The effect of cervical pessary on increasing gestational age at delivery in twin pregnancies with asymptomatic short cervix: a systematic review and meta-analysis of randomized controlled trials

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OBJECTIVE: The incidence of preterm delivery is much higher in twin pregnancies than in singletons and even higher if a short cervical length is detected in the second trimester. Studies are contradictory regarding the efficacy of a cervical pessary to decrease preterm birth in twin pregnancies and short cervical length. To conduct a systematic review and meta-analysis investigating the efficacy of cervical pessary in prolonging gestation, preventing preterm birth, and reducing adverse neonatal outcomes in twin pregnancies with an asymptomatic short cervix.

DATA SOURCES: PubMed, Scopus, Web of Science, and ClinicalTrials.org were searched for randomized controlled trials from inception to June 2023.

STUDY ELIGIBILITY CRITERIA: In this study, randomized controlled trials comparing the cervical pessary to expectant management in the pregnant population with twin gestations and asymptomatic short cervix were included.

METHODS: The Cochrane risk-of-bias-2 tool for randomized controlled trials was used for the evaluation of the risk of bias in included studies. A meta-analysis was performed by calculating risk ratio and mean difference with their 95% confidence interval using the random effects model or fixed effect model on the basis of heterogeneity and accounting for potential covariates among the included randomized controlled trials.

RESULTS: A total of 6 randomized controlled trials were included in the analysis. Cervical pessary did not significantly increase the gestational age at delivery in twin pregnancies with asymptomatic patients (mean difference, 0.36 weeks [−0.27 to 0.99]; P=.270; I^2=72.0%). Moreover, the cervical pessary use did not result in a reduction of spontaneous or all-preterm birth before 37 weeks of gestation (risk ratio, 0.88 [0.77−1.00]; P=.061; I^2=0.0%). There was no statistically significant difference in the composite neonatal adverse outcomes (risk ratio, 1.001 [0.86−1.16]; P=.981; I^2=20.9%), including early respiratory morbidity, intraventricular hemorrhage, necrotizing enterocolitis, and confirmed sepsis.

CONCLUSION: The use of cervical pessary in twin pregnancies with asymptomatic short cervix does not seem to be effective in increasing the gestational age at delivery, preventing preterm birth, or reducing adverse neonatal outcomes. This indicates that alternative interventions should be sought for the management of this patient population.

Key words: cervical pessary, extension of pregnancy, meta-analysis, neonatal outcome, preterm birth

Introduction

Preterm birth (PTB), affecting 5% to 18% of total pregnancies, is defined as birth before 37 weeks of gestation.[1] Although the percentage of preterm births in the United States decreased by 1% from 10.49% of all births in 2021 to 10.38% of births in 2022, according to the Centers for Disease and Prevention, this decline followed a 4% increase in the preterm rate from 2020 (10.09%) to 2021.[2] Although twin pregnancies account for only 3.2% of all-live births, 20% of preterm births occur in this population. Preterm birth is the leading

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Why was this study conducted?

This study aimed to assess the efficacy of cervical pessary in prolonging gestational age, preventing preterm birth, and reducing adverse neonatal outcomes in twin pregnancies with an asymptomatic short cervix.

Key findings

In twin pregnancies with an asymptomatic short cervix, cervical pessary did not substantially increase gestational age at delivery (mean difference, 0.36 weeks [−0.27 to 0.99]; P=.270; I^2=72.0%), reduce spontaneous or all-preterm births before 37 weeks of gestation (risk ratio [RR], 0.88 [0.77−1.00], P=.061; I^2=0.0%), and composite neonatal unfavorable outcomes (RR, 1.001 [0.86−1.16]; P=.981; I^2=20.9%).

What does this add to what is known?

This study contributes valuable evidence indicating that the use of cervical pessary in twin pregnancies with asymptomatic short cervix may not be effective in the outcomes mentioned. The findings suggest the need to explore alternative approaches or interventions for the management of this specific patient population.

cause of perinatal death in twin pregnancies, with a 5-fold higher risk of neonatal and infant death when compared with singletons.[3] PTB causes significant neonatal morbidity, which includes sepsis, respiratory distress syndrome, periventricular leukomalacia, intraventricular hemorrhage, necrotizing enterocolitis, and retinopathy of prematurity.[4−8] In addition, PTB is the leading cause of long-term neurodevelopmental impairment in nonanomalous newborns, causing a tremendous economic and psychosocial burden to society. Thus, both the short- and long-term impact of PTB from twin pregnancies cannot be overstated.

