

## A Comparative Study of Modified Shirodkar's Cerclage and McDonald's Cerclage in Cervical incompetence

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### Abstract

**Background and Objectives:** The term 'cervical incompetence' is used to describe a disorder in which painless cervical dilatation led to recurrent second trimester pregnancy losses. Structural weakness of cervical tissue was thought to cause or contribute to these adverse outcomes. The diagnosis has also been applied to women with one or two such losses/deliveries or at risk for such a loss/delivery. The aims and objectives of this study were to study the maximum gestational age upto which pregnancy can reach after cerclage, the morbidity of the procedure in terms of complications of the surgery, days of hospital stay, cost effectiveness, etc. and to estimate if cerclage prevents preterm birth and perinatal mortality and morbidity in women with previous preterm birth and short cervical length.

**Methods:** A hospital based prospective study including 50 cases of Modified Shirodkar's Cerclage and 50 cases of McDonald's Cerclage, from July 2012 to September 2014 at Dr. D.Y. Patil Medical College and Hospital, Pimpri.

**Results:** The average gestational age up to which pregnancy continued in patients with Modified Shirodkar's Cerclage was 36 weeks compared to patients with McDonald's Cerclage which was 33 weeks.

**Conclusion:** Modified Shirodkar's Cerclage was found to be a comparatively better method of cerclage than McDonald's Cerclage in terms of preventing preterm birth. Women undergoing Modified Shirodkar's Cerclage carried their pregnancy significantly longer, had lower neonatal admission rates and suffered a lower cost for maternal and neonatal care. They also showed higher birth weights and lower neonatal death rates.

**Key Words:** Cervical Incompetence, Modified Shirodkar's Cerclage, McDonald's Cerclage

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### Introduction

Early pregnancy loss is an emotionally frustrating event for couples and is a challenge for obstetricians.

Classically, the term 'cervical insufficiency' was used to describe a disorder in which painless cervical dilatation led to recurrent second trimester pregnancy losses. Structural weakness of cervical tissue was thought to cause or contribute to these adverse outcomes. The diagnosis also includes women with or at risk for one or more such losses/deliveries.

Although structural cervical weakness is the source of some preterm losses/births, most are caused by other disorders, such as decidual inflammation/infection or uterine over distension. These disorders can initiate biochemical changes in the cervix that lead to premature cervical shortening and, often, pregnancy loss or preterm birth.

Despite major research efforts, more than 10 million births before 37 weeks of gestation occur annually worldwide, and more than 1 million infants die from this

common complication of pregnancy (5–12% incidence).<sup>1</sup>

When cervical incompetence is associated with mechanical weakness, supportive measures such as cervical cerclage help to prolong pregnancy.

In contrast, if cervical changes result from non-mechanical processes, then cerclage would be less effective, and even harmful in some cases, because of possible inflammatory, prothrombotic and infectious complications.

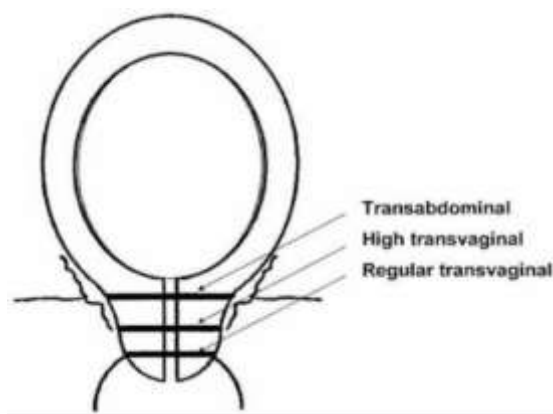
**Cervical cerclage (tracheloplasty)**, also known as a **cervical stitch**, is used for the treatment of cervical incompetence (or insufficiency). The treatment consists of a strong suture being inserted into and around the cervix early in the pregnancy, usually between weeks 14 to 16, and then removed towards the end of the pregnancy when the greatest risk of miscarriage has passed.

