

Cervical length at 23 weeks of gestation: the value of Shirodkar suture for the short cervix

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ABSTRACT

Objective To examine the possible benefit of cervical cerclage in women with a very short cervix identified during routine sonographic assessment of cervical length at 23 weeks of gestation.

Methods Transvaginal sonography was used to measure cervical length at 23 weeks of gestation in 2702 women with singleton pregnancies attending for routine antenatal care. In 43 (1.6%) cases the cervical length was ≤ 15 mm. The 43 women in this group were referred to their obstetricians for the further management of pregnancy; in 21 cases, the pregnancy was managed expectantly and in 22 a Shirodkar suture was inserted under spinal anesthesia. The two groups were compared in terms of patient characteristics and pregnancy outcome.

Results The 22 patients that were treated with cervical cerclage were not significantly different from the 21 given expectant management in ethnic origin, ponderal index, cigarette smoking or past obstetric history. The median cervical length was 10 mm in both groups. In the cervical cerclage group, 21 delivered after 32 weeks and one (5%) had spontaneous onset of labor and delivery before 32 completed weeks; all 22 infants survived. In the expectant management group, 11 (52%) had spontaneous onset of labor and delivery before 32 weeks; 20 infants survived but one baby died in the neonatal period.

Conclusions In women with a cervical length of ≤ 15 mm at 23 weeks there is a more than 50% chance of spontaneous delivery at less than 32 weeks. Insertion of a Shirodkar suture in women with a very short cervix may be associated with a ten-fold reduction in risk for such early delivery.

INTRODUCTION

Cervical suture has been used widely in the treatment of pregnancies considered to be at high risk for preterm delivery. Several observational studies during a 40-year

period starting from 1955, when the technique was first described, claimed high rates of successful pregnancy outcome in women that had a poor obstetric history attributed to cervical incompetence (Table 1)^{1–22}. Similarly, high success rates were reported in those cases where the suture was inserted as an emergency procedure because of premature cervical dilatation (Table 2)^{9,10,12,14,16,20,23–42}. This apparent major benefit of cervical cerclage was not supported by the results of three randomized studies in asymptomatic women with singleton pregnancies and a history suggestive of increased risk for preterm delivery (Table 3)^{43–45}. However, in two of these studies, patients considered to be at very high risk for preterm delivery had elective sutures and only those with a mild or moderate risk were randomized^{44,45}. Consequently, despite the extensive literature on this subject, there is uncertainty on the selection of patients that may benefit from elective cerclage.

Several studies have now reported that ultrasonographic assessment of cervical length may provide a useful prediction of preterm delivery^{46–48}. The aim of the present study was to examine the possible benefit of cervical cerclage in a group of patients with a very short cervix, identified during routine assessment of cervical length at 23 weeks of gestation.

SUBJECTS AND METHODS

At King's College Hospital, London, women attending for routine antenatal care are offered the option of having two ultrasound examinations: the first is at 10–14 weeks of gestation and the second at 23 weeks. Those attending for the 23-week scan are also offered transvaginal sonographic assessment of the cervix, as previously described⁴⁹. All patients were asymptomatic of preterm labor. During a 14-month period (January 1997 to March 1998), we measured cervical length in 2702 singleton pregnancies and the median length was 38 mm⁴⁹. The information recorded in

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Table 1 Papers reporting on the outcome of pregnancies treated with elective cervical cerclage because of a history of previous painless second-trimester miscarriage, early preterm delivery or cervical surgery or a congenital uterine defect. The gestational age at cerclage is given as the median (range); in some cases the suture was inserted before conception. Outcome measures are the percentage of pregnancies delivering at term and percentage of live births

