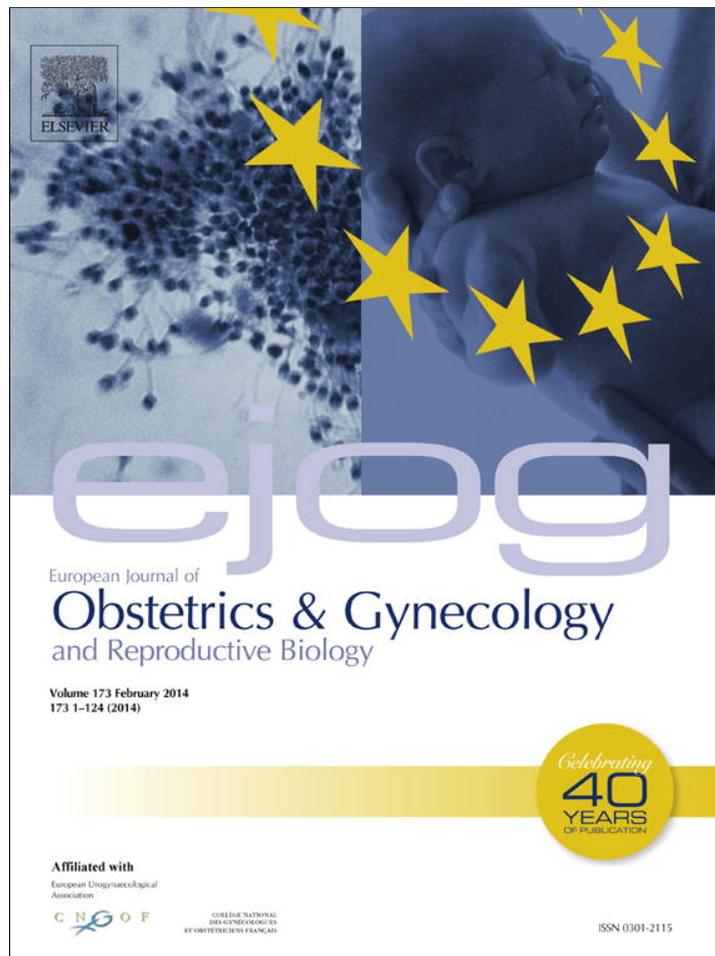


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## Outcomes of emergency or physical examination-indicated cerclage in twin pregnancies compared to singleton pregnancies



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### ABSTRACT

**Objective:** To report the obstetrical outcomes in patients with twin pregnancies who underwent an emergency/physical exam-indicated cerclage and to compare them to patients with singleton pregnancies undergoing the same procedure.

**Study design:** Patients who underwent emergency/physical exam-indicated cerclage in the second trimester in one maternal-fetal medicine practice from July 1997 to March 2012 were reviewed. We defined an emergency/physical exam-indicated cerclage as any cerclage placed in a patient with a dilated cervix on examination or membranes visible at the external cervical os on speculum examination. We compared outcomes between patients with singleton and twin pregnancies using non-parametric testing.

**Results:** There were 43 patients (12 twin and 31 singleton pregnancies) who underwent emergency/physical exam-indicated cerclage placement. The median gestational age at cerclage placement, cervical dilation, maternal age, and cerclage type were similar between the groups. Comparing twins to singletons, the median time from cerclage placement to delivery was similar (92 vs. 106 days,  $p = 0.330$ ), as was the median gestational age at delivery (33.5 vs. 35.0 weeks,  $p = 0.244$ ). The likelihood of delivery at  $>32$  weeks (75.0% vs. 71.0%,  $p > 0.999$ ) and the likelihood of neonatal survival to discharge (83.3% vs. 83.9%,  $p > 0.999$ ) were also similar.

**Conclusions:** Emergency/physical exam-indicated cerclage in twin pregnancies can be associated with favorable outcomes, including a high likelihood of delivery at  $>32$  weeks and a high likelihood of survival. Their outcomes appear similar to singleton pregnancies. Cerclage should be considered an option for patients with twin pregnancies and a dilated cervix in the second trimester.