Preterm birth is a complex condition impacted by a variety of interconnected characteristics[1]; cervical insufficiency is identified as a significant contributing factor[9−13] Numerous studies have demonstrated that a cervical length of ≤25 mm at 20−24 weeks of gestation serves as a reliable predicting factor for preterm birth occurring before 28 weeks of gestation.[14] Several medical and surgical interventions have been applied to prevent PTB in pregnant people with a short cervix, which includes vaginal progesterone,[15] cervical cerclage,[16] and cervical pessary.[4] According to a systematic review and meta-analysis, vaginal progesterone cannot prevent preterm birth in uncomplicated twin pregnancies; however, in twin pregnancies with a short cervix (<25 mm), it could decrease preterm birth at early gestational age.[17] In addition, another systematic review and meta-analysis showed that in twin pregnancies, cervical cerclage could reduce preterm birth rate in cervical length <15 mm.[18] Cervical pessary is a less invasive surgical approach that theoretically provides mechanical support for the cervix, and different studies have reported heterogeneous results on its efficacy.[19−24]

The efficacy of pessaries in singleton pregnancies has sparked controversy, as evidenced by a recent study.[25] However, there is a notable gap in comprehensive reviews regarding the use of pessaries in twin pregnancies. This study aimed to address this gap by investigating the potential positive effects of pessary use in twin asymptomatic pregnancies.

Objectives

The objective of this study is to evaluate the efficacy of using a cervical pessary to increase the gestational age at delivery and reduce composite neonatal adverse outcomes in pregnant people with twin gestations and asymptomatic short cervix.

Methods

This study is a systematic review and meta-analysis conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guideline (Figure 1).[26] The research protocol was prospectively registered with the International Prospective Register of Systematic Reviews (registration number CRD42023436994; June 27, 2023).

Eligibility criteria, information sources, search strategy

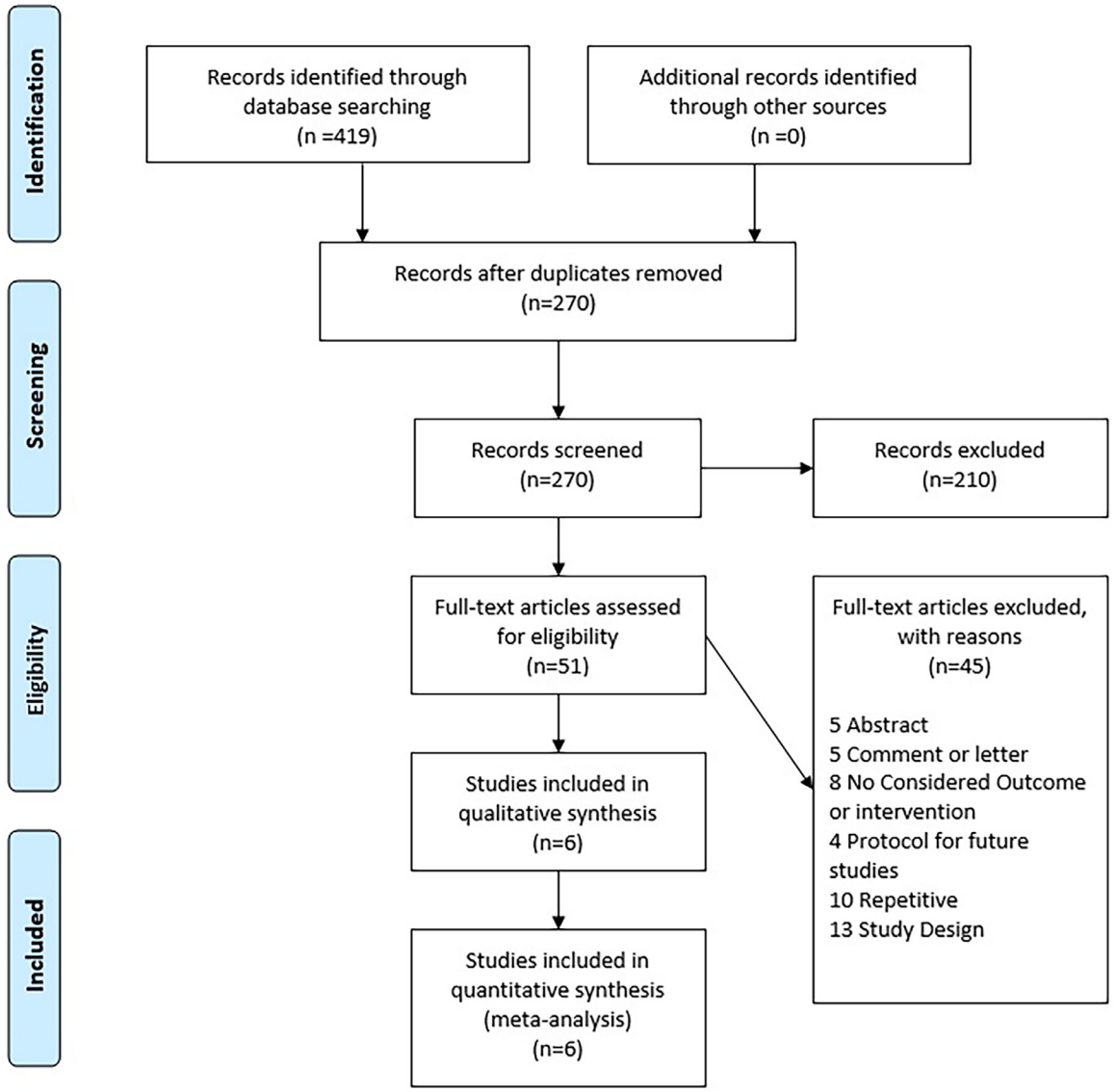
The eligibility criteria of this study were designed on the basis of the Population, Intervention, Control, and Outcome framework: (1) Population: pregnant people with twin gestations and asymptomatic short cervix (defined per study)—patients with risk factors for preterm birth (eg, severe twin-to-twin transfusion syndrome, selective fetal growth restriction, painful regular uterine contractions, and history of ruptured membranes) were excluded; (2) Intervention: Using of any cervical pessary; (3) Comparison: Expectant management—patients treated with vaginal progesterone or any other intervention other than cervical pessary were excluded; and (4) Outcome: Gestational age (GA) at delivery and composite neonatal adverse outcomes.