Reference	n	Gestational age at cerclage (weeks)	Term delivery (%)	Live births (%)
Barter <i>et al.</i> , 1958 ¹	22	18 (10–27)		73
Hefner <i>et al.</i> , 1961 ²	9	29 (25–32)	100	100
Gans <i>et al.</i> , 1966 ³	250	10–12	77	82
Shirodkar, 1967 ⁴	256	0–28		81
Hofmeister <i>et al.</i> , 1968 ⁵	72	16 (12–24)	52	63
Seppala <i>et al.</i> , 1970 ⁶	159	14 (0–31)		83
Jennings, 1972 ⁷	61	(13–32)	62	87
Lauersen <i>et al.</i> , 1973 ⁸	143	(13–31)		83
Kuhn <i>et al.</i> , 1977 ⁹	200	(14–18)		85
Toaff <i>et al.</i> , 1977 ¹⁰	346	(11–12)		89
Aarnoudse <i>et al.</i> , 1979 ¹¹	38	(14–16)	40	73
Peters <i>et al.</i> , 1979 ¹²	25	20 (12–28)	68	92
MacDonald, 1980 ¹³	148	14		87
Charles <i>et al.</i> , 1981 ¹⁴	69	(14–18)	78	87
Crombleholme <i>et al.</i> , 1983 ¹⁵	75	> 14	71	85
Magrina <i>et al.</i> , 1983 ¹⁶	21	(8–30)	90	86
Sivanesaratnam <i>et al.</i> , 1986 ¹⁷	33	(12–16)	73	94
Wright, 1987 ¹⁸	68	(14–16)	79	94
Cardwell, 1988 ¹⁹	70	19 (11–32)		81
Chryssikopoulos <i>et al.</i> , 1988 ²⁰	270	(14–17)	87	96
Whitehead <i>et al.</i> , 1990 ²¹	67			81
Golan <i>et al.</i> , 1995 ²²	260	(12–16)	75	92
Total (22 studies)	2662	(0–32)	75	86

Table 2 Papers reporting on the outcome of pregnancies treated with emergency cervical cerclage because of cervical changes detected at vaginal examination carried out routinely in patients at increased risk for preterm delivery and patients presenting with symptoms of preterm labor. The inclusion criteria were cervical dilatation of at least 1 cm with or without bulging membranes (BM). The gestational age at cerclage is given as the median (range). Outcome measures are the percentage of pregnancies delivering at term and percentage of live births

Reference	n	Gestational age at cerclage (weeks)	Cervical dilatation (cm)	Term delivery (%)	Live births (%)
McDonald, 1957 ²³	70	21 (16–28)	BM		47
Nishijima, 1969 ²⁴	46	20 (12–31)	BM	48	63
Smith <i>et al.</i> , 1969 ²⁵	58	23 (8–32)	≥ 3		83
Lipshitz <i>et al.</i> , 1975 ²⁶	71	23 (20–24)	≥ 3		85
Kuhn <i>et al.</i> , 1977 ⁹	42	(14–18)	≥ 2 + BM		60
Toaff <i>et al.</i> , 1977 ¹⁰	45	< 32	effaced		91
Goodlin, 1979 ²⁷	9	(18–23)	≥ 3 + BM	44	44
Peters <i>et al.</i> , 1979 ¹²	10	20 (12–28)	≥ 1 + BM	30	40
Harger, 1980 ²⁸	49		Cx dilatation	37	59
Olatunbosun <i>et al.</i> , 1981 ²⁹	11	21 (16–28)	≥ 4	82	91
Charles <i>et al.</i> , 1981 ¹⁴	46	(19–30)	≤ 2 + BM	9	61
Magrina <i>et al.</i> , 1983 ¹⁶	15	23 (15–29)	≥ 3	13	53
Goodlin, 1987 ³⁰	5	21 (18–24)	≥ 3 + BM	40	100
Chryssikopoulos <i>et al.</i> , 1988 ²⁰	49	(18–26)	≥ 2/BM	12	31
Scheerer <i>et al.</i> , 1989 ³¹	4	22 (21–23)	≥ 3 + BM	25	100
Barth <i>et al.</i> , 1990 ³²	13	22 (17–25)	≥ 3 + BM	8	77
Novy <i>et al.</i> , 1990 ³³	7	24 (21–26)	≥ 2 + BM	43	86
McDougall <i>et al.</i> , 1991 ³⁴	17	22 (16–28)	≥ 3	11	65
Kokia <i>et al.</i> , 1991 ³⁵	19	22 (15–26)	effaced		31
Mitra <i>et al.</i> , 1992 ³⁶	40	23 (14–26)	≥ 1	38	83
Higuchi <i>et al.</i> , 1992 ³⁷	26	26 (18–32)	≥ 2 + BM		86
Aarts <i>et al.</i> , 1995 ³⁸	14	22 (15–27)	≥ 3	14	71
Olatunbosun <i>et al.</i> , 1995 ³⁹	22	22 (20–27)	≥ 4		77
Lipitz <i>et al.</i> , 1996 ⁴⁰	32	22 (17–25)	≥ 2	16	47
Schorr <i>et al.</i> , 1996 ⁴¹	42	23 (20–24)	≥ 2		76
Hordnes <i>et al.</i> , 1996 ⁴²	16	23 (16–28)	≥ 2	25	69
Total (26 studies)	778	(8–32)	≥ 1	27	66

Cx dilatation, cervical dilatation

Table 3 Randomized studies of elective cervical cerclage because of a history suggestive of increased risk for preterm delivery. In the second and third studies, the patients with a very high risk were not randomized. Outcome measures are the percentage of pregnancies delivering before 33 weeks and survival

