

REVIEWS

Efficacy of cervical cerclage as a prophylactic measure in the management of triplet gestations

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ABSTRACT

Introduction: Prophylactic cervical cerclage has been introduced to treat cervical insufficiency, which is associated with a variety of perinatal complications. This literature review aims to evaluate the efficacy of this procedure in preventing cervical insufficiency in triplet gestations and therefore the various complications including pre-term delivery.

Methods: Three academic search engines, including “Medline”, “Science Direct” and “Scopus” were used. Key words used include “cervical insufficiency”, “multiple pregnancy”, “triplet”, “preterm labor”, “cerclage”, “cervical shortening”, “prolong of pregnancy” and “management”.

Results: Nine studies were retrieved, amongst which six are retrospective international researches, and three are meta-analysis not limited to triplet pregnancies. Majority of these researches shows no clear benefit in using cervical cerclage for women who have cervical shortening.

Conclusions: Prophylactic cervical cerclage is found to have no clear benefit for women with cervical insufficiency, who have triplet pregnancies. However, improvement can be made in future research for more accurate analysis of its efficacy.

Key Words: Prophylactic cerclage, Triplet, Pregnancy, Efficacy

1. INTRODUCTION

The incidence of multiple gestations has been increasing from 1970s. According to the Australian Bureau of Statistics, 4,500 confinements yielded multiple gestations in 2010, amongst which sixty-five were triplets and four were quadruplets or of a greater order.^[1] This presented a forty-three percent higher rate compared to the record of 3,200 confinements in 1990.^[1]

However, the majority of the triplet deliveries happened prior to thirty-four weeks.^[2] In fact, prematurity constitutes a substantial fraction of the perinatal morbidity and mortality related to triplet pregnancies of which seventy-five percent required neonatal intensive care.^[3] Other compli-

cations include premature preterm rupture of membranes, intra-amniotic infection and fetal loss.^[3]

Current literature proposes that cervical insufficiency is the ultimate culprit leading to serious complications. Cervical insufficiency describes a condition where asymptomatic dilation of the cervix occurs, subsequently resulting in loss of pregnancy or premature birth. Consequently, the elective placement of cervical sutures, namely cervical cerclage, has been used as a prophylactic means to extend pregnancy to allow full fetal maturation.

Cervical cerclage employs a variety of surgical procedures in which sutures or synthetic tape are used to mechanically

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increase the tensile strength of the cervix, hence theoretically lowering chances prematurity as a result of cervical insufficiency.^[4]

Up to the present time, several international randomized controlled studies and systematic reviews had been conducted to investigate the clinical value of elective cerclage in triplet gestations, however, with mixed results.

Therefore, this article aims to review the literature on the efficacy of cervical cerclage for the management of triplet gestations. It also explores the implications and potential areas for improvement for future studies.

2. METHOD

Twenty-four journal articles and one textbook chapter were retrieved using three academic search engines, including “Medline”, “Science Direct” and “Scopus”. Key words used were “cervical insufficiency”, “multiple pregnancy”, “triplet”, “preterm labor”, “cerclage”, “cervical shortening”, “prolong of pregnancy”, “multiple pregnancy” and “management”.

The inclusion criterion is that the paper should discuss the effectiveness of cervical cerclage in avoiding preterm labor in women with triplet pregnancy and otherwise normal gestation. Any papers discussing the value of cervical cerclage in pregnancy with singletons, twins were excluded. Critical appraisal of each of the articles was conducted in accordance with PRISMA methodology.

3. RESULTS

Nine studies were included in this review, ranging from 1970s to 2000s, amongst which six were retrospective studies, and three were meta-analyses not limited to triplet pregnancies.

In six studies, all patients underwent prophylactic cervical cerclage at 12th to 14th week of gestation. All studies investigated pertinent neonatal outcomes, including prolongation of gestation, newborn weight, rate of respiratory distress syndrome, Apgar score, perinatal mortality and duration of hospitalization. A summary of these studies and the relevant findings are presented in Tables 1 and 2 respectively.