There are many types of cerclage procedures.<sup>2</sup>

1. A **McDonald's cerclage**, described in 1957 by Ian Macdonald the most common, and is essentially a purse string stitch used to cinch the cervix close; the cervix stitching involves a band of suture at the upper part of the cervix while the lower part has already started to efface. This cerclage is usually placed between 14 weeks and 16 weeks of pregnancy. The stitch is generally removed around the 37th week of gestation.<sup>3</sup>
2. A **Shirodkar's cerclage** is very similar, but the sutures pass beneath the sub mucosa of the cervix so

they're not exposed. This type of cerclage is less common and technically difficult than a McDonald, and is thought (though not proven) to reduce the risk of infection. The Shirodkar's procedure sometimes involves a permanent stitch around the cervix which will not be removed and therefore a Caesarean section will be necessary to deliver the baby. The Shirodkar's technique was first described by Dr. V. N. Shirodkar in Bombay in 1955.

3. An **Abdominal cerclage**, the least common type, is permanent and involves stitching at the very top of the cervix, inside the abdomen. This is usually only done if the cervix is too short to attempt a standard cerclage, or if a vaginal cerclage has failed or is not possible. However, a few doctors (namely Dr. Arthur Haney at the University of Chicago and Dr. George Davis at the University of Medicine and Dentistry of New Jersey) are pushing for the transabdominal cerclage to replace vaginal cerclages, due to perceived better outcomes and more pregnancies carried to term.



The Modified Shirodkar's technique is done under general anesthesia. Cervix is exposed and held with sponge holding forceps. A transverse incision is taken over anterior lip of cervix at cervico-vaginal junction after complete emptying bladder. Bladder is separated and pushed off from area of internal os. With the help of stout curved round body needle ligature of black silk is passed starting from the 7 o'clock position through substance of cervix and taken out at 11 o'clock position through substance of cervix and then passed from 2 o'clock position to 5 o'clock position through substance of cervix. Knot is tied posteriorly at 6 o'clock position in the midline keeping it exterior. Anterior incision is sutured by few interrupted sutures using an absorbable material. This procedure differs from Shirodkar's cerclage as the needle is passed through substance of the cervix and no incision is taken posteriorly. The knot is kept exterior to facilitate easy removal of suture. The advantage is that the cerclage is at the level of the defect i.e. internal os.

## Aims and Objectives

To study the maximum gestational age upto which pregnancy can reach after cerclage.

To study the morbidity of the procedure in terms of complications of the surgery, days of hospital stay, cost effectiveness, etc.

To estimate if cerclage prevents preterm birth and perinatal mortality and morbidity in women with previous preterm birth and short cervical length.

## Materials and Method

This is a prospective study conducted over a period of 3 years from July 2012 to September 2014 including 50 cases of Modified Shirodkar's Cerclage and 50 cases of McDonald's Cerclage performed in Dr D Y Patil Hospital and Research Centre, Pimpri, Pune.

Our inclusion criteria was patients with cervical incompetence diagnosed based on history given by the patient, patients with history of preterm labour/ preterm birth, patients with clinically short cervix, patients with short cervical length on USG < 2.5 cm, patients with diameter of internal os > 1.5 cm, patients with bad obstetric history.

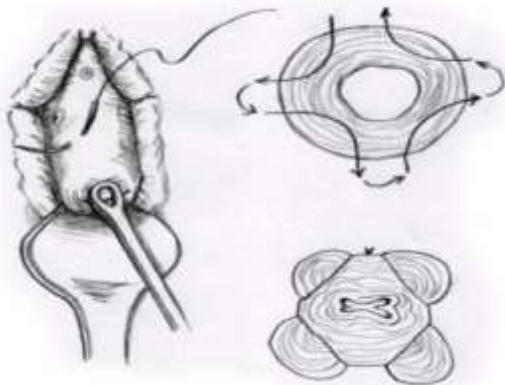
Our exclusion criteria was patients with USG suggestive of low lying placenta, congenital anomalies in the foetus, intrauterine death; patients with evidence of genital tract infections, chorioamnionitis; patients with history of leaking per vaginum, bleeding per vaginum.

## Methodology

100 women were enrolled for this study and after informed consent were divided into two groups of 50 each. Cervical cerclage was performed in all women by either McDonald's method (Group A) or Modified Shirodkar's method.(Group B)

## McDonald's Method

It consisted of placing a purse string suture around the cervix 1 to 1.2 cm below the level of the internal os. Number 1 Mersilk was placed as high as possible at the cervico vaginal junction without elevating bladder. The needle was directed into the stroma of the cervical wall, endocervical canal was avoided. Minimum of four bites were taken as right anterolateral corner (10 o'clock), right posterolateral corner (7 o'clock) left posterolateral corner (5 o'clock) and left anterolateral corner (2 o'clock). The suture was tied on the anterior cervical surface in the midline with a surgical knot. Operating time was 15 minutes with negligible blood loss. No complications were encountered.

