Cervical pessary in prevention of preterm birth: A case series*

By Erika Gail G. Hernandez, MD and Mary Anne Tabaquero, MD, FPOGS

Department of Obstetrics and Gynecology, St. Luke's Medical Center, Quezon City

ABSTRACT

Preterm birth defined as birth between 20-37 weeks age of gestation, poses major concerns as it causes serious health problems. Across 184 countries, the rate of preterm birth ranges from 5% to 18% of babies born and the Philippines ranks 8th out of 184 countries for the number of babies born prematurely, and ranks 17th for the total number of deaths due to complications from preterm birth. Management of incompetent cervix as one of the causes of preterm birth is cerclage. However, pessary insertion is an alternative especially in cases where cerclage may not be employed. To date, there have been no local published reports on effectiveness of pessary in prevention of preterm birth. Hence this study aims to report on cases supporting the use of pessary in preterm birth. This is a case series of three patients with short functional cervical lengths (<2.5 cm) seen in ultrasound, managed with pessary insertion showing its effectiveness in prolonging pregnancy. In conclusion, pessary is an affordable and safe alternative management of preterm birth which may be employed in our setting. Future clinical trials may be helpful in strengthening this evidence.

Keywords: Pessary, preterm birth, cervical incompetence

INTRODUCTION

Pessary is a device fitted into the vagina to provide structural support to pelvic organs. It dates back to the 16th century when the innovative French surgeon Ambriose Pare (1510-1590) devised a number of oval-shaped pessaries for uterine prolapse. It was also clearly described in the year 1701 when Hendrick Van Deventer (1651-1724) produced pessaries himself for uterovaginal prolapse. (1)

It has been predominantly used as support for pelvic organ prolapse until it was first postulated by Vitsky in 1961 that the incompetent cervix is aligned centrally, with no support except the nonresistant vagina, and a lever pessary, however, would change the inclination of the cervical canal deviating it more posteriorly, which in pregnancy, can thereby direct the weight of the pregnancy more on to the anterior lower segment.[2] (Figure 1). The cervical pessary has an internal diameter that matches that of the cervix and an external diameter large enough to wedge the device against the pelvic floor. This effectively deviates the cervix towards the posterior vaginal wall and corrects the cervical angle.[3] This is supported by the observational study performed by Cannie et al which demonstrated more systematically and objectively, using magnetic resonance imaging, that the placement of a pessary led to a more acute uterocervical angle and that this persists as long as the pessary remained *in situ*.[4]

This case series aims to report on three cases in our institution supporting the effectiveness of pessary in preventing preterm birth.

THE CASES

This paper presents three cases managed with pessary insertion for prevention of early preterm birth.

CASE 1

C.A.B. is a 35-year-old Gravida 2 Para 0 (0010) pregnancy uterine, admitted in our institution at 25 weeks and 3 days for short cervical length finding on ultrasound. Early ultrasound at about 12 weeks age of gestation showed a cervical length of 3.8 cm. Patient then was started on progesterone vaginal suppository once a day until 14 weeks age of gestation. Patient underwent congenital anomaly scan with note of decreased cervical length of 2.58 cm, hence dose of progesterone vaginal suppository was increased to twice a day then eventually thrice a day. On repeat ultrasound at about 26 weeks age of gestation showed a further decrease in cervical length to 1.62 cm, with funnel length of 1.12 cm, 59% funnelling, and internal cervical os dilated to 2.52 cm. With no history of perceived contractions nor vaginal bleeding, yet decreasing cervical length on monitoring, patient was admitted.

Patient was diagnosed gestational diabetes mellitus at 24 weeks age of gestation and started on metformin. There are no other known comorbidities.

