Class: Trematoda

Family: Dicrocoeliidae

Genus: Dicrocoelium

Species*: *Dicrocoelium dentriticum

Hosts: Ruminants (Sheep, cattle, deer, camel..) are the main definitive host of this fluke but other herbivorous animals, carnivores, and humans can be accidental definitive host

Lenght: 8-12 mm. It is very small according to *Fasciola.*

Unlike Fasciola;

Distinctly lanceolate and semi- transparent

All internal organs are lobed.

Ttestes are in front of the ovary.

There are no spines on the tegument

Site: Bile ducts and gall bladder

Distribution:Worldwide. It is also very common in Turkey

Intermediate hosts:Two are required.

1.Land snails of many genera as *Helix*, *Helicella*, *Zebrina*, *Cionella*

2. Brown ants of the genus Formica

Embryonated eggs containing miracidia are shed in feces of definitive hosts, which are typically ruminants .

The eggs are then ingested by the first intermediate host (snail) .

When the miracidia hatch , they migrate through the gut wall and settle into the adjacent vascular connective tissue, where they become mother sporocysts .

The sporocysts migrate to the digestive gland where they give rise to several daughter sporocysts. Inside each daughter sporocyst, cercariae are produced . There is no REDIA period

Cercariae migrate to the respiration chamber where they are shed in slime ball from the snail .

After a slime ball is ingested by the second intermediate host (ant), the cercariae become free in the intestine and migrate to the hemocoel where they become metacercariae .

When the infected ant is eaten by a suitable definitive host , the metacercariae excyst in the small intestine.

The worms migrate to the bile duct where they mature into adults .

Humans can serve as definitive hosts after ingesting infected ants (e.g. on contaminated food items) .

In the final host, the metacercariae hatch in the small intestine and the young flukes migrate up the main bile duct and thence to the smaller ducts in the liver.

There is no parenchymal migration and the prepatent period is 10-12 weeks. The flukes are long-lived and can survive in the final host for several years.

PATHOGENESIS

•Although several thousand *D. dendriticum* are commonly found in the bile ducts, the livers are relatively normal; this is presumably due to the absence of a migratory phase. However, in heavier infections there is fibrosis of the smaller bile ducts and extensive cirrhosis can occur ;

•sometimes the bile ducts become markedly distended.

CLINICAL SIGNS

In many instances these are absent. Anaemia, oedema and emaciation have been reported in severe cases.

EPIDEMIOLOGY

There are two important features vvhich differentiate the epidemiology of *Dicrocoeliu*m from that of *Fasciola.*

(i) The intermediate hosts are independent of water and are evenly distributed on the terrain.

(ii) The egg can survive for months on dry pasture, presenting a reservoir additional to that in the intermediate and final hosts.

DIAGNOSIS

This is entirely based on faecal examination for eggs and necropsy findings. The egg is small, 45 x 30 um, dark brown and operculate, usually with a flattened side. It contains a miracidium when passed in the faeces.

TREATMENT

High doses of anthelmintics are required for efîective removal of *Dicrocoelium*. The benzimidazole, albendazole, given at three times the roundworm dosage rate, is very effective, as is praziquantel at twice the rate used for tapeworms. Other drugs such as thiabendazole and fenbendazole are also effective, but at very high dose rates. Recently netobimin has been shown to be highly effective.

Albendazole	20 mg/kg
Thiabendazole	250 mg/kg
Netobimin	20 mg/kg
Praziquantel	50 mg/kg

Drugs used in the treatment of dicrocoeliosis			
Active ingredient	Route of administration	Dose (mg7kg)	
		Sheep and goat	Cattle
Thiabendazole	oral	200–300	100
Hetolin	oral	20–25	
Netobimin	oral	20	20
Febantel	oral	50	
Praziquantel	oral	20-50 (two times)	20-50
Hexachloroparaxylene	oral	150	125
Albendazole	oral	15-20 (2-3 weeks interval 2 times)	15-20
Fenbendazole	oral	100–150 (five times)	50
Mebendazole	oral	50–80	
Cambendazole	oral	25–100	
Luxabendazole	oral	7.5-10	
Thiophanate	oral	50	50
Diamphenethide	oral	80–200 (three times)	

Necrotic hepatitis: Black disease:

Causes: *Clostridium novyi*

Anaerobic environment occurs as a result of the destruction of the liver parenchyma.

