

# Case Review

## A Case of Tapeworm Infestation

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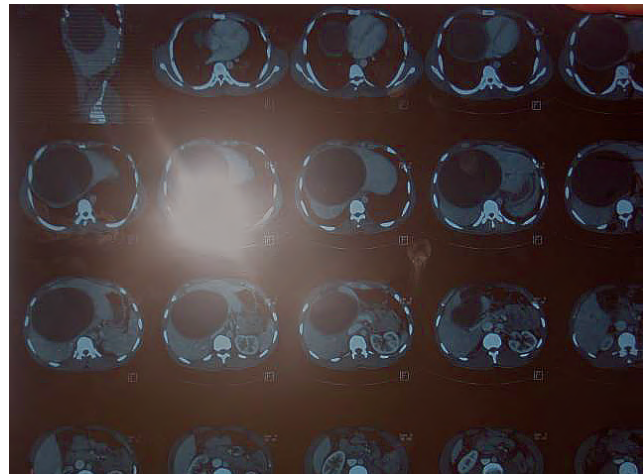
A 24-year-old male Afghan National Army (ANA) soldier in training presented to sick call complaining of several weeks of worsening, dull, and diffuse abdominal pain with abdominal distention with two days of constipation. He is from Kabul and resides full time at the Ranger camp. He visits his family regularly in the city and had no recent significant travel history. An extensive review of systems failed to disclose any additional symptoms and he was able to perform training with the rest of his unit.

His vital signs were normal and the physical exam was only notable for some central upper abdominal distention with diffuse mild tenderness. He was given a laxative and told to increase his fluid intake in hopes of relieving what was thought to be a case of constipation.

Several days later he returned and stated his constipation had somewhat resolved, yet he still had some distention and discomfort. He was taken to a local Afghan National Army (ANA) clinic and had an abdominal X-ray series performed that indicated retained stool still in his transverse colon. He was given Metamucil and told to return the next day. Several weeks later he returned to the clinic on sick call with an abdominal ultrasound report. He had reported to a local hospital while visiting his family with the same worsening complaints from his initial visits. The ultrasound was performed and no treatment was given.

The ultrasound report, translated to English, was notable for a 20cm hydatid cyst displacing almost the entire body of his liver. The remainder of the study was unremarkable. His physical examination that day was notable only for a palpably enlarged liver. The camp clinic is located in a relatively austere location which requires dangerous travel to larger facilities for studies beyond basic X-rays. We had previously visited and surveyed the national ANA hospital and infectious disease hospital and decided we would try and solicit his case to the surgeons at the closest International Security Assistance Force (ISAF) and American Role III facilities before admitting him for care at an indigenous facility.

At the closest ISAF hospital, he received another ultrasound in the emergency department (ED) that confirmed the initial report of a large hydatid cyst. A complete blood count (CBC), basic metabolic panel (BMP), and hepatic function panel (HFP) were performed and all were within normal parameters. After consultation with the chief of surgery, we took him to get a computed axial tomography (CAT) scan of his abdomen with IV contrast alone. Since the staff could



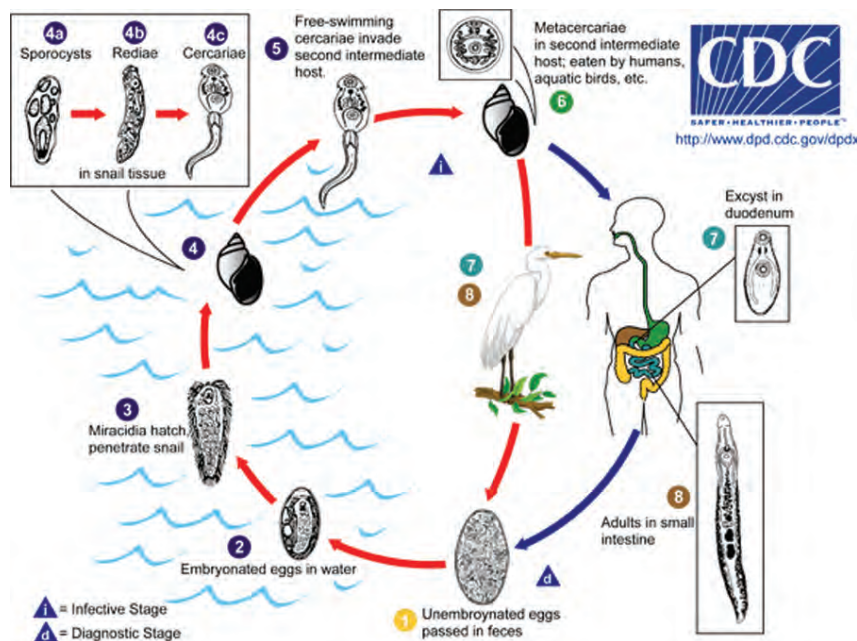
*CT Scan of the abdomen done at the ISAF Hospital, Kabul International Airport*

not take the images digitally, they photographed the CAT scan, and the cyst could easily be seen inside the body of his liver.

After presenting the case to the surgical staff of the regional ISAF role III facility, there was great academic interest, but no desire to place the facility's blood supply at risk. Both ISAF hospitals recommended that we refer the patient to the national ANA hospital in Kabul. Albendazole was started immediately and arrangements were made for admission and surgery at the ANA hospital. He was admitted to this hospital and had surgery to remove the cyst a week later.

