Bovine muscular cysticercosis

1-Definition

It is a larval cestodiasis whose larva is called *Cysticercus bovis* which is located in the striated muscle tissue of cattle

The adult *Tenia saginata* is located in humans.

This disease is a parasitic zoonosis.

2-Classification

Phylum Platyhelminthes
Class of Cestoda
Order of Cyclophyllidea
Family Taeniidae
Genus *Tenia*

3-Importance

- **social**: zoonosis, thru the consumption of raw or undercooked meat
- **economic:** seizure of meats
• Depreciation of meats
• Cost of sanitation
• Cost of treating human teniasis
• Weakly detectable because the vesicles are too small

4- Morphological characteristics of the parasite

- The larva Cysticercus bovis is of the cysticercus type
- It measures 6 to 8mm / 3 to 5mm - Ovoid in shape
- Thin, translucent, containing a pinkish liquid

5-Biology 5-1-Epidemiology

5-1-1-Infestation modalities

5-1-1-1-Sources of the parasite

-Humans represent a profuse source as they eliminate 8 to 10 segments in their feces or during intervals of defecation

-Taenia survives for 4 to 10 years, making it a durable source

-Virulent materials such as embryophore segments found in food, caregivers' fingers, and finally insects that could play a role in the transmission of the disease

5-2-Methods of contamination

5-2-1-Oral route

-Cattle pica

-Transplacental route

5-2-2 -Favorable conditions

-the lack of hygiene

-the absence of public restrooms,

-the contact between humans and cattle

-the embryophores that are expelled by humans outside of defecation

-the spreading of residual sludge from wastewater treatment plants on pastures; after such spreading, up to 2000 viable *T.saginata* eggs/m² can be found according to BARBIER et al., 1990

-nutritional deficiencies: pica, coprophagia

-flooding of cities by rivers containing sewage water

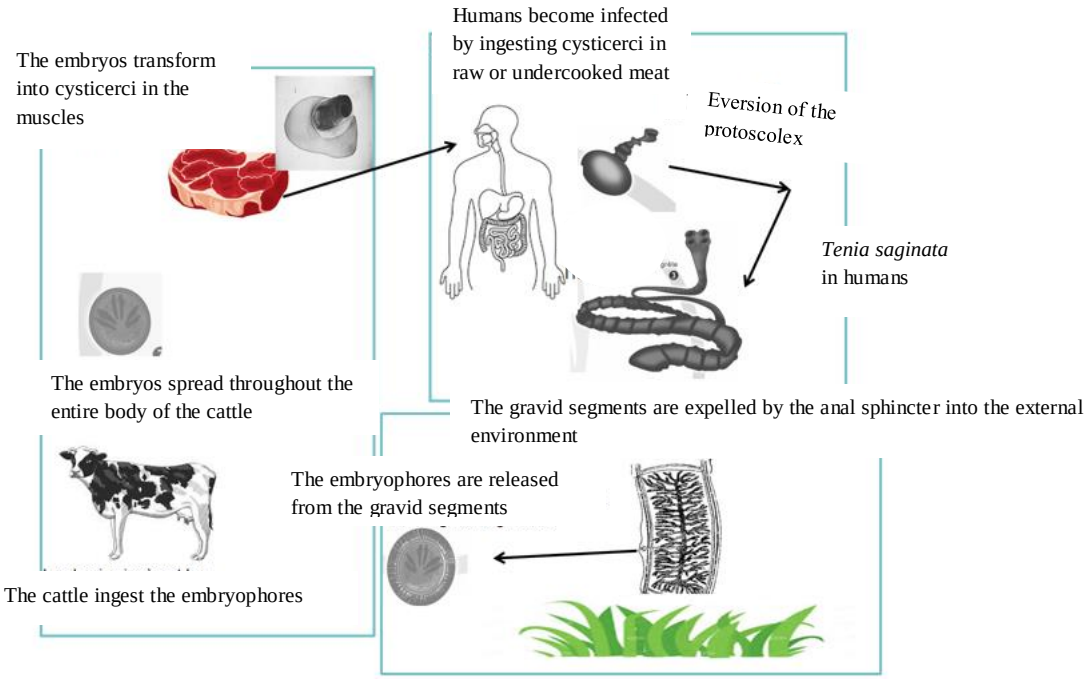
5-3-Susceptibility

-cattle are the animals susceptible to this disease

-age: lumpy skin disease is very rare in cattle older than 5 years -the rate of transformation of hexacanth embryos into cysticerci is 91% in animals younger than 2 years

5-4-Evolutionary cycle

The human expels ovigerous segments outside onto the grass, from which the eggs of the cestode *T. saginata* escape. The grazing cattle will ingest the eggs and thus become infested, developing *Cysticercus bovis* larvae in their striated muscles.



