

SCIENTIFIC BASIS OF CERVICAL INCOMPETANCE AND ANALYSIS OF 124 CASES TREATED BY ISTHAMIC ENCIRCLAGE

(by McDonald's Procedure)

by

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SUMMARY

Cervical Incompetance is one of the major causes of Mid-trimester abortions and premature deliveries leading to foetal wastage. This study was undertaken to evaluate definite diagnostic criteria (of cervical incompetance) laid down by various workers since nineteen hundred and fifties to till today, and to find out effectiveness, infant salvage ratio and complication rate of isthmie encirclage (McDonald's) Procedure.

From this and various other studies, the value of cervical encirclage by various methods has been well established, even when diagnosis of cervical incompetance is elusive due to the functional component.

Introduction

According to Cousins (1980), cervical incompetance is defined as inability of the uterine cervix to retain an intra-uterine pregnancy till term or according to signs and symptoms, it is characterized as a repeatative, acute and painless second trimester evacuation of uterine pregnancy (spontaneously) without associated bleeding or uterine contractions. It is often associated with premature rupture of membranes (PROM). This definition differentiates the onset of pre-

mature labour—i.e. onset of uterine contractions and cervical ripening (both events of labour) from true cases of cervical incompetance, in which passive dilatation of the cervix due to inherrent weakness of collagen fibrils occur. It differs from cervical ripening associated with onset of labour, in which dissociation of collagen fibrils due to various hormonal and environmental influences occur (Danforth *et al*, 1947, 1960, 1974. This functional incompetance of cervix plays a major role rather than anatomical defect in the cervix (Wood *et al*, 1965; Anderson and Turnbull, 1969; Pariekh and Mehta, 1961).

But again, all these definitions are useless in practice, as they help in making

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retrograde diagnosis only (i.e. after abortion or premature delivery has taken place).

For diagnosis of incompetent os in non-pregnant state, various procedures have been described:

- ** Passage of No. 8 Hegar's dilator in cervix without any resistance (Jenning, 1973).
- ** Direct measurement of the diameter of the cervical canal with specialized instrument (Johnston *et al*, 1972).
- ** Hysterosalpingographic study of cervical cone (Youssef, 1958).
- ** Intracervical balloon pressure and traction tests (Bergman and Svenherund, 1957).

But in the pregnant patient, none of the above criteria is helpful in making definite diagnosis of incompetent os.

Material and Methods

In our series of 124 cases, we used the following criteria:

(1) History of the patient with emphasis on:

- Number of abortions—spontaneous or induced.
- Number of premature deliveries.
- Full term deliveries with emphasis on unattended home delivery, precipitate labour, Operative delivery etc.
- Previous Dilatation and Curettage, conization etc.
- H/O uterine anomaly.

Previous pregnancy foetal wastage in which cervical incompetence is the likely cause, can be judged by foetal survival rate equation: (In multipara, emphasis is given to few last pregnancies' outcome).

If the value of equation is less than 0.5, it is a definitive indication of prophylactic isthmic encirclage during the present pregnancy, as early as 10 to 12 weeks of gestation. In our series, 49 patients had value of this equation less than 0.5, and hence were subjected to circlage operation, as early as possible after their first antenatal visit, after ruling out other causes of abortions.

(2) Patients complaining of heaviness in the pelvis, pain in legs, excessive vaginal discharge, frequency of urination etc. are examined and followed up for signs of incompetent os. The signs are as follows:

On abdomen examination:

- Fundal height appears less than months of gestation after ruling out causes of I.U.G.R. and wrong date.
- Presenting part sometimes is so deep in the pelvis, that often the lower pole of the uterus appears empty.

Vaginal examination:

- Presenting part appears low down in the pelvis.
- Cervical os is 3 to 4 cms or less dilated, but is not completely effaced.
- Bag of membranes (in cases having more than 3 cms dilatation) is protruding out or bulging through the canal (Herger, 1980) or in other words, hourglassing of membranes (Goldin, 1979).

These and other vaginal findings of incompetent os has remained till today a controversy. Various types of cervixes are shown in Fig. 1 by Mehta (1974), while defects in the membrane covering the internal os and presenting part are

* No. of term and near term children delivered
(both live and dead, death due to other causes)

Foetal survival rate equation = $\frac{\text{No. of term and near term children delivered}}{\text{Total no. of pregnancies} - \text{No. of 1st Trimester abortions}}$

shown in Fig. 2 (Goldin, 1979; Olatunbosum and Syck, 1981). If anatomical appearance of the cervix and membranes covering the presenting part are considered simultaneously, then probably we can reach nearer to our goal of diagnosing incompetent os during the pregnant stage as early as possible, though 100% diagnosis and prediction is still impossible because of the elusive and unpredictable functional component of incompetent os.

with previous history of foetal wastage in 2nd and 3rd trimester (in absence of causes other than incompetent os) prophylactic circlage is indicated irrespective to the type of the cervix.

