



Optical microscopy and cross anatomy for the intestinal wall of sheep infected with Tap worm

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ABSTRACT

Ten intestinal mucosa of sheep intestine were obtained for cross and microscopy examination, the specimens from those intestinal wall were taken at pieces half cm and washed well by running water, then processed by histological technique according to Bancroft & Steven 1987 including fixation, dehydration, clearing and embedding with paraffin wax also sectioning at six micrometer by microtome, finally stained by Hematoxylin and Eosin after that mounted with D. P. X and after drying in dry cabinet for 24 hour examined by light microscope , The intestinal wall was congested and patches of blood hemorrhage were seen. The histological examination revealed to sloughing of the intestinal villi from the luminal surface with presence of hyper secretion of mucus from the goblet cells and intestinal glands in the lamina propria also infiltration of white blood cells in the lamina propria in between the intestinal glands. In conclusion; the intestinal wall was damages after infection with Tape worm due to its effect on the villi of mucosa which are vital structures for absorption of nutritional elements in a animals.

1. Introduction

The tapeworm is a parasite that lives and feeds in the intestines of sheep. This condition is known as a tapeworm infection[1-3].

Tapeworms infect sheep and are characterized by their long, flat body, reaching a length of 4.5-6m. The worm's

body consists of many parts; the length of one part is 1-1.5cm, which is the same width as the tapeworm. In each part there is a complete reproductive system, where some fully developed parts are separated from the worm. It is loaded with eggs and comes out with the animal waste. When the wall of these pieces is

destroyed, the eggs come out of them. The eggs grow inside the leaves of the plants and develop into infective larvae. These enter the digestive canal of the sheep when they eat the plants stuck to them[1-3].

Inside the intestine, the larvae emerge from inside the plant leaves and develop into adult worms that are characterized by their pointed heads that immerse them in the inner layers of the intestine of the infected animal. The head of the worm attached to the intestine is connected to parts of the worm's body that move freely in the intestines of the animal, causing damage. These worms remain in the intestines for 2-3 months and then abandon them. Compared to other internal parasites, tapeworms are less harmful unless they are present in large numbers, causing intestinal obstruction or disruption of the digestion process and the passage of food, which leads to animal weakness and death. In many cases, there are these Worms are accompanied by other parasites. Copper sulfate or nicotine is useful in treating infected sheep [4].

Types of worms in sheep's

There are two types of worms that can infect sheep:

Roundworms : Most of them live in the intestines, but there are two types that live in the lungs. The shape is cylindrical, and its size ranges up to 7-10 mm, but Monisia worm reaches 20-34 mm. Roundworms are by far the most important parasite in sheep and will be the most important health challenges faced by sheep farmers[5].

Tapeworms: They live in the alimentary canal, and they are long, and these worms consist of many segments, and can reach a length of up to 6 meters. Tapeworms are passed in the feces, and because of their length and the numbers in which they exist, many farmers believe that they cause serious harm to lambs [3,4].

Effect of worms on sheep

The side effects of these worms infected on the animal are diarrhea, weight loss and death. Munizia worms are worms that cause anemia and death. Such severe cases are still relatively common because many farmers stress the possibility of their animals being exposed to worms. They may be using an anthelmintic lotion, or perhaps They use an effective dose but sheep are rapidly repopulated due to the high level of pasture contamination. The most common economic effect of worms is associated with subclinical levels of infection. It is nearly impossible for farmers to monitor appetite, reduced feed conversion and mild weight loss without regularly weighing their sheep [6]. Most farmers will not see a weight loss of 50 g/day in lambs, larvae over 2,000 days old, a lost opportunity of over 10,000 kg live weight, \$2.50/kg/\$25,000 loss, and for most farmers, it won't. This ends up being a direct loss because they will keep the lambs for longer, but it means additional costs such as eating more pasture, extra animal health, and a higher chance for the lamb to get facial eczema or pneumonia[7]

Treating intestinal tapeworm specifically is not likely to be beneficial, either in terms of belching or weight gain. Even more important is the effective treatment of less visible worms (roundworms *Moniezia* and roundworms), both of which cause severe production losses and death. If you feel you must remove the tapeworms, use a dose containing praziquantel.

