The incompetent cervix

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Preterm delivery is a leading cause of neonatal mortality and morbidity, with cervical incompetence being one of many multifactoral causes.

Preterm delivery or recurrent pregnancy loss come with feelings of loss, frustration and failure for the woman and her physician. With improving technology and escalating expectation, delivery of a non-viable fetus is now delivery of a fetus at the limits of viability with attendant neonatal mortality and morbidity. Cervical incompetence is viewed in the wider context of preterm delivery and associated financial, social, emotional and medico-legal implications.

Cervical incompetence still has no clear definition, no proven objective diagnostic test or criteria, and in this evidence-based world, no evidence supporting its treatment. Lack of clarity potentially leads to confusion in standard of care and increased medico-legal dispute.[1]

Milestones

1658 Practice of Physick Cole, Culpepper and Rowland: 'Slack orifice of the womb'
1865 *Lancet* – Gream – cervical incompetence
1955 VN Shirodkar and the Shirodkar suture (Mumbai)
1957 Ian McDonald and McDonald suture (Melbourne)
1965 Transabdominal sutures
1979 Transabdominal ultrasound scanning to detect cervical dilatation
1986 Transvaginal ultrasound scanning and the short cervix
1997 Laparoscopic sutures

Changing definitions

Traditional definitions are an expression of an anatomically defective cervix, congenital or acquired, with consequent recurrent second trimester loss or early preterm delivery. Ultrasound has changed the traditional view of the cervix being competent or incompetent, to degrees of incompetence. Cervical incompetence is considered a continuous variable, with various degrees leading to preterm delivery at different gestational ages.[2,3]

Table 1. Risk factors for cervical incompetence

Congenital	Acquired	Clinical
• Biological variation • Collagen disorders: Ehlors Danlos syndrome • Congenital uterine anomaly • In utero DES exposure	• Cervical lacerations or injury post vaginal or caesarean delivery • Prolonged second stage • Surgical procedures: D and C, excisional biopsy	• Asymptomatic • Progressively earlier deliveries • Vaginal pressure, spotting, increased discharge, discomfort • Advanced dilatation before labour • Short labours

The diagnosis

Diagnosis is difficult as there is no diagnostic test prior to, during or after pregnancy. All proposed tests are inaccurate, inconvenient and have not been proven to predict outcome. Diagnosis is often based retrospectively on history and exclusion of other causes of preterm delivery. Typical history is of recurrent midtrimester spontaneous loss or early preterm delivery. Presentation is of cervical effacement and dilatation in the absence of uterine contractions; symptoms of pressure; protruding membranes or rupture of membranes; little bleeding; and a rapid delivery.

Ultrasound, the short cervix and cervical incompetence

Ultrasound assessment of the cervix has been used since 1979. Transvaginal ultrasound scanning (USS), with closer proximity to the cervix and less cervical distortion from transducer pressure or a full bladder, is objective, highly reproducible and a reliable method to assess cervical length.

The short cervix is an expression of a spectrum of cervical disease or function. Other ultrasound parameters of funnelling and canal dilatation have not been verified.[3]

Cervical length and preterm delivery are inversely related: the shorter the cervix, the higher the risk of preterm delivery.[4,5] Unfortunately, a short cervical length on USS has become synonymous with cervical incompetence.

A short cervix increases risk of preterm delivery but does not by itself equate to cervical incompetence.

- Risk factors for preterm delivery DO NOT mean risk factors for cervical incompetence.
- The short cervix is the final common pathway of multiple causes of preterm delivery.
- Any woman threatening spontaneous preterm delivery will develop a short cervix. Most will not be due to cervical incompetence. Fifty per cent of women with a cervix 15mm or less deliver after 32 weeks.[2,4,5]
- The majority of women considered high-risk for preterm delivery due to cervical incompetence do not develop a short cervix and do not need cerclage.