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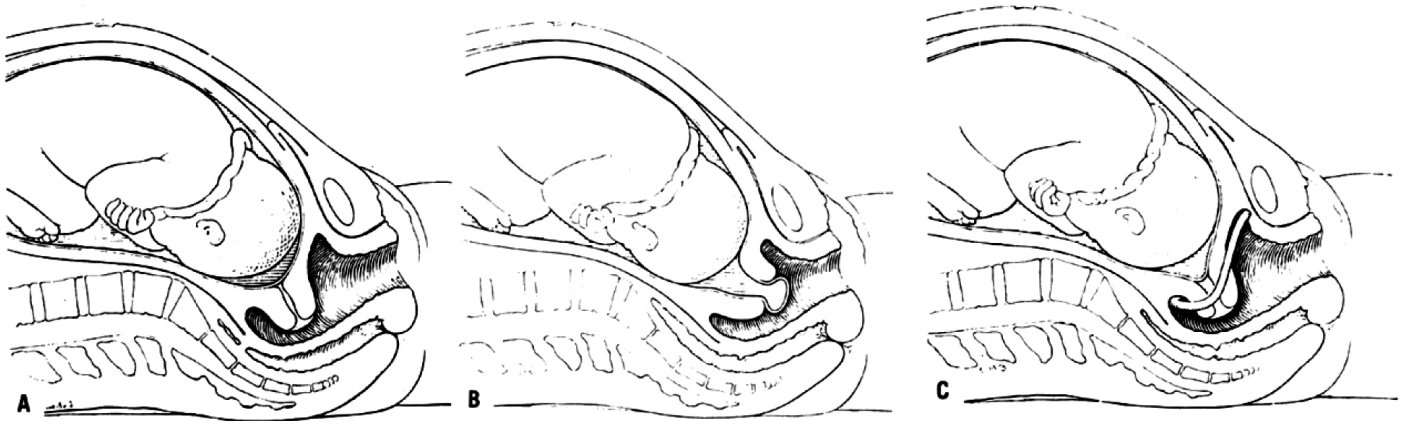

Figure 1. A. Normal cervix usually points posterior in the last trimester of pregnancy. **B**. An incompetent cervix usually points anteriorly in the mid and last trimesters of pregnancy, allowing the membranes to herniate. **C.** The lever pessary 'cradles' an incompetent cervix, keeping it pointing posteriorly in the last trimester, preventing herniation of membranes. (Javert CT: Further follow-up on habitual abortion patients. Am J Obstet Gynecol 84:1149, 1962) Lewicky-Gaupp, C, *Glob. libr. women's med., (ISSN: 1756-2228)* 2010; DOI 10.3843/GLOWM.10025

First pregnancy was spontaneously aborted at 12 weeks age of gestation one year prior to the present pregnancy.

On examination, fetal heart tone was 150 bpm, fundic height of 25 cm, no noted contractions on manual palpation. Speculum exam showed minimal whitish non foul smelling discharge. Internal examination revealed a short cervix dilated to 1 cm and effaced.

Upon admission, betamethasone was immediately administered intramuscularly and magnesium sulfate drip started. Patient was referred to perinatology service with the plan to do cervical cerclage for the incompetent cervix. However, on repeat ultrasound prior to the contemplated procedure, cervical length further decreased to 1.3 cm, also with note of amniotic fluid sludge. Furthermore, with manipulation of the probe, cervix seemed to close and lengthen. With these findings, the plan of cervical cerclage was abandoned for the possibility of iatrogenic rupture of membranes with such a short cervix and the idea of pessary placement was entertained. Hence, referral to urogynecology service for pessary insertion was done. At 26 weeks age of gestation, a hodge pessary (Figure 2) was then inserted. Patient was placed on complete bed rest and maintained on daily oral and intravaginal and weekly intramuscular progesterone to support pregnancy. With deranged blood sugar values on monitoring, patient was started on insulin.

Regular ultrasound monitoring was done. (Table 1)

Patient stayed in the hospital, placed on complete bed rest, maintained on oral nifedipine to maintain uterine quiescence. At 34 weeks 3 days age of gestation, patient complained of low back pain, and with moderate contractions occurring every 2-4 minutes appreciated on manual palpation, prompted internal examination revealing cervix 4 cm dilated 70% effaced station -2 intact bag of water, pessary in place. Pessary was removed and labor was allowed to progress. Patient delivered to a live preterm male apgar score 9,9 birth weight 2085g birth length 50cm Ballard's score 35 weeks AGA via normal spontaneous vaginal delivery. On inspection, placenta was noted to be small with no calcifications.

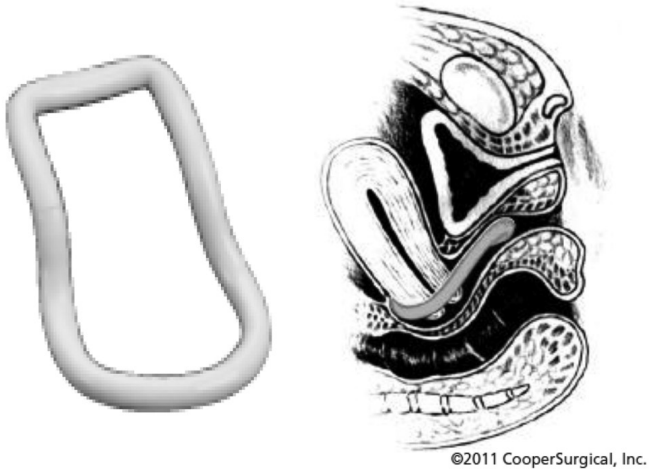

Figure 2. Hodge pessary

Table 1. Serial Ultrasound Monitoring of Case 1

Age of gestation	Sonographic age	Sonographic weight	Functional Cervical length
28 weeks	27 weeks	1093 +/-164g	2.68cm
30 weeks	29 weeks	1400+/-204g	1.65cm
32 2/7 weeks	31 2/7 weeks	1781 +/- 267g	1.30 cm
34 weeks	32 2/7 weeks	2050 +/- 308g	1.00 cm

