# Fungal Endometritis in Mares – Diagnosis, Management and Treatment

Patrick M. McCue, DVM, PhD, Diplomate American College of Theriogenologists
Colorado State University, Fort Collins, CO 80521 USA

**Review Outline**

**Part 1.** Diagnosis and General Treatment Protocols
- Diagnosis and identification of fungal organisms
- Identify and correct predisposing factors
- Treatment options

**Part 2.** *Candida* vs *Aspergillus*
- Specific treatment protocols for *Candida* and *Aspergillus* infections

**Part 3. Prognosis**
- Prognosis for future fertility
- Selected references

## Introduction

Fungal endometritis is one of the more challenging causes of infertility in broodmares. Successful treatment requires more than administering an antifungal medication. The most effective approach combines correction of predisposing factors, mechanical removal of fungal organisms, improvement of uterine clearance, and selective use of antifungal therapy.

An important consideration is that there are relatively few controlled clinical trials comparing treatment protocols. Consequently, many recommendations are based on clinical experience, retrospective studies, in vitro susceptibility testing, and expert consensus.

## Part 1. Diagnosis and General Treatment Protocols

Evidence-based approach to managing mares with fungal endometritis.

### 1. Confirm the diagnosis and identify the fungal organism

Before initiating treatment, determine whether fungal organisms are associated with active endometritis rather than representing contamination or incidental colonization.

Recommended diagnostic procedures include:

- **Endometrial cytology**: Evaluate for neutrophils, yeast cells, budding organisms, and fungal hyphae.
- **Uterine culture**: Obtain samples using a guarded swab, low-volume uterine lavage, or endometrial biopsy.
- **Fungal identification**: Differentiate yeasts, particularly *Candida* species, from filamentous fungi such as *Aspergillus*.
- **Antifungal susceptibility testing**: Request testing whenever possible, particularly in mares with recurrent infections.
- **Endometrial biopsy**: Consider in mares with persistent infections to assess inflammatory changes, endometrial degeneration, and possible tissue invasion.
- **Low-volume uterine lavage** can be particularly useful when conventional uterine swabs are negative despite evidence of endometritis.

Clinical recommendation: Obtain samples for both fungal culture and cytology before administering antifungal agents. Fungal culture alone does not establish that an organism is responsible for the mare's infertility. The results should be interpreted alongside cytology, clinical findings, and reproductive history.

**2. Identify and correct predisposing factors**

This is the most important component of successful long-term management.

Fungal endometritis is frequently associated with previous bacterial endometritis and repeated intrauterine antibiotic treatments.

Predisposing conditions include:

- Poor perineal conformation and pneumovagina.
- Incompetence of the vestibulovaginal sphincter.
- Urine pooling.
- Cervical dysfunction.
- Delayed uterine clearance.
- Repeated intrauterine antibiotic administration.
- Compromised uterine defenses.
- Advanced age and chronic endometrial degeneration.

Correct anatomical abnormalities whenever possible. A Caslick procedure may be indicated in mares with poor vulvar conformation. More extensive surgical intervention may be necessary in mares with urine pooling or severe vestibulovaginal incompetence. Discontinue unnecessary intrauterine antibiotic administration. Evaluate cervical relaxation and uterine clearance, particularly in older multiparous mares. These interventions are essential because fungal infections frequently recur when the underlying predisposing conditions remain unresolved.

**3. Uterine lavage is a cornerstone of treatment**

Mechanical removal of fungal organisms and inflammatory debris is a fundamental component of treatment.

- Perform uterine lavage during estrus when the cervix is relaxed and uterine drainage is facilitated.
- Use warmed sterile isotonic saline or lactated Ringer's solution.
- Infuse approximately 1–2 liters at a time, depending on uterine size and fluid recovery, and repeat until the recovered fluid is clear.
- Lavage may be performed daily during the initial treatment period.
- Administer oxytocin to facilitate uterine evacuation when indicated.
    - Oxytocin: 10–20 IU intravenously or intramuscularly, with repeat administration based on uterine clearance and clinical response.

Lavage serves several purposes:

- Removes free fungal organisms.
- Eliminates inflammatory debris.
- Reduces fungal burden.
- Improves contact between antifungal agents and the endometrium.
- Enhances uterine clearance.