This allows the development and toxin formation of *Clostridium novyi* spores present here, or from young intestines.

Generally, clinical symptoms are not seen.

Toxemia results in sudden death.

There is no abdominal pain and blood accumulation.

Deaths are mostly seen in sheep with good condition at the age of 2 -4 years.

Class: Trematoda

Family: Opistorchiidae

•Genus: OpisthorchisSpecies and definitive hosts

•*Opisthorchis felineus (syn. tenuicollis),* the cat liver fluke, in cat, dog, fox, pig, man, ete.

•*Opisthorchis (syn. Clonorchis) sinensis*, Chinese liver fluke, in MAN, dog, cat, pig, rat, ete.

•*Opisthorchis viverrini* in MAN, dog, cat, ete.

•Site: Bile and pancreatic ducts.

•**Distribution:** Endemic. Especially in South-East Asia (China, Taiwan, Korea, Vietnam, Japan, India) and Siberia.

• ALSO SEEN İN TURKEY

Morphology

•Length: 7-15 mm, transparent. Testes on the back of the body

•Egg: very small (30 µm), operculate, with Miracidium when passed in the faeces Intermediate hosts:

•first: CE develop in aquatic snails; *(Bulinus sp., Bithynia sp*)

second: Metasercaria develop in the musculature of cyprinoid fishes.

Pathogenesis, clinical signs

•Often remains unnoticed (subclinical infection).

•Heavier infeetions may cause proliferative cholangitis, pericholangitis, choleystitis, gastro-duodenitis, anorexia, liver cirrhosis, anaemia;

•clinics: indigestion, epigastric discomfort, diarrhoea;

O. viverrini in man is considered to be carcinogenic, often leading to cholangiocarcinoma and death.

Diagnosis

This is entirely based on faecal examination (sedimentation tecnique) for eggs and necropsy findings. Eggs 15 - 30 microns in diameter, pear shaped, with opreculum

Control

Cats and dogs act as reservoir hosts for the infection of humans.

Fish meat should be eaten sufficiently cooked.

Species: *Metorchis albidus, M. conjunctus*

Definitive hosts: It is a mammal that eats fish such as cats and dogs, and is rarely human.

Location: The liver lives in the biliary tract.

Intermediate hosts:

The first intermediate hosts are freshwater slugs, the second intermediate hosts are freshwater fish.

Prevalence: Located in Europe and North America.

Metorchis albidus were detected in cats in Turkey.

Pathogenicity: Metorchis can cause fatal liver diseases in cats and dogs.

Family : HETEROPHYİDAE

Genus : Heterophyes – Metagonimus

Species: *Heterophyes heterophyes*

Hosts: Cat, dog, pig, man etc.

Site: İntestine

Distribution: Endemic. Especially China, Taiwan, Korea, Vietnam, Japan, India, Siberia.Also Seen İn Turkey

Intermediate hosts: first: aquatic snails; second: fıshes.

Morphology

Lenght: 0.3-0.7 x 1-1.7 mm.
There are 3 suckers. 1. Oral,2. Ventral, 3. Genital

Patogenesis: Heavier infeetions may cause enteritis

Diagnosis:

This is entirely based on faecal examination for eggs and necropsy findings.

Species: *Metagonimus yokogawai*

Metagonimus yokogawai, a minute intestinal fluke (and the smallest human fluke)

Definitive hosts: MAN. In addition to humans, fish-eating mammals (e.g., cats and dogs) and birds can also be infected by *M. yokogawai*

Predilection site: Small intestine İntermediate host: Snails and fish

Prevalence: It is spread in East Asia and Balkans.

ALSO SEEN CATS İN TURKEY

Life cycle: like heterophyes Pathogenesis:

The main symptoms are diarrhea and colicky abdominal pain. Migration of the eggs to extraintestinal sites (heart, brain) can occur, with resulting symptoms.