Only randomized controlled trials (RCTs) were included in this study, and conference papers, case reports, case series, narrative reviews, animal studies, editorials, and letters were excluded from the analysis. A systematic search was conducted on PubMed, Scopus, Web of Science, and ClinicalTrials.org from their inception up to June 2023 with Medical Subject Headings terms or text words. The search terms used were as follows: (TITLE-ABS-KEY (“Cervical pessary”) OR TITLE-ABS-KEY (“Biotеque pessary”) OR TITLE-ABS-KEY (“Arabin pessary”)) AND (TITLE-ABS-KEY (“Multiple pregnanc*”) OR TITLE-ABS-KEY (“Twin pregnanc*”)). No language restrictions were applied during the search process.

Study selection

The records were included in the EndNote reference manager, and the 2-step screening was started after removing the duplicates. The initial screening involved reviewing titles, abstracts, and

FIGURE 1
The flow diagram of the study according to the PRISMA.



PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-analysis.

Norooznezhad. Pessary in twin pregnancies. Am J Obstet Gynecol Glob Rep 2024.

keywords. Subsequently, a full-text evaluation was conducted. Two independent reviewers (A.H.N. and N.Z.) performed the screening process on the basis of the predefined eligibility criteria. A third reviewer (A.A.S.) was engaged to resolve the disagreements.

Data extraction

Data extraction was performed by 2 independent reviewers (A.H.N. and N. Z.), and in case of any discrepancies, a third person (A.A.S.) was involved. The following variables were extracted: (1) demographic variables: first author name, year of publication, maternal age, BMI, parity, smoking status, race, and the number of participants (Table 1[19–24]); obstetrics history variables: assisted reproductive technology (ART), previous PTB, chorionicity, GA at intervention, cervical length at intervention, and mode of delivery (Table 2[19–24]); obstetrics outcomes: total number of live births, spontaneous births at <28, <34, and <37 weeks of gestation, GA at delivery, number of preterm premature rupture of membranes (PPROM); and neonatal outcomes: low birthweight (<1500 and <2500 g), composite neonatal adverse outcomes (necrotizing enterocolitis, intraventricular hemorrhage (grades 3 and 4), respiratory distress syndrome, blood culture-proven sepsis, initial treatment for suspected sepsis), bronchopulmonary dysplasia, retinopathy of prematurity, periventricular leukomalacia, blood transfusion, neonatal death.

TABLE 1
Study demographic of enrolled articles in the systematic review

Study	Country	Pessary	Gestation	Age, y	BMI, kg/m^2	Nulliparous	Smoking	Race (White)
Groussolles et al,[20] 2022	France	Arabin	Twin	P: 30.9±5.5 C: 31.5±5.3	P: 23.2 (20.3–26.6) C: 23.1 (20.7–25.9)	P: 96 (61.9) C: 93 (58.9)	P: 17 (11.0) 16 (10.1)	—
Norman et al,[23] 2021	United Kingdom Belgium	Arabin	Twin	P: 32.4 (17–51) C: 32.7 (17–50)	—	P: 150 (60.0) C: 135 (53.4)	P: 21 (8.4) C: 20 (7.9)	—
Berghella et al,[24] 2017	United States	Bioteque	Twin	P: 27.0 (23.4–33.0) C: 32.9 (26.2–36.8)	P: 24.7 (22.5–30.6) C: 28.2 (21.9–31.1)	P: 11 (48) C: 15 (65)	P: 0 (0) C: 1 (4)	P: 8 (35) C: 9 (39)
Nicolaides et al,[22] 2016	Multiple countries	Arabin	Twin	P: 33.1 (29.5–36.7) C: 33.2 (29.1–36.6)	—	P: 363 (61.5) C: 360 (61.0)	P: 45 (7.6) C: 53 (9.0)	P: 497 (84.2) C: 483 (81.9)
Goya et al,[19] 2016	Spain	Arabin	Twin	P: 35.4±3.6 C: 35.9±5.6	P: 24.3±1.5 C: 24.7±2.0	P: 31 (45.6) C: 29 (43.9)	P: 10 (14.7) C: 9 (13.6)	P: 38 (57.6) C: 41 (60.3)
Liem et al,[21] 2013	Netherlands	Arabin	97.8% twins 2.2% triplets	P: 33.1±4.6 C: 32.7±4.5	P: 23.7 (21.5–26.3) 22.9 (21.0–25.8)	P: 222 (55) C: 225 (55)	P: 16 (4) C: 25 (6)	P: 352 (91) C: 347 (90)
Pooled studies	—	—	—	P: 32.75±5.8 C: 32.8±5.7	P: 24.0±3.9 C: 24.2±3.7	P: 55.4 C: 56.1	P: 7.6 C: 8.5	P: 67.0 C: 67.9
P values				.39	.59	.81	.72	.95