6-Pathogenesis

6-1-traumatic and inflammatory action

-when the vesicle increases in size, it causes compression and separation of muscle fibers

6-2-bactericidal action

-this action is the cause of purulent scab disease

6-3-Antigenic action explained by metabolic antigens inducing the formation of different types of protective antibodies and antibodies indicative of infestation, the immunity obtained is a true lasting immunity. it is of a cellular nature (stimulation of opsonization: suffocation of cysts), this can be favorable for vaccination prospects

7-Symptoms

-in general, non-existent; some animals can present up to 30,000 cysticerci without showing symptoms

-however, in some cases, post-mortem myositis or myocarditis can be observed

8-Lesions

8-1-Localization of lesions

-Mainly in the muscles especially the striated muscles and the intermuscular connective tissue

-Rarely generalized to the entire musculature

-Preferred locations: The myocardium, the tongue, the pterygoids, the pharynx, the esophagus, the diaphragm, the ancones especially the intercostals, the triceps brachii, the psoas, the crural muscles

8-2-Aspect of cysticerci -the larvae appear in the form of parasitic granulomas, with a spot in the polar region representing a cephalic invagination. These larvae or cysts are enveloped in reactive connective tissue: slightly pinkish white pearl contrasting with the red muscles: grain of a miser

8-3-Evolution of the lesions

We are gradually witnessing an evolution over time of the cysts:

-A caseation

-A calcification transforming the vesicles into small grains of dry masonry -An abscess with the appearance of often greenish pus -Possibility of observing fragments of parasites in the abscesses and caseum, however, this observation is much more difficult in calcified vesicles

9-**Diagnosis**

9-1-Pre-mortem Diagnostic

9-1-1-Clinic: impossible

9-1-2 -Experimental:

-local hypersensitivity: I.D.R using antigens made from scolex extracts or vesicular fluid, the reaction is positive between the 3rd and 11th month of infestation, it is not specific, with cross-reactions with hydatidosis and fascioliasis
Complement fixation: positive even if the cysts have degenerated. Cross-reaction with Fasciolosis
-I.F.I: Indirect Immunofluorescence Indirect positive 1 to 4 weeks after infestation. Negative 9 months after the infestation, the antibodies do not persist as long as the infestation.

9-2-Post-mortem Diagnosis

-It's the most interesting it falls under the domain of H.I.D.A.O.A, the research methods are codified by the legislator -The research is systematically conducted on carcasses older than 6 weeks
-It is based on: inspection, palpation, and incision
--The tongue: it is incised longitudinally on the underside
--The esophagus: is separated from the trachea and examined
--The external and internal masseters: must be incised on 2 planes parallel to the lower jaw, from the lower edge of the jaw to the upper muscle insertion
--The internal pterygoids: must undergo a section parallel to the mandible
--The diaphragm: its muscular parts are freed from the serous membranes and then incised in several places along the direction of the fibers.
--The heart: was removed from the pericardial sac and incised into 4 according to Hertwig's section: opening of the ventricles by crossing the interventricular septum
Note: difficult diagnosis cases
Discrete infestation -sinking of the vesicle upon sectioning -when the larva is embedded in adipose tissue -during degeneration -during calcification -the WOOD lamp can be used, which will give a brick-red fluorescence when the pinkish hue of the larva contrasts less with the color of certain muscles

9-3-Differential Diagnosis - It is done with the erratic localizations of other larval cestodoses or pseudo-larvae. These are always degenerated in the muscle and are always present in their normal locations. -In the case of Sarcocystosis, the cysts are fusiform, whitish, intramuscular, containing banana-shaped spores in the esophagus. -In the case of muscular tuberculosis, there is a satellite ganglionic reaction.

10-Treatment

-slaughterhouse discovered disease, so no treatment, however, and theoretically, Praziquantel at 50 to 100mg/kg orally is effective on 3-month-old larvae, but not on 1-month-old larvae
-Albendazole at 50mg/kg is quite effective

11-Prophylaxis

11-1-Offensive Measures -in cattle, cysticerci must be destroyed -lazy meat must be detected at the slaughterhouse -lazy meat is considered any carcass presenting at least one living cysticercus, or numerous degenerative lesions, calcified or not, resembling lumpy jaw
-is considered suspicious any carcass showing degenerative lesions, calcified or not, in small numbers at the sites of choice

11-1-1-Conduct to follow

1-numerous cysticerci: live or degenerated (more than 1 cysticercus/dm2 in any location): total seizure for massive lumpy skin disease, followed by denaturation
2-rare cysticerci (≤ 1 cysticercus/dm2): thorough examination of the rest of the carcass (it consists of a meticulous examination of visible muscular surfaces, additional incisions, particularly in the preferred areas, and possibly even a dissection of the carcass):
--2-a-if massive cysticercosis is discovered: total seizure
--2-b-otherwise discreet infestation, seizure and destruction of the parasitized parts; with live cysticerci, sanitization of the rest of the carcass by freezing at -10°C for 10 days; with all cysticerci degenerated, market release without freezing

11-1-1-1-Conduct to follow in humans
--Treatment of teniasis

11-1-1-2-Conduct to follow in the external environment regarding the presence of eggs

--Treatment of sewage water
11-2-Defensive Measures
Medical means
--Vaccines
Sanitary measures
--Public education
--Installation of toilets in rural areas