

Super family :- Strongyloidea
Family :- Strongylidae

Introduction

These are cosmopolitanly distributed large bursate Nematodes of the equids inhabiting the large intestine. *Strongylus vulgaris* is of great pathogenic significance since the worms cause significant damage to the arterial system .

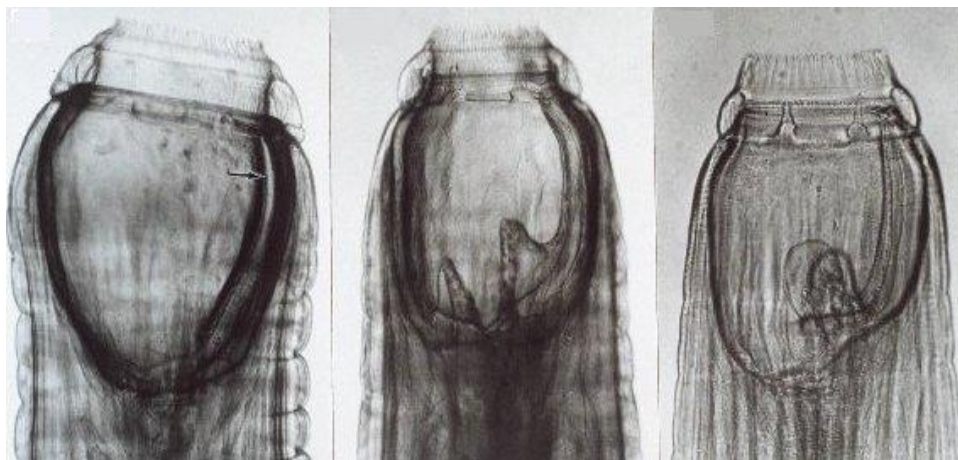
Prevalence :- they are cosmopolitan in distribution .

Genus :- Strongylus

Important Species 1- *S.edentatus*
2- *S. vulgaris*
3- *S.equinus*

Common name :- 1- *S.edentatus* —————→ toothless strongyle .
2- *S. vulgaris* —————→ double-toothed strongyle .
3- *S.equinus* —————→ triple - toothed strongyle
Or (sclerostome worm)
Or (verminous worm)

Name of disease *S.edentatus* —————→ cause the disease called :-
(haemonomelasma)
Or (verminous arteritis)
Or (verminous pneumonia)



Steps	<i>S. vulgaris</i>	<i>S. equinus</i>	- <i>S. edentatus</i>
1	The worms are found in the equines.	The worms are found in the equines.	The worms are found in the equines.
2	Buccal capsule is oval.	Buccal capsule is apparently is oval in outline.	Buccal capsule is Normal
3	A pair of ear-shaped teeth are present in the depth of buccal capsule.	There is presence of a large dorsal tooth with two bifid tips at the base of the buccal capsule and two subventral teeth are also present .	Teeth are absent .
4	These worms are smaller than other two worms.	These are larger than <i>S. vulgaris</i> .	These are larger than <i>S. vulgaris</i>
5	The external leaf crown is fringed anteriorly.	The external leaf crown is not fringed.	The external leaf crown is not fringed.
6	Cranial mesenteric artery is affected by the larvae.	Not affected.	Not affected.
7	Nodules are not formed by the larvae on caecum and colon.	Nodules are formed by the larvae on caecum and colon.	Haemorrhagic nodules are formed by the larvae on caecum and colon.
8	Adults live in the large intestine .	Adults live in the large intestine .	Adults live in the large intestine .
9	The common name of the worms is double-toothed strongyle.	The common name of the worms is triple-toothed strongyle. Or sclerostome . or blood worm.	The common name of the worms is toothless strongyle.

Life cycle of the Strongylus worms

Developmental stages

- 1- eggs.
- 2- Larva 1.
- 3- Larva 2.
- 4- Larva 3 (infective stage).
- 5- Larva 4 .
- 6- Adults .

Development in the environment

- 1- the eggs are expelled out of the host . the eggs developed and hatch in the environment .**
- 2- after hatching the larvae come out. These larvae are called as the 1st stage larvae. Further two stages of larvae development occur. The larvae voraciously take large amount of food. At the time of food intake the larvae remain very active. Later on, the larvae enter into lethargic phase. This is the preparatory phase of the larvae for the next stage. After one moulting the 1st stage larvae transform into 2nd stage larva. In a similar way the 2nd stage larvae further transform into 3rd stage larvae. The sheath of the second stage larvae is not cast off. Rather the sheath of the second stage larvae provide extra protection to the parasitic larvae. Now the larva are ready for the infection to the host. The infective larvae do not feed and the food stored in the intestinal cells is utilized during it`s stage. The larvae are negatively geotropic and positively phototropic to the light of low intensity. These two characters enable the larvae to crawl onto the grass blades. This stage is called the infective stage. Development upto the 3rd stage larvae is same for all strongyle.**

