Original Research Article

Role of transvaginal sonography in the objective diagnosis of incompetent cervix

Nazia Afreen[1*], Humera Sultana[2], Rubina Affreen[3]

[1]Postgraduate Resident, [2]Senior Resident, [3]Junior Resident
Department of OBG, Shadan Institute of Medical Sciences, Hyderabad, Telangana, India
[*]Corresponding author email: **drnaz02@gmail.com**

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Abstract

The syndrome of cervical incompetence is characterized by spontaneous painless passive dilatation of cervix followed by expulsion of an immature foetus. The subject has been subjected to increasing controversy in recent years. The wide variations in the incidence of cervical incompetence arise because there are no standard criteria for the diagnosis of cervical incompetence. The certain way of diagnosing a case of cervical incompetence is by history and vaginal examination. The introduction of transvaginal ultrasonographical examination into the obstetrics diagnosis has created further possibilities in recognition of isthmico – cervical insufficiency. The present study was conducted for a period of 18 months with gestational age between 14 to 26weeks and was aimed to evaluate the efficacy of transvaginal sonography and to know the incidence of cervical incompetence in this area. 50 pregnant women at high risk of pre-term delivery were taken in to the study. 36 out of 50 cases (72%) met the criteria and they were managed surgically and had a cervix length < 2.5 cm. 14 (28%) cases had cervix length. > 2.5 cm at the initial transvaginal sonographic evaluation. 40 out of 50 (80%) delivered at around term. Though the diagnosis of cervical incompetence is based primarily on past obstetric, gynaec history and clinical findings, but transvaginal sonographic surveillance of the cervix helps us to use the cervical cerclage more selectively i.e., when the cervix length i.e, < 2.5 cm, internal os open or close with funneling of cervical canal.

Key words

Cervical incompetence, Transvaginal, Ultrasonograph.

Introduction

The syndrome of cervical incompetence is characterized by spontaneous painless passive dilatation of cervix followed by expulsion of an immature fetus. The subject has been subjected to increasing controversy in recent years. The wide variations in the incidence of cervical incompetence arise because there are no standard criteria for the diagnosis of cervical incompetence. The certain way of diagnosing a case of cervical incompetence is by history and vaginal examination. The introduction of ultrasonographical examination into the obstetrics diagnosis has created further possibilities in the process of recognition of isthmico – cervical insufficiency.

Various terms have been used such as gaping of isthmus by Palmer R, Lacomme M [1], incompetence of internal os by Lash and Lash [2] 1950, Funnel cervix by Jeff Coate 1956. Although post traumatic, anatomic disruption of the cervical os has been suggested as the cause of habitual abortion since 1902; only in the last 40 years has the clinical entity, cervical incompetence received significant attention. Herman [3], 1902 at the turn of the century pointed to the anatomical alteration of the cervix as the cause of habitual abortion, for cervical lacerations resulting in habitual abortion, and achieved cure in 2 out of 3 cases with Emmets operation. Danforth [4], 1947 concluded that the fibrous quality permitted the cervix to act as a barrier to retain the products of conception within the uterus until maturity. Palmer and Lacomme [1] and Lash and Lash [2] wrote on gaping of internal os of cervix as a cause for repeated mid trimester abortions, suggested a traumatic etiology.

Shirodkar [5] described his method for management of the incompetent cervix with surgical repair during pregnancy. He described a new method using fascia lata instead of chromic catgut to surround the cervix during pregnancy. Asplund [6], stresses the importance of hysterography for detection of an incompetent and widely opened internal os. The investigations with inflatable balloons shown by Mann [7] can be done in non-pregnant state. Mc Donald [8] inserted a purse-string suture of No.4 mersilene tape externally at the junction of rugae vagina and smooth cervix at level of internal os. Page [9] described an external wrapping procedure with oxygel gauze.

Javert [10] mentioned the therapeutic possibilities of Smith Hodge pessary in the treatment of cervical incompetence. Edward Yosowitz [11] used silicon plastic cuff for the treatment of cervical incompetence. Danforth and Buckingham [12], separated the etiology of incompetence cervix into 3 categories based on the varying continuity of fibrous cervical ring.

Group-I: These patients in whom mechanical disruption of the fibrous ring is evident. This group involves the patients with history of cervical laceration. Rubovit [13] listed overzealous curettage, criminal abortions, Duhrssen incisions as possible etiological factors.