In some mares, lavage combined with correction of predisposing factors may eliminate the infection without additional antifungal medication.

**4. Antiseptic uterine lavage**

**Table 1.** Antiseptic solutions have historically been used to treat fungal endometritis.

| **Agent** | **Intrauterine concentration** | **Considerations** |
|---|---|---|
| Acetic acid | 2 % | Creates an acidic environment unfavorable to some fungi |
| Povidone-iodine | 0.1 to 0.2 % | Broad-spectrum antiseptic activity |
| Hydrogen peroxide | 1 % | Oxidizing agent; potential for endometrial irritation |
| Dimethyl sulfoxide (DMSO) | 20 % | Proposed anti-inflammatory and mucolytic effects |

| | | |
|---|---|---|
| Sterile isotonic saline | 0.9 % | Mechanical removal without direct antifungal activity |

An initial approach would be isotonic uterine lavage rather than routinely using potentially irritating antiseptics. Although antiseptic lavage has been advocated for fungal endometritis, controlled studies demonstrating superiority over isotonic lavage are lacking. Chemical irritation of the endometrium is a legitimate concern, particularly when repeated treatments are administered. Antiseptic lavage should be considered selectively rather than automatically included in every treatment protocol.

## 5. Selection of antifungal medication

Antifungal treatment should ideally be based on identification of the organism and susceptibility testing.

Two principal groups of antifungal agents have been used in mares:

**Polyenes**

- Amphotericin B
- Nystatin
- Natamycin

**Azoles**

- Clotrimazole
- Miconazole
- Fluconazole
- Itraconazole

There is no single antifungal agent that is consistently effective against every uterine fungal isolate. Selection of an antifungal drug should be based on the organism isolated and antifungal susceptibility tests. Research involving fungal isolates from equine uterine infections has demonstrated relatively favorable in vitro activity for polyene antifungals, particularly amphotericin B, natamycin, and nystatin. Azole susceptibility is more variable. Fluconazole should not automatically be selected for filamentous fungal infections, because many molds, including *Aspergillus* species, are intrinsically resistant.

Initial empirical drug selection - amphotericin B is a reasonable consideration when the isolate is susceptible. Treatment should be adjusted based on antifungal test results.

**Table 2.** Intrauterine antifungal treatments.

| Antifungal | Intrauterine dose | Comments |
|---|---|---|
| Amphotericin B | 100–200 mg | Broad activity against many yeasts and molds; administer once per day for seven days |
| Clotrimazole | 300–600 mg | Activity against various *Candida* species and some molds |
| Miconazole | 500–700 mg | Variable susceptibility |
| Fluconazole | 100 mg | Primarily considered for susceptible yeasts; administer once per day for seven days |
| Nystatin | Variable | Potentially useful against susceptible yeasts |
| Natamycin | Variable | Broad in vitro antifungal activity |

## 6. Biofilm disruption

Biofilm formation may contribute to the persistence of fungal endometritis, particularly in mares with recurrent yeast infections. *Candida* species can form biofilms that reduce susceptibility to antifungal medications.

- **Tris-EDTA or other buffered chelating agents**. These agents may disrupt microbial biofilms and improve antimicrobial activity. One strategy is to infuse 250–500 mL of a buffered chelating solution, such as Tris-EDTA, followed by uterine lavage to remove the solution and debris before subsequent antimicrobial treatment.
- **N-acetylcysteine**. N-acetylcysteine has been investigated as a mucolytic agent in mares with chronic endometritis. Potential benefits include disruption of mucus and improved clearance of inflammatory material. However, evidence specifically demonstrating improved treatment outcomes in fungal endometritis is lacking.
- **Recommendation:** Consider biofilm-directed treatment primarily in refractory infections rather than as routine first-line therapy.

## 7. Suggested clinical treatment protocol

For a nonpregnant mare with confirmed fungal endometritis, the following represents a reasonable management strategy. The exact treatment duration should be individualized. A five- to seven-day course is commonly recommended, but refractory infections may require longer or alternative treatment. Intrauterine medications are generally administered after lavage and adequate evacuation of fluid, rather than

immediately before another lavage. This sequence helps maximize contact between the antifungal agent and the endometrium.