Values are presented as mean±standard deviation, median (interquartile range), n (%), or % for P vs C subjects.

BMI, body mass index; *C*, control; *P*, pessary.

Norooznezhad. Pessary in twin pregnancies. Am J Obstet Gynecol Glob Rep 2024.

TABLE 2
Study characteristics of enrolled articles in the systematic review

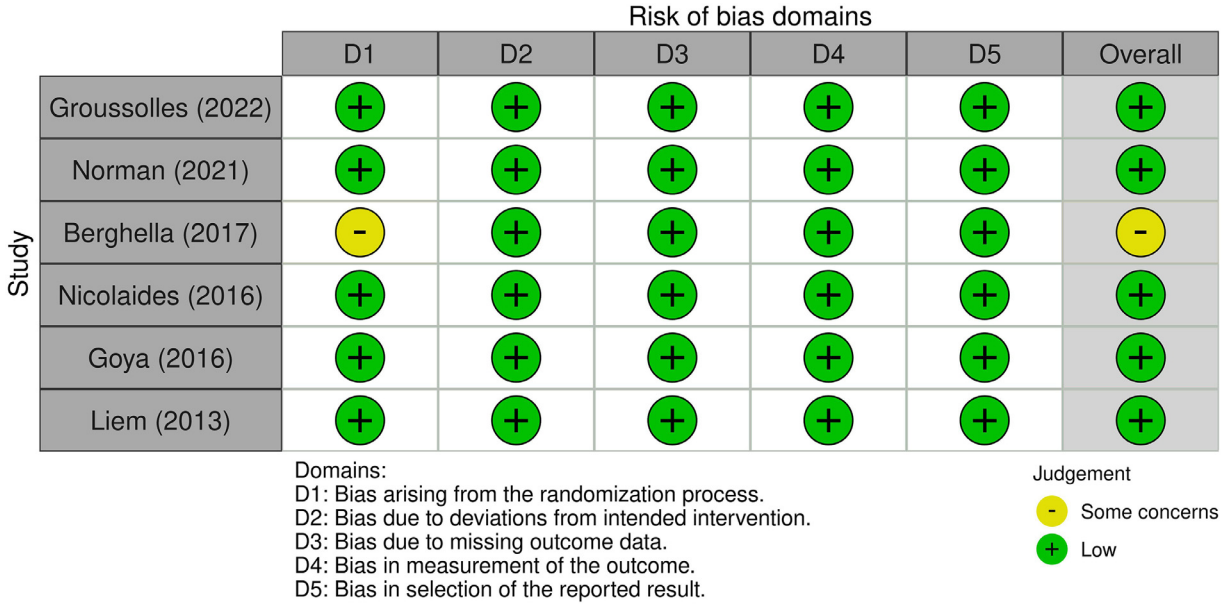
Studies	Population	n	IVF/ART	GA at start	CL at start	Previous PTB	C/D	Dichorionic diamniotic
Groussolles et al,[20] 2022	Twin, CL≤35 mm at 16 ± 0 to 24±0 wk	P: 157 C: 158	P: 42 (27.1) C: 46 (29.1)	P: 20.8±2.0 C: 20.9±2.2	P: 27.0 (21.0–31.0) C: 25.0 (19.0–30.0)	P: 14 (9.0) C: 12 (7.6)	P: 81 (52.3) C: 49 (38.3)	P: 112 (71.3) C: 107 (67.7)
Norman et al,[23] 2021	Twin, CL≤35 mm at 18±0 to 20±6 wk	P: 250 C: 253	—	—	P: 28.8±5.8 C: 29.5±5.1	—	P: 169 (67.6) C: 162 (64.0)	P: 200 (80.0) C: 202 (79.8)
Berghella et al,[24] 2017	Twin, CL≤30 mm at 28±0 wk, screen at 18±0 to 23±6 wk	P: 23 C: 23	P: 3 (13) C: 10 (43)	P: 21.0 (20.1–24.2) C: 21.2 (20.1–24.3)	P: 16.7 (10.7–27.8) C: 22.9 (15.9–25.6)	P: 0 (0) C: 3 (13)	P: 13 (56) C: 16 (70)	P: 18 (78) C: 18 (78)
Nicolaides et al,[22] 2016	Twin, CL at 20±0 to 24±6 wk	P: 590 C: 590	P: 196 (33.2) C: 204 (34.6)	P: 22.6 (21.4–23.9) C: 22.7 (21.4–23.9)	P: 32.0 (27.0–36.0) C: 32.0 (27.0–37.0)	P: 20 (8.8) C: 33 (14.3)	—	P: 479 (81.2) C: 479 (81.2)
Goya et al,[19] 2016	Twin, CL≤25 mm at 18–22 wk	P: 68 C: 66	P: 21 (30.9) C: 20 (30.3)	P: 22.1±0.8 C: 22.5±0.7	P: 19.2±3.5 C: 19.6±3.6	P: 11 (16.7) C: 12 (17.6)	P: 29 (42.6) C: 28 (42.4)	P: 55 (80.9) C: 54 (82.4)
Liem et al,[21] 2013	Multiple, CL at 12–20 wk	P: 403 C: 410	P: 150 (37) C: 141 (34)	P: 16.9±2.0 C: 17.0±2.0	P: 43.6±8.1 C: 44.2±8.5	P: 29 (7) C: 26 (6)	P: 209 (52) C: 180 (44)	P: 316 (78) C: 310 (76)
Pooled studies	—	—	P: 28.1 C: 34.2	P: 20.5±2.5 C: 20.7±2.5	P: 27.7±7.9 C: 28.8±8.2	P: 8.4 C: 11.7	P: 54.0 C: 51.6	P: 78.2 C: 77.5
P values			.14	.83	.79	.24	.49	.66