Albendazole helps remove parts of the tapeworm, but it will not kill the head of the tapeworm. Be aware, however, that resistance to the important sheep and goat worms to albendazole (not to mention [8], several other active substances is very common.

Intestinal hypersensitivity This is an allergic reaction of the intestine to the incoming pure worm larvae leading to diarrhea, even with relatively low levels of larvae. This differs from the severe damage to the intestinal lining caused by the heavy burden of adult worms. Anaphylaxis usually occurs in the winter and spring months, in animals that have developed immunity to the adult worm, and is more pronounced in mature animals[9].

Sheep intestines contain large numbers of tapeworms and large numbers of tapeworms are regularly excreted from the alimentary canal of lambs that seem to have reached slaughter weight without problems. But sometimes the numbers may be large enough to cause loss of condition, diarrhea and, in extreme circumstances, bowel obstruction[10].

If treatment is deemed necessary, it is worth keeping in mind that not all anthelmintic treatments cure tapeworms. White dewormers containing albendazole, oxfendazole, fenbendazole or ricobendazole are generally most effective. [11]

Diagnosis : The number of eggs in the feces can provide a reasonable assessment if there are adult worms present, which is more reliable than in cattle. However, sheep with worm problems can have zero fecal eggs, usually when there are mounds of larval stages that are not mature[12].

Management & Treatment

There is a wide range of anesthetics available for use in sheep. Management of worms at the farm level is a very complex issue, and requires a good understanding of the worm's life cycle and the interactions between the worm, host, and environment. In the past, worms were effectively controlled by anthelmintic drugs that kill Parasites, but nowadays, worms are becoming resistant to most drugs, which makes parasite control more difficult. Scientists are working hard to find new ways to control parasites in sheep[13]. In recent years, there has been widespread resistance of worms to whiteflies, and it is very important to reduce this to a minimum and this can be done by following steps:

Avoid introducing resistant worms or quarantine treatment, Without effective quarantine treatment, the risk of resistance can increase dramatically. Quarantine strategies should be applied

to all sheep whether purchased from sales or brought home from grazing on other farms. Treat all incoming sheep and keep sheep on pasture for 24 to 24 hours. 48 hours after treatment to ensure that all the worms in their intestines pass into their feces, make sure they are fed and watered during this period, If there is no "dirty" pasture, keep the sheep out of pasture for 72 hours after stone treatment before allowing them to graze on a paddock.

Farm resistance test

If you think you have a problem on a farm, it would be worth checking which worms are working and which aren't. There are a variety of tests you can do, whether that's a simple test for fecal egg counts after worming tests or more elaborate cuts. Control relies on not grazing pastures likely to be severely infested with susceptible lambs. Avoidance of infected pastures from July onwards can be incorporated into some farm management systems by transferring weaned lambs to hay or fodder from mid-June onwards. On some mixed farms, it may be possible to rotate pastures annually between cattle and sheep and to operate a "modified" clean grazing system for two years [14].

Care must be taken when purchasing from other farms because without adequate quarantine protocols it is very easy to introduce resistant worms into the flock. A period of at least 3 weeks of isolation coupled with immersion in quarantine will greatly reduce the risk of this happening. [15].

2. Materials and methods

The present work was done as histological technique according to Bancroft, 1987 including fixation, dehydration , clearing, embedding wax paraffin , sectioning and staining by Hematoxylin and Eosin .

3. Result

The histological examination revealed to sloughing of the intestinal villi from the luminal surface with presence of hyper secretion of mucus from the goblet cells and intestinal glands in the lamina properium also infiltration of white blood cells in the lamina propria in between the intestinal glands.

3.1 Intestine control

Intestine tissue contained finger villi lining by simple columnar cells, with the presence of microvilli on the surface of columnar cells facing the intestinal cavity, as they appeared as a red line.