CASE 2

M.J.C. is a 34-year-old gravida 2 para 1 (0101) pregnancy uterine, admitted in our institution at 31 weeks age of gestation for an incidental finding of short cervix on ultrasound. During her regular prenatal check-up, ultrasound revealed cervical length of 2.7 cm without funneling, prompting an internal examination revealing cervical dilation of 1-2 cm. Patient was asymptomatic with no perceived contractions or vaginal bleeding. Patient was admitted.

Patient is a gravidocardiac with a history of open heart surgery for mitral valve repair for congenital severe mitral valve regurgitation, asymptomatic after the operation with no maintenance medications.

Patient had a previous pregnancy 5 years prior to the present, delivered preterm at 33 weeks age of gestation after preterm labor.

On examination, vital signs were stable, abdomen gravid with fetal heart tone of 130 bpm, fundic height of 26 cm, with no noted contractions on admitting cardiotocogram. Speculum examination showed a violaceous smooth cervix with whitish non foul smelling discharge. Internal examination revealed a short cervix dilated to 1-2 cm dilated.

Upon admission, intramuscular betamethasone was immediately administered and oral tocolytics, Nifedipine 10 mg every 8 hours, were started. Work up was done showing no evidence of infection as possible cause of preterm labor. Nevertheless, oral antibiotic was started. Patient was referred to perinatology service. Oral progesterone was started to support pregnancy.

On the fourth hospital day, ultrasonographic cervical scoring was done showing a U-shaped cervix with a further decrease in cervical length to 1.79 cm. This prompted urogynecology service referral for pessary placement. At 31 4/7 weeks age of gestation, a hodge pessary was then inserted and patient was placed on complete bed rest and maintained on intravaginal progesterone. There were no appreciated uterine contractions until the 16th hospital day when the patient had vaginal discharge and upon internal examination, the cervix was 3-4 cm dilated 80% effaced station 0 with intact bag of water, pessary displaced, with mild to moderated contractions noted. Expectant management was then employed.

On the 22nd hospital day, 17 days after pessary insertion, patient at 34 weeks age of gestation, delivered via normal spontaneous vaginal delivery to a live preterm male apgar score 9,9 birth weight 2010g birth length 44 cm Ballard's score 34 weeks AGA.

CASE 3

S.B. is a 34-year-old gravida 4 para 3 (3003) admitted in our institution at 17 weeks and 6 days for vaginal bleeding. It was prior to admission in our institution that the patient started to have vaginal bleeding consuming approximately 2 pads with no perceived contractions. Consult was done at a local hospital and patient was prescribed tranexamic acid, antibiotics, and started on magnesium sulfate drip. Pelvic ultrasound done at that time showed a low lying placenta with a distance of 2cm from the cervical os. Patient still with vaginal bleeding then transferred to our institution.

Patient was diagnosed with Hypertension at 4 weeks age of gestation when blood pressure elevated to 140/100. There were no medications given for hypertension.

Patient had 3 previous pregnancies all carried to term. She initially delivered via normal spontaneous delivery but underwent cesarean section for the subsequent pregnancies with oligohydramnios as reason for the primary cesarean section.

On examination, vital signs were stable, fetal heart tone at 140 beats per minute, no contractions on manual palpation and internal examination showed a short but closed cervix with minimal blood on examining finger.

Upon admission, work up showed no infection. Patient, in threatened abortion, with low lying placenta, was started on magnesium sulfate drip and isoxuprine tablet. On repeat ultrasound, placenta was 5.1 cm from the cervical os but the cervix was noted to be Y-shaped with functional length of 1.1 cm and 50% funnelling. Serial ultrasound scans were done thereafter. (Table 2)