Values are presented as mean±standard deviation, median (interquartile range), n (%), or % for P vs C subjects.

ART, assisted reproductive technology; *C/D*, Cesarean Delivery; *C*, control; *CL*, corpus luteum; *GA*, gestational age; *IVT*, in vitro fertilization; *P*, pessary; *PTB*, preterm birth.

Norooznezhad. Pessary in twin pregnancies. Am J Obstet Gynecol Glob Rep 2024.

FIGURE 2
Risk of bias assessment of included studies



Norooznezhad. Pessary in twin pregnancies. Am J Obstet Gynecol Glob Rep 2024.

Assessment of risk of bias

The risk of bias was assessed by 2 independent reviewers (A.H.N. and N.Z.) using the Cochranes's risk-of-bias 2 tool. Disagreements were resolved by the third reviewer (A.A.S.).

Data analysis

In studies that reported continuous variables with median, interquartile range, and mean ± standard deviation were calculated by the referenced formula.[27] Meta−analysis was performed by calculating risk ratio (RR) and mean difference (MD) with a 95% confidence interval using the random effects model or fixed effect model on the basis of heterogeneity and symmetrical assumption among the included RCTs. The between-study-variation and heterogeneity were checked using the I^2 index, Q-test, funnel plot, and meta-regression. The publication bias was assessed using Egger's regression test to assess the asymmetry of the funnel plot. The leave-one-out method was used as a sensitivity analysis to assess the robustness of the results. The statistically significant level was considered at 0.05. All statistical analysis was done using the meta function for R software (version 4.2.2; R Core Team, Vienna, Austria).

Results

Study selection

The screening process is shown in PRISMA flowchart (Figure 1).

Study characteristics

Six studies were identified, which included 2983 pregnant women and 5982 neonates (1 study had a limited number of triplets). The study characteristics are shown in Tables 1 and 2.[19−24] All of the included studies were characterized as multicenter open-label RCTs. The definition of a short cervix is shown in Tables 1 and 2,[19−24] in which different cutoffs have been used by the authors, including <35 mm,[20] <30 mm,[24] 30-35 mm,[23] and 25 mm.[19] Two studies did not report any definition for "short cervix," and their patient population was selected on the basis of their institutional protocol.[21,22] Five studies[19−23] used the Arabin pessary, whereas 1 used the Bioteque[24] pessary.

Risk of bias assessment, publication bias, and sensitivity analysis

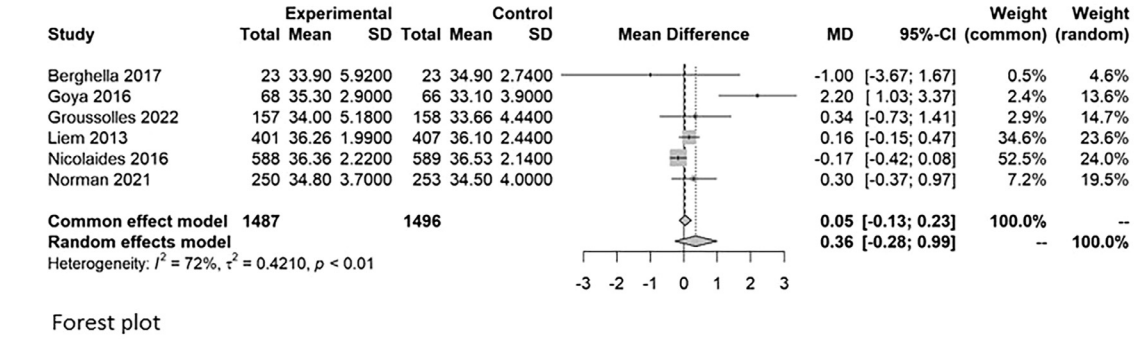
The result of the risk of bias assessment is shown in Figure 2. None of the studies had poor overall quality. The funnel plot for the GA at delivery is shown in Figure 3. Egger's regression test and meta-regression showed no significant publication bias or significant heterogeneity. According to the results of the leave-one-out method, the pooled effect size was robust against the elimination of each included RCT (Figure 3).