Though workers like Olatunbosum and Dyck (1981) have tried emergency circlage in patients having cervical dilatation of atleast 4 cms and even more with herniation of membranes in the vagina after starting isoxsuprine or alcohol drip and giving general anaesthesia, and Goldin (1979) advocates encirclage as early as 12 hours after admission of the patient, with abdominal amniocentesis to remove 50 to 150 ml of amniotic fluid so as to suppress the bulging membranes, such emergency circlage was not tried in this series.

TYPES OF OS

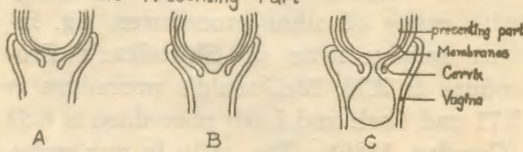
CLOSED OS				OPEN OS				
I	II	III	IV	V	VI	VII	VIII	IX
NON PREG.	EXT OS OPEN	CANAL OPEN	CANAL OPEN	CANAL LONG	MULTI PAROUS	RIPE	1F	2F IN LABOUR AS 1F
		LONG	SHORT		CANAL SHORT			

Fig. 1 (Mehta A.C., 1974)

The line drawings demonstrating the different types of cervix noted during pregnancy.

Fig. 2

Types of Membranes covering the Presenting Part



- A. Membranes well applied to presenting part
- B. Bulging - Hourglass Membrane.
- C. Herniation of Membranes.

Prophylactic circlage is advisable in type IV, V and VI cervixes and also in type VII and VIII cervixes after adequate rest, (i.e. ruling out premature labour) especially in nulliparous patients with no history of foetal wastage. In patients

(3) Postural test:

The patients with above signs and symptoms, especially patients having VII, VIII and IX type of open os are admitted. On admission, shape of the uterus is marked on the abdomen and fundal height measured. The patient is given complete bed rest with raised foot-end of the bed for 2 days, alongwith sedatives at night. The test is considered to be positive, if

- complaints of the patient disappear.
- fundal height of the uterus increases and appears as if the uterus has stood up from the pelvis (Nadkarni, 1962).
- Periodic uterine contractions disappear, and foetus is alive.
- On vaginal examination, presenting part appears to recede upwards and cervical os closes slightly.
- Bleeding per vaginum stops completely and there is no evidence of vaginal infection (after treatment, if necessary).

This test indicates good prognosis of cervical circlage procedure as it rules out the cases in which onset of premature labour has occurred (those cases generally deliver within 48 hours).

Circlage Procedure

Though various procedures like Shirodkar's (1955), Lash and Lash (1950), McDonald's (1957), Wurm (Hefner *et al*, 1961) etc. and their modifications for pregnant and non-pregnant state of the cervix, have been described, we did encirclage by McDonald's procedure. A purse-string suture with 1 or 2 strands of sutopack Nylon No. 1 was taken as high as possible after retracting the bladder i.e. about 2.5 to 3 cms from the tip of the exocervix. Post-operative bed rest was given from 24 to 72 hours and oral antibiotics were given for 5 days due to poor hygienic conditions. Progestins and Uterine relaxants like Isoxsuprine were given only in cases where abortion (mid-trimester) or premature labour was eminent.

Results

In the present study of 124 cases, the average circlage to delivery interval was 105 days. This indicates that in many cases, circlage was done in late mid-trimester. This was due to many of the patients coming late in pregnancy for their first antenatal checkup, and also because in some of the patients, there was no previous history of foetal wastage, which can justify prophylactic cervical circlage.

Table I shows the relationship of circlage operation to the weeks of gestation alongwith failure rate. All the patients

were arbitrarily divided in two groups. Group I consisted of patients who underwent circlage before 16 weeks of gestation and Group II consisted of the cases who underwent circlage after 16 weeks. Failure of circlage was considered if the suture had to be removed 4 weeks before or earlier the due date or 2 weeks prior or earlier to elective removal. In the Group I, failure rate was 24.08% (13 out of 54 cases). The corrected failure rate i.e. after deduction of the cases in whom apparent cause of failure like overdistension of uterus due to hydramnios, twins etc. and congenital anomalies of the foetus etc. was found (7 out of 13 cases), was 11.11% (6 out of 54 cases). In group II, failure rate was 7.14% (7 out of 98 cases). In 1 patient, circlage suture had to be removed due to hydramnios, hence corrected failure rate was 6.12% (6 out of 98 cases).

Table II shows infant salvage ratio, i.e. ratio of infant survival rate after and before circlage operation. In our study, infant salvage rate after and before operation were 86.9% and 23.1% respectively, with resultant infant salvage ratio of 3.76. This ratio compares favourably with ratios of other procedures, e.g. infant salvage ratio of Shirodkar's Procedure is 3.78, McDonald's procedure is 2.71 and Lash and Lash procedure is 6.89 (Cousins, 1980). The ratio in our series is slightly higher as previous pregnancy wastage before circlage was as high as 76.9% in poor patients attending the hospital. Bafana and Maheshwari (1984) series of 100 patients of cervical cerclage has reported infant survival rate before and after operation to be 18.51% and 80.78% with McDonald's procedure. Hence infant salvage ratio is 4.30, which turns out to be even higher than our series.