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### 1. Introduction

Cervical cerclage has been a common practice in obstetrics since it was first described by Shirodkar [1] and then McDonald [2] in the 1950s. Indications for cerclage placement have included the patient's obstetrical history, ultrasound findings, physical examination, or a combination of the above. In certain high-risk women, cerclage appears to prolong pregnancy and reduce the risk of preterm birth [3–6]. However, most of the larger and randomized trials studying the effectiveness of cerclage were done for the indication of a short cervix on ultrasound (“ultrasound-indicated”

cerclage) [5,7–10] or for a history of prior pregnancy loss or preterm birth (“history-indicated” cerclage) [11–14]. With regard to cerclage placement for patients who present in the second trimester with a dilated cervix and prolapsed membranes (“emergency/physical exam-indicated” cerclage), the published studies are either prospective on a small number of patients [15–17] or retrospective [18–20]. Although these studies suggest that emergency/physical exam-indicated cerclage is associated with prolonged gestation and a reduced risk of preterm birth, due to limitations in the studies, management of these patients remains controversial.

For patients with twin pregnancies, it is unclear in which circumstances a cerclage may improve outcomes. Cerclage for the indication of twin pregnancy alone does not appear to be useful [21,22]. Patients with twin pregnancy and a shortened cervix  $\leq 2.5$  cm prior to 24 weeks do not appear to benefit from a cerclage placement [23,24], and may even be harmed by one [25]. In regard

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to patients with twin pregnancies and a dilated cervix in the second trimester, there are no comparative studies of cerclage vs. expectant management. There is a paucity of literature to rely upon when counseling patients with twin pregnancies about the potential benefit of an emergency/physical exam-indicated cerclage should this situation arise.

In our practice, we have been offering emergency/physical exam-indicated cerclage to patients with twin pregnancies and a dilated cervix in the second trimester. The objective of this study was to describe our experience with emergency/physical exam-indicated cerclage in patients with twin pregnancies and to compare outcomes to patients with singleton pregnancies undergoing the same procedure.

## 2. Materials and methods

The records of all patients with who underwent cerclage placement by one of six physicians in a maternal-fetal medicine practice from July 1997 to March 2012 were reviewed. Institutional Review Board approval was obtained prior to conducting the study. The records were reviewed for patient history, indication for cerclage, cerclage type, perioperative treatments, hospital admissions, and delivery outcomes. We defined an emergency/physical-exam-indicated cerclage as any cerclage placed in a patient in the second trimester (14–23 6/7 weeks) with a dilated cervix on examination or membranes visible at the external cervical os on speculum examination.

In our practice, the techniques for cerclage placement have been described previously [26] and are as follows: McDonald cerclages are placed using 5 mm Mersilene suture circumferentially around the cervix counter-clockwise from 11 o'clock. The knot is tied at 12 o'clock. Shirodkar cerclages are performed in a modified manner as described by Druzin and Berkeley [27]. After the vaginal mucosa is dissected off of the cervix anteriorly and posteriorly, the lateral vaginal mucosa on each side of the cervix is grasped with curved Allis clamps and retracted laterally. A double needle 5 mm Mersilene suture is then passed from anterior to posterior on both the left and right side of the cervix in the space between the cervical stroma and the retracted vaginal mucosa. The knot is then tied at 6 o'clock. The anterior vaginal mucosa is routinely reapproximated. The posterior vaginal mucosa is typically left open, unless sutures are needed for hemostasis. Our preference is to place Shirodkar cerclages. In select cases, a McDonald cerclage was chosen per operator discretion based on the anatomy present.