**Table 3.** Potential management approaches to fungal infections.

| Stage | Recommended Management |
|---|---|
| Initial examination | Reproductive examination, ultrasound, uterine cytology, fungal and bacterial culture |
| Before treatment | Identify predisposing factors and request antifungal susceptibility testing |
| Days 1–2 | Uterine lavage with warmed isotonic fluid; oxytocin as indicated |
| Days 2–7 | Continue lavage as necessary and initiate susceptibility-guided antifungal therapy if infection persists or disease severity warrants |
| During treatment | Monitor uterine fluid accumulation, inflammatory response, and tolerance of treatment |
| After treatment | Repeat cytology and fungal culture after an appropriate drug-free interval |
| Before breeding | Confirm resolution of infection and assess uterine clearance |

## 8. Systemic antifungal therapy

Systemic antifungal administration is not routinely necessary for uncomplicated superficial fungal endometritis. It may be considered in mares with:

- Refractory infection despite appropriate local therapy.
- Suspected deeper endometrial invasion.
- Concurrent fungal infection elsewhere.
- Organisms for which systemic therapy offers a pharmacologic advantage.

Potential systemic agents include fluconazole and itraconazole. However, the evidence supporting systemic treatment of equine fungal endometritis is limited. Systemic antifungal drugs may also be associated with adverse effects, including hepatic toxicity, and their ability to achieve effective concentrations in uterine tissues varies. Consequently, systemic therapy should be reserved for carefully selected cases.

## 9. Confirm elimination of infection before breeding

Clinical improvement alone does not establish that a fungal infection has been eliminated. Ideally, mares should undergo repeat uterine cytology and fungal culture after completion of treatment. The timing should allow sufficient clearance of the administered antifungal to reduce the likelihood of a falsely negative culture. For mares with recurrent infections, repeat evaluation during a subsequent estrous cycle may be appropriate. A general recommendation is to withhold breeding until the infection has resolved. Following successful treatment, particular attention should be given to post-breeding uterine clearance. Mares with a history of fungal endometritis frequently have other reproductive abnormalities that predispose them to persistent post-breeding inflammation.

## Part 2. Specific Treatment Protocols for *Candida* and *Aspergillus* Infections

Fungal endometritis in mares requires a multimodal approach involving mechanical removal of fungal organisms, antifungal therapy, correction of predisposing conditions, and confirmation of infection elimination. However, the optimal treatment strategy differs between *Candida* (yeast) and *Aspergillus* (filamentous mold) infections, particularly with respect to antifungal selection, resistance patterns, and management of persistent infections.

The following protocols incorporate treatment regimens, clinical recommendations, and current antimicrobial prescribing guidelines. Most intrauterine antifungal treatments are extra-label, and no single protocol has been established as superior through controlled clinical trials.

### Differences Between Candida and Aspergillus Endometritis

**Table 4.** Clinical and microbiological differences between *Candida* and *Aspergillus*.

| Characteristic | *Candida* spp. | *Aspergillus* spp. |
|---|---|---|
| Organism | Yeast | Filamentous mold |
| Relative frequency | Most common fungal isolate | Second most common |
| Common species | *C. albicans*, *C. tropicalis*, *C. glabrata* | *A. fumigatus*, *A. niger* and others |
| Cytology | Budding yeasts, occasionally pseudohyphae | Septate, branching hyphae |
| Biofilm formation | Important in some species | Possible, but less well characterized in the equine uterus |

| | | |
|---|---|---|
| Fluconazole susceptibility | Variable; often useful for susceptible isolates | Generally ineffective |
| Polyene susceptibility | Frequently favorable | Variable; generally better than fluconazole |
| Prognosis | Guarded | Guarded, potentially worse with persistent infection |
| Primary treatment | Lavage plus susceptibility-guided antifungal agent | Lavage plus mold-active antifungal agent |

In a review from Australia, *Candida* accounted for approximately 58–69% of reported fungal endometritis cases, while *Aspergillus* accounted for approximately 25–26%. The most important therapeutic distinction is that fluconazole and nystatin may be useful for *Candida* infections, whereas treatment of *Aspergillus* generally requires a mold-active antifungal such as amphotericin B or an appropriate azole. Species identification and susceptibility testing remain essential.