Development in the vertebrate host

S. edentatus

- 1- After ingestion , exsheathment of the parasitic larvae (L3) occurs.**
- 2- After exsheathment the larvae enter into the wall of the intestine, the larvae enter the liver via the hepatoportal circulation and moult to become 4th stage larvae.**
- 3- In the liver the larvae migrate for several days. Then from the liver the larvae reach to right abdominal flank via the hepatic ligament. Here in this vicinity the larvae form the haemorrhagic nodules. In the haemorrhagic nodules the larvae remain for few months.**
- 4- Then the larvae reach the wall of caecum and colon where they will form haemorrhagic nodules again.**

S. equines

- 1- The host gets infection by ingestion of the infective larvae (L3).**
- 2- After ingestion will occurs exsheathment انسلاخ of the larvae.**
- 3- After exsheathment the larvae will penetrate the wall of the large intestine. In the wall of the large intestine the larvae form the nodules.**
- 4- In the nodules the larvae perform one moulting and transform into the 4th stage larvae.**

- 5- These 4th stage larvae then leave the nodules and reach the peritoneal cavity.
- 6- From the peritoneal cavity the larvae then reach the liver after 11 days where they migrate for several days to several weeks.
- 7- From the liver the larvae then reach the pancreas .
- 8- From the pancreas the larvae then reach the peritoneal cavity.

S. vulgaris

- 1- The host gets infection by ingestion of the infective larvae (L3).
- 2- After ingestion will occurs exsheatment انسلاخ of the larvae.
- 3- After exsheatment the larvae will penetrate the wall of the large intestine and transform into 4th stage after moulting .
- 4- These 4th stage larvae then enter into the small arteries of the submucosal layer of the intestine and enter the intema.
- 5- From the small artery the larvae enter the large artery. The larvae follow the arterial route of cranial mesenteric artery and then reach the caecum and colon.
- 6- In the wall of the caecum and colon , nodules are formed and the parasites come into the lumen after rupture of the nodules where they get sexually matured.

Pathogenesis

Pathological features (lesion)

- Haemorrhagic nodules formation on the wall of intestine.
- Verminous arteritis.
- Verminous aneurysm..
- Embolism etc.

Description

- 1- Several types of pathogenesis occurs as the location of different species is defferent.
- 2- When the larvae occur in the liver , there occurs the damage of the liver which lead to functional disturbance.
- 3- When the larvae occur in the large intestine they cause the formation of the haemorrhagic nodule. Haemorrhgic nodules are also formed in other places .
- 4- The architecture of the affected system is altered resulting in circulatory disturbances .
- 5- *S. edentatus* causes formation of nodules in the wall of the large intestine which are termed as haemonomelasma ilei.
- 6- The larvae of *S. equinus* causes formation of small nodules on the wall of the intestine.

- 7- Most damage is caused in the arterial system when involvement of *S. vulgaris* occurs. The larvae affect the media and intima part of the artery. Haemorrhages and necrosis occur in the artery which is associated with large number of lymphocytes. This is called verminous arteritis. The necrotic and haemorrhagic material occlude the lumen of the artery causing circulatory disturbances. The elastic fibers get loosened resulting in dilation of the artery or vein which is called as (Verminous aneurysm). Anterior mesenteric , iliac , renal and other arteries are affected.
- 8- Sometimes the parasites get attached to the wall of the arteries which causes obstruction of the arteries. The parasite and the lesion material lead to the formation of the embolism. Thrombosis of submucosal artery comprise the 4th stage of larvae.
- 9- At the peripheral circulation there occurs the formation of the infection. The prolonged persistence of infraction leads to formation of necrosis of the affected part.
- 10- One more striking pathological feature occurs due to aberrant migration of the larvae in brain , lung , and vital organs.

Diagnosis

A – General

- 1- Examination of faeces for detection *Strongylus* eggs.
- 2- Faecal culture for identification of *Strongylus* larvae.
- 3- Per-rectal examination reveals aneurysm of cranial mesenteric artery.

B- Immunodiagnosis

Immunodiagnosis can be done by using the specific immunodominant proteins.

Treatment

- Peprazine salts - 220 mg /kg.
- Fenbendazole – 7.5 mg /kg .
- Mebendazole -10 mg /kg.
- Cambendazole – 20 mg /kg .
- Phenothiazine - 35 mg /kg .