We recommend amniocentesis (of the presenting twin in twin pregnancies) for all patients prior to an emergency/physical exam-indicated cerclage to test for intra-amniotic infection (glucose, cell count, gram stain, aerobic and anaerobic cultures). External tocodynamometry was performed in all cases for prolonged periods at least 6–24 h prior to cerclage placement in order to rule out preterm labor or impending miscarriage. Lack of cervical change over this time period was documented prior to proceeding with cerclage placement. If the gram stain and cell culture from the amniocentesis were reassuring, we did not routinely wait for full culture results before proceeding with cerclage placement. Therefore, the interval from presentation to cerclage was typically less than 24 h. If membranes are prolapsing past the external cervical os, during the amniocentesis we will also perform an amnioreduction to reduce tension on the membranes and allow for retraction prior to cerclage placement. Tocolytics are not prescribed routinely perioperatively. One exception is that a short (1–3 days) course of indomethacin may be given postoperatively primarily for symptomatic relief of surgical discomfort from the procedure. However, we do not place cerclages in patients deemed to be in preterm labor after contraction monitoring and serial

cervical assessment prior to placement. Broad-spectrum antibiotics are given perioperatively, with the type and duration at the discretion of the surgeon, but we do not prescribe antibiotics for more than one week postoperatively.

We do not routinely recommend bedrest for patients following the procedure, but we recommend abstinence from intercourse, and instruct the patients not to perform vigorous physical activity. All patients are hospitalized after the procedure for 24–72 h and then managed as outpatients. Patients are followed with cervical length ultrasounds and fetal fibronectin (fFN) testing until 32 weeks, and in the case of twin pregnancies, serial growth ultrasounds until delivery, as well as weekly biophysical profile testing from 32 weeks until delivery. Decisions to administer antenatal corticosteroids are based upon clinical symptoms, cervical length, and/or fetal fibronectin results. Cerclages are electively removed at 36–37 weeks or earlier, as clinically indicated. All patients are delivered at a large tertiary-care academic medical center with a level III neonatal intensive care unit (NICU).

Our goals in this study were twofold: first, to present in detail our experience with emergency/physical exam-indicated cerclage in twin pregnancies, as there is a paucity of reports in the literature regarding this procedure in twins. Therefore, we present a detailed description of each patient and outcome. Second, we sought to compare outcomes in patients with twin vs. singleton pregnancies undergoing an emergency/physical exam-indicated cerclage. For this analysis, we compared outcomes using the Fisher's exact test and Mann Whitney *U* test, as appropriate.

## 3. Results

Forty-three patients underwent emergency/physical exam-indicated cerclage over the study period. Thirty-one (72.1%) had singleton pregnancies and 12 (27.9%) had twin pregnancies. All twin pregnancies were dichorionic-diamniotic. Baseline characteristics are shown in Table 1 and did not differ between the two groups, aside from a higher incidence of in vitro fertilization in the twin group, as expected. In the twin cohort, the 25% cervical surgery constituted two patients with prior loop electrosurgical excision procedure (LEEP) and one patient with prior cryosurgery. Of note, 41 of 43 cerclages placed were of the Shirodkar type.

Pregnancy outcomes are shown in Table 2 and also did not differ between the groups. Patients with twin pregnancies had a high likelihood of delivery at >32 weeks (75.0%) as well as neonatal survival (83.3%).

The details for each patient with twin pregnancy, including patient history, cerclage type, gestational age, and outcomes are described in Table 3. In this group, the median sonographic cervical length before cerclage placement was 0.4 cm (range 0–0.7 cm) and after cerclage placement was 2.4 cm (range 1.6–2.7 cm). All patients preoperatively were noted to have clinically significant funneling seen (>1 cm × 1 cm). There were 50 fFN samples obtained post-cerclage in this series of twin gestations, nine (18%) of which were positive. Seven of 11 patients pregnant after 24 weeks received antenatal corticosteroids. All six patients delivering between 24 and 34 weeks received antenatal corticosteroids, while only one of five patients who delivered >34 weeks received antenatal corticosteroids. The mode of delivery was vaginal for six (50%) and cesarean delivery for the other six (50%).

The four neonatal deaths (16.7%) in the twin cohort include one patient who delivered at 25 weeks with subsequent neonatal demise of both twins due to prematurity, and one patient who underwent termination of pregnancy due to a dilated cervix and suspected preterm labor at 22 weeks after emergency/physical exam-indicated cerclage placement at 16 weeks.