**Specific protocol for *Candida* endometritis**

**Step 1. Confirm the diagnosis**

Perform a complete reproductive examination, including:

- Transrectal ultrasonography.
- Vaginal and cervical examination.
- Endometrial cytology.
- Uterine fungal and bacterial cultures.
- Antifungal susceptibility testing.

When available, fungal identification should extend to the species level. This is especially important because different *Candida* species have substantially different susceptibility patterns. For example, *Candida glabrata* may exhibit reduced susceptibility to fluconazole, whereas *C. krusei* is intrinsically resistant.

**Step 2. Evaluate predisposing conditions**

Assess:

- Perineal conformation.
- Pneumovagina.
- Cervical incompetence.

- Urine pooling.
- Uterine fluid retention.
- Previous intrauterine antibiotic treatment.

Correct anatomical defects whenever possible. Discontinue unnecessary intrauterine antibiotics.

**Step 3. Initiate mechanical treatment**

If the mare is in estrus, perform uterine lavage with warmed sterile isotonic saline or lactated Ringer's solution.

**Lavage Protocol:**

- Infuse 1–2 L per lavage cycle.
- Recover the fluid completely.
- Repeat until the effluent is relatively clear.
- Administer oxytocin, typically 10–20 IU IV or IM, when indicated to promote clearance.

The total lavage volume depends on the amount of inflammatory material and fluid recovery. If the mare is in diestrus, treatment may be scheduled for the next estrus when clinically appropriate.

**3. Antifungal treatment**

For confirmed *Candida* endometritis, several intrauterine antifungal options have been described.

**Protocol A: Clotrimazole**

Treatment protocol:

- Clotrimazole: 400–700 mg.
- Route: Intrauterine infusion.
- Frequency: Every 24 hours.
- Duration: Seven days.

Clotrimazole has activity against many *Candida* species and is one of the commonly reported treatments for equine fungal endometritis. This is a reasonable option when susceptibility testing supports its use.

**Protocol B: Amphotericin B**

Treatment protocol:

- Amphotericin B: 100–200 mg.
- Route: Intrauterine infusion.
- Frequency: Every 24 hours.
- Duration: Seven days.

Amphotericin B is a polyene antifungal with broad activity against many yeasts and molds. It is a reasonable alternative when the isolate is susceptible, particularly when an azole-resistant yeast is identified. The specific formulation and diluent must be selected carefully. Conventional amphotericin B and lipid formulations should not be assumed interchangeable for intrauterine administration.

**Protocol C: Nystatin**

Treatment protocol:

- Nystatin: 0.5–2.5 million IU.
- Route: Intrauterine infusion.
- Frequency: Every 24 hours.
- Duration: Seven days.

Nystatin is particularly relevant for yeast infections. A common equine protocol consists of dilution in 100–200 mL sterile water because the preparation may precipitate in saline. Compatibility must be confirmed for the actual product being used.

**Protocol D: Fluconazole**

Treatment protocol:

- Fluconazole: 100 mg.
- Route: Intrauterine infusion.
- Frequency: Every 24 hours.
- Duration: Seven days.

Fluconazole is an option only when the *Candida* isolate is susceptible. It should not be selected empirically for all *Candida* infections.

**Table 5.** Practical drug selection for *Candida.*

| Clinical situation | Treatment considerations |
|---|---|
| Susceptible *C. albicans* | Clotrimazole or another susceptibility-supported agent |

| | |
|---|---|
| Fluconazole-susceptible yeast | Local or systemic fluconazole may be considered |
| Azole-resistant *Candida* | Amphotericin B or another active polyene |
| Recurrent yeast infection | Reassess anatomy, clearance, biofilm potential, and susceptibility |
| Persistent infection despite local therapy | Consider systemic treatment and endometrial biopsy |

One approach for a *Candida* infection would be lavage followed by a seven-day course of an intrauterine antifungal selected according to susceptibility testing. It may not be necessary to add multiple antifungal medications.