The core of the villi contained loose connective tissue with the presence of fibroblasts and infiltration of numbers of white blood cells, and there were numbers of goblet cells among the epithelial cells (Fig. 1).

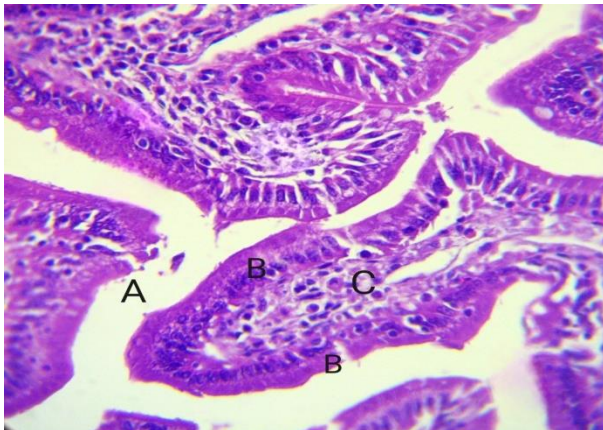


Fig.(1) Intestinal villi (A) Epithelial columnar cells (B) the core of villi infiltrated with WBCs(C) H&E X40

3.2 Control intestine

The mucous folds of the intestine were found, and they contained many villi that appeared in the form of a labyrinth, as they were lined with simple columnar epithelial cells, and on their surface were the absorptive microvilli. The core of the villi was filled with white blood cells and fibroblasts present with the soft connective tissue that forms the core of the villi (Fig. 2)

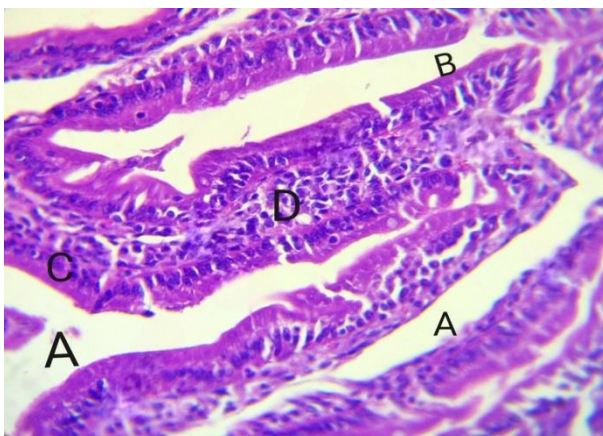


Fig.(2) Finger – like intestinal villi (A) microvilli (B) Epithelial columnar cells (C) the core of villi with WBCs (D) (H&E X40)

Control intestine

The mucous membrane of the small intestine contained numbers of intestinal glands lined with columnar to cuboidal cells that secrete mucus, and around them large numbers of white blood cells were found extending to the bases of the glands. (Fig.3)

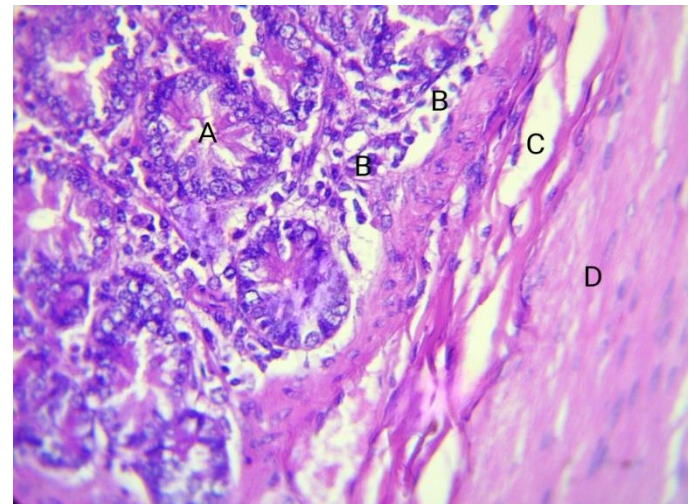


Fig. (3) Intestinal glands (A) in the lamina propria infiltration of WBCs and macrophages (B) submucosa glands (C) Tunica serosa (D) (H&E X40)

control Intestine

The presence of large numbers of intestinal glands appeared in the lamina propria of the mucous membrane of the intestine, and the cells of the glands had dark nuclei at the bases of the cells adjacent to the basement membrane of the glands of the interstitial tissue of the lamina propria between the glands, from which large numbers of white blood cells and macrophages infiltrated (Fig. 4).