Group – II: Includes those patients demonstrating histological deficit. In these patients bundles of smooth muscle fibers, not ordinarily present in significant quantity are distributed in large numbers, through the fibrous connective tissues and ground substances of the cervix.

Group-III: Those patients in whom no defects structural or histological can be identified.

In these cases the cause is presumed to be premature triggering of the normal mechanisms for effacement and dilation.

Mann [7] and his co-workers strongly suggested the isthmus rather than the cervix to be primary sphincter of pregnancy using radiographic technique. They reported a close correlation between isthmic tone in the non-pregnant state and the development of cervical incompetence during pregnancy. Eastman and Danforth [4] opposed to the great importance given to the isthmic sphincter in maintaining pregnancy.

Classification: Cervical incompetence is classified by dividing cases into complete and incomplete groups. Complete incompetence would involve the entire cervical tissues or structure while the incomplete incompetence would be concerned either with the supra vaginal position of the cervix or vaginal portion. The supravaginal portion of cervix would include the internal os and the upper body of the cervix. The vaginal portions would include the external os and the lower body of the cervix.

A new method of classification of cervical incompetence.

- Pure incompetence
- Cervical incompetence associated with other factor leading to abortion.

Even this method did not give much clinical information about incompetence but only excluded other causes of abortions. So Shirodkar [5], for clinical purposes divided cervical incompetence in to three distinct groups.

Group – I: Includes those patients who give history of repeated mid trimester abortion of about 4 to 11 abortions between 16-20 weeks.

Group – II: Includes those patients who did not on any occasion go beyond 16 weeks of gestation even in their previous pregnancies and may not give a typical history of cervical incompetence.

Group – III: These in whom the majority of abortions have occurred in the 1st trimester but one or two pregnancies have gone up to 20-24 weeks of gestation.

Later Sherman in 1966 studied a large series of cases and classified cervical incompetence in point of early intervention into three groups.

Group – A: In patients who had a full term pregnancy or any history of operation followed by 2 or more consecutive pregnancies which aborted spontaneously between 12-36 weeks of gestation. Patients in this group gave a history of intervention or abnormal previous delivery or they underwent surgical procedures like dilatation and curettage or conization of cervix.

Group – B: Includes patients who had 2 or more consecutive and trimester abortion but did not given any past history of full term pregnancies or any operation to which they were subjected.

Group – C: Patients in current pregnancy. These are patients who had no mid trimester abortions but who manifest incompetent os during the current pregnancy.

Stage – I indicates 28-36 weeks
Stage – II indicates 20-28 weeks
Stage – III indicates 12-20 weeks

Diagnosis: The classic diagnosis of an incompetent cervix is based on a relatively sudden, painless mid-trimester pregnancy loss. This criterion is unsatisfactory from 2 points of view.

- Lack of specificity – a variety of abnormal conditions leading to premature labour can mimic situation.
- Lack of sensitivity in the final stage of cervical dilatation with incompetence cervix, pain can be experienced. An additional shortcoming of this diagnostic methodology is at least one pregnancy loss is required before the diagnosis can be made.

Diagnosis in Pregnancy State:

History: The typical history is of repeated painless abortions occurring in second trimester or nearly third trimester premature deliveries, relatively of short duration of labour. Typical history of painless rupture of bag of waters followed by an abortion which occurs at the same period of gestation or slightly earlier in successive pregnancies.

Pelvic Examination: The infalliable way to diagnose a typical case of cervical incompetence is first by the history and then by following the clinical course of a given case coupled with weekly vaginal examinations, to note the gradual opening of the internal os without pain.

Per Speculum Examination: Deep cervical tears may be demonstrated and membranes may be seen through the dilated cervical os. In some

cases the bag of waters may herniated through the dilated cervix and occupy the vagina.

Diagnosis in the Non - Pregnancy State: Simple Instrumental Procedures:

a) Passage of No.8 or wider Hegar dilator easily in non pregnant state without resistance was suggested by Palmar 1940. According to Dr. V. N. Shirodkar in majority of the multiparous patients No.8 Hegar dilator or 15 Pratt dilator can be passed easily without resistance.

b) Traction test of Berman [14]: Foley's catheter with its balloon filled with 10 cc of water is introduced into uterine cavity. If force necessary to withdraw the catheter through the cervix is < 600gms cervical incompetence is diagnosed.

c) Insertion of an olive tipped sound is painless Durfee [15]. Recently different instruments are devised for measuring diameter of internal os but the instruments are complicated and do not give clear idea of the defect.