## DISCUSSION

A hydatid cyst, also known as echinococcosis, is a parasitic infestation of humans by the tapeworm *Echinococcus*. There are three principal species of *Echinococcus* that infect humans and cause disease. The most common species is *Echinococcus granulosus*, which causes cystic echinococcosis. The other two species are *Echinococcus multicoluaris*, which causes alveolar echinococcosis, and *Echinococcus vogeli*, which causes polycystic echinococcosis. In the life cycle of the *E. granulosus*, humans, swine, sheep, etc. act as intermediate hosts and are infected by ingestion of food or water contaminated with canine and other carnivores' feces that contain the eggs of *E. granulosus*. The eggs are released from the adult tapeworm that is present in the carnivore's small intestine. Upon ingestion of the eggs, the infection process starts when the eggs make their way to the intestine. There they hatch and release an oncosphere, which makes its way through the intestinal wall and enters the circulatory system ending up in various organs, most commonly in the lungs and liver. There they develop into cysts. The cycle is completed once the infected organs are eaten by the definitive host, and protoscolices that were in the cysts attach to the intestine and mature into the adult tapeworm. The life cycles for *E. multicoluaris* and *E. vogeli* are similar to *E. granulosus* only varying slightly in the types of animals that are definitive and intermediate hosts and the duration and proliferation of the larval stage in the intermediate host.



Occurrence of all forms of Echinococcosis is rare in the continental United States with less than one case per one-million inhabitants being reported and most of the cases occurring on the coast of Alaska and

in Canada around the Hudson Bay. Across the globe, the most endemic areas are the Middle East, the southern part of South America, Iceland, Australia, and the southern part of Africa. The incidence of cystic echinococcosis is around 1 to 220 cases per 100,000 inhabitants, while alveolar echinococcosis ranges from 0.03 to 1.2 cases per 100,000 inhabitants.<sup>1</sup>

Presentation of infection varies greatly. A case may present asymptomatic for years, or the infection may show signs and symptoms within weeks. The type of parasite, site, and extent of infection determine the degree of signs and symptoms. In cystic echinococcosis, often a singular slow-growing mass develops in the body. The most common areas of cyst formation are the liver, being involved in around 65% of the cases, and the lungs are involved in 25% of the cases; however, cyst formation can occur in any organ, including the brain, bones, skeletal muscles, kidneys, and spleen.<sup>2</sup> The site of infection along with the size of the cyst itself will determine the signs and symptoms present. The pressure and displacement of the cyst to the organs is what typically causes the presentation of infection. A larger cyst can go asymptomatic in the lungs, liver, or other thoracic organs, whereas a cyst in the brain may present with signs and symptoms within a few days to weeks. An infection in the liver can present with abdominal pain and tenderness, hepatomegaly, jaundice, biliary obstruction, and portal hypertension. Cyst formation in the lungs can show chest pain, cough, shortness of breath, decreased lung sounds, and hemoptysis.

Furthermore, a cyst in the brain can cause headache, nausea, vomiting, neurological deficits, and a decreased level of consciousness.

Secondary complications can occur due to a leak or burst of the cyst itself. Extruded contents of the cyst can cause from a mild allergic reaction to a full-blown anaphylactic shock depending on the severity of the rupture. In alveolar echinococcosis, the liver is more specifically targeted and the disease process is more fulminant, resembling that of cirrhosis or carcinoma that eventually leads to liver failure. While cystic echinococcosis typically forms one encapsulated cyst, the disease process of alveolar echinococcosis typically has multiple compartments that spread locally and distantly that suggests a malignancy and is typically harder to treat.<sup>1</sup>

In any type of echinococcosis, imaging is typically the first tool used for diagnosis, followed by the use of blood work and serologic tests for verification of imaging results. The preferred imaging techniques to

be used are ultrasound, CAT scan, and magnetic resonance imaging (MRI). The best results are yielded when there is a presence of daughter cells in the cyst in cystic echinococcosis or areas of calcification as seen in alveolar echinococcosis. In cysts that are less extensive, it may be difficult to differentiate between hydatid cysts and abscesses, amebic cysts, and benign or malignant tumors.<sup>3</sup> This is why the use of serologic testing and blood work is essential for verification of imaging results. Serologic tests include the enzyme-linked immunosorbent assay (ELISA) and the immunoblot. Together they have a sensitivity of 80% overall and can distinguish between the echinococcal infections. Eosinophilia occurs in over 25% of cases and is determined from a CBC.<sup>1</sup> Imaging verified by serologic tests can lead to a definitive diagnosis.

Treatment of echinococcosis often involves the use of albendazole (*Albenza*) in conjunction with the surgical removal of the cyst. Albendazole has been shown to suppress the growth of cystic formation and is often administered before and after surgery to prevent metastatic infection in case of leakage of cystic contents. The dosage of albendazole is 10-15mg/kg/d given bid PO for one to six months. Mebendazole (*Vermox*) can be used in lieu of albendazole. The dosing of mebendazole is 40-50mg/kg/d PO given for three to six months. In cases where the cysts are inoperable or cystic formation is diffuse and extensive, percutaneous aspiration, injection, and reaspiration (PAIR)

technique has been proven to be effective. In this technique, the cyst's contents are aspirated and then injected with a scolicidal agent (20% hypertonic saline or albendazole metabolites including albendazole sulfoxide and albendazole sulfone) for 15 minutes and then the contents are reaspirated. This process is repeated until the return of contents is clear. This technique is less invasive and less expensive, but the occurrence of cystic rupture or leakage is greater.<sup>1</sup>

Echinococcosis still remains a rather rare disease in North America. When deployed however, the prevalence of infection is greatly increased. If taking care to use simple preventive techniques such as proper hand washing, correct food preparation and storage, and limited exposure to wildlife, echinococcosis can remain a rare occurrence for troops at home and abroad.

#### REFERENCES

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