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Case Report

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Preterm Labor Associated with Cervical Cerclage Infected by Morganella Morganii: A Case Report

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Abstract

Backround: Cervical cerclage (CC) is one of the limited effective interventions currently available to prevent preterm resulting from cervical insufficiency. One of the possible complications of cervical cerclage is infection of the suture. Morganella Morganii is considered as an uncommon,opportunistic pathogen that mainly causes post-operative wound and urinary tract infections and rarely involves obstetrical pathology.

Case presentation: We report a 37-year-old, G2P1 woman, with a history of a previous preterm birth due to cervical insufficiency, who underwent cervical cerclage placement at 20 weeks of gestation. She presented to the maternity department at 35+4weeks of gestation with vaginal discharge and uterine contractions. The cerclage was removed, and she gave birth vaginally the next day. A laceration of the cervix occurred during the labor and the neonate was admitted two days afterwards to the neonatal ICU because of apneas, caused by an infection. The culture of the cervical cerclage suture yielded multi-resistant Morganella Morganii.

Conclusions: Cervical cerclage-related infections due to Morganella morganii are rare but clinically relevant. This case underlines that early diagnosis and timely removal of cerclage,tailored antibiotic treatment may improve maternal and neonatal conditions in such cases. More studies are needed to determine the epidemiology and personalized management of these patients.

Keywords: Preterm labor; Morganella Morganii; cervical cerclage

Abbreviations

The following abbreviations are used in this manuscript:

PTB: Preterm Birth

CC: Cervical Cerclage

CI: Cervical Insufficiency

Introduction

Preterm birth (PTB) is commonly defined as any birth before 37 weeks completed weeks of gestation [1]. Cervical insufficiency (CI), or a short/incompetent cervix, is a major risk factor for preterm birth. Management frequently involves placement of a cerclage, a procedure whereby a suture is placed around the cervix to prevent premature dilation and preterm labor [2].

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Cervical cerclage is indicated based on either a medical history, ultrasound, or a physical exam. History-indicated cerclage is indicated for women with a history of three or more preterm deliveries and/or a history of second-trimester miscarriages and is typically done electively in the late first or early second trimesters [3]. Ultrasound-indicated cerclage is recommended for women who, before 24 weeks of pregnancy, have a cervical length shorter than 25 mm on a transvaginal ultrasound and a history of one or more spontaneous preterm births or second-trimester losses [3]. Physical examination-indicated, or rescue cerclage, is done when a pregnant woman shows signs of painless cervical dilation during a physical exam before 24 weeks of pregnancy, often with visible fetal membranes, to prevent an imminent preterm birth. The decision to perform cerclage depends on a comprehensive evaluation of the patient's medical history, clinical presentation, and institutional protocols, making consultation with a maternal-fetal medicine specialist essential [4].

While cerclage has been proven to lessen the incidence of of preterm birth in certain populations, its application is not without potential complications, including infection. Infections associated with cerclage can lead to adverse outcomes, such as preterm premature rupture of membranes and chorioamnionitis, which may lead to preterm labor [5] It is estimated that 25–40% of PTBs are caused by intrauterine infections [6,7]. In a study of 482 cases, Treadwell et al. reported an overall infection rate of 6.6%, with higher rates observed in emergent compared to elective cerclage procedures (12.7% vs. 4.7%, respectively) [8]. Intrauterine infections during pregnancy are most frequently caused by bacteria ascending from the vagina and the cervix [7]. Infection can complicate the management of pregnancy even with cerclage, resulting in preterm delivery or other adverse pregnancy outcomes.

Morganella morganii, a Gram-negative, rod-shaped, facultative anaerobic bacillus [9], is an uncommon cause of obstetrical pathology and has been associated with cases of early-onset neonatal sepsis [10,11].