Radiological Method:

- The use of X-ray and contrast media to delineate the architecture of the internal os and the uterine cavity. It utilized withdrawal hysterogrpahy and assumed incompetence to exist if the cervical canal at the level of internal os was wider than 8mm.
- Palmer, Asplund [6] stated that if diameter of cervical canal at the level of internal os is more than 9 mms. It is diagnostic of cervical incompetence provided the procedure is carried out in secretary phase when the diameter of internal os is smallest.
- Rubovitz FE [13] described balloon hysterography. Various sized balloons can be used according to size of uterine cavity and balloons are attached to tip of canula and then introduced in the uterine cavity.
- Paul G. Peterson, et al. [16] presented a method for the diagnosis of an incompetent internal cervical os. They used intracervical balloon in which artificial dilatation was eliminated by using thin oil an exit tube from balloon.
- Block and Rahhal [17] have devised a cervical incompetence scoring system that they believe may be useful both diagnostically and prognostically.

Role of ultrasound in diagnosis: For many years investigators have searched for an objective method to determine cervical change in the pregnant women at risk for cervical incompetence.

Patient with suspect previous history should be offered serial USG examination from 1 trimester to select those in need of cervical encerclage and to treat them adequately and promptly to save the pregnancy. Evaluation of the endocervical canal is performed utilizing the full bladder technique.

- A min term finding fluid in the endocervical canal should alert the physician a possibility of incompetent os.
- Another point which suggests incompetence is the shortness of the cervix. When bladder is full the length of the normal cervix usually varies from 2.6 to 6 cm.
- The cervical canal measurements are more reliable in assessing the prognosis at risk of cervical incompetence. The diameter of the internal os will be more than 3 mm in cervical incompetence. A short cervix of 2.5 cm in length with a closed cervical canal less than 5 mm in width and the width of the cervix at the internal os less than 3 mm usually signifies good prognosis. If the cervical canal measures 8 mm or more with herniation of the amniotic membrane containing foetal parts is usually an ominous prognostic sign. Varma, et al. [18 using digital and calipers measured cervical length, and width of the cervical canal at the level of the internal os.

Sonographic Predictors of Cervical Incompetence:

Cervical Length: Cervical length assessment by Ultrasound is established by means of assessing the risk of pre-term delivery and labour. Zemlyn [19] songoraphically measured the uterine cervix of 50 non-pregnant and 100 normal pregnant women. The average cervical length for the non-pregnant cervix was 2.5 cm compared to 3.7 cm for the pregnant cervix. He determined that the pregnant cervix is rarely more than 6 cm in length.

Michaels, et al. [20], studied 107 patients at risk for cervical incompetence prospectively and demonstrated described cervical length from 4.43 +0.92 cm to3.03+1.1 cm in patients how developed incompetence.

Varma, et al. [18], studied 115 women at risk for cervical incompetence based on their previous history. 75 patients were found to have a defective cervix by ultrasound examination. Of this group, 40 underwent cerclage, 16 aborted and 24 gave birth prematurely. The cervical length in this group of 75 women ranged between 2-3 cm compared to 3-4 cm in a group of 40 women who went to term. However, these authors did note that shortening of the cervix is a physiological phenomena of the mid-trimester and emphasized that the patients in their study with a short cervix (<2.5cm) has a good prognosis.

Width of the Internal os: Similar Brook, et al. [21] measured the width of the internal os in 24 patients between 11 and 18 weeks of pregnancy admitted to the hospital for elective cerclage. A group of 19 gravid women at the same gestational age was used for controls. The mean width of the internal os for the cerclage group was 2.57 + 0.36cm versus 1.67+0.2cm for the control group. The authors concluded that a width of 1.9 cm or more was suggestive.

Bulging of the membranes: Since Sarti's observation that ultrasound could detect bulging of the membranes into the endocervical canal, prior to pregnancy loss, several studies have addressed the relationship between membrane herniation and cervical incompetence. Vaalamo and Kivikoski [22] scanned 91 patients at risk for cervical incompetence. Serial examinations were done from late first trimester up to 28 weeks. The only criterion for diagnosis was the presence of membrane bulging into a partially dilated cervix.

