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Laparoscopic Transabdominal Cerclage for Cervical Insufficiency in the Setting of Severe Acquired Vaginal Gynatresia

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Abstract

Introduction: Cervical insufficiency (CI) associated with **severely obstructive vaginal anatomy** represents a rare and complex surgical challenge. While transabdominal cerclage (TAC) is classically indicated after failed transvaginal approaches, its laparoscopic application (LTAC) in the setting of complete vaginal obliteration remains poorly documented, particularly in low-resource settings. **Case Presentation:** A 33-year-old woman (G4P0) with three prior second-trimester losses presented at 10 weeks of gestation. Clinical evaluation revealed acquired concentric vaginal gynatresia, rendering the cervix completely inaccessible. To bypass this anatomical barrier and address her recurrent CI, a laparoscopic transabdominal cerclage was performed at 11 weeks using a polypropylene mesh. **Results:** The procedure was completed successfully with minimal blood loss and no fetal compromise. The pregnancy was prolonged from a baseline of 14 weeks in previous gestations to 30 weeks. Delivery was performed via cesarean section. Although the neonate survived only 48 hours due to extreme prematurity-related complications, the surgical goal of achieving a viable gestational age was significantly advanced. **Conclusion:** LTAC is a robust and feasible intervention for patients with a "hostile" vaginal

vault. In regions where caustic-induced vaginal stenosis is prevalent, LTAC should be integrated into the surgical armamentarium to improve obstetric outcomes.

Keywords

Laparoscopic Transabdominal Cerclage, Cervical Insufficiency, Acquired Vaginal Gynatresia, Salvage Surgery, Cameroon

1. Introduction

Cervical insufficiency (CI) is a pivotal etiological factor in recurrent second-trimester pregnancy loss and extreme prematurity, with profound emotional and psychological repercussions for affected individuals [1]. Transvaginal cervical cerclage, as described by Shirodkar and McDonald, remains the standard surgical intervention [2] [3]. However, its efficacy is limited when the cervix is anatomically distorded or surgically unreachable, including cases of prior trachelectomy, severely shortened or scarred cervix, congenital anomalies, or failed previous cerclage [4].

In such circumstances, transabdominal cerclage (TAC) offers a mechanically superior alternative by positioning the suture at the uterine isthmus, above the pathological cervical segment [5]. Historically performed via laparotomy, the open TAC, while effective, is associated with significant operative morbidity and complicates future delivery, necessitating a cesarean section [6]. The advent of minimally invasive surgery introduced the laparoscopic approach (LTAC), typically performed pre-pregnancy or in the early first trimester, demonstrating reduced morbidity, shorter hospitalization, reduced adhesion formation, and faster recovery while maintaining comparable obstetric outcomes to the open technique [7] [8].

In the present report, LTAC was not employed as an emergency or classic salvage cerclage but as an anatomically indicated abdominal strategy, necessitated by complete vaginal obstruction that rendered any vaginal approach impossible.

2. Case Presentation

A 33-year-old G4P0 woman was referred at 10 weeks' gestation with history of three consecutive pregnancy losses between 14 and 16 weeks, despite prophylactic transvaginal cerclages in the two most recent pregnancies. Gynecological examination revealed severe acquired vaginal gynatresia, with a concentric fibrous ring obstructing the lower third of the vagina (**Figure 1**). This lesion resulted from the intravaginal use of traditional caustic substances for infertility treatment.

Given the impossibility of vaginal access and the high hemorrhagic risk of vaginoplasty during pregnancy, an anatomically indicated laparoscopic transabdominal

cerclage was selected.

2.1. Surgical Procedure

Under general anesthesia, a four-port laparoscopy was performed (Figure 2). Because vaginal uterine manipulators were contraindicated, uterine manipulation was achieved using atraumatic laparoscopic graspers applied to the round ligaments and fundus, combined with controlled external suprapubic pressure. This technique allowed adequate uterine mobilization, exposure, and stabilization throughout the procedure.