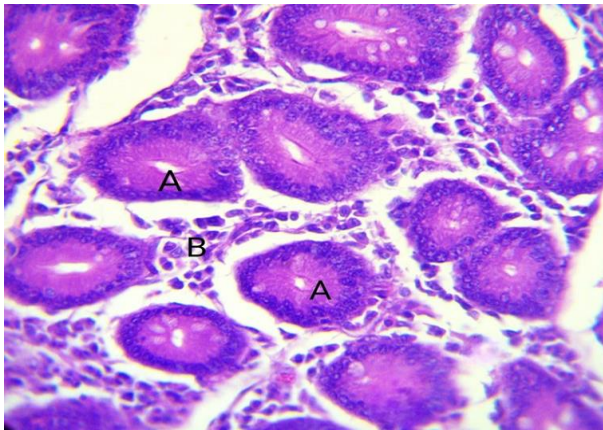


Fig.(4) Intestinal glands (A) in the lamina propria infiltration of WBCs (B) in between glands (H&EX40)

3.3 Infected Intestine

The destruction of the intestinal mucosal villi of the intestine appeared, where the luminal wall of the intestine facing the cavity in a flat manner and the intestinal glands were found from the destruction of mucous cells at the cavity of the intestine and the lamina propria , from which numbers of inflammatory and phagocytic white blood cells infiltrated, especially at the upper part of the intestinal mucosa facing the lumen of the intestine (Fig.5)



Fig. (5) Destruction and desquamation of the intestinal villi (A) hyper secretion of

mucus from intestinal glands (B) WBCs in the lamina propria (C) (H&EX 40)

Infected Intestine

There was a complete breakdown of the intestinal villi responsible for the absorption of nutrients, and the protrusion of the ends of the intestinal glands towards the intestinal cavity, and there is a shedding of its surface cells. (Fig.6).

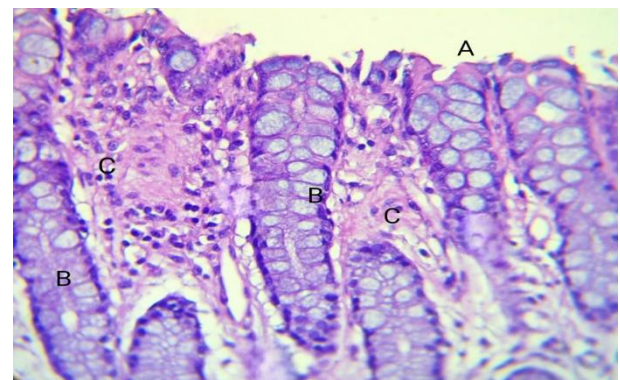


Fig. (6) Destruction and sloughing of the intestinal villi (A) , mucus cells (B) of intestinal glands, WBCs infiltration (C) in the lamina propria (H&E X40)

Infected Intestine

The presence of dispersed intestinal glands in the, lamina propria and the presence of mucous secretions in the cells of the glands, in which the cavity of the glands was filled with connective tissue between the glands, appeared in a disjointed and loose manner, and contained infiltration of many white blood cells and macrophages as well, which extended to the thickened mucous muscle (Fig.7)

