Closing the Brief Case: Disseminated Microsporidiosis with Intestinal Cryptosporidium Coinfection in a Patient with Kaposi’s Sarcoma and Castleman Disease Presenting with Acute Kidney Injury

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ANSWERS TO SELF ASSESSMENT QUESTIONS

1. What is the infective form of microsporidia?
   a. Meront
   b. Sporont
   c. Sporoblast
   d. Spore

   Answer: d. Spores undergo gemination resulting in extrusion of polar tubule into the host cell. Via the polar tubule, the infective sporoplasm is released into the host cell, which undergoes various stages of development.

2. What is the gold standard test for identification of microsporidia?
   a. Electron microscopy
   b. Gram stain
   c. PCR test
   d. Serum IgG levels

   Answer: a. Electron microscopy. Transmission electron microscopy helps in identification of internal structures of spores, such as number of coils of polar tubule and presence of parasites in different stages of development inside vacuoles. These morphological details are important to determine the species of microsporidium. Other methods of detection include Gram stain, Chromotrope 2R, quick-hot Gram chromotrope technique, trichrome blue, acid-fast stain, Warthin-Starry stain, modified trichrome stain, calcofluor white stain, and immunohistochemistry can help with detection, but these methods cannot provide species-level identification. PCR is a faster and easier method than transmission electron microscopy for identification of microsporidium at the species or genus level. A prior knowledge of suspected species in the specimen is needed to select the appropriate PCR assay. This can be derived from type of specimen, clinical presentation, or electron microscopy. However, PCR is not widely available.

3. What is the morphology of microsporidia on Gram stain?
   a. Gram-positive diplococci
   b. Gram-negative bacilli


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c. Gram-variable spore with band-like stripe

d. True hyphae

Answer: c. Various staining methods are utilized for identification of microsporidia. Spores are ovoid and Gram positive and can be Gram variable. The mature spores stain Gram positive, and immature spores stain Gram negative. The horizontal belt-like stripe corresponds to the polar tubule.

**TAKE-HOME POINTS**

- Microsporidia are unicellular obligate parasitic fungi which produce heat-resistant spores.
- The spores are infective forms containing a coiled polar tubule, which is extruded in the host cell to inject sporoplasm.
- Transmission electron microscopy is the gold standard test for identification of microsporidia. Other tests for identification include Gram stain, Chromotrope 2R, quick-hot Gram chromotrope technique, trichrome blue, acid-fast stain, Warthin-Starry stain, modified trichrome stains, calcofluor white, immunohistochemistry, and PCR.
- *Encephalitozoon intestinalis* commonly infects the gastrointestinal tract. However, it can also infect the kidneys and lungs. Microsporidiosis should be considered as a cause of renal failure in an immunocompromised patient.