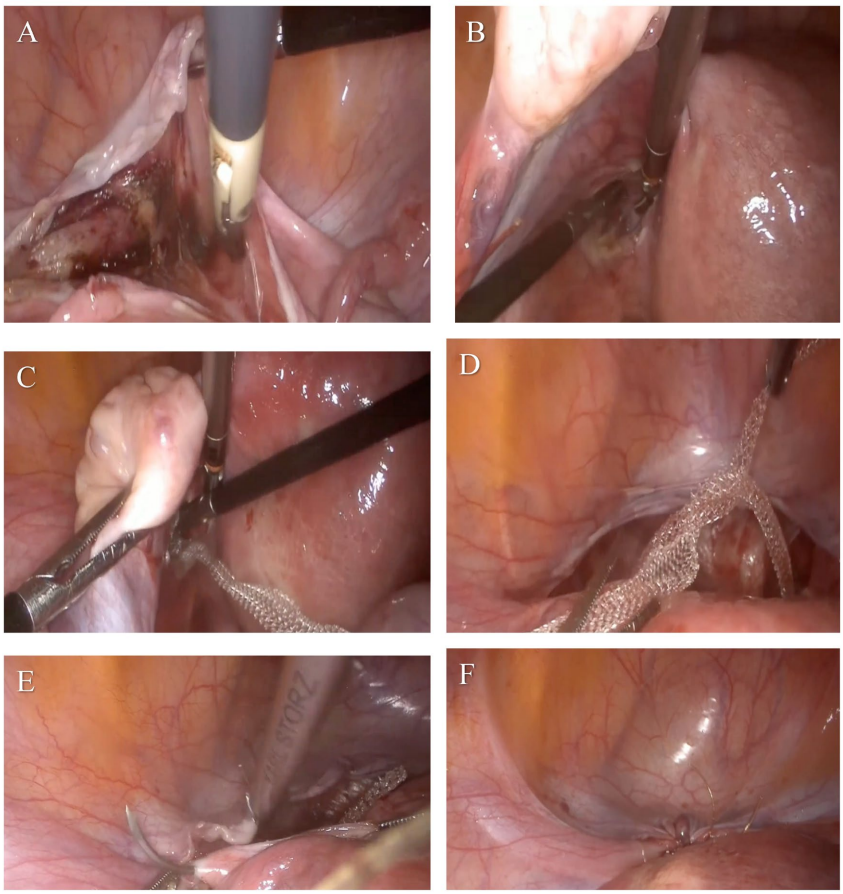
The vesicouterine peritoneum was sharply incised, and the bladder was reflected inferiorly to expose the uterine isthmus. A 1.5 cm macroporous polypropylene mesh was passed through bilateral fenestrations created in the broad ligaments medial to the uterine vessels and secured anteriorly at the cervico-isthmic junction with intracorporeal knots. Fetal viability was confirmed intraoperatively and postoperatively by ultrasound.

2.2. Postoperative Management and Follow-up

Postoperatively, the patient received prophylactic antibiotics for 48 hours and vaginal progesterone (200 mg daily) until 24 weeks' gestation. No routine tocolysis was administered. Serial ultrasound monitoring demonstrated stable cervical length (25 mm).

At 30 weeks of gestation, she presented with preterm premature rupture of membranes (PPROM) followed by spontaneous labor. A cesarean section was performed, delivering a male neonate weighing 1050 g. Despite neonatal intensive care, the infant died after 48 hours form respiratory distress syndrome.

Figure 1. Acquired Vaginal gynatresia with concentric stenosis in the lower third of the vagina (image from HGOPY).



A: Vesicovaginal space dissection; **B**: Fenestration of broad ligament; **C**: Passing mesh trough the fenestrated broad ligament; **D**: Cervico-isthmic mesh knotting; **E**: Closure of vesico-uterine peritoneum; **F**: Final view after reperitonization.

Figure 2. Laparoscopic transabdominal cerclage (Images from HGOPY).

3. Discussion

This case illustrates the successful surgical management of CI in the presence of severe vaginal gynatresia. While gestational prolongation was achieved, the outcome highlights the complexity of defining "clinical success" solely on gestational age extension, particularly in the context of neonatal mortality.

In Sub-Saharan Africa, iatrogenic vaginal stenosis remains a disturbing reality due to traditional practices. Our critical analysis suggests that in such "hostile" environments, the abdominal route is not merely an alternative but a mandatory requirement. We demonstrated that even in a low-resource setting, laparoscopic precision allows for the safe placement of a permanent mesh, which can be left in situ for future pregnancies, thereby avoiding the trauma of repeat abdominal surgeries. The extension of the pregnancy from 14 to 30 weeks represents a significant "clinical success", shifting the prognosis from inevitable loss to potential viability.

The evolution of this patient's care, from failed prophylactic McDonald cerclages to a successful LTAC, mirrors a paradigm shift in managing refractory CI. Transvaginal cerclage, while effective for many, fails in a subset of patients, often

those with a profoundly short cervix, prior surgical excision, or congenital anomalies [9] [10]. Our patient's consecutive losses despite cerclages placed at 12 - 13 weeks strongly suggest that the site of functional failure was above the level achievable via the vaginal route. The transabdominal approach, by placing a permanent suture at the level of the uterine isthmus, provides superior mechanical support by physically reinforcing the internal os and the upper cervical canal [11]. Systematic reviews confirm that abdominal cerclage, whether open or laparoscopic, yields high rates of term delivery (often >85%) in patients with prior transvaginal cerclage failure [7].

However, the defining feature of our case was not merely prior failure, but the absolute contraindication to a vaginal approach. The severe vaginal stenosis transformed LTAC from a superior choice into the only viable option. While LTAC is well-documented for cervical anomalies or a "absent" cervix post-trachelectomy [12] [13], its indication for iatrogenic or inflammatory vaginal stenosis is less frequently highlighted. This scenario is particularly relevant in contexts where the use of traditional vaginal practices is prevalent, potentially leading to caustic injuries. A study from Côte d'Ivoire on iatrogenic gynecologic conditions underscores the reality of such complications in African healthcare settings [14]. In these situations, attempting vaginoplasty during pregnancy is fraught with risks of hemorrhage, infection, and pregnancy loss. LTAC elegantly bypasses this hostile territory, accessing the uterus directly through the abdomen. This case expands the classical indications for LTAC to include any condition that creates an impassable vaginal corridor, solidifying its status as a first-line necessity rather than a last resort in such specific anatomical contexts.

