Cervical cerclage in difficult situations: giving life a chance!

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An estimated 13.4 million babies were born preterm in 2020. The majority of preterm births occur in southern Asia and sub-Saharan Africa with more than 90% of extremely preterm babies (less than 28 weeks) born in low-income countries die within the first few days of life. In addition, survivors of preterm birth live with a lifetime of disability, including learning disabilities and visual and hearing problems, thus leading to a huge burden to the healthcare system[1].

There are a considerable number of interventions in order to improve the survival rate of preterm babies. Delaying the delivery by even a few days during extreme prematurity has shown to have a significant improvement in the survival and overall outcomes.

Cervical insufficiency is the inability of the cervix to retain the fetus, in the absence of uterine contractions or labor (painless cervical dilatation), owing to a functional or structural defect which occurs 1% in the general obstetric population and 8% in women with a history of previous mid-trimester miscarriages[2].

It is a component of a larger and more complex spontaneous preterm birth syndrome. Recent evidence suggests that cervical integrity is likely to be a continuum influenced by many endogenous and exogenous factors and not solely due to the intrinsic structure of the cervix[3].

Cervical cerclage is a key intervention that reduces the risk of preterm birth or second trimester pregnancy loss. It provides a degree of structural support to a 'weak' cervix[2]. This maintains the cervical length and the integrity of the endocervical mucus plug that act as a mechanical barrier to ascending infections[4].

Indications for cervical cerclage insertion are categorised into 3 types:

1. History indicated
2. Ultrasound indicated
3. Rescue cerclage

In the early 90's, an attempt was made to place a stitch

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on the cervix to prevent preterm birth. An article published in the AJOG in 1950 describes that the aetiology of habitual abortions is multifactorial[5].

In 1955, an Indian gynaecologist, Dr. Vithal Nagesh Shirodkar presented a different method to treat cervical incompetence where he initially used 3 strings of catgut material, later he started to use "harvested fascia lata" as a suture material now famously known as the Shirodkar cerclage[6].

Two years later, in 1957, Ian McDonald of Melbourne, Australia, introduced what is now the most commonly performed cerclage technique, the McDonald cerclage. This involves placing a transvaginal purse-string suture at the cervicovaginal junction, avoiding dissection of the bladder and rectum and is currently considered the method of choice by many gynaecologists[6].

Multiple modifications of the Shirodkar method have been described. One commonly described modification involves only anterior mucosal dissection, while leaving the posterior aspect of the suture exposed. Caspi and colleagues made a single transverse incision anteriorly and placed a knot high in the posterior fornix at 6 'O' clock position[7].

Other methods include the Wurm technique and the Espinoza Flores cerclage[8].

Although many modifications exist, the choice of transvaginal cerclage technique (high cervical insertion with bladder mobilization or low cervical insertion) should be at the discretion of the surgeon [Grade C], but the cerclage should be placed as high as is practically possible[9].

Two common options are monofilament non-braided suture (looped nylon) and the multifilament braided suture (mersilene tape). Current data do not confirm the superiority of one suture type over the other, thus the choice is therefore made based upon the operators' experience and preference[10].

As properly designed studies comparing Shirodkar to McDonald's cerclage are scant, only data from systematic reviews shed some light. In summary, no well-designed study has confirmed which method is the superior.

The first abdominal cerclage was reported by Benson and Durfee in 1965 for patients with extreme cervical shortening. It allows for placement of the suture at the internal os, providing greater structural support to the cervix. The absence of a foreign body in the vagina may also reduce the risk of ascending infection. However, this necessitates a cesarean delivery and the procedure is also viewed as a more morbid option due to the risk of bleeding from the uterine vessels[11]. Evidence supports an abdominal cerclage as a more effective treatment than repeated vaginal cerclage in patients with one prior failed vaginal cerclage[12].

