Author/s:
Russell, EB;Oscos-Snowball, MA;Courtman, NF;Bryce, AJ;Knight, CS;Gauci, CG

Title:
What is your diagnosis? Mandibular mass in a rabbit

Date:
2021-09-01

Citation:
Russell, E. B., Oscos-Snowball, M. A., Courtman, N. F., Bryce, A. J., Knight, C. S. & Gauci, C. G. (2021). What is your diagnosis? Mandibular mass in a rabbit. Veterinary Clinical Pathology, 50 (3), pp.451-454. https://doi.org/10.1111/vcp.12933.

MS. ELISE RUSSELL (Orcid ID : 0000-0001-7583-5465)

Article type : What is your Diagnosis?

WHAT IS YOUR DIAGNOSIS? MANDIBULAR MASS IN A RABBIT

Elise B Russell

Marja A Oscos-Snowball

Natalie F Courtman

Adrian J Bryce

Christina S Knight

Charles G Gauci

Faculty of Veterinary and Agricultural Sciences, The University of Melbourne, Werribee, VIC, Australia

Correspondence

E. Russell, Faculty of Veterinary and Agricultural Sciences, The University of Melbourne, Werribee, VIC, Australia

Email: e.russell3@student.unimelb.edu.au

Cestode, coenurus, lagomorph, metacestode, scolex, *Taenia serialis*, tapeworm.

1| CASE PRESENTATION

A 3-year-old female Dwarf rabbit was presented to the U-Vet Animal Hospital, Werribee, Victoria, Australia, for investigation of a swelling in the left mandibular region. The swelling had been present for several weeks and had been slowly growing. Computed tomography (CT) performed a month earlier demonstrated a cystic mass; however, aspiration did not yield diagnostic material, and the lesion had reformed. The rabbit was housed indoors only and lived with another 5-year-old female spayed Mini Rex rabbit. Both were fed a diet of hay ad libitum, pellets, and fresh greens. The owner had acquired the rabbit from a pet shop at a young age. On physical exam, a 1 cm diameter, fluctuant swelling was present just dorsocaudal to the left mandible. The overlying skin was unremarkable. No abnormalities were found on conscious oral or otoscopic examination, and there was no pain associated with opening the mouth. The rabbit was sedated, and ultrasonographic imaging of the region was performed. Approximately 0.5 mL of clear fluid was collected from the swelling via fine-needle aspiration (FNA), at which point there was resistance to further aspiration. A wet mount was prepared from plugged material at the needle tip (Figure 1).

END OF PAGE 1

Only Figure 1 goes on page 1.

Cytologic interpretation. Parasitic/cestode/tapeworm cyst infection; coenurosis

The aspirate contained a single protoscolex in a clear background (Figure 1). The protoscolex measured approximately 1 mm in diameter by 3 mm in length and possessed 30 hooks arranged in two rows on its rostellum and four round suckers. The larger hooks were approximately 175 µm long. The protoscolex surface contained numerous 10 – 20 µm, clear, refractile, round bodies (calcareous corpuscles). Given the location of the cyst in the subcutaneous/intermuscular fascia rather than the peritoneal cavity, the findings were consistent with a metacestode cyst of *Taenia serialis.*

2 | ADDITIONAL TESTING

CT (Figure 2) and ultrasonographic imaging (Figure 3) demonstrated that the mass caudal to the mandible was cystic. On ultrasound, the cyst had a well-defined capsule and contained anechoic fluid and heterogeneous hyperechoic structures with hyper- and hypoechoic linear striations on its ventral surface (see also Supplementary material). Based on these findings, a parasitic cyst was considered the most likely diagnosis, with a cystic neoplasm considered less likely.

3 | DISCUSSION

Several morphologic features allowed identification of this parasite as *T serialis*. Calcareous corpuscles are remnant organelles found in cestodes and metacestodes that are comprised of varying proportions of calcium, magnesium, phosphate, and carbonate[1]. Their presence in cytologic samples is a useful clue in the diagnosis of cestodiasis or metacestodiasis, particularly in cases where adults or larvae are absent[1].

