

Intra-amniotic infection involving *Candida albicans* subsequent to emergency cerclage: A case series

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Vaginal colonization and symptomatic vaginitis involving *Candida albicans* is common during pregnancy (1,2); however, infection of the amniotic fluid in the presence of intact membranes is encountered rarely in obstetrical practice and mostly recognized retrospectively (3). *C. albicans* is able to cross intact fetal membranes (4) and several case reports describe the isolation of the organism from amniotic fluid in amniocentesis specimens obtained before placement of emergency cervical cerclage (2,5). We present three cases in which *C. albicans* was not isolated on culture from the precerclage amniotic fluid, but was isolated from the postcerclage amniotic fluid. The present cases were identified during a retrospective review of all cases of emergency cerclage at our institution and approval was granted through the Research Ethics Board at the University of Manitoba (Winnipeg, Manitoba).

CASE PRESENTATIONS

Case 1

At 20 weeks of pregnancy, ultrasound examination revealed an open cervix. Precerclage amniocentesis Gram stain revealed no polymorphonucleated cells (PMNs) or organisms, and subsequent culture revealed no growth. At the time of cerclage, the cervix was open 1 cm and the membranes were visible just above the level of the external os. A McDonald-type cerclage was placed using Mersilene tape.

Postcerclage day 4, Gram stain from a repeat amniocentesis revealed no organisms. The next day, postcerclage day 5, abdominal cramping and fever (temperature of 37.9°C) developed and the postcerclage culture revealed *C. albicans*. Intravenous fluconazole was started and the cervical stitch removed. Purulent discharge was noted at the os and swabs revealed *C. albicans* and mixed bacterial flora. A stillborn infant was delivered 4 h after cerclage removal. The patient received 10 days of oral fluconazole and responded well.

Case 2

At 19 weeks of pregnancy, ultrasound examination revealed an open short cervix. Precerclage amniocentesis Gram stain revealed no organisms and subsequent culture revealed no growth. At time of cerclage, the cervix was open with membranes beyond the external os. A Foley catheter balloon was used to reduce the fetal membranes and a Wurm-type cerclage was placed using nylon suture.

On postcerclage day 4, amniocentesis Gram stain revealed no PMNs but yeast with mycelium were observed, and final culture revealed *C. albicans*. There were no clinical signs of infection, oral fluconazole was started and the patient was kept in hospital. On postcerclage day 11, after seven days of oral fluconazole, amniocentesis was repeated. Gram stain revealed 2+ PMNs and 3+ yeast with mycelium. The cerclage was removed the same day, and the patient delivered a live infant who died at 2 h of age.

Postpartum, the patient developed a fever (38.5°C) and broad-spectrum antimicrobial coverage, including intravenous fluconazole, was administered. Blood cultures were negative and the patient responded well. Placental examination confirmed infection and the final amniocentesis revealed *C. albicans*.

Case 3

At 19 weeks of pregnancy, a woman presented with pelvic pressure and vaginal spotting. The cervix was open 2 cm and the membranes were hour-glassed into the upper vagina. Precerclage amniocentesis Gram stain revealed no organisms and culture revealed no growth. At the time of cerclage, a Foley catheter balloon was used to reduce the membranes and a McDonald type cerclage using silk sutures was placed.

On day 7 postcerclage, amniocentesis Gram stain revealed no organisms, but final culture revealed *C. albicans*. There were no clinical signs of infection. On day 11, postcerclage repeat amniocentesis yeast-like organisms were observed on microscopy. The cerclage was removed and, within hours, a very immature infant was delivered who died soon after. The patient received oral fluconazole and responded well.

DISCUSSION

Of the various species of *Candida*, *C. albicans* appears to be unique in its ability to invade through intact fetal membranes (4). Despite its ubiquity in the vagina, intra-amniotic infection involving *C. albicans* is rare. In one study involving women presenting in preterm labour with intact membranes (6), *C. albicans* was detected in five of 773 (0.65%) amniocenteses. If polymerase chain reaction is used instead of traditional culture, the rate of detection may be 1.2% (7). When the diagnosis is incompetent cervix rather than preterm labour, the culture rate is 6% (two of 33 cases) (8).

Traditional culture techniques may take 48 h to 96 h to grow *C. albicans* from amniotic fluid, and this may result in placement of emergency cervical cerclage on the basis of reassuring Gram stain results even though the organism is present (2,5). Novel proteomic analysis may improve the ability to detect pre-existing intra-amniotic infection involving nonbacterial organisms and avoid the placement of cervical cerclage in such cases (9).

Our cases are unique in that we have clearly demonstrated that the intra-amniotic infection involving *C. albicans* did not predate the placement of the cerclage. In all three cases, negative (no growth up to 120 h) precerclage cultures of amniotic fluid were followed by positive postcerclage cultures. This suggests that *C. albicans* may be translocated across the fetal membranes at the time of cerclage or in the subsequent days. There were no risk factors for candidal vulvovaginitis, such as diabetes, in any of the cases, nor was there a history of candidal vulvovaginitis during the pregnancy. However, in all three cases, the fetal membranes were visible at the time of cerclage, with the membranes protruding into the

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vagina in two of the three cases. It is probable that the exposed outer surface of the membranes became colonized with *C albicans* from the vagina, and the organism then translocated across the membranes sometime after the cerclage placement.

In two of our cases, the decision was made to remove the cerclage and proceed with a vaginal delivery when the diagnosis of intra-amniotic infection with *C albicans* was made; in the other case, a one-week trial of oral fluconazole was attempted but failed to eradicate the organism, and the cerclage was removed. In one report, in which cerclage had been placed before the precerclage presence of *C albicans* had been identified (2), two patients experienced successful outcomes involving the delivery of surviving babies, after the cerclage was left in situ and the patients received systemic antifungal therapy, including intra-amniotic administration of fluconazole.

Ideally, one would avoid placement of emergency cervical cerclage in the presence of known intra-amniotic infection involving *C albicans*.

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Proteomic and polymerase chain reaction technologies for rapid detection of intra-amniotic infection may avoid this problem. The ubiquitous nature of *Candida* makes interpretation of its significance difficult in most clinical scenarios. The present three cases demonstrate more conclusively that *C albicans* can be introduced into the uterine cavity through the cervical procedure. However, it is not clear whether they represent the primary pathogen or are a signal of risk for a polymicrobial infection. The first question that remains is whether screening for or empirically treating *C albicans* before emergency cervical cerclage would be of value. The second question is whether consideration for antifungal therapy, with or without broader-spectrum agents, should be given in the appropriate clinical context.

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