Ultrasound Criteria For Cervical Incompetence: Pit Falls in Sonographic Diagnosis: The subject at real risk may dilate fast after normal scan (within few hours). Bladder volume (even it partly filled, though not required, affects the configuration of internal os. Intrauterine pressure itself varies and changes the appearance of internal os. Angulation of transducer alters the appearance and dimensions. Direct pressure by transducer tip through anterior or posterior fornix on to the cervix may alter the dimensions. At times, clinically detected case may not be diagnosed by USG.

Role of Trans Vaginal Scan: It is a gold standard technique of assessment. Recently a transvaginal approach has been used to evaluate the cervix.

In 1988, Balde, et al. [23], published an article on the topic of transvaginal echography, an application in the diagnosis of cervical incompetence. The result of their work showed that this ultrasonic method through the vagina gives us much more accurate measurements of the cervix than digital vaginal examination. Bohmer S, et al. [24], in a clinical study compared the results of vaginal palpation and vaginal sonography. The conclusion is the cervical length obtained by sonography was constantly higher in all patients than the results obtained by palpation. In case of suspected cervical incompetence continuous sonographical examination can supervise the development of the uterine cervix during pregnancy.

According to Balde, et al. [23], transvaginal ultrasound provides detailed information, which cannot be obtained by routine manual vaginal

examination. A cervical length of 46.3 – 39.3 mm was found in normal pregnancies and length of 34.0 – 21.4 when a clinically incompetent cervix had been diagnosed difference of 12.3-17.9 mm.

Balde MD, et al. [25], published an article stating that besides its contribution to the diagnosis, the vaginal sonography or transvaginal ultrasound is a remarkable support in the indication of the treatment of cervical incompetence and its control after cerclage.

Joffe GM, et al. [26 mentioned about the diagnosis of cervical change in pregnancy by means of transvaginal ultrasonography. Cervical cerclage may be useful in preventing silent cervical dilatation however no prospective trails with and without cerclage have been demonstrated by ultrasonography.

According to Chung TK, et al. [27] the development of transvaginal sonography has resulted in a clearer image of the internal os, a development which may indirectly have beneficial effects on outcome. Guzman ER, et al. [28], described a new method using vaginal ultrasound and transfundal pressure to evaluate the asymptomatic incompetent cervix. Transfundal pressure elicited no changes in the internal os of the 150 control patients of whom 141 delivered at term, 2 miscarriages at 22 and 23 weeks and 7 delivered prematurely (4.7%). Conclusion is application of transfundal pressure during transvaginal ultrasound evaluation of the cervix and its internal os may assist in detecting the asymptomatic incompetent cervix.

Anderson and Colleagues [29]: Transvaginal and transabdominal ultrasound evaluation of the uterine cervix were compared in a study of 186 pregnant women.

Advantages: Transvaginal ultrasonography appears to hold significant promise in providing an accurate and objective diagnosis of incompetent cervix. Transvaginal sonography is non invasive, repeatable over time and can be performed during pregnancy. In women who are at risk of a preterm delivery the cervical appearance of transvaginal sonography are markedly different from the normal. Several studies using transvaginal ultrasound have shown that a cervical length of less than 25mm being associated with a 50% risk of preterm delivery. Funneling of the cervical canal at rest or in response to fundal pressure is the ultrasonographic appearance of cervical incompetence. Appearance of membranes in response to fundal pressure or spontaneously suggests to us an ultrasound appearance of cervical incompetence.

Management The management consists of:

- Therapeutic procedure and
- Supportive treatment

Therapeutic procedure:

The controversy in medical literature about surgical and non-surgical treatment of cervical incompetence has given rise to confusion. When an anatomical defect is clearly demonstrated in non-pregnant state, prophylactic repair is preferable. If however one is dealing with a congenitally or physiologically incompetent os, one might have to depend on making a positive diagnosis during pregnancy as the condition becomes apparent, and repair it at same time.

Therapeutic procedures can be divided broadly into two groups:

Procedures done during pregnant state:

- Cerclage procedure
- Other than cerclage

Cerclage Procedure:

1) Shirodkar's [5] procedure: It was Dr. V.N. Shirodkar's pioneer work that has given some hope in the patients with cervical incompetence. There have been many modifications up to date following the original procedure. Initially theprocedure was done during pregnant state but its usefulness in non-pregnant state also was reported.