The presence of numerous hooks and four round suckers identified the parasite as a cyclophyllidean tapeworm[2]. Two cyclophyllidean parasites of lagomorphs are *T serialis* and *Taenia pisiformis*. *Taenia serialis* generally parasitizes subcutaneous and intermuscular tissues (as was the case for the coenurus found in this patient), while *T. pisiformis* generally occurs in the peritoneal cavity. There is one case report of atypical *T. serialis* cysts within the peritoneal cavity of a rabbit; however, molecular diagnostics were not performed to confirm the species[3]. *Taenia serialis* adult worms and scoleces typically have 28 – 34 hooks, with the rostellar (larger) hooks measuring approximately 130 – 165 µm in length, though there could be differences between adult and larval forms[4]. *Taenia pisiformis* adult worms and scoleces have larger rostellar hooks ranging from 220 – 300 µm. The type of cyst (coenurus versus cysticercus) can also aid in the differentiation of the cestode species

parasitizing rabbits. A coenurus is a cystic structure found in the tissues or internal organs of the intermediate host that contains multiple (typically dozens) of inverted, juvenile tapeworm heads (protoscolices) attached to the cyst wall[2]. It reflects the larval metacestode stage of *T. serialis*, among others, including *Taenia multiceps* (an economically important cyclophyllidean with a canid-sheep lifecycle). This contrasts with *T. pisiformis,* which forms a cysticercus in the abdominal cavity of the host, in which a single inverted 'bladder worm' occurs within the cyst.

Taenia serialis has worldwide distribution. Canids (eg, foxes, dingoes, wolves, hyenas, coyotes, jackals, and less commonly, dogs) are the definitive hosts and carry adult tapeworms. Intermediate hosts, carrying the larval form, are generally rabbits, hares, and rodents, though there have been rare reports of coenurosis in cats, possums, and non-human primates. Pet rabbits could be infected by ingestion of eggs shed by urban foxes[2]. The rabbit in this case was most likely infected by ingestion of contaminated fresh greens as the survival of *Taenia* eggs is significantly reduced in stored dry hay[5]. The patient could have been infected prior to acquisition, as studies in other species suggest that cysts can take years to develop to a stage at which they are detectable. The parasite stage that is infective to the intermediate host is the tapeworm egg containing the early larval stage or oncosphere (Figure 4). Once the Taeniid egg is ingested by the intermediate host, the oncosphere is released and penetrates the intestinal wall, entering the bloodstream (Figure 4). From here, the oncosphere migrates to the subcutis and/or intermuscular fascia and matures into its larval form. Canids can ingest metacestode cysts in intermediate hosts, which mature into adult tapeworms and attach to the intestinal mucosa. Gravid proglottids in the distal end of the worm are then released in feces or crawl out the anus and drop to the ground. Once outside the host, they release their eggs into the environment and are immediately infective to intermediate hosts. As eggs are often not released until after the tapeworm segment has exited the host, fecal examination is unreliable for the diagnosis of cyclophyllidean infections in definitive hosts, and DNA tests on feces are considered more reliable[2]. These tests have also proven useful for the definitive diagnosis of *T. serialis* in intermediate hosts.

Tooth root abscesses are more common differential diagnoses for mass lesions in the mandibular region of rabbits, and coenurosis could be misdiagnosed as a tooth root abscess on CT. In this case, CT and ultrasonography were useful in diagnosing a cystic mass, which was more consistent with parasitism. FNA may not always yield diagnostic material, as was initially the case in this patient. On the second aspiration attempt, the large protoscolex (1 x 3mm) blocked the needle tip, resulting in resistance to aspiration. This allowed the clinician to make a diagnostic wet preparation. Grossly,

coenuri may measure up to 10 cm diameter and contain clear gelatinous material with many white cystic 1 mm structures[3]. The clinical outcome is generally favorable,[3] but is dependent on location. Treatment generally consists of surgical excision, though medical management with anthelminthics might be necessary in cases where surgical management is not possible[3].

Taenia serialis can rarely cause zoonotic disease.[6]

ACKNOWLEDGMENTS

The authors would like to thank Dr Aisha Young for her assistance with interpretation of the CT scans.

ORCID

Elise B. Russell https://orcid.org/0000-0001-7583-5465

Natalie F. Courtman https://orcid.org/0000-0003-0947-3261

KEYWORDS

Cestode, coenurus, lagomorph, metacestode, scolex, *Taenia serialis*, tapeworm.