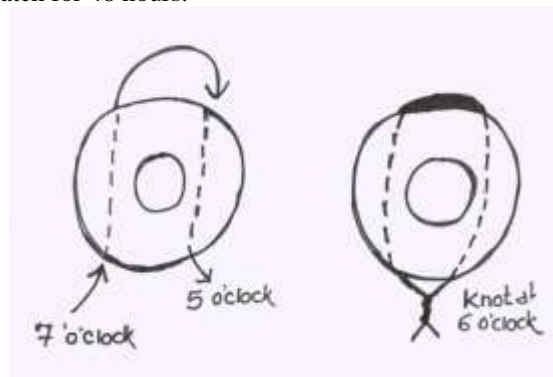


### Modified Shirodkar's Method

The Modified Shirodkar's technique is done under general anesthesia. Cervix is exposed and held with sponge holding forceps. A transverse incision is taken over anterior lip of cervix at cervico-vaginal junction after complete emptying bladder. Bladder is separated and pushed off from area of internal os. With the help of stout curved round body needle ligature of black silk is passed starting from the 7 o'clock position through substance of cervix and taken out at 11 o'clock position through substance of cervix and then passed from 2 o'clock position to 5 o'clock position through substance of cervix. Knot is tied posteriorly at 6 o'clock position in

the midline keeping it exterior. Anterior incision is sutured by few interrupted sutures using an absorbable material. This procedure differs from Shirodkar's cerclage as the needle is passed through substance of the cervix and no incision is taken posteriorly. The knot is kept exterior to facilitate easy removal of suture. The advantage is that the cerclage is at the level of the defect i.e. internal os.

Postoperatively give antibiotics for 5 days and NTG patch for 48 hours.



Data was analyzed using the Statistical Package for Social Sciences (SPSS) 17.0 software. Frequencies were enlisted. For significance testing in the cross tabulation tables, Chi square test, Z test and Proportion test were used.

### Results

**Table 1: Comparison of before CL and after CL in study groups**

CL	Group A (n=50)	Group B (n=50)	P Value
	Mean	Mean	
Before	2.16	2.08	>0.05
	2.25	2.41	
After			<0.05

When cerclage was done by method A, the cervical length increased from 2.16 cm to 2.25 cm. When cerclage was done by method B, the cervical length increased from 2.08 cm to 2.41 cm. Therefore, Group A showed a significant increase in cervical length over Group B. The 'p' value was calculated to <0.05 which makes this finding statistically significant.

**Table 2: Comparison of gestational age at cerclage & birth in study groups**

GA at	Group A (n=50)	Group B (n=50)	P Value
	Mean	Mean	
Cerclage	20.88	20.43	>0.05
Birth	33.18	35.70	<0.001

Group A could continue the pregnancy up to a mean gestational age of 33.18 weeks, while Group B could continue the pregnancy up to a mean gestational age of 35.70 weeks. The 'p' value was calculated to be 0.001 which makes this finding highly statistically significant.

**Table 3: Comparison of hospital stay in study groups**

Hospital	Group A (n=50)	Group B (n=50)	P Value
	Mean	Mean	
Stay (days)	3.04	5.30	<0.0001

Group A had a mean of 3 days whereas Group B had a mean of 5 days. P value worked out to be <0.0001 which is statistically significant.

**Table 4: Comparison of birth weight in study groups**

Parameter	Group A (n=50)	Group B (n=50)	P Value
	Mean	Mean	
Birth wt. (kgs)	2.28	2.75	<0.001

Group A had a mean birth weight (kgs) to be 2.28 kgs whereas Group B had a mean birth weight (kgs) to be 2.75 kgs. The p value worked out to be (p<0.001) which is statistically significant.