Table 2. Ultrasound and cervical length

What is short?	• No agreement on what a sonographic short cervix is • Lengths of 15mm to 30mm have been used in studies • Optimum cut-off for the truly high-risk cases appears to be 25mm[4]
Who?	• USS should only be used in HIGH-RISK cases • Limited and not recommended as a screening tool in low-risk women
Why?	• A method of risk assessment that can modify A Priori risk • To identify, monitor and manage women with history consistent with cervical incompetence and risk factors for preterm delivery
When?	• Between 14 and 24 weeks • Cut-off depends on gestational age at which one is willing to perform intervention, which depends on neonatal morbidity and mortality at given gestational age
How often?	• Optimum interval between measurements is unknown

The treatment: cerclage

The many past and future interventions include:
- Cervical cerclage;
- Progesterone;
- COX2 selective non-steroidal anti-inflammatory agents;
- Anti-chemokine agents;
- Collagen injections;
- Vaginal pessary or inflatable balloons; and
- No sex, no excessive activity and bed rest.

Cervical cerclage is traditionally offered on the basis of suspected cervical insufficiency based on obstetric history. The rationale being to provide mechanical support to the cervix, to prevent shortening and dilatation, and to prevent or postpone preterm delivery. Fifty years after the introduction of cervical cerclage, debates and controversy continue as to when and how cerclage should be used.

Table 3. Cervical cerclage - the problems

Contraindication	Complication[2]
• Fetal anomaly incompatible with life • Intrauterine infection • Active bleeding • Active preterm labour • Ruptured membranes • Fetal demise	• Serious complication 1 in 50 • Anaesthetic • Postop abdominal pain, bleeding, bladder injury • Ruptured membranes (2% elective, up to 65% non-elective) • Chorioamnionitis 1-8% • Preterm labour • Fetal loss • Cervical laceration • Cervical dystocia • Difficulty removing suture 1%

Approaches

Table 4. Vaginal sutures

Shirodkar	McDonald
• Transverse incision anterior cervix, bladder pushed up above internal cervical os • Vertical incision in posterior vaginal wall • 5mm Mersilene tape or monofilament non-absorble suture to surround the cervix at level of internal os. Knot anteriorly	• 5mm Mersilene tape or monofilament non-absorble suture • Cervix encircled as high as possible, purse string suture in 5 to 6 bites with knot positioned anteriorly
Shirodkar versus McDonald: No difference in rate of preterm birth or neonatal survival in retrospective studies.[6]	

Table 5. Transabdominal sutures

Indications	• Very poor obstetric history • Previous failed vaginal cerclage • Little remaining cervical tissue either congenitally or from extensive surgery
When	• Pre-pregnancy • Requires caesarean section delivery at 37 to 39 weeks
Routes	• Laparotomy 1965 • Laparoscopy 1997
Benefits	• Overcomes technical problems of placing suture in short scarred cervix • More precise placement anatomically at the internal os • Assumption that higher suture placement prevents funnelling at internal os and reduces risk of PPROM • Absence of foreign body in vagina with consequent lower infection risk • Ability to leave the suture for future pregnancies
Complications	• Need for two laparotomies • Potential uterine artery ligation and IUGR • Late rectouterine fistula if left too long
Success	85% to 90%

Evidence

Cerclage does appear to mechanically support the cervix and prevent shortening and dilatation.[7] However, evidence is conflicting as studies vary in design, population, definitions and cervical length, precipitating intervention. *The Cochrane Review* has found no conclusive evidence that cervical cerclage in women perceived to be at risk of preterm delivery or second trimester loss attributable to cervical factors reduces the risk of pregnancy loss, preterm delivery or associated morbidity.[8]