REFERENCES

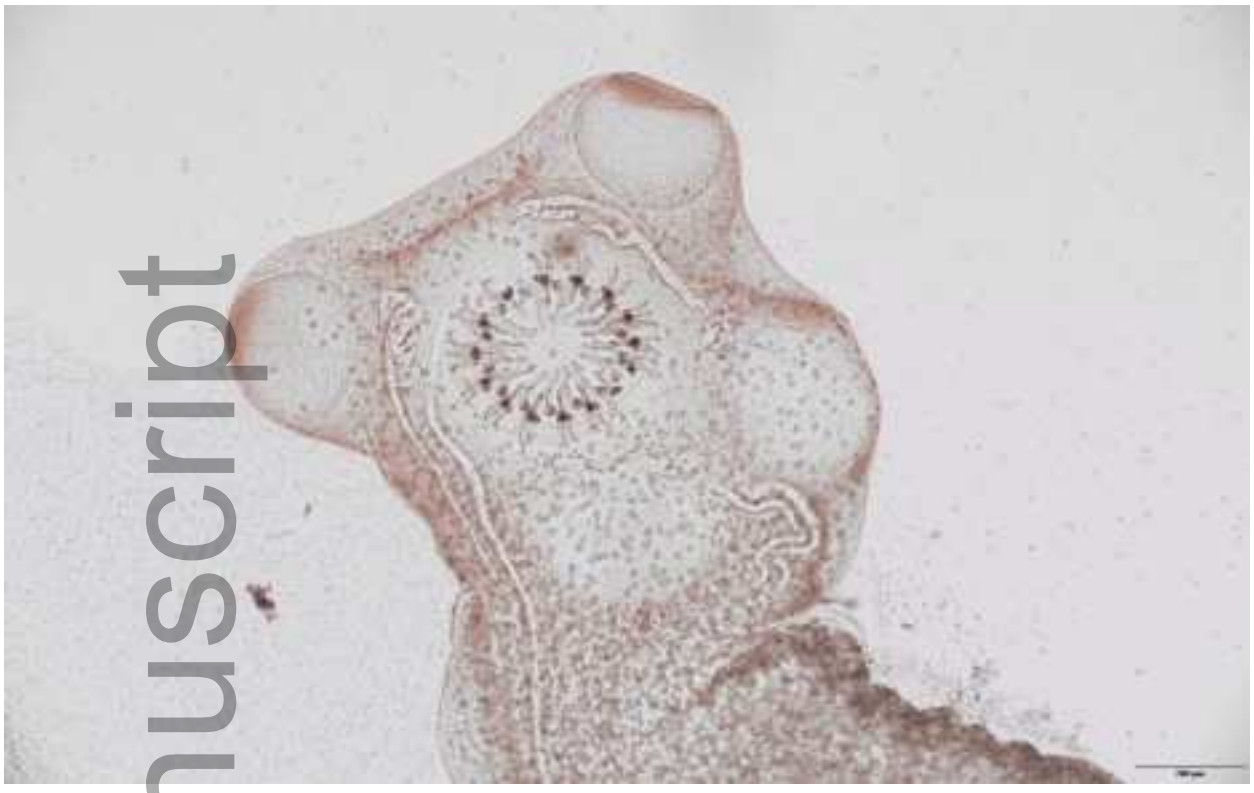
1. Caruso KJ, James MP, Fisher D, Paulson RL, Christopher MM. Cytologic diagnosis of peritoneal cestodiasis in dogs caused by *Mesocestoides* sp. *Vet Clin Pathol.* 2003;32(2):50-60.
2. Jacobs D, Fox M, Gibbons L, Hermosilla C. *Principles of Veterinary Parasitology.* Hoboken, UK: John Wiley & Sons, Inc.; 2015.
3. Alex CE, Hebert J, Boabaid F, Ambrose D, Howerth EW. Pathology in Practice. *J Am Vet Med Assoc.* 2017;250(4):393-395.
4. Beveridge I, Gregory GG. The identification of *Taenia* species from Australian carnivores. *Aust Vet J.* 1976;52(8):369-373.
5. Lucker J, Douvres F. Survival of *Taenia saginata* eggs on stored hay. *Proc Helminthol Soc Washingt.* 1960;27(1):110-111.
6. Yamazawa E, Ohno M, Satomi K, et al. First case of human neurocoenurosis caused by *Taenia serialis*: A case report. *Int J Infect Dis.* 2020;92:171-174.

FIGURE 1. Photomicrographs of a fine-needle aspirate sample from a mandibular swelling in a rabbit, unstained, (A) x10, and (B) x20 objectives

FIGURE 2. Computed tomography demonstrates a 14 mm diameter, ovoid structure caudal to the calvarium, that is in contact with the caudolateral aspect of the left tympanic bulla and transverse process of the atlas (blue arrow). Its contents are -10 Hounsfield units, consistent with a cystic structure.