**Table 5: NICU admission wise distribution of cases in study groups**

NICU admission	Group A (n=50)	Group B (n=50)	P Value
Yes	30 (60)	15 (30)	<0.005

30 babies in Group A required NICU admission as compared to 15 babies in Group B. The p value worked out to be (p<0.005) which is statistically significant

**Table 6: Association between H/o previous preterm birth and GA at birth in both groups**

GA at birth (Wks)	H/O previous preterm birth				Total	
	Group A		Group B		GR A	GR B
	Yes	No	Yes	No		
<37	6	16	4	8	22	12
≥37	2	6	7	7	8	14
Total	8	22	11	15	30	26

## Discussion

The purpose of this study was to compare the results of Modified Shirodkar's cerclage and McDonald's cerclage. The rationale for this study stems from the prevention of preterm births in the patients managed with cerclage and its proven efficacy.

In our study the difference in mean gestational age at delivery was found to be 33 weeks in women managed with McDonald's cerclage and 36 weeks in patients managed with Modified Shirodkar's cerclage. Perrotin F et. al. found that the difference in mean gestational age at delivery with Modified Shirodkar's cerclage was 35.7 +/- 3.2 weeks and with McDonald's cerclage it was 33.2 +/- 2.9 weeks.<sup>3</sup>

In our study mean hospital stay after McDonald's cerclage was found to be 3 days and after Modified Shirodkar's cerclage was 5 days. Perrotin F et. al. in their study found the mean hospital stay after both Modified Shirodkar's cerclage and McDonald's cerclage to be 5 days.<sup>3</sup>

In our study women undergoing Modified Shirodkar's cerclage had 15 NICU admissions whereas those undergoing McDonald's had 30 NICU admissions. Perrotin F et. al. in their study found no statistical difference in the number of NICU admissions between the two procedures 'p' value being 0.9. Women undergoing Modified Shirodkar's cerclage were found to

have 22 NICU admissions whereas those undergoing McDonald's were found to have 31 NICU admissions.<sup>3</sup>

In our study there was no statistically significant difference found in the neonatal survival rates in women undergoing cerclage by Modified Shirodkar's and McDonald's cerclage. Perrotin F et. al. and their findings correlate with our findings.<sup>3</sup>

In our study we evaluated the prolongation of present pregnancy in women with history of previous preterm birth. We found that Modified Shirodkar's cerclage could prolong 68% pregnancies in women who suffered from prior preterm birth. Whereas McDonald's cerclage could prolong only in 42% pregnancies in women who suffered from prior preterm birth. Odibo et. al. found that pregnancy could be prolonged in women with previous preterm birth in 20% of the women undergoing Modified Shirodkar's cerclage and 23% of women undergoing McDonald's cerclage.<sup>4</sup>

In our study we found that the mean cervical length before cerclage in McDonald's method was 2.16cm and after cerclage it was 2.25cm. In Modified Shirodkar's group the cervical length before cerclage was 2.08cm and after cerclage was 2.41cm. In the study conducted by Rozenberg P. There was no significant difference between the cervical length before or after conducting a cerclage by either Modified Shirodkar's or McDonald's method because before Modified Shirodkar's cerclage

cervical length was 3.13cm and after cerclage 3.17cm whereas before McDonald's cerclage cervical length was 3.56cm and after cerclage 3.16cm.<sup>5</sup>

### Conclusion

The average age of the woman at which cervical shortening occurs and cerclage was done was 23 years in our study. Group A included 20 Primigravidae and 30 multigravidae patients whereas Group B included 24 Primigravidae and 26 multigravidae patients.

The incidence of preterm labour is more in women with history of previous preterm birth.

When compared to the initial cervical length before cerclage, the resultant cervical length studied after cerclage was studied in both groups. The group of women that underwent cerclage by McDonald's technique showed a lesser increment in cervical length as compared to those that underwent cerclage by Modified Shirodkar's technique.

Modified Shirodkar's technique was more successful in prolonging pregnancy till term in case of shortened cervix as compared to McDonald's technique till 33 weeks of cerclage.

Women who underwent Modified Shirodkar's technique of cerclage had a more prolonged convalescence period and hospital stay as compared to McDonald's technique of cerclage.

There was no significant difference in the mode of delivery in the two groups that underwent cerclage by McDonald's versus Modified Shirodkar's technique.

Women who underwent cerclage by Modified Shirodkar's technique had a higher birth weight of the neonate as compared to women who underwent cerclage by McDonald's technique.

Women who underwent cerclage by Modified Shirodkar's technique had a significantly lower NICU admission rate as compared to women who underwent cerclage by McDonald's technique.

Thus we conclude that Modified Shirodkar's cerclage is not only a good anatomical stitch but also have more efficacy.

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