2) Ritter's modification of Shirodkar's technique. To avoid slipping off, the suture is placed above the uterosacral ligament and through the cardinal ligament under direct vision.
3) Nadkarni placed the steel wire loop 2 cm above the external os claiming it to be at the level of histological internal os. He considered that histological internal os bears the load of products of conception during pregnant state. He passed the sutures through lowermost reflection of cardial ligament on both the sides while doing the cerclage procedure. The loop of steel wire was cut at 36-38 weeks os gestation and vaginal delivery was achieved.
4) McDonald's [8] method – A purse string suture No.4 mersilk on a Mayo needle was inserted around the exocervix as high as possible to approximate to the level of internal os i.e., at the junction of rugose vagina and smooth cervix
5) Green Armytage [30] and Other's Technique 1957: He did the cerclage similar to that of Shirodkar's only that a suture was placed at internal os by mobilizing bladder and suture material used was No.7 orNo.8 nylon.
6) Boyd, did cerclage by using same technique as McDonald but used steel wire and placed two purse string sutures, one at the level of internal os and the other just above the external os.
7) Mann [31] 1961: Believed the lesion to be at the isthmic region rather than internal os. So he advised lower isthmic cerclage by placing purse stringsuture through utero-sacral and cardinal ligaments.
8) Encerclage in midcervical region by mersilene tape and closing both cervicalcanal and the external os was another method described.
9) Picot [32] used two purse string sutures with autoclaved polythene tubing in which tentalum wire is passed. The sutures were passed through exocervix and at the level of internal os.
10) Benson R.C. and Durfee [33] in 1965 advised abdominal cerclage procedure in congenitally short cervix, extensive amputation of cervix done in conservative operation for genital prolapsed, extensively scarred cervix, where the previous encerclage was unsuccessful by vaginal route, multiple tears which were deep, unhealed penetrating fornicial lacerations and subacute cervicitis.
11) Jennings [34] - A short transverse incision is made in the mucosa at cervicovaginal junction and the bladder is advanced to the level of internal os. A 0.5 cm mersilene hand is carried around the cervix with a small gallis fascia needle.

Procedure performed during pregnancy other than cerclage:
These are of two types: 1. Operative. 2. Non operative
Operative: In operative technique complete or partial obstruction or closure of cervix was tried by some workers and total closure of external os after mucosal denudation in pregnancy.

Baden and Baden [35] 1957 described bridge tracheoplasty after 25th week of gestation when cervical dilatation was more than 3 cm.

Trans Cervical - Wurms technique: James D. Heftier [36] and his colleagues published simple technique originally described by Roger S. Wurm of Adelaide, Australia for surgical closure of incompetent internal os in 1959. In this procedure at the level of internal os mattress sutures is placed from 12 o' clock to 6 o' clock and back to 12 o' clock position. The other mattress suture is placed from 3 o'clock to 9 o'clock and back to 3 o'clock position.

Non-operative treatment during pregnancy:
Though it gives success to some extent old method of giving complete bed rest to the patient throughout the pregnancy has been suggested which is practically tedious and boring to the patient. Various myometrial relaxants such asprogesterone, isoxsuprine with bed rest have some hopeful results.

Cervical Pessary: Mayer Vitsky [37] 1961 described Hodge Smith Pessary insertion to treat the incompetent cervical os.
Bacelite Ring: A Bacelite ring was used to control incompetence of internal cervical os.

Plastic Cuffs: Similar efforts were made by Yosowitz E.E. [11] and others by using an inflatable silicon plastic cuff (baylon balloon).

B.Procedure Performed In Non-Pregnant State: They are as follows:

1. Cerclage:

a. Shirodkar's [5] method of cerclage can be done in non-pregnant state also with good results.

b. Mann [31] did cerclage by putting two purse string sutures. One at the histological internal os and other at sutures. One at the histological internalos and other at anatomical internal os and anchoring the sutures tocardinal ligament and uterosacral ligament.

2. Tracheloplasty:

a. Emmet [38]: This is the oldest surgical approach to the problem consisting of denudation of the old cervical laceration and suturing the denuded surface together. This operation was device for preventing abortions.

b. David's tracheloplasty: A triangular wedge of cervical tissue is excised with apex at the internal os from both the anterior and posterior lip of the cervix.

3.Isthmorrhaphy: Lash and Lash [2] procedure of isthmorrhaphy for traumatic origin of cervical incompetence was advised ideally in immediate post abortal phase. This can be done in non-pregnant state also.