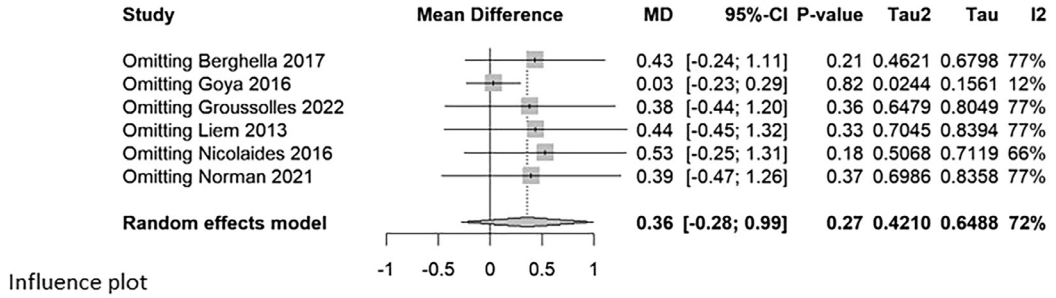
Synthesis of results

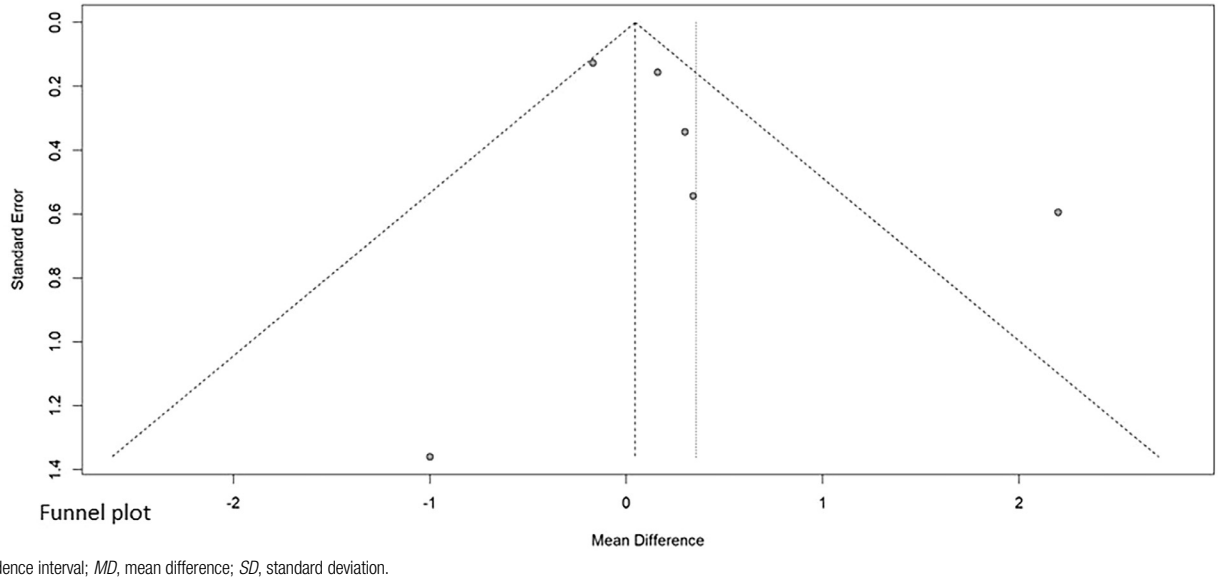
Neonatal outcomes. The analysis results indicated that cervical pessary use had no significant impact on increasing the GA at delivery (MD, 0.36 [−0.27 to 0.99]; P=.270; I^2=72.1%). Moreover, the using a cervical pessary did not influence the incidence of spontaneous births before 28, 34, and 37 weeks of gestation (Table 3[19−24]). Notably, cervical pessary use did not reduce the incidence of PPROM (RR, 1.13 [0.88−1.45]; P=.333, I^2=46.7%).

Using a cervical pessary did not decrease the composite neonatal adverse outcomes (RR, 1.001 [0.86−1.16]; P=.981, I^2=20.9%). Moreover, cervical pessary did not decrease early respiratory morbidity, intraventricular hemorrhage, necrotizing enterocolitis, or blood culture-proven sepsis (Table 3[19−24]). In addition, there was

FIGURE 3
The forest plot, influence plot, and funnel plot of gestational age at delivery







CI, confidence interval; *MD*, mean difference; *SD*, standard deviation.