**Table 1**

Baseline demographics of women undergoing emergency/physical exam–indicated cerclage, based on singleton or twin pregnancy.

	Singleton pregnancy N=31	Twin pregnancy N=12	P <sup>a</sup>
Maternal age (median, range)	33.5 (21–43)	32.5 (24–39)	0.776
Maternal race			0.646
Caucasian	80.6%	75.0%	
African American	9.7%	16.7%	
Asian	0%	0%	
Hispanic	3.2%	8.3%	
Other	6.5%	0%	
In vitro fertilization	19.4%	75.0%	0.001
Prior preterm birth or second trimester loss	45.2%	16.7%	0.158
Prior term birth	29.0%	8.3%	0.237
Prior cervical surgery	9.7%	25.0%	0.325
Cervical dilation (median, range)	2.0 cm (0.5–4.0)	1.75 cm (1.0–4.0)	0.483
Gestational age at cerclage placement (median, range)	20.6	19.9	0.315
Cerclage type			0.485
Shirodkar	30 (96.8%)	11 (91.7%)	
McDonald	1 (3.2%)	1 (8.3%)	

<sup>a</sup> Fisher's exact test or Mann Whitney *U* test.**Table 2**

Pregnancy outcomes of women undergoing emergency/physical exam–indicated cerclage, based on singleton or twin pregnancy.

	Singleton pregnancy N=31	Twin pregnancy N=12	P <sup>a</sup>
Days from cerclage to delivery	106 (2–165)	92 (26–145)	0.330
Gestational age at delivery	35.0 (18.3–41.3)	33.5 (22.3–37.4)	0.244
Delivery >32 weeks	71.0%	75.0%	>0.999
Neonatal survival to discharge	83.9%	83.3%	>0.999

<sup>a</sup> Fisher's exact test or Mann Whitney *U* test.

#### 4. Comments

The role of a second trimester emergent or emergency/physical exam–indicated cerclage is controversial. A significant amount of literature in the last two decades has attempted to evaluate the advantages and disadvantages of this heroic treatment in singleton gestations in the face of impending pregnancy loss. In singleton pregnancies, placement of an emergency/physical exam–indicated cerclage <24 weeks appears to prolong gestation and improve outcomes compared to expectant management, but the data supporting this come from small prospective trials and larger retrospective studies [15–20]. It is reassuring that our singleton data are comparable to the published literature in this setting. For example, in our singleton pregnancy cohort the preterm birth rate at <32 weeks in patients who underwent emergency/physical-exam indicated cerclage was 29% and neonatal survival 84%, which is similar to the 31% and 96% respective rates in one prospective study in similar patients [17].

Sometimes, obstetricians are presented with clinical situations in which limited evidence-based data are available, such as a patient with a multiple gestation and painless cervical dilation in the second trimester. In this rare clinical scenario, in the absence of vaginal bleeding, signs of infection, or onset of labor, it is unclear if bed rest, pregnancy termination, or placement of a cerclage provides benefit or harm. Prior studies consist of small case series of twin pregnancies who underwent emergency/physical exam–indicated cerclage. In a large analysis of the prevalence of cervical incompetence in multiple gestations 28 cases out of 802 patients were identified, of which 11 twin pregnancies were classified as having “emergent” cerclage placement [28]. In this series, however, cervical ultrasound length <1.5 cm with >50% funneling at a gestational age <24 weeks was defined as “emergent” criteria for cervical incompetence due to “clinically evident effacement”. No cases of cervical dilation or membranes protruding through the external os were included.

Another case series reported outcomes in 14 patients with twin pregnancies who underwent an “emergency” cerclage in the midtrimester, but only four of the patients had a dilated cervix with bulging membranes, and even in this group the mean cervical length at cerclage placement was 16.5 mm [29]. In this series, 2 of the 4 patients delivered <28 weeks, and only 5 of the 8 twins survived. Another small series included three patients with twin pregnancies who underwent a second trimester emergency/physical exam–indicated emergency cerclage, one of whom delivered at 24 weeks [30].