4.Scarring:

a) Scarrification of the internal os from within. Barnes [39] employed shallow electroconization followed by heavy electro-coagulation in upper portion of resultant wound.

b) External Scarification of the upper cervix: It was said that a constricting band of scar tissue around the cervix at the level of junction of cervix and the rugose vaginal mucosa. The area was denuded and wrapped with a band of oxygel gauze dipped in benzoin and saturated with sterile U.S.P. talc in non-pregnant state. 3 months time isr equired for natural scarring to occur. This scarring is responsible for retaining the pregnancy but would yield to natural forces of labour.

5. Cutis Graft with Trachelorrhaphy: A wedge is removed from anterior lip of the cervix and the cervix is recontracted

Aim of the study

- To evaluate the efficacy of transvaginal sonography in providing an objective diagnosis of incompetent cervix in pregnant women at risk.
- To know the incidence of cervical incompetence in this area.
- To know the probable influence of age, parity and social status on this.

Materials and methods

The study was conducted over a period of 18 months at Shadan Institute of Medical Sciences, Teaching Hospital and Research Centre.

3150 pregnant women at were recruited into the study. After taking consent of 50 women, were followed up till delivery. The gestational age of this group was between 14 to 26 weeks. We have selected the cases, depending on the following criteria i.e.

- Asymptomatic women with clinically short cervix.
- Women with past history of mid trimester abortions and preterm deliveries.
- Women with symptoms suggestive of preterm labour

A detailed obstetric history was taken. Clinical examination and ultrasound scan for evidence of incompetent cervix was done.

All women were further evaluated by transvaginal ultrasonographical examination of cervix after being properly investigated, to exclude other factors which may lead to abortions.

Transvaginal sonography procedure: Procedure was explained to the patient. She was asked to empty her bladder. Patient was placed to lithotomy position. The ultrasound equipment was prepared beforehand. The transducer tip is

covered with gel and inserted in a condom. The transducer probe is introduced in to the vagina; contact was made with the anterior formix of the vagina. The cervix was examined and the findings were recorded as follows:-

- Length of the cervical canal in cm.
- Internal os open or close.
- Funneling or coning of cervical canal at rest or in response to fundal pressure whether present or absent.

Management: All cases were admitted in the hospital injection hydroxyl progesterone caproate (500 mg) was given deep intramuscularly pre operatively. Cerclage stitch (Mc Donald's) was applied within 48 hours after admission in the hospital. Patients were discharged 24 hours after the operation. They were reviewed once in 2 weeks at antenatal outpatient department and admitted 2 weeks prior to the due date of delivery for stitch removal.

They were advised to take adequate rest, avoid heavy manual work avoid sexual intercourse, Come for antenatal check-up once in every 2 weeks, Report to hospital if she develops imminent symptoms of preterm labour (i.e., heaviness in pelvis, pain in legs, excessive vaginal discharge, frequent micturition etc.).

All cases were evaluated by transvaginal ultrasonography once in 2 weeks.

Results

Age wise distribution was as per **Table – 1**. Incidence was higher in middle class socio economic group rather than lower socio economic group. This may be because the chances of diagnosing any disease in higher income is high as they seek medical advice earlier in lower socio economic patients (**Table – 2**).

Table - 3 shows 76% were booked between 16-18 week s and 20% booked between 18-20 weeks. **Table - 4** shows study population mostly consisted of multigravida 70% and primi 30%.

Table – 1: Age Wise Distribution. Chi square Y^2 was not significant

Age Group (Years)	No. of cases	%
18-25	29	58
26-30	18	36
> 30	3	6
Total	50	100

Table – 2: Distribution of cases according to Socioeconomic Status.

Socio- economic status (class)	No. of cases
HIGHER	5
MIDDLE	29
LOW	16
TOTAL	60

Table – 3: Gestational age at time of Admission.

Duration of Pregnancy in weeks	No. of cases	%
16 - 18 weeks	38	76
18 - 20 weeks	10	20
20 - 24 weeks	2	4
Total	50	100

Table – 4: Gravida wise distribution of cases.

Gravida	No. of cases	%
Number of Primigravida	15	30
Multigravida with BO H		
Gravida 2	20	40
Gravida 3	8	16
Gravida 4	2	4
Gravida 5	5	10
Total	50	100

Table – 5: Gestational age of the cases at the initial TVS evaluation.