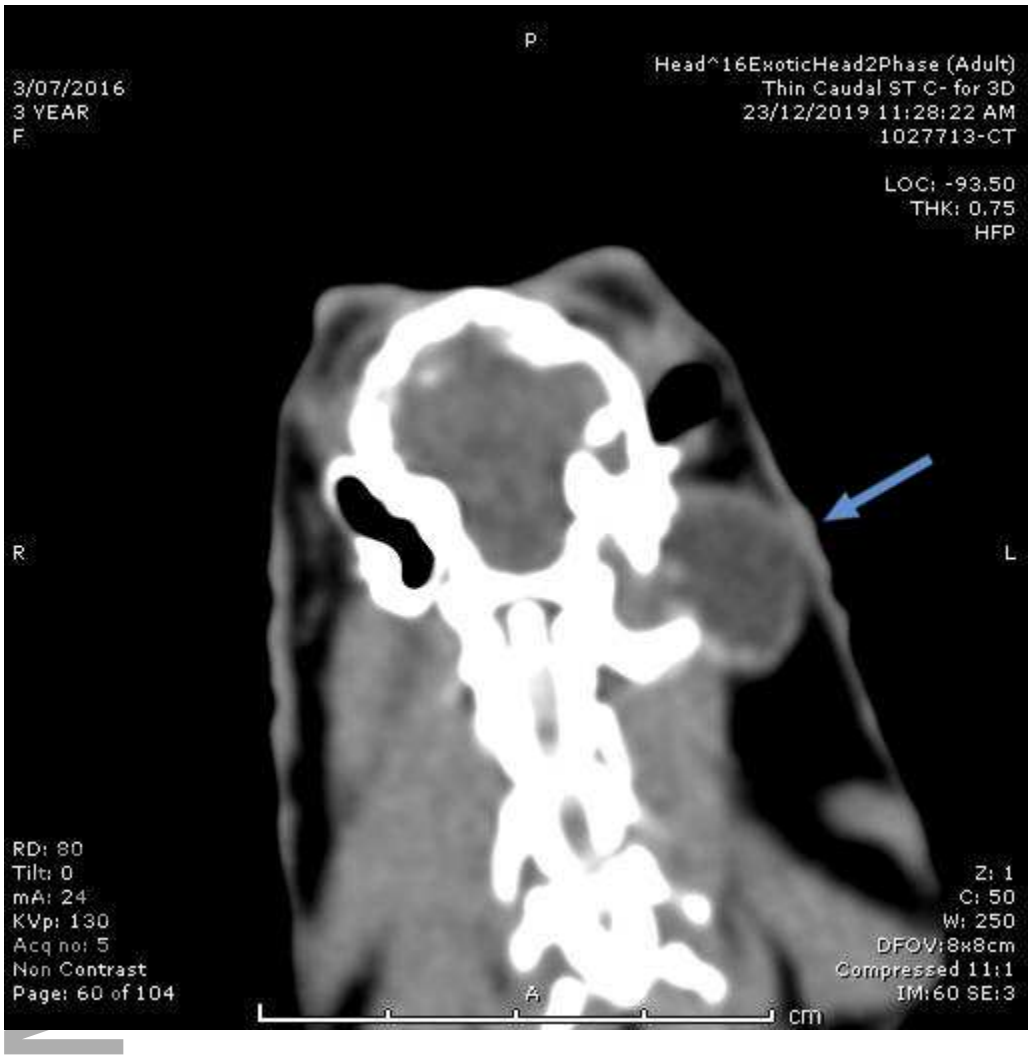
FIGURE 3. Ultrasound image of the cyst demonstrating a distinct outer capsule, anechoic cystic fluid, and heterogenous hyperechoic structures on the ventral wall of the cyst, with hyperechoic linear striations (corresponding to protoscolices; blue arrows).

FIGURE 4. *Taenia serialis* lifecycle. Diagram by S MacBride.