Morganella morganii is commonly a part of the normal flora of the intestinal tracts of humans, mammals, and reptiles and it is usually harmless, but as an opportunistic pathogen, it can cause a variety of infections, especially in immunocompromised patients. Clinical manifestations of M. morganii are urinary tract infection, skin and soft tissue infection, sepsis, abscess, and rare cases of purple urine bag syndrome, chorioamnionitis, and cellulitis [12]. Another single center, retrospective study from a tertiary hospital showed that soft tissue and skin infection was the most common presentation accounting for 54% of patients, followed by pyelonephritis and infections of female genital tract. Importantly, M. morganii was frequently involved in polymicrobial infections, and although fatality was uncommon, it did occur in immunocompromised patients [13].

Bacteremia caused by M. morganii infections has been associated with high mortality rates, especially in elderly, those with underlying conditions and in neonates [11,13]. The urinary tract is frequently identified as the primary portal of entry in most of these cases [14].

The emergence of antibiotic-resistant strains of M. morganii poses a growing concern. Some clinical isolates exhibit resistance to multiple antibiotics, including the production of extended-spectrum beta-lactamases and metallo-beta-lactamases, which complicate treatment strategies [10]. Therefore, the empirical treatment with wide spectrum antibiotics may be useless in such cases and a more personalized management of the infection should be considered. Given the increasing recognition of M. morganii as a significant opportunistic pathogen, understanding its epidemiology, resistance profiles, and clinical impact is crucial for effective management and treatment of infections caused by this organism.

Case Report

A 37-year-old G2P1 woman presented to the emergency department with complaints of uterine contractions and increased vaginal discharge at 35+4 weeks of gestation. Her obstetrical history was significant for a preterm delivery at 35weeks in her last pregnancy, three years ago due to cervical incompetence, diagnosed based on her history of painless cervical dilation. At the 20th week of her current pregnancy she had undergone a cervical cerclage, performed with McDonald's technique, because of a shortened cervix observed on ultrasound and taking her obstetrical history into consideration. To be more specific, her cervical canal length had decreased from 35mm at the first trimester to 21mm at the 20th week of her pregnancy, with funneling.

The patient had also been diagnosed with gestational diabetes by the glucose tolerance test at 24 weeks of pregnancy and was treated with diet. Her first and second trimester scans had shown low risk for fetal abnormalities.

Upon vaginal examination of the patient at the emergency department a thick, malodorous vaginal discharge was observed. Her vital signs at presentation were blood pressure of 130/85 mmHg, heart rate of 95 beats per minute, respiratory rate of 18 breaths per minute, temperature of 36.9°C, and oxygen saturation of 97% on room air. Her cardiotocography revealed a reassuring fetal heart rate and 80mmHg uterine contractions, 3-4 per 10 minutes. At her admission her blood chemistry showed elevated white blood cells with neutrophilia and lymphopenia (WBC:16900, Neu :83%) and her CRP was mildly increased. The cervical cerclage was removed, and the suture was removed and sent microbiology laboratory for

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analysis. She was treated with prophylactic intravenous (IV) 2000 mg ampicillin every six hours, and she received it for 48 hours.

She gave birth the next day, vaginally after rupture of the membranes. to a male, weighing 2930 grams, with APGAR score 9/10 at the first minute. Amniotic fluid stain at the time of the rupture was classified as grade 2 and the cardiotocography during the labor was reassuring. A laceration of the cervix occurred during the labor at the 9 o'clock position and a second-degree perineal tear. They both required suturing. During her hospitalization she remained afebrile, and her vital signs were stable. Her WBC also decreased to 14.720 with Neu :79 % one day after the labor. Her hematocrit, despite the cervical laceration which caused some blood loss, remained stable at 37%

The microbiological analysis of the cervical cerclage suture revealed infection by Morganella Morganii. The bacillus was resistant to cephalosporines (MIC>=64.0) and ampicillin (MIC>=32.0) and sensitive to gentamicin (MIC<=1.0) and quinolones (MIC <=0.25 for ciprofloxacin), according to the antibiogram. The bacillus was sensitive to piperacillin/ tazobactam as well (MIC <=4.0). However, the available pharmaceutical form of piperacillin/ tazobactam in Greece can only be administered intravenously. Therefore, oral ciprofloxacin was chosen, so that the patient could be discharged, as her clinical condition was already improved by the time the microbiological results were provided.