### Specific Protocol for Aspergillus Endometritis

The initial diagnostic examination is similar to that for *Candida*. However, several additional considerations are important.

#### Step 1. Confirm Aspergillus infection

Because *Aspergillus* species are widespread environmental organisms, a positive culture should be interpreted alongside evidence of endometrial inflammation. The presence of septate fungal hyphae in an inflammatory uterine sample strongly supports the diagnosis.

Confirm infection using:

- Fungal culture.
- Endometrial cytology.
- Histopathology when indicated.

#### Step 2. Consider endometrial biopsy

Histopathology may help identify:

- Fungal elements associated with the endometrial surface.
- Evidence of tissue invasion.
- Chronic inflammatory changes.
- Endometrial fibrosis.
- Other factors affecting fertility prognosis.

Periodic acid–Schiff or Gomori methenamine silver staining may facilitate identification of fungal organisms.

### Step 3. Initiate uterine lavage

Perform repeated lavage with warmed isotonic fluid. Use oxytocin when indicated to improve uterine clearance. As with *Candida*, mechanical removal of fungal material is an essential part of treatment.

## Antifungal treatment options for Aspergillus

### Protocol A: Amphotericin B

Treatment protocol:

- Amphotericin B: 100–200 mg.
- Route: Intrauterine infusion.
- Frequency: Every 24 hours.
- Duration: Seven days.

Amphotericin B is a reasonable consideration for susceptible *Aspergillus* isolates. However, susceptibility varies between species and isolates. For example, *Aspergillus terreus* is often resistant to amphotericin B. Consequently, it is important not to assume that every *Aspergillus* isolate will respond.

### Protocol B: Clotrimazole

Treatment protocol:

- Clotrimazole: 400–700 mg.
- Route: Intrauterine infusion.
- Frequency: Every 24 hours.
- Duration: Seven days.

Clotrimazole has activity against some filamentous fungi and may be appropriate when susceptibility testing supports its use.

### Protocol C: Miconazole

Treatment protocol:

- Miconazole: 500–700 mg.
- Route: Intrauterine infusion.
- Frequency: Every 24 hours.
- Duration: Seven days.

Miconazole has been used for equine fungal endometritis, but susceptibility is variable. It would not be the optimal first empirical choice for *Aspergillus* without supporting susceptibility information.

**Drugs to avoid for Aspergillus**

- Fluconazole should generally not be used for *Aspergillus* endometritis. *Aspergillus* species are intrinsically resistant to fluconazole. Nystatin also should not be assumed to provide reliable activity against *Aspergillus*.
- Itraconazole has activity against many *Aspergillus* isolates and has been described as a systemic treatment option for equine fungal endometritis. However, oral absorption in horses is formulation-dependent, and uterine tissue concentrations are not well established. For persistent *Aspergillus* endometritis, systemic itraconazole may be considered when the isolate is susceptible, particularly if deeper tissue involvement is suspected.
- Such treatment requires careful evaluation of potential adverse effects, drug interactions, and the limitations of available equine pharmacokinetic data.

**Standardized Step-by-Step Clinical Treatment Protocol**

**Diagnostic examination**. The objective is to establish the diagnosis and identify factors contributing to infection.

Tests:

- Complete reproductive examination.
- Transrectal ultrasound.
- Guarded uterine sampling for cytology and culture.
- Fungal identification and susceptibility testing.
- Evaluation of cervical function and perineal conformation.
- Endometrial biopsy when indicated.

If the mare has significant uterine fluid or inflammatory debris, begin uterine lavage after obtaining diagnostic samples. Avoid unnecessary antibiotic treatment.

**Mechanical clearance**. The objective is to reduce fungal burden.

Protocol:

- Ultrasound examination.
- Warmed isotonic uterine lavage.
- Repeat lavage until recovered fluid is relatively clear.
- Administer oxytocin as needed.
- Confirm satisfactory evacuation of lavage fluid.

A commonly used oxytocin dose is 10–20 IU IV or IM. Repeated doses may be administered according to uterine response, cervical status, and the mare's stage of cycle.