TABLE I

	Group I (before 16 weeks)	Group II (after 16 weeks)	Total
No. of patients	54	98	152*
No. of cases in whom circlage had to be removed 4 weeks before due date or 2 weeks prior to elective removal or earlier	13	7	20
Percentage	24.08%	7.14%	13.16%
Apparent cause found (like overdistension of uterus due to hydramnios, twins etc., congenital anomalies of foetus, etc.)	7	1	8
Corrected failure in No. of cases	6	6	12
Corrected failure rate (in Percentage)	11.1%	6.12%	7.89%

* Full term or near term previous pregnancy delivery, in which circlage was done, included, in 124 patients.

TABLE II

	Total No. of Pregnancies	No. of babies survived	Percentage Infant Salvage Rate
Before operation	256	59	23.1%
After circlage operation	152*	132**	86.9%

** followed up for 7 days after birth.

$$\begin{aligned} \text{Infant Salvage Ratio:} &= \frac{\text{Infant Survival Rate after Operation.}}{\text{Infant Survival Rate before operation.}} \\ &= \frac{86.9\%}{23.1\%} = 3.76. \end{aligned}$$

Discussion

Even though, cervical Incompetance has been an accepted entity now, its relation to open cervical os is still debatable. Authors like Floyd (1961), Pariekh and Mehta (1962), Anderson and Turnball (1969), Mehta (1974) and various others have not found any significant change in

outcome of labour in patients having open cervical os. While Wood *et al* (1965), Shrotri (1978, 1983), and many other workers have shown increase in preterm labour in patients having open os. Value of Internal exam to detect weak short or open os is immense. The character of membranes covering the internal os—hourglassing of membranes

into vagina, becomes a corroborative finding.

Even though we are likely to overdo cervical encirclage especially in multiparous patients with open os, it is better to err on the safer side by doing circlage in borderline cases, rather than waiting till premature labour and then labelling it as Functional Cervical Incompetance. This is because even though diagnosis of incompetent os is still debatable, value of cervical encirclage by McDonald's or other procedures have been firmly established, without any debate because of consistently improved infant salvage rates as reported by various workers.

References

1. Anderson, A. B. M., Turnbull, A. C.: *Am. J. Obstet. Gynec.* 105: 1207, 1969.
2. Bafana, N. and Maheshwari, M.: *J. Obstet. Gynec. India*, 34: 73, 1984.
3. Bergman, P. and Svennerund, S.: *Int. J. Fertil.*, 2: 163, 1957.
4. Cousins, L. M.: *Clinical Obstet. Gynec.*, 23: 467, 1980.
5. Danforth, D. N.: *Am. J. Obstet. Gynec.* 53: 541, 1947.
6. Danforth, D. N., Buckingham, J. C., Roddick, J. W.: *Am. J. Obstet. Gynec.* 80: 939, 1960.
7. Danforth, D. N., Veis, A., Breen, M., Weinstein, H. G., Buckingham, J. C., Manelo, P.: *Am. J. Obstet. Gynec.*, 120: 641, 1974.
8. Floyd, W. S.: *Obstet. Gynec.*, 27: 130, 1961.
9. Goldin, R. C.: *Obstet. Gynec.*, 54: 748, 1979.
10. Harger, J. H.: *Obstet. Gynec.*, 56: 543, 1980.
11. Hefner, J. D., Patow, W. E., Ludwig, J. M.: *Obstet. Gynec.*, 18: 616, 1961.
12. Jennings, C. L.: *Am. J. Obstet., Gynec.* 113: 1907, 1972.
13. Johnstone, F. D., Boyd, J. E., McClure, J., Browne, J. C.: *Lancet*, 2: 1294, 1972.
14. Lash, A. F., Lash, S. R.: *Am. J. Obstet. Gynec.*, 59: 68, 1950.
15. McDonald, I. A.: *J. Obstet. Gynec. Brit. Emp.*, 64: 346, 1957.
16. Mehta, A. C.: *J. Obstet. Gynec., India*. 24: 450, 1974.
17. Nadkari, R. M.: *Souvenir, All India Obstet. Gynec., Congress, Ahmedabad, 1962.*
18. Olatunbosun, O. A. and Dyck, F.: *Obstet. Gynec. Brit. C'wealth.*, 68: 818, 1981.
20. Shirodkar, V. N.: *Antiseptic*, 52: 299, 1955.
21. Shrotri, A. N., Sutaria, U. D., Shah, R. G.: *J. Obstet. Gynec., India*. 33: 339, 1983.
22. Shrotri, A. N.: *J. Obstet. Gynec. India*. 28: 730, 1978.
23. Wood, C., Bonnerman, R. H. O., Booth, R. T., Pinkerton, J. H.: *Am. J. Obstet. Gynec.*, 91: 396, 1965.
24. Youssef, A. F.: *Am. J. Obstet. Gynec.*, 75: 1305, 1958.