The infant was admitted to the neonatal ICU 48 hours later, because of jaundice and apnoea. The apnoea was attributed to early-onset neonatal infection and the newborn was given antibiotic prophylaxis. At its admission, white blood cells and CRP were elevated (WBC: 12000 and CRP :0.20) and total bilirubin level was 15.48mg/dL. Intravenous benzylpenicillin with gentamycin as the first- choice antibiotic regimen for empirical treatment of suspected early-onset infection. The blood culture was negative, and neonatal sepsis was not confirmed. However, the neonatal infection causing the apneas could be associated with the infected cervical cerclage suture by Morganella Morgani and the treatment with gentamycin that was administered to the neonate may have helped significantly, as it was established that the pathogen was sensitive to it.

The patient was discharged two days after the labor from the obstetrical department with normal vital signs and biochemistry and the instruction to receive ciprofloxacin orally twice a day for ten days, according to the antibiogram. The infant was discharged from the ICU after nine days in good clinical condition, with improved biochemistry.

During her follow up examination ten days afterwards there was no foul-smelling or purulent lochia detected, and her biochemistry was normal.

Discussion

Morganella morganii is a gram-negative, facultative anaerobic bacillus from the Enterobacteriaceae family. It is natively part of the normal flora of the gastrointestinal tract, but it may serve as an opportunistic pathogen in immunodeficient patients or when medical devices are inserted. Specifically, it is known to cause urinary tract infections, as well as intra-abdominal infections, especially of the hepatobiliary tract [12,13]. Although M. morganii is an infrequent pathogen among obstetric populations, the organism can demonstrate pathogenicity throughout the reproductive tract and particularly in association with cervical cerclage, poses significant risks for adverse pregnancy outcomes, including preterm labor and neonatal sepsis [10,15].

Cervical cerclage is a common intervention to reduce the risk of preterm birth for women with cervical insufficiency. While cerclage placement is typically associated with good outcomes, it is also known to increase the risk of infections, which could ascend to the amniotic sac, leading to chorioamnionitis, PPROM, and preterm labor [16]. Although infections associated with cerclage are frequently attributed to common vaginal flora, this case illustrates the infrequent yet clinically important potential of M. morganii as an infectious agent in such patients.

The two most employed techniques to place a cervical cerclage are the McDonald and Shirodkar operations. A number of studies have analyzed the effectiveness of these two methods. A comprehensive review and meta-analysis released in 2023 discovered that the Shirodkar cerclage led to a notable decrease in preterm births before 37 weeks compared to the McDonald technique. To be precise, the relative risk (RR) was 0.91, suggesting a 9% decrease in the likelihood of preterm birth when using the Shirodkar method [17]. Furthermore, the Shirodkar technique was associated with reduced rates of preterm birth before 35, 34, and 32 weeks, and a lower occurrence of preterm premature rupture of membranes (PPROM) [17]. However, not all studies demonstrated a clear superiority of one technique over the other. A study from 2007 comparing the two methods in women with a short cervical length found no significant difference in the prevention of preterm birth before 33 weeks between the two techniques [18]. Ultimately, while some studies suggest that the Shirodkar cerclage might be more effective in preventing certain complications, the best approach depends on the individual patient. Factors like medical history, cervical anatomy, and the surgeon's experience all play a key role in deciding which technique is most suitable.

In our case the infection of the suture caused a cervical laceration. In a retrospective review of 251 cerclages (including 49 rescue and 202 history-indicated sutures) over a7.5–year period, cervical laceration requiring suturing at the

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time of birth was reported in 11% of Shirodkar and 14% of McDonald procedures, which was higher than that reported in 55 688 other births occurring during the same period (2%) [19].