Table 6. Timing of cerclage

Timing of cerclage	• Not well defined • Generally after first trimester to allow for prenatal screening and evaluation of fetal anomaly • Not at gestations when delivery is likely to have a good outcome • 24-28 weeks with high neonatal morbidity and mortality is controversial and in general avoided for fear of accidental PPROM
Primary (prophylactic)	• Prophylactic cerclage usually at 10-12 weeks based on obstetric history • No difference in preterm delivery and neonatal survival with or without primary cerclage in high-risk women[7,9] • 59% of women with cerclage do not need one. Application of cerclage based on history alone leads to unnecessary intervention in 50%[2,7]
Secondary (therapeutic)	• Therapeutic cerclage done after detection of early cervical changes detected by USS, with no exposure of membranes • Management with TVUSS serial follow-up of cervical length with secondary intervention is a safe alternative to traditional primary cerclage and prevents unnecessary intervention[2] • Secondary cerclage with bed rest is preferred management for women at high risk of preterm delivery from cervical insufficiency based on history and short cervix <25mm[7]
Tertiary (emergency/ salvage)	• Emergency cerclage done with severe cervical changes, membranes exposed • Emergency cerclage with bedrest is better than bedrest alone[7] • Limit of gestational age depends on institution and individual obstetricians

Perspectives

Medicine is changing. Now, more than before, our practice is challenged by technology savvy, internet-surfing patients and their lawyers.

Table 7. The Evidence vs Google and The Law

Medical evidence[8]	• Until more data becomes available, cervical cerclage should not be offered to women considered at low or medium risk of second trimester miscarriage or preterm labour. • Predicting those women who will miscarry due to a cervical factor remains elusive. • Due to the invasive nature of the cervical suture and dubious benefit, further evaluation of effectiveness and safety should be performed within randomised controlled trials.

Patients and the internet	• 'The diagnosis can be made either manually or with ultrasonograph.' • 'The competent cervix…a problem that is detectable by ultrasound and can be remedied with a surgical procedure.' • 'Determining whether a woman has an incompetent cervix is fairly simple. Incompetent cervix can be detected either through a manual pelvic exam or though ultrasound. Incompetent cervix can be treated though a procedure known as cervical cerclage. This simple treatment involves sewing your cervix with stitches.' • 'The surgery is actually a simple matter of inserting a noose-like tape around the perimeter of the cervix to keep it closed…a cerclage is a lifesaver and an intuitively obvious solution to the problem of incompetent cervix.'
Lawyers	• **Obstetrics for Lawyers by John Hare 2000** Allegations of a failure to perform cervical cerclage and hence of a failure to prevent late miscarriage or early delivery of a child who develops cerebral palsy because of prematurity is a frequent reason for litigation. • **Medical Malpractice Settlement Report 2004** $1.4M settlement for mother of child with cerebral palsy as a result of failure to utilise cerclage resulting in premature delivery of the minor plaintiff at 26 weeks, resulting in his moderate neurologic injuries. • **Undisclosed County (Mass) Superior Court 2003** $2.6M settlement. Failure to place cerclage blamed for brain damage: due to an incompetent cervix, a woman gave birth at 25 weeks gestation to a baby girl. In suing, the mother claimed that the O and G failed to recommend cervical cerclage despite the fact that the woman had a prior fetal loss due to an incompetent cervix, as well as previous successful pregnancy with the placement of a prophylactic cerclage. The woman maintained that her child's injuries would have been avoided had a cerclage been utilised. The O and G contended that the patient's medical history as described was not consistent with an incompetent cervix. • In one case, a pregnant woman with a known history of miscarriages was not given a simple procedure, called a cervical cerclage, to prevent another miscarriage. As a result, she again delivered early and her baby became blind with retinopathy of prematurity.

Summary

- Assess risk factors and take an obstetric history to identify women at risk of preterm delivery.
- It is difficult to identify who, among women at risk of preterm delivery, will have cervical incompetence.
- Prophylactic cerclage, based on history alone, is unneccesary intervention in 50 per cent of cases.
- Transvaginal USS is useful for high-risk women: Identifies the truly high-risk among the perceived high-risk cases.
- Transvaginal USS modifies A Priori risk. It can be used to avoid unnecessary intervention.
- Cervical length of less than or equal to 25mm is the optimum cut-off for identifying the high-risk cases.
- Transvaginal USS from 14 to at least 24 weeks, optimum interval unknown.
- Secondary cerclage if high-risk and short cervix on USS.
- Evidence does not suggest cerclage for a short cervix alone has any benefit.[10] USS is not useful in low-risk women.
- A short cervix increases risk of preterm delivery but does not by itself equate to cervical incompetence.

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