**Initiate targeted antifungal therapy**. The objective is to eliminate remaining fungal organisms. Select an antifungal based on identification and susceptibility testing. For *Candida*, reasonable options include clotrimazole, amphotericin B, nystatin, or fluconazole when susceptibility supports their use. For *Aspergillus*, consider amphotericin B, clotrimazole, or another mold-active agent supported by susceptibility results.

**Treatment sequence:**

- Examine the uterus by ultrasound.
- Perform lavage if fluid or debris is present.
- Allow adequate uterine evacuation.
- Administer the selected intrauterine antifungal.
- Avoid immediately repeating lavage after antifungal administration.

The timing of antifungal administration should be coordinated with lavage to provide adequate contact with the endometrium.

**Duration of treatment - approximately 7 days.** The objective is to maintain antifungal activity while promoting uterine clearance. Continue the selected intrauterine treatment every 24 hours according to the chosen regimen.

Assessment:

- Intrauterine fluid accumulation.
- Uterine edema.
- Cervical relaxation.
- Clinical evidence of irritation.
- Response to treatment.

Perform additional lavage when indicated by fluid accumulation or inflammatory debris. Avoid unnecessary instrumentation once uterine clearance is satisfactory. A seven-day antifungal course is frequently recommended, although shorter and longer regimens have been reported.

**Reassessment.** The objective is to determine whether infection has resolved. After allowing an appropriate drug-free interval, repeat:

- Uterine cytology.
- Fungal culture.

- Transrectal ultrasonography.

The interval should be selected to minimize residual antifungal interference with culture. There is no universally validated post-treatment sampling interval for all intrauterine antifungal formulations. For mares with persistent positive cultures, repeat organism identification and susceptibility testing. Do not automatically repeat the same treatment without reassessing the underlying problem.

**Subsequent estrus: Confirm resolution**. For mares with recurrent or difficult-to-treat fungal endometritis, Perform another reproductive examination during a subsequent estrous period. This may include repeat cytology and fungal culture. Breeding should ideally be delayed until infection has resolved.

### Management of Refractory Fungal Endometritis

Mares that remain culture-positive after initial treatment require a more comprehensive evaluation.

**Reassess the diagnosis.** Repeat fungal identification and susceptibility testing.

Determine whether the positive culture represents:

- Persistent infection.
- Reinfection.
- Contamination.
- Mixed bacterial and fungal infection.

### Investigate the caudal reproductive tract

The vagina, vestibule, and clitoral fossa may serve as reservoirs of fungal organisms. Targeted treatment of these sites may be appropriate when colonization is documented. Treatment options include cleansing the vagina, vestibule and clitoral fossa with an antiseptic agent, followed by packing the clitoral fossa with a non-specific antimicrobial agent such as silver sulfadiazine (SSD).

### Consider alternative antifungal therapy

If initial treatment with clotrimazole fails, a switch to amphotericin B may be reasonable when susceptibility supports the change. Conversely, amphotericin-resistant organisms may require an alternative agent. The decision should be based on the isolate rather than simply escalating treatment intensity.

### Consider systemic antifungal treatment

For refractory infections, systemic treatment may be appropriate.

- **Systemic fluconazole for susceptible Candida**
    - Treatment regimen:
        - Loading dose: 14 mg/kg orally.
        - Maintenance: 5 mg/kg orally every 24 hours.

This regimen has been reported to produce plasma and endometrial concentrations exceeding the minimum inhibitory concentration for susceptible *C. albicans* isolates. However, clinical efficacy in fungal endometritis has not been established through controlled trials.

- **Systemic itraconazole for susceptible Aspergillus**
    - Treatment regimen:
        - Itraconazole: 5 mg/kg orally every 12–24 hours.

Formulation-dependent absorption, adverse effects, and the absence of established uterine pharmacodynamic targets limit its use. For prolonged systemic treatment, baseline and follow-up liver function testing are advisable. Intravenous amphotericin B additionally requires renal monitoring.