Gestational Age (weeks)	No. of cases	%
12 - 16	17	34
17 - 20	31	62
21 - 24	2	4
25 - 28	0	0
Total	50	100

All cases were selected at an average gestational age of 19-20 weeks. X^2 value is not significant

(**Table – 5**). Other findings were depicted as per **Table – 6 to 12**.

Table – 6: Distribution of cases according to cervical length.

Cervical Length	No. of cases	%
1 - 1.4	5	10
1.5 - 1.9	10	20
2 - 2.4	21	42
2.5 -2.9	14	28
> 3	0	0
Total	50	100

Table – 7: Distribution of cases according to internal os diameter.

Internal os Diameter	No. of cases	%
Closed	49	98
>5	1	2
Total	50	100

Table – 8: Number of cases with Bad Obstetric History.

Previous obstetric history	No. of cases	%
Mid trimester abortion	11	22
Preterm deliveries	6	12
Mid trimester abortion + Preterm deliveries	2	4
History of Circlage	7	14
Total	26	52

Table – 9: Outcome of cases with No BOH.

Outcome	Total	%
No. of term deliveries	26	52
No. of preterm deliveries	2	4
Total	**28**	**56**

Table – 10: Outcome of cases with Bad Obstetric History.

Outcome	Total	%
No. of term deliveries	12	24
No. of Preterm deliveries	8	16
Total	20	40

The infant salvage rate in previous pregnancy was 88.57%. In Present Study the infant salvage rate was 93.33% (**Table – 13**). When reasons other than incompetent cervix:

2 case: labour induced at 34 wks in v/o oligo, PIH

2 case: labour induced at 35 wks is v/o oligo, breech with poly

1 case: labour induced at 36 wks in v/o 2 prev LSCS with polyhydramnios

1 case: labour indced at 35 wks in v/o PIH (**Table – 14**)

Table – 11: Outcome of cases.

Outcome	No. of cases	%
No. of term deliveries	40	80
No. of preterm deliveries	10	20
Total	50	100

Table - 12: Mode of delivery.

Outcome	No. of cases	%
Spontaneous vaginal delivery	37	74
Assisted breech delivery	1	2
L.S.C.S	12	24
Forceps delivery	0	0
Total	50	100

Table - 13: Fetal salvage rate.

	No of pregnancies	No. of full term deliveries	Infant salvage rate
Previous pregnancies	35	31	88.57
Present pregnancies	15	14	93.33

Table – 14: Analysis of failed cases.

PIH	**2**
Twins with polyhydramnios	**2**
IUGR with oilgohydramnios	**2**
Failure due to incompetent cervix	**4**
Total/ Percentge	10/20

Out of 4 cases, all were multigravida with BOH, 3 cases has short cervix with funneling (short cervix and funneling might have predisposed to

ascending infection of membranes and preterm labour). In cases C the technical problem in cerclage could have resulted in miscarriage.1 case lost in follow up for 2 months and reported at onset of labour at 36 weeks of gestation baby was alive. The reason for preterm labour was unclear (**Table – 15, 16**).

Table - 15: Corrected failure rate.

	Total	**%**
No. of cases	50	100
No. of preterm deliveries/ early losses	6	12
Reasons other than/ in competent cervix	6	12
Preterm deliveries due to in competent cervix	4	8

We got sensitivity of about 94.12%, specificity 75%, positive predictive value 88.89%, negative predictive value 85.71%, percentage of false positive cases 25% and percentage of false negative is 5.8% (**Table – 17**).

Discussion

72% of our cases required circlage as similar to study by Balde M Stolz W [23] as per **Table – 18**. The cervical length with parameters >2-3.4 cm were managed conservatively were less than those of normal pregnant women, but more than surgically treated (**Table – 19**). In both study **Table – 18, 19**, opening of internal os was not considered, unless it associated with funneling of cervical canal.

Table – 16: Analysis of failed cases due to incompetent cervix.

Cervical Parameters	**Case-A**	**Case-B**	**Case-C**	**Case-D**
Cervix Length	2	2	2	2
Internal os	Closed	Closed	Closed	Closed
Funneling	Absent	Present	Present	Present
Gestational age at the time of delivery	36	32	24	32

Table – 17: Transvaginal sonography diagnostic accuracy.