On the third hospital day, the patient who was

Table 2. Serial Ultrasound Monitoring of Case 3

Age of gestation	Sonographic age	Sonographic weight	Functional Cervical length	Cervical Funneling Percentage
17 6/7 weeks	17 4/7 weeks	210 +/- 31 g	1.1 cm	50 %
18 weeks	17 3/7 weeks	182 +/- 27 g	1.32 cm	66 %
18 1/7 weeks	17 3/7 weeks	203 +/- 30 g	2.1 cm	32 %
18 3/7 weeks	---	---	0 cm	100%
18 4/7 weeks	---	---	0.87 cm	99.7 %
18 6/7 weeks	---	---	0.58 cm	87 %

previously asymptomatic, complained of hypogastric pain. Urinalysis requested showed urinary tract infection for which oral cefuroxime was started, and maintained on isoxuprine drip. On repeat cervical scoring the following day, functional cervical length was 0 cm with 100% funnelling. Patient was referred to urogynecology for pessary insertion. Plan was to complete the oral antibiotics for urinary tract infection prior to pessary insertion. Meanwhile, transvaginal monitoring of the cervix was done regularly.

On the 12th hospital day, at 19 3/7 weeks age of gestation, a hodge pessary was placed intravaginally and the patient was discharged the following day.

At 33 2/7 weeks age of gestation, patient had watery vaginal discharge. With an internal examination of cervix 4 cm 70% effaced, floating presenting part but ruptured bag of water, breech presentation, the patient underwent repeat cesarean section with bilateral tubal ligation and delivered to a live preterm female Apgar score 8,9 birth weight 1950g birth length 44 cm Ballards score 35 weeks AGA.

Tabulation of patients' characteristics summarized in Table 3.

DISCUSSION

The American College of Obstetricians and Gynecologists (ACOG) defines preterm birth as birth between 20-37 weeks age of gestation.[5] Our local society, the Philippine Obstetrical and Gynecological Society adapts the same definition.

Preterm birth poses major concerns as it causes serious health problems upon birth and even up to adulthood. Underdeveloped organs in infants born prematurely lead to a number of complications, namely, respiratory distress syndrome, patent ductus arteriosus, intraventricular hemorrhage, hydrocephalus, hypothermia, necrotizing enterocolitis, anemia, jaundice, hypoglycaemia, infection upon birth; and cerebral palsy, impaired cognitive skills, visual and hearing problems, behavioural and psychological problems as long term effects.[6]

According to the World Health Organization, an estimated 15 million babies are born preterm every year and almost 1 million children die each year due to complications of preterm birth while many survivors face a lifetime of disabilities.[7] Across 184 countries, the rate of preterm birth ranges from 5% to 18% of babies born.[7] Philippines ranks 8th out of 184 countries for the number of babies born prematurely, and ranks 17th for the total number of deaths due to complications from preterm birth.[8] According to the Department of Health of the Philippines data, disorders of short gestation and low birth weight are among the top ten leading causes of infant mortality in the years 2000-2010.[9] Its economic impact is an approximate healthcare cost of seven thousand to fifteen thousand pesos per day for preterm newborn in the intensive care unit.[10]

Table 3. Summary of Patients' Characteristics

	Case 1	Case 2	Case 3
Maternal Age (years)	35	34	34
OB Score	G2P0 (0010)	G2P1 (0101)	G4P3 (3003)
Ultrasonographic Cervical Functional Length at Pessary Insertion (cm)	1.3	1.79	0.58
Type of Pessary	hodge	hodge	hodge
AOG at Pessary Insertion	26 weeks	31 4/7 weeks	19 3/7 weeks
AOG at Delivery	34 3/7 weeks	34 weeks	33 2/7 weeks
Number of weeks of pregnancy prolonged by pessary	7 4/7	2 3/7	13 6/7
Fetal Outcome	AS 9,9 BW 2085g BL 50 cm BS 35 weeks AGA	AS 9,9 BW 2010g BL 44 cm BS 34 weeks AGA.	AS 8,9 BW 1950 BL 44 BS 35 weeks AGA

AS- apgar score; BW- birth weight; BL- birth length; BS- Ballard's score; AGA- appropriate for gestational age

One of the causes of preterm birth is incompetent cervix. The American College of Obstetricians and Gynecologists (ACOG) defines cervical incompetence as the inability of the uterine cervix to retain pregnancy in the second trimester, in the absence of uterine contractions, characterized as painless cervical dilatation. This definition applies to all three cases in this series. The incidence of incompetent cervix has been highly variable and it has been described in various reports in the literature as ranging from 1%-8%.[11] ACOG recommends cerclage in cervical insufficiency, as in case 2, with prior spontaneous preterm birth and short cervical length less than 2.5cm.[12] However, women whose cervical length is determined to be short and who have not previously had a preterm single birth, such as in cases 1 and 3, are poor candidates for cerclage.[12] Also, according to the Society of Obstetricians and Gynecologists of Canada (SOGC), there is no benefit to cerclage in women with incidental finding of short cervix by ultrasound but no prior risk factors, such as in cases 1 and 3.[13] Furthermore, the use of cerclage has been assessed in two Cochrane reviews wherein data do not allow a firm conclusion on the use of cerclage in prevention of preterm birth because of contradicting review results.[14] Another form of mechanical prevention of preterm birth in women where cerclage may not be considered such as in the three cases above, may be in the form of nonsurgical pessary.