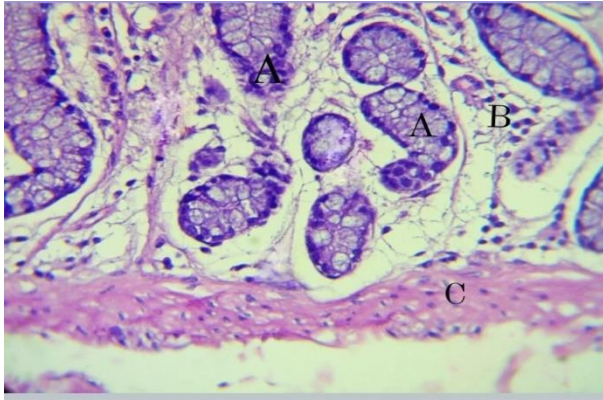


Fig.(7) Shrinkage and atrophy of intestinal glands (A) WBCs (B) in the lamina , Degeneration and thickening the muscularis mucosa (C) (H&EX 40)

3.4 Intestine Infected

The main lamina propria of the small intestine contained the tubular intestinal glands, in which there is hypersecretion of mucus, where the cavity of the glands was filled with mucous changes and white blood cells, and they were diffusely present and focal aggregations with other phagocytic cells (Fig. 8).

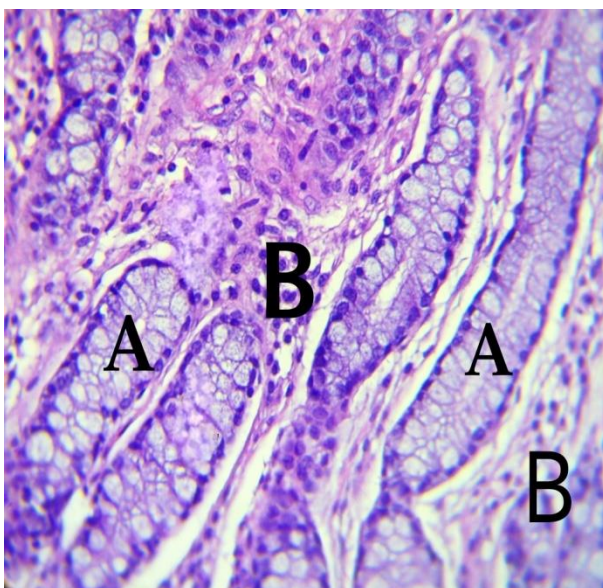


Fig.(8) Hyper secretion of mucus from intestinal glands (A) , infiltration of WBCs and macrophages (B) (H&E X40).

Intestine Infected

The intestinal mucosal lamina contained the intestinal glands, and it had atrophy and contraction in the basement membrane surrounding it. Around the glands, large numbers of white blood cells were found, extending to the depth of the lamina and under the bases of the glands.

The intestinal wall of smooth muscle fibers has vacuolar degeneration for many cytoplasm of smooth muscles. These resulted in the dissociation of the bundles of external muscle fibers (Fig. 9).

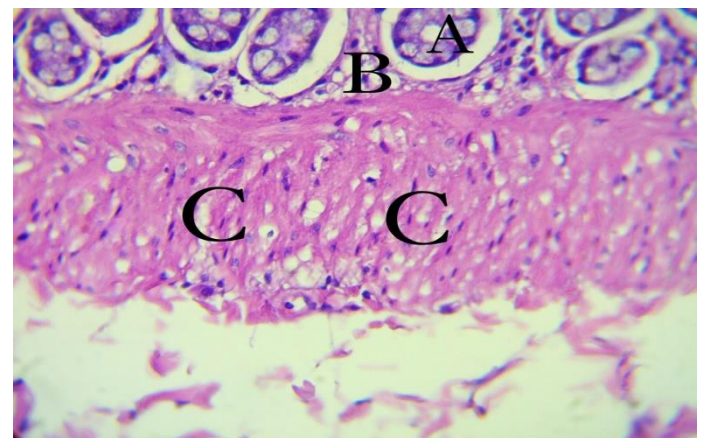


Fig.(9) Atrophy of intestinal mucus glands (A) and shrinkage from the basement membrane , WBCs (B) vascular degeneration of smooth muscle fibers (C) of tunica muscularis (H&E X40)

4. Discussion

The histological study began with observation with the naked eye. In some cases, intestinal obstruction was seen as a result of the presence of large numbers of tapeworms, which lead to pressure on the intestinal wall and thus the occurrence of sutures in the intestine.