The technical success of LTAC hinges on precise surgical anatomy and optimal timing. Performing the procedure at 11 weeks of gestation was a strategic decision that leveraged the advantages of the first trimester. The smaller uterine size facilitates laparoscopic manipulation, provides excellent exposure of the uterine isthmus and uterosacral ligaments, and significantly reduces the risk of bleeding from engorged pelvic vessels or iatrogenic rupture of membranes [15]. Large case series, such as that by Ades *et al.* (n = 121 pregnancies), demonstrate that LTAC performed preconceptionally or in the early first trimester is associated with the highest success rates and lowest complication profiles [8]. Delaying the procedure increases technical difficulty and may compromise outcomes.

The laparoscopic technique itself demands advanced skills. The dissection of the vesicouterine peritoneum, careful creation of a window in the broad ligament medial to the uterine vessels, and secure placement of a permanent suture at the cervico-isthmic junction are critical steps [16] [17]. Our decision to leave the polypropylene Mesh in place for future pregnancies is standard, avoiding the need for repeat abdominal surgery and its associated risks [6]. This aspect is crucial for counseling patients in settings with high fertility desires, as it offers a durable solution for subsequent pregnancies.

This case powerfully illuminates the stark disparities in managing CI between

high-income countries and many African nations. The challenges are multifactorial. First, diagnostic capacity is a major bottleneck. Routine mid-trimester cervical length screening via transvaginal ultrasound, the cornerstone of identifying at-risk pregnancies in high-resource settings [18], is not widely available or standardized across much of Africa [19]. Many women, like our patient in her earlier pregnancies, are only diagnosed after cervical dilation has begun, tragically limiting therapeutic options. The establishment of our patient's diagnosis at 10 weeks in this pregnancy was a fortunate exception enabled by referral to a tertiary center.

Second, therapeutic access is severely limited. While LTAC is a standard offering in specialized centers in Europe and North America, in Africa, it remains confined to a handful of urban, tertiary-care institutions with advanced laparoscopic capabilities [20] [21]. The required multidisciplinary team, maternal-fetal medicine specialists, skilled laparoscopic surgeons, and specialized anesthetists, represents a concentration of expertise that is rare. Furthermore, the cost of laparoscopic equipment and maintenance can be prohibitive. This creates a profound inequity where a life-changing procedure is geographically and economically out of reach for most women on the continent.

This case hints at the complex interface between biomedical and traditional health systems. The patient's use of traditional vaginal suppositories, a practice documented in studies on infertility management in Côte d'Ivoire and other regions, may have directly contributed to the vaginal pathology that complicated her care [14]. This underscores the need for culturally sensitive health education and engagement with traditional practitioners to prevent harmful practices, while not dismissing the important psychosocial role these systems play.

For women with a history suggestive of CI and an anticipated hostile vaginal anatomy (from prior surgery, trauma, or infection), preconception counseling should include a discussion of LTAC as a planned primary intervention. Viewing LTAC not as a failure of vaginal cerclage but as a planned, definitive strategy for a specific anatomical problem can reframe patient hope and clinical planning.

Although the pregnancy did not result in a surviving neonate, the procedure successfully prevented mid-trimester loss, which had been inevitable in previous pregnancies. It validates LTAC as a singularly effective solution when CI coexists with an inaccessible cervix and contributes to the scarce literature on this specific indication from an African perspective.

Our report is limited by its nature as a single case study, which precludes generalization. We cannot definitively prove causation between the traditional suppositories and the gynatresia, though the association is highly plausible. A comparative analysis with other potential strategies (attempted vaginoplasty) was not possible. Despite the surgical success in prolonging the pregnancy to 30 weeks, the neonate succumbed to complications of extreme prematurity, reminding us that LTAC is a tool for viability but does not eliminate all risks of preterm birth.

The occurrence of PPROM at 30 weeks warrants careful consideration. The vaginal gynatresia may have created a closed reservoir favoring bacterial coloni-

zation and ascending infection, potentially contributing to membrane rupture. Alternatively, although unlikely, chronic foreign-body presence of the mesh could have played a minor inflammatory role. No clinical signs of chorioamnionitis were observed, and infection remained speculative.

4. Conclusion

Laparoscopic transabdominal cerclage is a valuable anatomically indicated intervention for cervical insufficiency when the vaginal route is inaccessible. While it can significantly prolong gestation, its impact on neonatal survival depends on multiple factors beyond cervical competence alone. Expansion of access to LTAC in specialized African centers is warranted for selected high-risk patients.

Authors' Contributions

All authors who contributed to this work have declared that they have read and approved the final version of the manuscript.

Consent

The patient provided written informed consent for the publication of her clinical history and associated images.

Conflicts of Interest

The authors have no conflicts of interest to declare regarding the publication of this manuscript.

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