An elevated maternal C-reactive protein level is associated with histological evidence of chorioamnionitis in cases of preterm labour or PPROM, however they should be used in conjunction with clinical characteristics [20,21]. In an uncontrolled retrospective review of 17 cases of emergency cerclage, the authors reported that a preoperative C-reactive protein value below 4.0 mg/dl and a maternal white cell count less than 14 000/microlitre were associated with prolongation of pregnancy compared with women with values above these cut-offs [22]. In the abovementioned case, by the time that the cerclage was placed white blood cells were 10.000 and CRP value was below 4.0 mg/dl and the pregnancy was prolonged till 35+4 weeks, but no longer than 37 weeks

Several risk factors may be involved in the pathogenesis of cerclage-associated infections. First, the cerclage suture is a foreign body that provides a surface for bacterial adhesion and biofilm formation, facilitating persistent infections [23]. Altered vaginal microbiota due to pregnancy-related changes in hormone levels and the need for the immune system to tolerate the growing fetus result in an immunocompromised state that is more susceptible to infection [24]

In this case, the infection of the cervical cerclage likely played a role in causing inflammation and subsequent preterm labor with cervical laceration and could also be associated with the infection that caused the neonatal apnea. Previous studies have documented similar instances where pathogens colonizing the cerclage resulted in negative pregnancy outcomes [25].

Additionally, in our case, the patient did not have any routine genital tract screening before the cerclage insertion. This approach is in line with the recommendations of RCOG. According to these recommendations, routine genital tract screening should not be undertaken before cerclage insertion because no prospective studies have assessed the benefit of microbial screening prior to cerclage insertion [22].

Nevertheless, a vaginal swab obtained after the placement of the cerclage may have helped. Xiao et al ,2023 showed that cerclage may alter the vaginal microbiota by increasing microbiota diversity, decreasing vaginal Lactobacillus abundance, and increasing the abundance of pathogenic bacteria that are not conducive to pregnancy maintenance [26]. Therefore, a vaginal culture at least one week after the operation may have revealed an infection caused by the altered vaginal flora.

Regarding the perioperative interventions, neither antibiotics nor prophylactic tocolytics has been shown to improve the efficacy of cerclage, regardless of timing or indication, according to ACOG bulletin recommendations (2014) [2]. However, the decision for antibiotic prophylaxis at the time of cerclage placement should be at the discretion of the operating team, according to the RCOG recommendations (2022) [22]. This practice is based on a randomized controlled trial, which proved that a greater proportion of pregnancies were prolonged by 28 days among women who received indomethacin and perioperative antibiotics. Nevertheless, a limited number of women participated in this trial and therefore further studies are needed. Our patient received antibiotics perioperatively, but not indomethacin.

Another point to be considered is the suture material. Research comparing different suture materials for cervical cerclage suggests that monofilament sutures are linked to reduced risk of infections like chorioamnionitis and maternal sepsis compared to braided sutures, as seen in the C-STICH trial [27]. Braided sutures have been associated with vaginal microbiome alterations, potentially increasing the risk of preterm birth, while monofilament sutures have a minimal impact. Thus, other studies found no significant difference in infection rates, gestational age at delivery, or neonatal outcomes based on suture type [28]. Overall, while monofilament sutures might offer some infection-related benefits, more research is needed to confirm their superiority.

Diagnosis of infections related to cerclage is problematic due to the nonspecificity of symptoms such as lower abdominal pain, unusual vaginal discharge, and contractions of the uterus. Clinical observation is important, but a correct diagnosis is done by microbiological culture and PCR for accurate detection of the pathogen involved [29]. In this case, isolating M. morganii from the cerclage suture was key in guiding effective treatment with antibiotics.

M. morganii is known for producing extended-spectrum beta-lactamases, which causes its resistance to various antibiotics, including penicillin and cephalosporins. Its presence in infections related to cerclage highlights the necessity of prompt culture and antibiogram to inform suitable antimicrobial treatment [30].

Regarding the management of cerclage-associated infections there are important measures that need to be considered, in order to have the best outcomes. Fisrtly, when an infection is suspected the cerclage suture has to be timely removed and sent for analysis. Secondly, choosing an empiric prophylactic antibiotic as is commonly practiced when antibiotics are given may not be the most effective strategy due to multiple resistance of the bacteria that cause these kinds of infections. Waiting 48 h for culture results may, however, not be a viable option [31]. Antibiotics should be changed with the culture result to have an efficient elimination of the invasion. Furthermore, serial maternal and fetal assessments are essential to detect signs of worsening infection or fetal distress.