Reference	n	Indication	Gestational age at cerclage (weeks)	Delivery < 33 weeks		Survival	
				Cerclage (%)	Controls (%)	Cerclage (%)	Controls (%)
Rush <i>et al.</i> , 1984 ⁴³	195	high risk	18	13	10	91	91
Lazar <i>et al.</i> , 1984 ⁴⁴	506	moderate risk		1.5	0.4	99.3	99.6
MRC/RCOG 1993 ⁴⁵	1292	obstetrician uncertainty	16	13	17	92	90

the patient notes was whether the cervical length was more than 15 mm or less than or equal to 15 mm. This cut-off was selected at the onset of the study, which was essentially an observational one. However, on the basis of existing data, the risk for preterm delivery associated with a cervical length of ≤ 15 mm was considered to be substantially increased and justified informing both the patient and her obstetrician. This policy was agreed by all the obstetricians involved and was approved by the hospital ethics committee.

Patients with a cervical length above 15 mm received normal antenatal care. In 43 (1.6%) cases the cervical length was ≤ 15 mm and the 43 women in this group were referred to their obstetricians for the further management of pregnancy. In 21 cases, the pregnancy was managed expectantly and in 22 a true Shirodkar suture, with bladder reflection and high placement, was inserted under spinal anesthesia. The main determinant in favor or against placement of a suture was the preference of the individual obstetrician. This study compares the two groups in terms of patient characteristics and pregnancy outcome.

Patient characteristics, including demographic data and previous obstetric and medical history, were obtained from the patients at their first antenatal visit to the hospital by midwives and were entered into a computer database. Similarly, the ultrasound findings were recorded in the database at the time of the scan. Gestational age was determined from the menstrual history and confirmed from the measurement of fetal crown-rump length at the first-trimester scan. In terms of obstetric history, the patients were classified into six groups:

- (1) No previous pregnancies;
- (2) Only fetal losses before 16 weeks of gestation;
- (3) One or more term deliveries, with or without previous fetal losses before 16 weeks;
- (4) At least one previous spontaneous preterm delivery at 33–36 weeks;
- (5) At least one previous spontaneous preterm delivery at 24–32 weeks;
- (6) At least one previous fetal loss at 16–23 weeks.

Some patients in the latter three groups may also have had first-trimester losses or term deliveries.

To calculate the significance of differences between the two management groups, the Mann-Whitney *U* test was used for the continuous variables (cervical length at the

Table 4 Comparison of the expectant management and cervical groups for demographic characteristics and previous obstetric history

	Expectant	Cerclage	<i>p</i> Value
Median maternal age (years)	28.7	32.6	0.072
Ethnic group			0.416
Caucasian	4	2	
Afro-Caribbean	17	19	
other	0	1	
Median ponderal index (kg/m ²)	25.2	26.7	0.437
Cigarette smoking	1	2	0.518
Obstetric history			0.730
no previous pregnancy	3	5	
fetal loss at < 16 weeks	9	7	
delivery at ≥ 37 weeks	7	6	
delivery at 33–36 weeks	1	1	
delivery at 24–32 weeks	1	1	
delivery at 16–23 weeks	0	2	

23-week scan, maternal age, ponderal index and gestational age at delivery) and χ^2 or Fisher's exact tests were used for the categorical variables (ethnic origin, cigarette smoking, previous obstetric history, percentage delivering before 33 weeks and percentage neonatal survival).

RESULTS

The 22 patients that were treated with cervical cerclage were not significantly different from the 21 given expectant management in ethnic origin, ponderal index, maternal age, cigarette smoking or past obstetric history (Table 4). None of the patients reported alcohol drinking or drug abuse and none had previous cervical surgery. The median cervical length was 10 mm in both groups (Figure 1; $Z = 0.07$, $p = 0.942$) and in all 43 cases there was funneling at the level of the internal os.

