The evidence for the use of cervical cerclage

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Abstract

Cervical incompetence is an important factor in the aetiology of preterm birth and mid-trimester miscarriage. Its diagnosis usually relies on clinical history, but recent studies have investigated the role of transvaginal ultrasound scanning, with the finding of shortened cervical length being associated with an increased risk of preterm delivery.

Cervical incompetence can be treated using MacDonald and Shirodkar cervical sutures. The largest study to date found a significant reduction in preterm delivery in those women who had a suggestive clinical history. This finding has been supported by the insertion of sutures in women found to have a shortened cervix on ultrasound scan. These findings are inconsistent, with some studies failing to confirm benefit.

Transabdominal cervical sutures have a role in treating women with previously failed cervical cerclage (success rates reported as over 80% in most studies) although the numbers of women who have undergone this treatment is small.

Cervical sutures have been used in the management of multiple pregnancies, although to date there is no good evidence that cervical sutures have a significant role.

The use of emergency cervical sutures seems to have a role in a select population of women who present with painless cervical dilatation, in the absence of infection; in these women gestation has been prolonged by up to seven weeks.
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1. Introduction

Delivery prior to 37 weeks' gestation occurs in 10% of pregnancies and accounts for 75% of neonatal deaths [1]. Delivery is iatrogenic in about a third of cases and spontaneous in the remainder, with cervical incompetence playing a significant role. This article reviews the evidence for the use of cervical cerclage in the management of cervical incompetence. Aspects covered include the diagnosis of cervical incompetence, an assessment of relevant research publications on the use of cervical cerclage in the prevention of preterm birth, and its role as an emergency treatment in pregnant women presenting with painless cervical dilatation. The use of cervical cerclage in the management of multiple pregnancies is also discussed.

2. Pathogenesis

The pathogenesis of cervical incompetence remains unclear. Although associated with cervical trauma and congenital urogenital abnormalities, it is mostly a diagnosis made retrospectively in women with anatomically normal cervices. Cervical ripening involves the activation of inflammatory pathways with significantly increased levels of pro-inflammatory cytokines in the cervix, in both term and preterm labour [2]. Risk factors predisposing to preterm labour include multiple pregnancy, infection (systemic or intra-uterine), uteroplacental ischaemia and congenital anomalies. It has been proposed that these risk factors

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may alter the threshold by which the mechanical barrier of the cervix can be breached, leading to colonisation by vaginal bacteria and up-regulation of the pro-inflammatory pathways initiating cervical change and preterm labour [3].

3. Diagnosis of cervical incompetence

Diagnosis of cervical incompetence is problematic due to the lack of standard diagnostic criteria. Diagnosis is usually based on women's past obstetric history, being suggested by one or more second or early third trimester losses characterised by a rapid and often relatively pain-free labour. Problems with this clinical basis for definition are that it is a subjective diagnosis made retrospectively.

Researchers have attempted to establish accurate diagnostic criteria to diagnose cervical incompetence. A cervical compliance score has been proposed, and this incorporates three scores measured at hysteroscopy [4]; the cervical-canal ratio (upper cervical canal width compared to the hysteroscope width on an X-ray film taken during hysteroscopy), the degree of difficulty passing a number eight Hagar dilator, and the degree of traction required to pull a balloon filled with 2 ml of saline, were assessed together producing a cervical compliance score. A higher preterm delivery rate was seen in those with a high score compared to low (24% compared to 9% delivering before 30 weeks). However, those with a high score were recommended for a cervical cerclage and despite this had a higher rate of premature delivery. Disadvantages of hysteroscopy are that it cannot take place during pregnancy and relies on clinical history to initiate the investigation. Digital cervical examination has also been studied but was found not to improve outcome [5]. Instruments designed to measure the force required to pass a dilator through the cervix have been studied, and women with a classical history of second trimester miscarriage had a lower cervical resistance score compared to a parous control group [6].

Transvaginal ultrasound scanning of the cervix has been investigated to identify women at risk of preterm delivery. A large study of a low-risk population found it acceptable to women, with 90% reporting that the procedure was associated with no or only mild discomfort and embarrassment and 75% finding it equally or less uncomfortable than a speculum examination [7]. These researchers found good inter- and intra- observer variability with highly reproducible cervical length measurements. In 95% of occasions the difference between two measurements by the same observer, and by two observers, was 3.5 mm or less and 4.2 mm or less respectively.

Iams et al. examined 2915 women at approximately 24 weeks and again at 28 weeks and compared results with delivery before 35 weeks gestation, measuring the cervix transvaginally from the internal os to the external os [8]. The relative risk of pre-term delivery was 1.98 (95% confidence interval (CI) 1.20–3.27) for women at or below the 75th

percentile (cervical length 40 mm), 3.79 (95% CI 2.32–6.19) at or below the 25th percentile (30 mm), and 9.49 (95% CI 5.95–15.15) at or below the 5th percentile, and 13.99 (95% CI 7.89–24.78) at or below the 1st percentile (13 mm). This supported the hypothesis that cervical incompetence is a continuum rather than the cervix being either incompetent or competent.

Another large study investigated the role of transvaginal ultrasound in predicting risk of preterm delivery before 32 weeks gestation [9]. Measurement of cervical length at 23 weeks gestation provided a sensitive prediction of severe pre-term delivery. In this low-risk cohort 2% had cervical length of ≤ 15 mm. This group contained 60% of women delivering spontaneously before 32 weeks' gestation, 80% of those delivering at ≤ 30 weeks' gestation and 100% of those delivering at ≤ 26 weeks. The estimated risk for severe pre-term delivery increased with decreasing cervical length from 0.2% at 60 mm, to 0.8% at 30 mm, 4.0% at 15 mm and 78% at 5 mm.

Funnelling of the cervix may be associated with increased risk of pre-term delivery. The description of funnelling varies in the literature from 'any degree of funnelling' [10] to 'protrusion of the amniotic membranes 3 mm or more into the internal cervical os' [8], and to 'dilatation of the internal os of ≥ 5 mm in width' [11]. Funnelling was defined as a significant predictor of pre-term delivery after controlling for cervical length in one study [8]. However, other researchers have failed to show an association of cervical funnelling independent of cervical length [11].

4. Treatment of cervical incompetence

Therapies for cervical incompetence aim to provide additional structural support to the cervix by using a circumferential suture placed transvaginally or transabdominally. Mechanisms of action include a structural effect, the benefit of additional cervical length and reduction of the risk of ascending infection. When assessing the benefit of treatment it is important to consider the natural history without any intervention in these women. Women who have delivered one pregnancy between 20 and 36 weeks gestation will carry a subsequent pregnancy to term in 85% of cases, and those who have delivered two pregnancies at the same gestation will deliver at term in approximately 70% of occasions [12].

4.1. Primary transvaginal cervical cerclage

The techniques for cervical suture described by Shirodkar [13], later modified by MacDonald [14], have become the standard methods used today. Both involve placement of a circumferential suture around the cervix, Shirodkar's technique including dissection of the bladder, with MacDonald's being a simple purse string suture. No studies