Norooznezhad. Pessary in twin pregnancies. Am J Obstet Gynecol Glob Rep 2024.

no evident difference in birthweight <1500 g and <2500 g between the control and cervical pessary groups (Table 3[19–24]).

Outcomes based on cervical length ≤35 mm. Two studies, including Liem et al[21] and Nicolaides et al[22] did not incorporate any specific cervical length cutoff in their inclusion criteria. Consequently, an additional analysis was conducted, excluding these 2 studies. The results indicated that there was no

TABLE 3
Main results of the meta-analysis based on all types of pessaries for all outcomes

Outcome	Studies, n	RR (95% CI)	*P* value	I^2	Publication bias's test, *P* value
Spontaneous birth <28 wk	4[19,20,23,24]	0.750 (0.52–1.07)	.119	0.0%; *P*=.690	.448
Any birth <28 wk	5[20–24]	0.876 (0.66–1.16)	.361	0.0%; *P*=.770	.318
Any birth <32 wk	3[21–23]	0.903 (0.72–1.13)	.374	0.0%; *P*=.840	NA
Spontaneous birth <34 wk	5[19,20,22–24]	0.901 (0.75–1.07)	.235	45.8%; *P*=.110	.101
Any birth <34 wk	5[19,20,22–24]	0.934 (0.80–1.08)	.385	49.1%; *P*=.097	.122
Spontaneous birth <37 wk	4[19,20,23,24]	0.881 (0.77–1.00)	.061	0.0%; *P*=.830	.498
Any birth <37 wk	4[20,21,23,24]	0.943 (0.86–1.03)	.191	0.0%; *P*=.750	.188
GA at delivery	6[19–24]	0.360[a] (−0.27 to 0.99)	.270	72.1%; *P*=.003	.068
pPROM	5[19–21,23,24]	1.130 (0.88–1.45)	.333	46.7%; *P*=.111	.389
Composite neonatal adverse outcomes	5[19,21–24]	1.001 (0.86–1.16)	.981	20.9%; *P*=.281	.418
Early respiratory morbidity	6[19–24]	1.060 (0.88–1.27)	.544	0.0%; *P*=.712	.102
Intraventricular hemorrhage	6[19–24]	0.990 (0.64–1.54)	.975	16.3%; *P*=.309	.065
Necrotizing enterocolitis	6[19–24]	0.778 (0.44–1.37)	.386	0.0%; *P*=.446	.509
Proven sepsis	6[19–24]	0.960 (0.41–1.23)	.748	12.8%; *P*=.333	.591
Birthweight <2500 g	4[19–22]	0.959 (0.91–1.007)	.093	43.7%; *P*=.149	.228
Birthweight <1500 g	4[19–22]	0.997 (0.85–1.17)	.975	0.0%; *P*=.792	.201

The sensitivity analysis (used by the leave-one-out method) for all values was robust. Publication bias test was performed using Egger's regression test.

CI, confidence interval; *GA*, gestational age; *NA*, not applicable; *pPROM*, Preterm premature rupture of membranes; *RR*, risk ratio.

[a] Mean difference (not RR).

Norooznezhad. Pessary in twin pregnancies. Am J Obstet Gynecol Glob Rep 2024.

significant difference in the GA at delivery between the control and intervention arms (MD, 0.66 [−0.43 to 1.77]; *P*=238, I^2=68.8%) (Table 4[19–24]). Moreover, it was shown that using a cervical pessary was not associated with a reduced risk of PPROM in pregnant people with cervical length <35 mm (RR, 1.20 [0.88–1.63]; *P*=.239; I^2=58.6%).

The overall rate of composite neonatal adverse outcomes was not different between the control and cervical pessary groups (RR, 0.98 [0.75–1.26]; *P*=.881; I^2=54.6%). Subgroups of neonatal-related morbidities, including early respiratory morbidity, intraventricular hemorrhage, necrotizing enterocolitis, proven sepsis, and low birthweight (<1500 g and <2500 g), were not significantly influenced by the using a cervical pessary (Table 4[19–24]).

Comment

Main findings

The results of this study indicate that using a cervical pessary in asymptomatic pregnant women with twin pregnancies and cervical shortening did not significantly increase GA at delivery as a primary outcome, nor did it significantly prolong pregnancy or reduce composite neonatal adverse outcomes as a secondary outcome.

Strengths and limitations

A major strength of this meta-analysis lies in its exclusive inclusion of RCTs. Therefore, several important conclusions and recommendations can be drawn from the results, which can give us a comprehensive conclusion on the efficacy of using a cervical pessary in twin pregnancies. Furthermore, this study adhered to the PRISMA guidelines during its execution.