Cervical sutures were inserted at 23–24 weeks and, in all cases, the patients received prophylactic antibiotics perioperatively; they did not receive prophylactic tocolytics and were allowed home the following day. In all cases, the suture was inserted successfully but one patient had a spontaneous rupture of the membranes 8 h after the operation and the suture was removed; she delivered spontaneously at 26 weeks and the infant survived. In another case, there was spontaneous rupture of the membranes at 34 weeks; the suture was removed and a healthy infant was delivered spontaneously 3 days later. In a third case, there was spontaneous onset of labor at 35 weeks; the suture was removed and a healthy infant was delivered. In the other 19 cases,

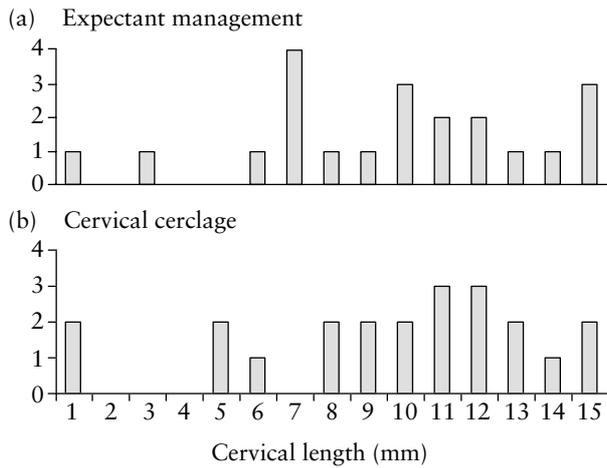


Figure 1 Distribution of cervical length at 23 weeks of gestation in the expectant management group (a) and cervical cerclage group (b)

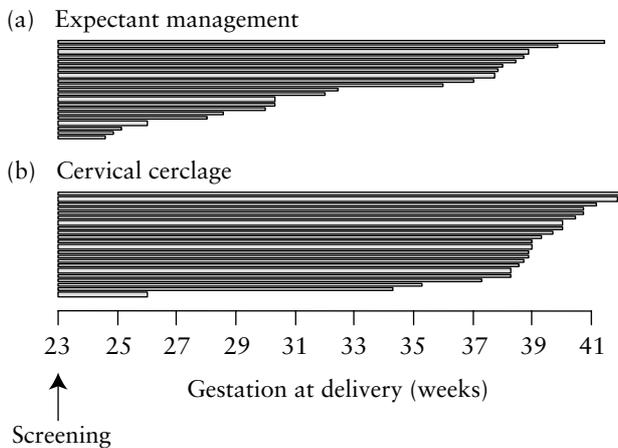


Figure 2 Interval between gestation at screening at 23 weeks and gestation at delivery in each patient in the expectant management group (a) and cervical cerclage group (b)

the pregnancies were uncomplicated and the sutures were removed under spinal anesthesia at 36 weeks; healthy infants were delivered at 37–42 weeks (Figure 2).

The 21 patients that were managed expectantly did not receive prophylactic antibiotics or tocolytics and were not hospitalized. In all cases, there was spontaneous onset of labor and nine delivered at 37–39 weeks, one at 36 weeks and 11 before 32 completed weeks (Figure 2); 20 infants survived but one baby born at 24 weeks died in the neonatal period. In two cases, there was preterm prelabor rupture of membranes at 25 and 31 weeks; the first patient delivered spontaneously the next day and the second 1 week later.

The rate of early preterm delivery in the cervical cerclage group (5%) was significantly lower than the 52% rate observed in the expectant management group ($p = 0.001$). However, the two groups did not differ significantly in neonatal survival rate (100% compared to 95%, $p = 0.49$).

DISCUSSION

The findings of this study suggest that routine assessment of cervical length at 23 weeks of gestation identifies a group of pregnancies at very high risk for early preterm delivery. Of the 21 women with a cervical length of ≤ 15 mm that were managed expectantly, 52% delivered spontaneously before 32 completed weeks. Furthermore, the data suggest that the insertion of a Shirodkar suture in women with a very short cervix in the late second trimester of pregnancy is technically feasible and safe and that such treatment may be associated with a ten-fold reduction in risk for early delivery.

In this study, the clinical management of each patient was influenced by the preference of her obstetrician. Nevertheless, the lack of significant differences between the two management groups, both in terms of demographic characteristics and sonographic findings, suggests that the significant difference in outcome between the two groups is a true reflection of the benefit of cerclage.

The data provided by our study will form the basis for a randomized controlled trial to define the role of cervical cerclage in the prevention of preterm delivery. The entry criteria for such a study would be the finding of cervical length of ≤ 15 mm during routine assessment at 23 weeks of gestation, and the main outcome measures would be the incidence of early preterm delivery (before 32 completed weeks) and neonatal survival. To demonstrate that cervical cerclage is associated with a significant reduction in the rate of severe preterm delivery from about 50% to 10%, it would be necessary to randomize 50 patients (test of significance at the 5% level, power 90%). Since the prevalence of cases where the cervical length ≤ 15 mm is 1.6%⁴⁹ and on the assumption that only 50% of patients will accept randomization, the number of patients that need to undergo cervical assessment at 23 weeks would be about 6500.

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