)

Table 3. Emergency cerclage; overall profile of the studies and their outcome

Study	N	Average age (years)	POG of stitch (weeks)	Maternal outcome	Perinatal outcome
Nelson L et al. 2009 [7]	18	23.5	21.3	Preterm birth (76.8%) PPROM (64.7%) Chorioamnionitis (42.9%) Prolongation of pregnancy (56.3days)	>36 weeks birth (23.5%) NND (43.8%) BW 1117gms
John F 2012 [8]	-	-	-	--	-
Andrea Liddiard et al. 2011 [9]	9	31	23	Preterm birth (00%) PPROM (100%)	Live birth (64%) BW 900gms NND 36%
A. Kofinas, G. Kofinas [10]	24	Not specified	19.4	Pregnancy loss (29%) Caesarean section (20%) Prolongation of pregnancy (7 days)	Birth weight (1737.2gms) Live birth (62.5%)
E.R Guzman 1998 [11]	-	-	-	-	-
J.L Rego et al. [12]	-	-	-	-	-
John Owen et al. 2009 [13]	-	-	-	-	-
Daskalakis et al. 2009 [14]	29	27.1	22.4	Preterm delivery (31%) PPROM (6.89%) Chorioamnionitis (10.3%) Caesarean section (24.1%) Prolongation of pregnancy (64 days)	Birth weight(2101.0gms) Live birth (86.2%) Neonatal survival (96.0%)
M .J. Khan et al. 2012 [15]	17	30	20.7	Preterm delivery (52.9%) PROM (17.7%) Caesarean section (17.7%) Prolongation of pregnancy (77 days)	Birth weight(2111grams) >36 weeks delivery (47.1%)

**POG-Period of Gestation*

Table 4. Comparative analysis of elective, emergency and urgent cerclage with various maternal outcomes

Maternal outcomes	Urgent cerclage	Elective cerclage	Relative risk	95% CI
Preterm birth	96	121	1.09	0.87-1.36
Caesarean section	21	42	0.69	0.41-1.13
PPROM/ PROM	20	28	0.98	0.56 -1.71
Pregnancy loss	14	8	2.40	1.02-5.65
Chorioamnionitis	4	1	5.49	0.61-48.90
	Emergency erclage	**Elective cerclage**	**Relative risk**	**95% CI**
Preterm birth	29	121	0.98	0.69-1.37
Caesarean section	9	42	0.88	0.44 - 1.73
PPROM/PROM	24	28	3.51	2.13 - 5.77
Pregnancy loss	6	8	3.07	1.09 - 8.64
Chorioamnionitis	9	1	36.84	4.72 - 287.29
	Emergency erclage	**Urgent cerclage**	**Relative risk**	**95% CI**
Preterm birth	29	96	3.58	2.21-6.18
Caesarean section	9	21	1.28	0.61-2.69
PPROM/PROM	24	20	3.57	2.07-6.18
Pregnancy loss	6	14	1.28	0.50-3.23
Chorioamnionitis	9	4	6.70	2.11-21.28

Table 5. Comparative analysis of elective, emergency and urgent cerclage with various perinatal outcomes

Perinatal outcome	Urgent cerclage	Elective Cerclage	Relative risk	95% confidence interval
Live birth/>36 weeks birth	141	382	0.60	0.53-0.69
Neonatal death	10	65	0.25	0.13-0.48
	Emergency cerclage	**Elective cerclage**	**Relative risk**	**95% CI**
Live birth/>36 weeks birth	57	382	0.79	0.66-0.94
Neonatal death	15	65	1.22	0.73-2.05
	Emergency cerclage	**Urgent cerclage**	**Relative risk**	**95% CI**
Live birth/>36 weeks birth	57	141	1.30	1.06-1.60
Neonatal death	15	10	4.84	2.25-10.42

The risk for chorioamnionitis is slightly high with urgent cerclage (relative risk 5.49; 95% CI 0.62 – 48.91) however it is very significantly increased with emergency cerclage in comparison with elective cerclage (relative risk 36.84; 95% CI 4.72 – 287.29).According to the ACOG guideline in managing cervical insufficiency, it stated that the incidence of choriamnionitis increases as the duration(weeks) of cervical cerclage placement increases. Delayed placement of cerclage especially in emergency cerclage, increases the probability of fetal membrane being in contact with the vaginal bacterias thus predisposing to choriamnionitis [19]. In a recent prospective cohort study published by Manish Gupta, concluded that in 45 emergency cerclages done prevelance of chorioamnionitis is 79.2%, which indicates poor prognosis [20].

When the other two non elective cerclages were compared it was evident that morbidities were higher in the emergency cerclage like preterm birth (three to four folds), PPROM/ PROM (three to four folds) and chorioamnionitis (six to seven folds) than urgent cerclage. However, the risk for operative delivery and pregnancy losses were comparable. A study published by Cavus Y et al suggests that the difference in incidence of vaginal delivery and caesarean delivery is stasticatically not significant (p=0.371) and concluded the mode of delivery does not depend on the cervical cerclage alone [21]. As for the pregnancy loss, in a RCT trial by Purnima Deb et al. [22] it was suggested that the increased rate of pregnancy loss is due to infection that was undetected before the cerclage and also after cerclage where cerclage being a source of infection inducing in the exposed membranes.

When the perinatal outcome was analysed it was found that even though there was a 40% reduction of live birth or birth after 36 weeks (relative risk 0.60; 95% CI 0.53 – 0.69) in women with urgent cerclage, there was 75% reduction in neonatal death in this group (relative risk 0.25; 95% CI 0.13 – 0.48).This could be due to the administration of vaginal progesterone which was found to be effective in a study published by E.A De Franco et al. Among 19 patients who received the vaginal progesterone was found to be having decreased neonatal mortality [23].

However in women with emergency cerclage, there was a 22% reduction of live birth or birth after 36 weeks (relative risk 0.78; 95% CI 0.66 – 0.94) and slightly higher risk for neonatal death when compared to elective cerclage.

Emergency cerclage in comparison to urgent cerclage shows a poor outcome in both live birth and neonatal death. Currently, there is no evidence of RCT that differentiates the outcomes between urgent and emergency cerclage. However, in a RCT by MJ Khan et al in which elective, urgent and emergency cerclage comparison done, was suggested that emergency cerclage does have benefits in view prolongation of pregnancy but has poor outcome compared with other two cerclages [15].

5. CONCLUSION

The three different cerclages are done for different situations but they reflect differences in the maternal and perinatal outcome. Elective cerclage seems to have an overall better outcome when compared to the other two cerclages. The urgent cerclage is comparable to the elective cerclage with lesser risk of neonatal death but a threefold higher risk of pregnancy loss. The emergency cerclage has shown poor outcome when compared to the other two types of encerclage. Therefore it can be recommended to evaluate the cervical length after one previous preterm delivery and if would to be less than 25 mm then a cervical cerclage should be considered. By this type of encerclage we can reap the benefits of better outcomes of both elective and urgent cerclage.

CONSENT

All authors declare that ‘written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images.

ETHICAL CLEARANCE

Not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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