### The Role of Antiseptic Lavage

Antiseptic lavage remains controversial. Options include:

- Acetic acid (2 %)
- Hydrogen peroxide (1 %)
- Povidone-iodine (0.1–0.2 %)
- DMSO (10–20 %)

Antiseptic solutions have been used to reduce microbial burden and create conditions less favorable to fungal growth. However, they can also irritate the endometrium. Nonspecific intrauterine chemical treatments may resolve approximately 20% of treatment cycles, although this estimate should not be interpreted as a controlled comparison of efficacy. Do not combine multiple antiseptic agents or use them sequentially without a clear indication. Begin treatment with isotonic lavage and susceptibility-guided antifungal therapy. Antiseptic treatment would be reserved for selected refractory cases, recognizing that evidence supporting a particular concentration or regimen is limited.

**Table 6.** Comparison of Treatment Protocols

| Treatment component | *Candida* endometritis | *Aspergillus* endometritis |
|---|---|---|
| Initial lavage | Warmed isotonic saline | Warmed isotonic saline |
| Ecbolic treatment | Oxytocin as indicated | Oxytocin as indicated |
| Common local antifungal | Clotrimazole | Amphotericin B or clotrimazole |
| Alternative local antifungal | Nystatin, fluconazole, amphotericin B | Miconazole or other susceptibility-supported mold-active agent |
| Typical local treatment duration | 7 days | 7 days |
| Systemic option | Fluconazole if susceptible | Itraconazole if susceptible |
| Biofilm-directed therapy | Consider for refractory infection | Consider selectively; limited evidence |
| Endometrial biopsy | Persistent or recurrent cases | Lower threshold in persistent cases |
| Post-treatment testing | Cytology and fungal culture | Cytology and fungal culture |
| Principal concern | Recurrence and antifungal resistance | Mold resistance, persistence, possible tissue involvement |

**Overall management strategy**

**First:** Establish a definitive diagnosis using uterine cytology and fungal culture, ideally with organism identification and susceptibility testing.

**Second:** Correct underlying anatomical and functional abnormalities that predispose the mare to uterine infection.

**Third:** Use repeated isotonic uterine lavage and ecbolic therapy to reduce fungal burden and promote uterine clearance.

**Fourth:** If antifungal medication is indicated, select the agent based on fungal identification and susceptibility testing. Amphotericin B is a reasonable option for susceptible organisms, but should not be considered universally superior.

**Fifth:** Reserve antiseptic lavage and biofilm-disrupting treatments for selected cases, recognizing the limited evidence supporting their efficacy.

**Sixth:** Confirm resolution of infection before attempting another breeding.

## Prognosis for fertility

The prognosis depends on several factors:

- Duration of infection.
- Fungal species involved.
- Severity of endometrial inflammation.
- Presence of endometrial degeneration.
- Underlying anatomical abnormalities.
- Ability to eliminate the organism and prevent recurrence.

Mares with relatively recent infections and minimal endometrial damage may return to normal fertility following successful treatment. In contrast, older mares with chronic endometritis, poor uterine clearance, and significant endometrial fibrosis have a more guarded prognosis. Importantly, elimination of the fungal organism does not necessarily restore normal fertility if substantial preexisting endometrial pathology is present.

## Selected references

Beltaire KA, Cheong SH, Coutinho da Silva MA. Retrospective study on equine uterine fungal isolates and antifungal susceptibility patterns (1999–2011). Equine Veterinary Journal. 2012;44:84-7.

Hardefeldt L, Thomas K, Page S, Norris J, Browning G, El Hage C, Stewart A, Gilkerson J, Muscatello G, Verwilghen D, van Galen G. Antimicrobial prescribing guidelines for horses in Australia. Australian veterinary journal. 2025;103(12):781-889.

LeBlanc MM. Advances in the diagnosis and treatment of chronic infectious and post–mating-induced endometritis in the mare. Reproduction in domestic animals. 2010;45:21-7.

Scott CJ. A review of fungal endometritis in the mare. Equine Veterinary Education. 2020;32(8):444-8.

Stout TA. Fungal endometritis in the mare. Pferdeheilkunde. 2008;24(1):83.

This document was adapted from McCue PM. Clinical Equine Reproduction (Volume 1). (eBook); 2019 ISBN # 978-0-9965269-7-5, with additional material obtained from ChatGPT.

Updated October 15, 2026