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An infection on a cervical cerclage caused by an uncommon opportunistic pathogen presents a complex clinical challenge that demands a highly personalized approach regarding the treatment. Additionally, elements along with the affected person's immune reputation, gestational age, and the capacity risks to both the mother and fetus must be cautiously weighed while determining management strategies [25]. In some cases, it may be necessary to remove cerclage, while in others, a combination of antimicrobial therapy and close monitoring may preserve pregnancy.

In this case, the cerclage was removed very soon after the onset of the symptoms and broad-spectrum antibiotics were administered. However, the occurrence of preterm labor and the laceration of the cervix emphasizes the potential for serious complications despite prompt intervention.

Conclusions

This case points out the importance of suspicion for rare infections due to atypical pathogens like M. morganii in relation to cervical cerclage. The early detection, timely removal of the infected material, and proper antibiotic treatment will definitely reduce the risk of poor pregnancy outcomes. Obtaining vaginal swabs after the placement of the cerclage could also be considered. Due to the unique nature of each infection, a multidisciplinary group of obstetricians, infectious disease experts, and microbiologists ought to collaborate to develop a tailored treatment strategy. Further studies are necessary to describe the pathogenesis, risk factors, and management strategies concerning M. morganii infection in obstetric practice.

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The authors confirm that written informed consent has been obtained from the involved patient. She has given approval for this information to be published in this case report.

Conflicts of Interest:

The authors declare no conflicts of interest.

References

1. Quinn JA, Munoz FM, Gonik B, et al. Brighton Collaboration Preterm Birth Working Group. Preterm birth: Case definition & guidelines for data collection, analysis, and presentation of immunisation safety data. Vaccine 34 (2016): 6047-6056.
2. ACOG Practice Bulletin No.142: Cerclage for the management of cervical insufficiency. Obstet Gynecol 123 (2014): 372-379.
3. Shennan A, Story L, Jacobsson B, et al; FIGO Working Group for Preterm Birth. FIGO good practice recommendations on cervical cerclage for prevention of preterm birth. Int J Gynaecol Obstet 55 (2021): 19-22.
4. Roman A, Suhag A, Berghella V. Cerclage: Indications and Patient Counseling. Clin Obstet Gynecol 59 (2016): 264-269.
5. Kunpalin Y, Burul G, Greenwold N, et al. Factors associated with preterm birth in women undergoing cervical cerclage. Eur J Obstet Gynecol Reprod Biol 251 (2020): 141-145.
6. Tantengco OAG, Menon R. Breaking Down the Barrier: The Role of Cervical Infection and Inflammation in Preterm Birth. Front Glob Womens Health 2 (2022): 777643.
7. Chan, m. Y.; smith, m. A. Infections in pregnancy. Comprehensive toxicology 232 (2017).
8. Treadwell MC, Bronsteen RA, Bottoms SF. Prognostic factors and complication rates for cervical cerclage: a review of 482 cases. Am J Obstet Gynecol 165 (1991): 555-558.
9. Zaric RZ, Jankovic S, Zaric M, et al. Antimicrobial treatment of Morganella morganii invasive infections: Systematic review. Indian J Med Microbiol 39 (2021): 404-412.
10. Casanova-Román M, Sanchez-Porto A, Casanova-Bellido M. Early-onset neonatal sepsis caused by vertical transmission of Morganella morganii. Scand J Infect Dis 34 (2002): 534-535.
11. Ovalle A, Martínez MA, Kakarieka E, et al. Sepsis neonatal precoz causada por transmisión vertical de Morganella morganii, en un embarazo de término [Fatal neonatal sepsis caused by vertical transmission of Morganella morganii. Report of one case]. Rev Med Chil 137 (2009): 1201-1204.
12. Liu H, Zhu J, Hu Q, et al. Morganella morganii, a non-negligent opportunistic pathogen. Int J Infect Dis 50 (2016): 10-17.
13. Falagas ME, Kavvadia PK, Mantadakis E, et al. Morganella morganii infections in a general tertiary hospital. Infection 34 (2006): 315-321.
14. Lin TY, Chan MC, Yang YS, et al. Clinical manifestations and prognostic factors of Morganella morganii bacteremia. Eur J Clin Microbiol Infect Dis 34 (2015): 231-236.