In a systematic review carried out by Liem et al in 2013, all cohort studies included, namely Quaas et al, Arabin et al, Acharya et al, Sieroszewski et al, Antczak-Judycka et al, and Kimber-Trojnar et al, all indicated potential effectiveness of pessary in preventing preterm birth.[14] One among the two randomized trials in the same review also showed promising results. The Pesario Cervical para Evitar Prematuridad (PECEP) trial, with a study population of 385 women with a short cervix, is the first randomized study of the use of cervical pessary for prevention of preterm birth, whose result confirm the benefit of pessary use in such population.[15] To date, there are no published studies on pessary as management for preterm birth locally.

The reported success rates of vaginal pessaries closely mirror those observed with cerclage and nominal success rates are in the 80-90% range.[16] However, there are a number of advantages favoring pessary over cerclage. Unlike the surgical cerclage, pessary is noninvasive with no anesthesia needed during placement, and with no needles involved, least likely to cause iatrogenic rupture of membranes, bleeding, or cervical laceration. Pessary is easy to apply, reposition if dislodged, and remove once indicated, with little expertise needed. In an extremely short cervix wherein cerclage may be difficult to perform, a pessary may be placed instead. All these advantages are evident in our three cases. Also, the mechanism of the pessary, as desbribed above, displaces the cervix posteriorly, and redirects the weight of pregnancy away from the vaginal axis, as opposed to cerclage which does not. In addition, pessary is a cheap device that can be made readily available in low resource areas in the country.

In all three cases, the hodge pessary was used. (Figure 2) It is a type of pessary that is manually shapeable and its anterior bar is applied behind the pubic arch, redirecting the cervix posteriorly and repositioning the weight of the growing fetus thereby reducing direct pressure on the cervical os in an incompetent cervix whose axis generally points forward in the axis of vagina. (Figure 1) Different models of pessaries have been used in previous studies. (Figure 3) Presently, there are no studies showing the advantage of one type of pessary over another in the prevention of preterm birth.

There is increasing survival rates with increasing age of gestation and weight at birth. According to the Philippines Obstetrical and Gynecological Society (POGS), the percentage survival rates based on age of gestation (AOG) and birth weight at delivery are: at least

Figure 3z. Different models of pessaries used to prevent spontaneous preterm birth. (a) Ring pessary (top left), Hodge pessary (top right) and donut pessary (bottom left), all originally designed to prevent genital prolapsed or uterine retroflexion, and butterfly – shaped pessary to support the cervix according to Jorde and Hamann (bottom right). (b) Arabin cervical pessary, design to enclose, incline and possibly rotate the cervix as high as possible. (Arabin B. And Alfirevic Z. Cervical pessaries for prevention of spontaneous birth: past, present and future. Wiley online library. Ultrasound Ostet Gynecol 2013; 42:390-399)

60% between 28-31 weeks AOG and greater than 85% between 32-36 weeks AOG, and at least 50% between 1000-1499 grams and more than 70% at 1500-1999 grams at birth.[10]

The present trend for management of preterm labor is tocolysis to facilitate administration of steroids for lung maturity. However, for our three cases, the simple placement of pessary did not just limit our intervention to steroid administration but even increased the chances of survival by prolonging the pregnancy up to about 34 weeks age of gestation wherein survival rate is reported at 85%, as evidenced by good outcome of babies born all in three cases.

Pessary in pregnancy is well tolerated. Only a few complications have been reported which is most likely due to the relatively short duration of use and proper antenatal care.[2] Increase in vaginal discharge may be one complication as shown in the study of Arabin et al in 2003.[2] However, the study by Havlik et al in 1986 reports that there is no change in vaginal flora in women with pessary.[2] Discomfort or minor bleeding due to erosions or lacerations may be observed.[17] In all these cases, the pessary may be removed and cleaned with running water before reinsertion and repositioning.

CONCLUSION

In the search for strategies to prevent preterm birth, pessary has promising results. It is an affordable and safe alternative management of preterm birth which may be employed in our setting. Future clinical trials may be helpful in strengthening this evidence. ■

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