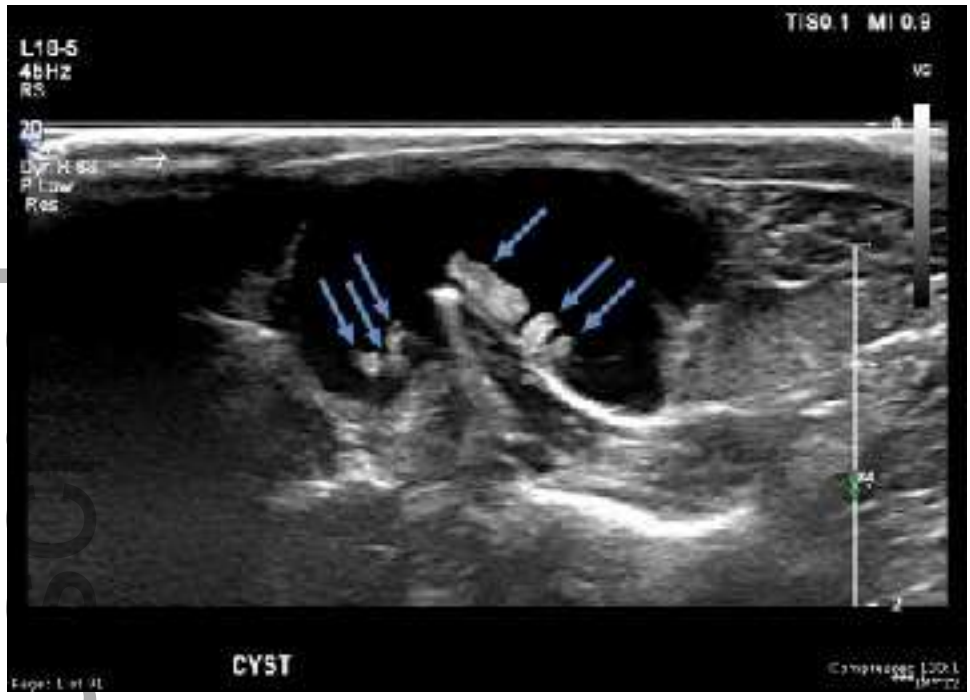


vcp_12933_f1 zoom.tif

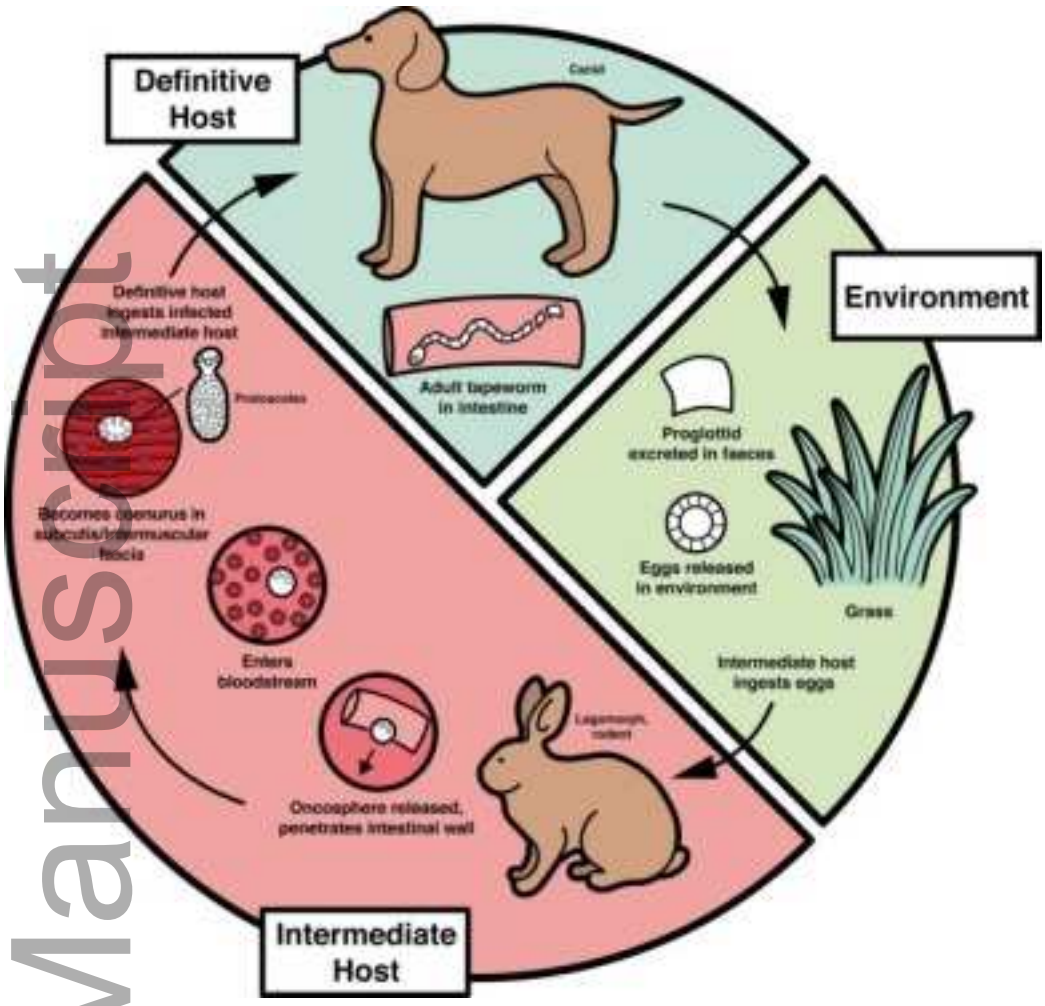
vcp_12933_f1.tif



vcp_12933_f2.tif



vcp_12933_f3.tif



vcp_12933_f4.tif