Table 1. Summary of the studies reviewed

Authors	Years	Study Design	Summary of Results
Goldman et al.	1989	Cohort Study	Elective cervical suture is a definite contribution to the successful management of multiple pregnancies with more than two fetuses. It lengthens the gestation, reduces morbidity rate and increases neonatal weight significantly.
Elimian et al.	1999	Retrospective Chart Review	Prophylactic cerclage decreased significantly the incidence of extremely low birth weight neonates in triplet pregnancies.
Mordel et al.	1993	Cohort Study	Triplet gestations do not benefit from an elective cervical suture. No statistically significant results seen in length of gestation, neonatal birth weight and perinatal morbidity.
Lipitz et al.	1989	Cohort Study	Prophylactic cerclage did not lengthen gestation duration or decrease fetal mortality rate.
Strauss et al.	2002	Cohort Study	No statistically significant results seen in length of gestation, neonatal birth weight and perinatal morbidity.
Rebarber et al.	2005	Retrospective Review	There was no beneficial role of prophylactic cervical cerclage, including length of gestation, neonatal birth weight and perinatal morbidity.

Table 2. Presentation of the parameters investigated in each of the study

Authors	Groups	Mean Length of Gestation	Mean Neonatal Weight	Mean Apgar Score	Mean Length of Hospitalization	RDS Morbidity Rate	Mortality
Goldman et al.	Cerclage	35 weeks	2.022kg	8.9	3.1 weeks	8.3%	2.8%
	Control	30.7 weeks	1.416kg	6.9	6.4 weeks	20%	20%
Elimian et al.	Cerclage	32.8 weeks	1.730kg	8	N/A	11%	0%
	Control	31.5 weeks	1.663kg	8	N/A	32%	5%
Mordel et al.	Cerclage	33 weeks	1.833kg	N/A	N/A	N/A	N/A
	Control	34.7 weeks	1.884kg	N/A	N/A	N/A	N/A
Lipitz et al.	Cerclage	33.2 weeks	N/A	N/A	N/A	N/A	9.3%
	Control	N/A	N/A	N/A	N/A	N/A	N/A
Strauss et al.	Cerclage	31.4 weeks	1.368kg	9	N/A	30%	2.08%
	Control	31.8 weeks	1.568kg	9	N/A	30%	3.42%
Rebarber et al.	Cerclage	33.1 weeks	1.817kg	N/A	3 weeks	N/A	N/A
	Control	33.0 weeks	1.819kg	N/A	3.2 weeks	N/A	N/A

Note. RDS = Respiratory distress syndrome

Table 3. A summary of the findings from three meta-analysis

Authors	Years	Study Design	Summary of Results
Harger et al.	2002	Meta-analysis	No randomized trials established to support the routine use of tocolytics, corticosteroids and antibiotics with cervical cerclage.
Drakely et al.	2003	Meta-analysis	Perinatal outcomes are being inconsistently defined or applied to different patient populations in most of the studies.
Jorgensen et al.	2007	Meta-analysis	Cerclage was even found to be harmful, such as causing pregnancy loss or death of the patients in multiple gestations.

In addition, three meta-analyses that investigated multiple gestations were also included in this literature review. Although the meta-analyses were not specific to triplet pregnancies, they yielded interesting perspectives for future research direction (see Table 3).

4. DISCUSSION

In this literature review, two studies found routine prophylactic cerclage advantageous. Goldman, Dicker, Peleg and Goldman made retrospective comparisons in their study between 12 triplet pregnancies with prophylactic cervical cerclage and 10 triplets with no prophylactic cerclage.^[5] The average length of gestation advanced by no less than 4 weeks, with prophylactic cerclage in-situ. As predicted, the birth weight and various neonatal outcomes, including incidence of respiratory distress syndrome, Apgar score, perinatal mortality, and duration of hospitalization were significantly better compared to the null-cerclage cohort.

It is important to note that in this study both groups were also managed uniformly regarding bed rest, beta mimetic drugs and dexamethasone for the enhancement of fetal lung maturity, which together with a rather small group of patients, are confounding parameters in this study.