A fourth series retrospectively identified 11 multiple gestation (8 dichorionic and 3 monochorionic gestations without evidence of twin–twin transfusion syndrome) out of 45 emergency cerclages placed with dilated cervixes (range 2–8 cm) [31]. The authors reported that a “good outcome” was achieved in four (36%) of the multiple pregnancies. Interestingly, cerclages in this series were performed using a “modified Wurm-type suture using two “0” prolene sutures transversely across the cervix, usually with lateral longitudinal sutures as described by Heffner.”

Finally, in a recent series evaluating pregnancy outcomes after various types of cerclages placed, out of 177 cerclages, there were 9 cases of rescue cerclages placed, of which 4 sets of twins were included in this subset [32]. Separate analysis of the twins is not listed but the cervical dilation ranged from 3 to 9 cm and the gestational age at suture placement was noted to be 23 weeks (range 20–24 weeks). The mean suture to delivery interval in the total subset of rescue cerclages was noted to be 3 weeks (range 0–14 weeks). The literature is otherwise notably absent on this issue except for possible scattered case reports of twin gestations with cervical dilation and attempts at emergent cerclage placement not identified in our analysis.

In our study, we were able to report the largest series to date of emergency/physical exam–indicated cerclage placement in patients with twin gestations with clinically evident cervical dilation at the time of placement prior to 24 weeks. Additionally,

**Table 3**  
Pregnancy details of patients with twin pregnancies and an emergency/physical exam-indicated cerclage.

Patient number	History	GA	Cervical dilation	Cerclage type	GA at Removal	GA at delivery	Neonatal outcomes	Comments
1	G1P0, IVF, BMI=43	20 6/7	2 cm	Shirodkar	32 0/7	32 0/7	(A) 1294 g, alive (B) 1890 g, alive	Gestational diabetes. Corticosteroids at 31 weeks. Delivered for PPRM and preeclampsia. Preterm labor
2	G4 P0030, IVF, 1st trimester bleeding	18 3/7	2 cm	Shirodkar	34 4/7	34 4/7	(A) 2183 g, alive (B) 2041 g, alive	Preterm labor
3	G2P1001, spontaneous loss from triplets to twins at 23 4/7 wks, PCOS, BMI=32	19 4/7	1.5 cm	Shirodkar	34 1/7	34 1/7	(A) 2255 g, alive (B) 2165 g, alive	Preterm labor
4	G1P0, IVF, ovarian torsion at 8 weeks, Hypothyroid	21 0/7	4 cm	McDonald	33 1/7	33 1/7	(A) 1700 g, alive (B) 2110 g, alive	Amnioreduction prior to cerclage. Corticosteroids at 25 weeks. Preterm labor, chorioamnionitis, placental abruption.
5	G3P0110, IVF, prior PTB of a singleton, stage III endometriosis	16 5/7	1 cm	Shirodkar	37 3/7	37 3/7	(A) 3045 g, alive (B) 2880 g, alive	Corticosteroids at 24 weeks. Induction of labor after cerclage removal
6	G1P0, IVF, multifetal reduction from 4 to 2	18 0/7	1 cm	Shirodkar	35 5/7	35 5/7	(A) 2475 g, alive (B) 1520 g, alive	Cerclage removal and induction of labor for IUGR of Twin B.
7	G5 P0130, prior 21-week twin preterm birth. BMI=33, prior cryosurgery	19 6/7	1 cm	Shirodkar	33 3/7	33 3/7	(A) 2225 g, alive (B) 1695 g, alive	Gestational diabetes. Corticosteroids at 24 weeks. Delivered for severe preeclampsia.
8	G3 P002, sperm donor, asthma.	20 5/7	1 cm	Shirodkar	33 6/7	33 6/7	(A) 2035 gm, alive (B) 2255 gms, alive	Corticosteroids at 30 wks. Preterm labor.
9	G1P0, IVF, BMI=37	22 1/7	2.5 cm	Shirodkar	36 1/7	36 1/7	(A) 2948 g, alive (B) 2693 g, alive	Gestational diabetes, preeclampsia.
10	G5 P0040, IVF, spontaneous loss at 9 wks from triplets to twins, 1st trimester bleeding, Twin A increased nuchal of 4 mm, cervical polyp.	21 5/7	1 cm	Shirodkar	25 3/7	25 3/7	(A) 850 g, neonatal demise (B) 794 g, neonatal demise	Vag progesterone at 19 wks, PPRM at 23 6/7 weeks, followed by preterm labor and cerclage removal at 25 3/7 weeks. Corticosteroids at 25 weeks. Repair of cervical laceration.
11	G1 P0, IVF, prior LEEP, Sickle Cell trait, asthma	20 0/7	2 cm	Shirodkar	30 6/7	30 6/7	(A) 2070 g, alive (B) 1956 g, alive	Preterm labor. Corticosteroids at 30 weeks.
12	G2P0010, IVF, prior abdominal myomectomy, and hysteroscopic myoma resection, prior LEEPx2, prior hysteroscopic lysis of uterine, 2 fibroids 4 cm each	16 2/7	2 cm	Shirodkar	22 2/7	22 2/7	TOPx2	Presented at 22 weeks with bulging sac, Termination of pregnancy with KCL performed and then cerclage removed, and misoprostol given to induce labor.