This review was limited by the small number of relevant papers included in the analysis and the high level of heterogeneity observed. It is presumed that variations in the applied definitions of "short cervix" could be a significant contributor to this heterogeneity. Moreover, 2 studies defined "short cervix" on the basis of their institutional practice. Therefore, the choice to use a cutoff of 35 mm as a "short cervix" for our subgroup analysis may also represent a potential limitation because of small number of included studies. Consequently, the observed lack of benefit from cervical pessary use may be due to this choice of threshold rather than indicating a genuine lack of efficacy of the cervical pessary.

Comparison with existing literature

A prior study found that using a cervical pessary in individuals with a singleton gestation and a cervical length of ≤20 mm did not result in a reduction in the risk of PTB. Rather, this approach was linked to an increased rate of fetal, neonatal, and infant mortality.[25] These findings reinforce the conclusions drawn from our study's outcomes concerning singleton pregnancies.[25]

TABLE 4
Main results of the meta-analysis based on all types of pessaries for studies investigated cervical length ≤35 mm

Outcome	Studies, n	RR (95% CI)	*P* value	I^2	Publication bias's test, *P* value	Sensitivity analysis
Spontaneous birth <28 wk	4	0.750 (0.52–1.07)	.119	0.0%; *P*=.690	.448	Robust
Any birth <28 wk	3	0.815 (0.57–1.17)	.268	0.0%; *P*=.850	.201	Robust
Any birth <32 wk	1	NA	NA	NA	NA	NA
Spontaneous birth <34 wk	4	0.831 (0.56–1.10)	.168	47.6%; *P*=.170	.082	Robust
Any birth <34 wk	4	0.831 (0.60–1.14)	.260	52.8%; *P*=.095	.066	Robust
Spontaneous birth <37 wk	4	0.881 (0.77–1.00)	.061	0.0%; *P*=.830	.498	Robust
Any birth <37 wk	3	0.912 (0.81–1.02)	.108	0.0%; *P*=.691	.105	Robust
GA at delivery	4	0.665[a] (−0.43 to 1.77)	.238	68.8%; *P*=.022	.520	Robust
pPROM	4	1.203 (0.88–1.63)	.239	58.6%; *P*=.064	.078	Robust
Composite neonatal adverse outcomes	3	0.980 (0.75–1.26)	.881	54.6%; *P*=.115	.045	Sensitive
Early respiratory morbidity	4	0.947 (0.69–1.28)	.732	0.0%; *P*=.599	.065	Robust
Intraventricular hemorrhage	4	0.877 (0.39–1.95)	.747	46.4%; *P*=.132	.045	Sensitive
Necrotizing enterocolitis	3	0.383 (0.13–1.11)	.078	0.0%; *P*=.668	.101	Sensitive
Proven sepsis	4	1.021 (0.56–1.86)	.944	41.2%; *P*=.164	.302	Robust
Birthweight <2500 g	2	NA	NA	NA	NA	NA
Birthweight <1500 g	2	NA	NA	NA	NA	NA

Publication bias test was performed using Egger's regression test, whereas sensitivity analysis is used by the leave-one-out.

CI, confidence interval; *GA*, gestational age; *NA*, not applicable; *pPROM*, Preterm premature rupture of membranes; *RR*, risk ratio.

[a] Mean difference (not RR).

Norooznezhad. Pessary in twin pregnancies. Am J Obstet Gynecol Glob Rep 2024.

The findings of this meta-analysis do not align with the results of prior reviews regarding using a cervical pessary for the purpose of preventing PTB and improving prenatal outcomes in twin pregnancies.[4,23,28,29] In all of these investigations, some of the studies included in our study were not included because of limitations in the search time frame. In some of these studies, the control group included additional treatments, such as Atosiban or vaginal progesterone, whereas we used those with only standard care of treatment as controls.[4,28] Furthermore, certain studies have detailed the use of a pessary following an episode of arrested preterm labor.[29] Most of these studies, including ours, did not demonstrate a reduction in PTB.[4,23,29]

Conclusions and implications

This study showed that using a cervical pessary did not prolong pregnancy or the proportion of births at < 28, 32, and 36 weeks in twin pregnancies with an asymptomatic short cervix and no prior risk factors for PTB (acknowledging variations in cervical length definitions across medical protocols). Moreover, it did not reduce the composite neonatal adverse outcomes or any other neonatal morbidity or mortality rate. Similar findings were observed in the subgroup of pregnant people with a cervical length <35 mm. It is speculated that the short cervix results from a pathophysiologic process more complex than merely a lack of mechanical support, and its treatment requires further investigation. ■

CRediT authorship contribution statement

Amir Hossein Norooznezhad: Writing – original draft, Methodology, Conceptualization. **Nikan Zargarzadeh:** Writing – original draft, Methodology. **Ali Javinani:** Writing – original draft, Methodology. **Seyedeh Maedeh Nabavian:** Writing – original draft. **Shohra Qaderi:** Visualization. **Shayan Mostafaei:** Formal analysis. **Vincenzo Berghella:** Writing – review & editing, Supervision. **Yinka Oyelese:** Writing – review & editing, Supervision. **Alireza A. Shamshirsaz:** Writing – review & editing, Supervision. ■

Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.xagr.2024.100347.

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