In certain difficult situations such as patients with refractory cervical insufficiency or very short cervices requiring a high cerclage and since the abdominal method is the more morbid option, we tried hydro-dissection using diluted vasopressin to improve the quality of the surgeries.

During the Shirodkar method, dissection of the bladder away from the cervix can lead to bleeding, making the surgical field less clear[13]. RCTs have shown that infiltration of vasopressin to minimize blood loss in various gynaecological surgical procedures is a safe and effective option[12]. There is evidence to suggest that local injection of vasopressin reduces blood loss during caesarean section in placenta previa.

Vasopressin is a potent vasoconstrictor that acts on V1 and oxytocin receptors. Oxytocin and V1 receptors are very low in early pregnancy in both the myometrium and the endometrium. In addition, the cervical region has low levels of V1 receptors[15].

The FDA advises using vasopressin only if the benefits outweigh the risks in pregnancy. Hence, we judiciously used diluted vasopressin in women who have very short cervix or had a history of failed McDonald method before. We obtained ethical approval and written consent from the patients prior to procedures.We infiltrated the diluted vasopressin (1 vial: 200ml saline equant to 0.1 units/ml) to vesico-cervical junction to perform hydrodissection.

We also conducted a study to assess whether hydro-dissection using diluted vasopressin during the modified Shirodkar cerclage improves the surgical quality. Previously, a case series involving 10 cases where hydrodissection using diluted vasopressin has already been published[16]. The current study involved a total of 44 pregnant patients with ages ranging from 22 to 43 years. Among them, only four were gravida 1 (G1). The procedures conducted included 10 elective and

34 emergency cases. Additionally, four patients had a history of one failed cervical cerclage, while two had experienced two failed vaginal cervical cerclages, and one had a prior Manchester repair. Three patients had twin pregnancies with a short cervix, and 34 cases showed a cervix shorter than 2 cm with or without bulging membranes. The procedures primarily involved the use of merselene tape in 34 cases and 2 looped nylon in 10 cases, with diluted vasopressin used in all instances to manage bleeding. Intraoperative complications were minimal, with only one case involving bleeding due to an accidental prick in the vaginal side wall. Fortunately, no anaesthetic, cardiac, or uterine contraction complications were reported, and no damage to membranes occurred during the procedures. Post-operative complications included two cases of excessive bleeding managed conservatively and three cases of ruptured membranes within a week after the procedure. Four patients required stitch removal before 28 weeks, while five delivered between 28 to 34 weeks, and 35 patients delivered after 34 weeks. Unfortunately, there were three early neonatal deaths. Difficult stitch removal was experienced in four cases, which necessitated removal in the operating room, while the remaining stitches were removed in outpatient department settings. Furthermore, one case of an infected residual stitch was reported. The study provides valuable insights into the outcomes and challenges associated with these pregnancy procedures, and underscores the need for careful monitoring and management throughout the process.

A novel tool has been designed to improve the efficiency of cerclage procedures: Curved cervix holding forceps.

We have acquired intellectual property rights for this industrial design. This instrument was designed to have curved jaws, a shaft, a hinge, a shank, a ring handle and a ratcheted lock. The curved jaws had been uniquely designed to hold the circumference of the cervix both the anterior and posterior lips together without crushing and this compression would push the membrane upwards within the canal and provide a safe margin for the surgeon to pass the needle with confidence. This device cannot only push the membrane away, but also can provide a good grip for the surgeon to hold the cervix and minimsie the bleeding risk when it is applied along the cervix following the dissection of the bladder base as in the Shirodkar method. This tool appears to be more useful in performing cervical cerclages that are deemed to be difficult, such as women with a shorter cervix less than 1.5 cm and women with membrane bulging through the cervix. Another benefit is that this tool can be used even with a combination of other membrane repositioning methods described in the literature. Clinical trials will be undertaken in the future prior to making strong recommendations. Further surgical and non-surgical use of this device and further modifications will also be explored and documented in future.

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