	Incompetent cervix		**Total**
	Present	**Absent**	
Positive	32	4	36
Negative	2	12	14
	34	16	50

Table – 18: Comparative analysis of the group wise division.

	Present Study	**Balde M, Stolz W [23] Study**
Percentage of ultrasound indicated cerclage cases	72	80
Cases managed conservatively	28	20

Table – 19: Comparison analysis of cervical parameters.

Cervical Parameters	**Present Study**	**Balde MD Stolz W [23]**
Cervix Length	>2 - 3.4 cm	=2.1 - 3.4 cm
Internal os Open	(1/14) 7.14%	6/8 (75%)
Funneling on fundal pressure	Absent	Absent

Outcome: The percentage of term deliveries in surgically treated group was 88.57%. Fetal salvage rate is 1.05%, when compared to other studies. Infant salvage rate of our study is much close to Mc Donald [8] series i.e., we had less number of failures after cerclage operations. Guzman E.R; Forster J.K. [40] Conducted a study and compared the outcomes in women at

risk treated with elective versus ultrasound indicated cerclage cases (**Table – 20**).

Failure percentage of our study is less when compared to Guzman ER's study [40]. The explanation for increased percent of preterm deliveries in Guzman's study. Guzman's study was a retrospective study. They have taken cervix length of <2.0 cm as a cut off length for cerclage placement (**Table – 21**).

The corrected failure rate of our study is less compared to other studies. The difference in outcome m ay partly by explained by the diversity in inclusion criteria i.e., the above studies used a variety of criteria to define a short cervix i.e. <1.5, < 2.0, < 2. 5 cm, etc. (**Table – 22**).

Table – 20: Infant salvage ratio's of surgically treated cases.

	Our study	**Mc Donald's study [8]**
Infant salvage ratio	1.05	2.7 1

Table – 21: Pregnancy outcomes in transvaginal sonogrpahy indicated cervical cerclage.

	Present Study	**Guzman ER, For ster J.K**
Percentage of early loss (<25 wks)	2	8.8
Percentage of preterm deliveries	18	36.8

Summary

50 pregnant women at high risk of pre-term delivery were taken in to the study. The gestational age of all the cases was between 14-26 weeks. After proper clinical examination, we have subjected them for transvaginal sonography evaluation of the cervix. We have set certain sonographic criteria for application of cerclage in patients at high risk of pre-term delivery i.e., cervix length < 2.5 cm, funneling of cervical canal at rest or in response to fundal pressure. 36 out of 50 cases (72%) have met the criteria and they were managed surgically and had a cervix length < 2.5 cm. 14 out of 50 (28%) cases had cervix length > 2.5 cm at the initial transvaginal sonographic evaluation. All these cases were managed conservatively and followed up by serial transvaginal sonographic surveillance of cervix every 2 weeks. None of them required intervention during follow-up period. 40 out of 50 (80%) delivered at around term. Out of remaining 10 cases (20%), 4 cases delivered preterm, one at 24 weeks, two at 32 weeks, one at 36 weeks.

Conclusion

Though the diagnosis of cervical incompetence is based primarily on past obstetric, gynec history, clinical findings and transvaginal ultrasound provided important information, which cannot be obtained by routine manual vaginal examination i.e., actual length of the cervix, early dilatation and funneling of the cervical canal .It is difficult to detect the dilatation of the internal os by digital examination inpatients with a closed external os. Transvaginal sonography identifies such a change in internal cervical os. Application of fundal pressure during transvaginal sonographic evaluation of the cervix and its internal os may assist in detecting the asymptomatic incompetent cervix. Funneling of cervical canal on fundal pressure or at rest appears to be an important risk factor. The pregnancy outcome was not so favorable in the group with funneling of cervix irrespective of the surgical intervention we have taken.

Transvaginal sonographic surveillance of the cervix helps us to use the cervical cerclage more selectively i.e., when the cervix length i.e., < 2.5 cm ,internal os open or close with funneling of cervical canal .Application of cerclage stitch after an objective diagnosis by transvaginal

sonography is evidence based and medically acceptable.

By following these criteria the number of unnecessary cerclage operations can be reduced. Transvaginal sonography is highly sensitive i.e., sensitivity of about 98.63% and the percentage of false negative cases is around 1.36% which is negligible.

Finally, transvaginal sonographic assessment of cervix is no doubt useful as an important adjunct to pelvic examination in detecting the patients at risk for cervical incompetence.

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