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DOI:10.26502/aimr.0201

15. Dessie SA, Dobariya V, Singh D, et al. A Case of Morganella morganii-induced Fetal Demise. Cureus 12 (2020): e7169.

16. D'Antonio F, Eltaweel N, Prasad S, et al. Cervical cerclage for prevention of preterm birth and adverse perinatal outcome in twin pregnancies with short cervical length or cervical dilatation: A systematic review and meta-analysis. PLoS Med 20 (2023): e1004266.

17. McAuliffe L, Issah A, Diacci R, et al. McDonald versus Shirodkar cerclage technique in the prevention of preterm birth: A systematic review and meta-analysis. BJOG 130 (2023): 702-712.

18. Odibo AO, Berghella V, To MS, et al. Shirodkar versus McDonald cerclage for the prevention of preterm birth in women with short cervical length. Am J Perinatol 24 (2007): 55-60.

19. Harger JH. Comparison of success and morbidity in cervical cerclage procedures. Obstet Gynecol 56 (1980): 543-548.

20. Trochez-Martinez RD, Smith P, Lamont RF. Use of C-reactive proteinas a predictor of chorioamnionitis in preterm prelabour rupture ofmembranes: a systematic review 114 (2007): 796–801.

21. Wiwanitkit V. Maternal C-reactive protein for detection ofchorioamnionitis: an appraisal. Infect Dis Obstet Gynecol 13 (2005): 179-181.

22. Shennan AH, Story L; the Royal College of Obstetricians, Gynaecologists. Cervical Cerclage. BJOG 129 (2022): 1178-1210.

23. Lindsay M. Kindinger et al., Relationship between vaginal microbial dysbiosis, inflammation, and pregnancy outcomes in cervical cerclage.Sci. Transl. Med.8,350ra102-350ra102 (2016).

24. Amir, M.; Brown, J.A.; Rager, S.L.; et al. Maternal Microbiome and Infections in Pregnancy. Microorganisms 8 (2020): 1996.

25. Alani, Sanah1; Wang, Jessica1,2; Suarthana, Eva1; Tulandi, Togas1,*. Complications Associated with Cervical Cerclage: A Systematic Review. Gynecology and Minimally Invasive Therapy 12 (2023): p 4-9.

26. Xiao Y, Huang S, Yu W, et al. Effects of emergency/nonemergency cervical cerclage on the vaginal microbiome of pregnant women with cervical incompetence. Front. Cell. Infect. Microbiol 13 (2023): 1072960.

27. Hodgetts Morton V, Moakes CA, Daniels J, et al. Cerclage suture type to prevent pregnancy loss in women requiring a vaginal cervical cerclage: the C-STICH RCT. Health Technol Assess 28 (2024): 1-44.

28. Stafford IA, Kopkin RH, Berra AL, et al. Efficacy of different cerclage suture materials in reducing preterm birth. J Matern Fetal Neonatal Med 33 (2020): 3509-3513.

29. Wang H, Zhang W, Tang YW. Clinical microbiology in detection and identification of emerging microbial pathogens: past, present and future. Emerg Microbes Infect 11 (2022): 2579-2589.

30. Sabharwal ER. Antibiotic susceptibility patterns of uropathogens in obstetric patients. N Am J Med Sci 4 (2012): 316-319.

31. Moisidis-Tesch CM, Ginsberg NA, Uleer C, et al. The role of cervical cultures to guide perioperative antibiotics in cervical cerclage - a retrospective analysis of 65 consecutive cases. J Matern Fetal Neonatal Med 29 (2016): 3629-3633.

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