This is consistent with what [16] found when examining intestines infected with tapeworms and threadworms. . It was also noted during the study that there are nodules on the outer walls of the infected intestine, due to the population of worms in these areas. [1] found the presence of such nodules on the walls of the intestine when infected with *echinobothria* worms causing Nodular tapeworm disease [17]. also confirmed the occurrence of these intestinal nodules when infected with the *R. tetragona* tapeworm. [15]also noted the presence of these nodules in the intestine infected with the *Passerile pies* tapeworm.

In the current study, another pathological condition appeared, which is the smashing of the villi, where the villi appear worn out, fragmented, and lost their natural shape. Thompson, et al (2015) noted a similar case of smashing in the mucous layer of the intestine when it was infected with *Omithsoorphis ghirafiane*, which is a type of vampire, and also noted this case of laceration . Barnouti in the glycogenic muscular layer of the intestinal muscles when infected with the threadworm *Sermonspiculum arractalato*[3]. This case was also observed by Rosenzvi (2011) in the intestines of sheep infected with *R. cysticles* tapeworms, as well as Al-Abbas (2008) when infecting the intestines of sheep with the same previous worm. The condition of smashing and destroying the villi was observed by (Mustafa, 1984) when studying the effect of tapeworms on the intestines, as well as this pathological

condition was observed by Al-Hadrawy (2005) when studying the effect of some pathogenic and tapeworms in the intestines of sheep and goats[18-20].

This case was reported by (Abu-Hasan 2020) when the mucous layer of the intestine of sheep was infected by *Orinthrostrongolis qadriradianis*. Others noted such a case[21]. Taghizadeh, (2003) mentioned when he reported about the infection of sheep with *cesticillus* worm[22]. This worm cause it leads to cell death and necrosis.

It was observed that red and dark blue spots appear on the outer walls of the intestine, and it seems that these spots arise as a result of bleeding of the mucous layer during infection with tapeworms. This atrophy is evident, especially near the areas of worm presence, as the villi appeared short and wide as a result of friction at the ends of the villi, and this leads to a decrease in absorption efficiency. Babero, B. B.; AL-Dobagh (2013) attributed the lack of space that should be available for the absorption of nutrients, liquids and salts necessary for the normal metabolism to the atrophy of the villi This condition is called malabsorption[14].

Conclusion

The intestinal wall was damage after infection with Tap worm due to its effect on the villi of mucosa which are vital structures for absorption of nutritional elements in animals

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رؤيا مجهرية وتشريحية عيانية لجدار امعاء الأغنام المخمجة بالدودة الشريطية

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الملخص

تم الحصول على عشرة أغشية مخاطية معوية من جدار أمعاء الأغنام للفحص العياني والمجهرية. تم غسل العينات بالماء الجاري و واخذ نصف سم ، عولجت العينات باستخدام تقنية التقطيع النسيجي وذلك استنادا للطريقة المستخدمة من قبل Bancoft & Steven 1987 بما في ذلك التثبيت والتجفيف والتطهير والتضمين بشمع البارافين، و باستخدام مايكروتوم تم تقطيع العينات بحجم 6 مايكرومتر وصبغت باستخدام صيغة تحتوي على بالهيماتوكسيلين والإيوسين بعد ذلك حملت بواسطة D. P. X و تم تجفيفها لمدة 24 ساعة . لوحظ عند الفحص المجهرية باستخدام المجهر الضوئي انتشارا كثيفا لبقع النزف الدموي. أظهر التحليل النسيجي أن الزغابات المعوية قد انسلخت من السطح المعوي ، وأن الصفيحة الاساسية ، التي تقع بين الغدد المعوية ، قد طورت إفرازات مفرطة للمخاط من الخلايا الكأسية والغدد المعوية. أخيرا ، تضرر جدار الأمعاء بعد الإصابة بالديدان الشريطية بسبب تأثيره على الزغابات المخاطية التي تعتبر هياكل حيوية لامتصاص العناصر الغذائية في الحيوانات.