In another similar study conducted by Elimian, Figueroa, Nigam, Verma, Tejani and Kirshenbaum, a conclusion was made that triplet patients who received prophylactic cerclage subsequently have a lower incidence of extremely low-birth-weight neonates and a higher proportion of pregnancies delivered after 31 and 32 weeks.^[6]

The underlying principle accounting for the beneficial role of cervical cerclage in triplet gestations was also hypothesized in this paper for the first time. Elimian et al. proposed that the over-distension of the uterus in early pregnancy might play a vital role to the resultant poor perinatal outcome of triplets.^[6] It was revealed in their study that extremely low rates of histologic chorioamnionitis (8.5%) correlates to the very high rate of preterm birth (81.2%) in their cohort of triplet pregnancies, suggesting the role of uterus overdistension caused by chorioamnionitis.^[6] This hypothesis, however, was neglected in later literatures. It is therefore important to realize

that future study should focus more on the underlying pathophysiology of cervical insufficiency. Further understanding of pathophysiology provides a more solid rationale to investigate the role of cerclage to manage cervical insufficiency.

In comparison, four studies found no benefit of prophylactic cerclage. One retrospective study compared 12 patients with triplet gestations that undertook prophylactic cerclage at 12 to 14 weeks with 23 patients with triplet gestations who were observed conservatively.^[7] The average duration of gestation was in fact superior in the non-sutured group by 1.7 weeks, with no evidence of negatively affecting the weight of the newborns. This study drew the conclusion that no beneficial role was established using cervical stitches in triplet gestations.

The study by Lipitz et al. demonstrated that prophylactic cerclage did not lengthen gestation duration or decrease fetal mortality rate, compared to the control group amongst their 78 triplet pregnancies.^[8]

A relatively recent research assessed this field by comparing 16 triplets with cervical suture in-situ with 78 triplet gestations without cerclage. No statistically significant difference was produced in terms of birth age, neonate mortality and morbidity rate, including fetal blood pH.^[9]

However, all 3 studies were limited by a relatively small sample size. The more recent study by Rebarber, Roman, Istwan, Rhea and Stanziano used a significantly larger sample, therefore containing more power than the previous studies and reducing the chance of type II error.

In this study of more than 3,000 patients, it was discovered that there was no beneficial role of prophylactic cervical cerclage in terms of gestational or neonatal outcome improvements, namely birth before 32 weeks, gestational stage at birth, rate of prematurity, average weight of the newborn, neonatal intensive care unit (NICU) management, or duration hospitalization.^[10] As argued by preceding researches, this study also supported the findings that the average age at birth was 33 weeks in both groups and that triplets commonly suffered a greater chance of NICU management.

Despite the large cohort number, a number of limiting factors was present in this study. For instance, this is a retrospective study and therefore raised the possibility of selection bias in choosing candidates for cervical suturing. In addition, the baseline sample characteristics in this study are of no similarity between the sample groups, rendering more potential errors when interpreting the direct effect of cervical cerclage on the pregnancy.

The evidence-based analysis conducted by Harger found that no randomized trials have presented findings that were without confounding variables to support the routine use of tocolytics, corticosteroids and antibiotics with cervical cerclage.^[11] In addition, Drakeley, Roberts and Alfirevic pointed out that the source of heterogeneity for detrimental perinatal outcomes, such as maternal infection, preterm delivery, mean gestational age, is being inconsistently defined or applied to different patient populations in most of the studies.^[12] Conflicting or unclear research definitions may contribute to biased conclusion in these studies. Drakeley et al. also concluded in their meta-analysis that cervical cerclage should not be proposed to patients at low to medium risk of mid-trimester loss.^[12]

Data from the more recent meta-analysis of more than 1,000 women undergoing cerclage in the context of several randomized controlled trials indicate no clear value from the intervention in terms of pregnancy loss or perinatal outcome.^[13] Instead, cerclage was even found to be harmful, such as causing pregnancy loss or death of the patients in multiple gestations, although only a small number of multiple pregnancies were included in this analysis.^[13]

5. CONCLUSIONS

Prophylactic cervical cerclage for triplet gestations is found to have no clear benefit for women who have cervical insufficiency in the majority of current publications. However, improvement can be made in future research for more accurate analysis of its efficacy. This includes a more critical evaluation of the underlying mechanism of cervical insufficiency, a clearer definition of perinatal outcomes, a more consistent cut-off for confounding parameters such as concurrent use of corticosteroid and a larger sample size. Randomized controlled studies are needed in this area.

CONFLICTS OF INTEREST DISCLOSURE

The authors declare they have no conflicts of interest.

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