GA, gestational age.

we were able to compare outcomes to similar patients with singleton pregnancies undergoing the same procedure by the same group with similar management. Our data suggest that outcomes are similar for twins and singletons. Due to the rare incidence of painless dilation in the second trimester, we were underpowered to make definitive conclusions. In order to assess the clinical benefit of such a procedure in twins, a multicenter prospective randomized trial would need to be performed comparing cerclage to expectant management. Due to the rarity of the event, clinician/patient election to obtain a cerclage rather than enroll in a trial, and the probable loss of patients due to pregnancy termination, it is unlikely for such a study to be undertaken and completed with adequate power to answer our concerns in the near future.

It is notable that Shirodkar-type cerclage was primarily used in our cases, which has not been previously reported in twin pregnancies that have undergone emergency/physical exam-indicated cerclage. While traditionally the literature has suggested no differential benefit to Shirodkar versus McDonald cerclages, we have recently shown that in the setting of an ultrasound-indicated cerclage in a singleton gestation the Shirodkar technique appeared

to be more effective in prolonging gestation [26]. It is possible that our surgical technique led to our better outcomes than previously reported, but more studies are needed.

Limitations of our study include the retrospective nature of the study design and the relatively small number of cases with possible selection bias such as patients with more advanced cervical dilation choosing to terminate pregnancies (affecting both singletons and twins). The single-center approach with an almost universal standard for cerclage placement allows for improved comparison but may limit extrapolation to other populations. Due to the temporal bias inherent in a study spanning 15 years of practice, limitations of neonatal outcomes analysis are noted as well. However, current neonatal outcomes can be extrapolated for the cohort in this setting based upon nationally reported NICU events based on the mean gestational age reached within each group.

Even though our comparative analysis was underpowered, which certainly is a limitation, it is important to restate that our study still remains the largest reported cohort of twin pregnancies undergoing an emergency/physical exam-indicated cerclage.

In twin gestations there is no prospective evidence to support prophylactic cerclage placement [21,22] and in the setting of a short cervical length it may actually result in a twofold increase in risk of preterm birth [25]. No guidelines exist with regard to placement of a cervical cerclage in twin gestations with a dilated cervix prior to 24 weeks without contractions, but some deem offering cerclage in this setting as heroic and even foolish. Our study suggests that emergency/physical exam-indicated cerclage with subsequent outpatient management is possible in twin pregnancies, and appears to be associated with favorable outcomes. The optimal management in this clinical scenario remains unclear and controversial, but to date, progesterone, bedrest, and/or tocolysis have not been shown to be beneficial in twins. In conclusion, our study suggests that for patients with twin pregnancies and a dilated cervix in the second trimester who are not in labor, an emergency/physical exam-indicated cerclage is an option that may have success with limited maternal morbidity and a high rate of neonatal survival.

### Disclosure

The authors report no conflicts of interest.

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