

Ocular Changes caused by *Angiostrongylus cantonensis* : Report of two Cases

Yosanan Yospaiboon *
Arporn Prabripataloong*
Suchart Pariyanond**

* Department of Ophthalmology, and
** Department of Parasitology,
Faculty of Medicine, Khon Kaen University.

การเปลี่ยนแปลงในลูกตาที่เกิดจากพยาธิ *Angiostrongylus cantonensis* : รายงานผู้ป่วย 2 ราย

ยศอนันต์ ยศไพบูลย์ พ.บ.*, อารporn ปรบริปตลวง พ.บ.*, สุชาติ ปริยานนท์ วท.ม.**

* ภาควิชาจักษุวิทยา และ ** ภาควิชาปรสิตวิทยา คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น

Angiostrongylus cantonensis เป็นพยาธิของปอดหนู พบเป็นสาเหตุสำคัญที่ทำให้เกิดโรคเยื่อหุ้มสมองอักเสบชนิดอีโอซิโนฟิลิกในคน คนได้รับการติดเชื้อโดยการรับประทานหอยโข่งดิบ ๆ เชื่อกันว่าตัวอ่อนของพยาธิจะเจริญเติบโตเป็นตัวอ่อนระยะที่ห้าในสมอง แล้วเคลื่อนมาตามเส้นประสาทตา เข้าสู่ลูกตา การที่พยาธิเข้าสู่ลูกตานั้น ทำให้การเปลี่ยนแปลงของส่วนต่าง ๆ ภายในลูกตาได้ เช่น เส้นประสาทตาจอตา น้ำวุ้นตา และเปลือกตา เป็นต้น ผู้เขียนได้รายงานผู้ป่วย 2 รายที่ตรวจพบมีพยาธิอยู่ในลูกตา พยาธิในผู้ป่วยทั้ง 2 รายได้รับการตรวจพิสูจน์ยืนยันว่าเป็น *Angiostrongylus cantonensis* การเปลี่ยนแปลงในลูกตาที่ตรวจพบ ได้แก่ การอักเสบของน้ำวุ้นตา และจอตาเสื่อมสภาพ (ศรัณกรินทร์เวชสาร 2529 ; 1 : 51 - 58)

Angiostrongylus cantonensis is a metastrongylid lung worm of the rat, demonstrated to be the important etiologic agent of eosinophilic meningitis among Thai patients. Man is accidentally infected by consuming raw Pila snails, which are its intermediate host. It is proposed that the parasite required period of development in the brain, the migrated along the optic nerve and reaches the eye. There are some ocular changes caused by this worm migration, involving eyelid, vitreous, retina and optic nerve head. Two cases of intraocular *Angiostrongyliasis* are reported. Both worms are proved to be *Angiostrongylus cantonensis*. The ocular changes detected are severe pan-uveitis and pigmentary retinal degeneration. —X—

INTRODUCTION

Angiostrongyliasis is one of the common parasitic infection among Thai people, caused by *Angiostrongylus cantonensis*. Nomura and Lin first reported this parasitic infection in man in 1945, six worms being found in the cerebrospinal fluid of a boy in Taiwan.⁽¹⁾ In 1962, Rosen et al reported this worm in the brain and meninges of the patient died with eosinophilic meningitis in Hawaii.⁽²⁾ In the same year, Prommindaroj et al reported the third case in Thailand, the first case that the worm was removed from the anterior chamber of the eye.⁽³⁾ Since that time, many cases of ocular *Angiostrongyliasis* were reported, some associated with clinical manifestation of eosinophilic meningitis.⁽⁴⁻⁸⁾

Recently the authors had an opportunity to study two cases of ocular Angiostrongyliasis, one in the vitreous and one in the anterior chamber. Worms in both cases were surgically removed and proven to be *Angiostrongylus cantonensis*. The ocular changes detected in both cases were of interest and worthy to be mentioned.

CASES REPORT

Case 1

A 13 year-old Thai boy was seen at Srinagarind Hospital on December 27, 1983, complaining of blurred vision in his left eye for 3 weeks. He also had ocular pain and itching symptom, that made him go to see a local doctor. At that time, ocular inflammation was diagnosed and symptomatic treatment was given without improvement. He had no history of headache, fever or migratory swelling, but positive history of consuming raw Pila snails. He was then referred to this hospital for definite diagnosis and management. Ocular examination on admission revealed visual acuity of 6/6 in the

right eye and counting finger in the left eye. Applanation tonometry reported normal intraocular pressure in both eyes. Slit-lamp biomicroscopic examination of the left eye showed mild circumcorneal injection, fine keratic precipitate, mostly on the inferior half of the cornea, numerous cells and flares and hypopyen (1 mm. from lower limbus) in the deep anterior chamber. The lens was clear. There was also numerous inflammatory cells and flares in the anterior vitreous. Examination of the fundus by binocular indirect ophthalmoscope revealed moderate vitreous opacities and a living round worm was seen actively moving in the vitreous. The disc was seen faintly as pink color and within normal limit. Other details of the fundus was obscured. Initial treatment was 45 mg. of prednisolone daily, topical steroid and 1% Atropine eye drop. He was advised to lie in prone position in the hope that the worm would gravitate to the anterior chamber. Six days later, the worm was seen in the anterior chamber, as expected (Fig I).

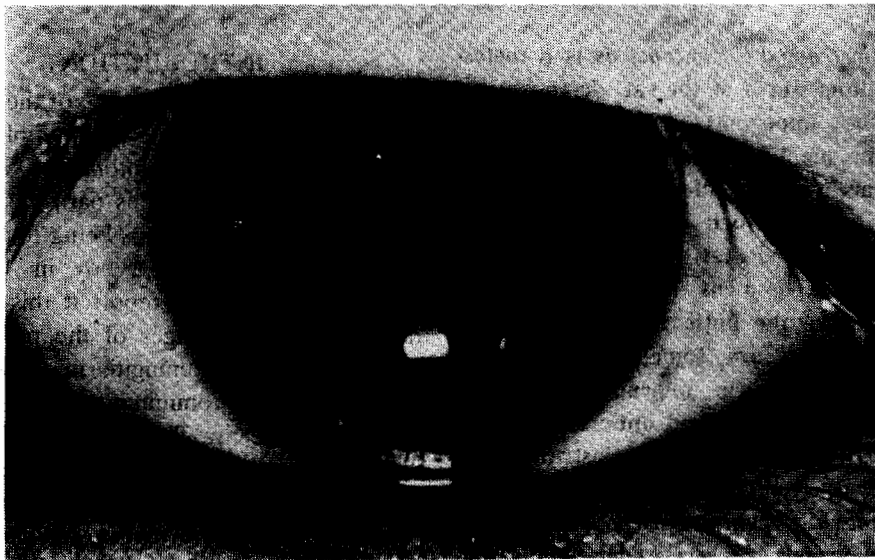


Fig. 1 The worm was demonstrated in the inferior part of the anterior chamber. (white arrow)

The pupil was immediately constricted and an emergency operation was performed. The worm was removed intact through the corneoscleral incision and fornix-based conjunctival flap at 12 - 3 o'clock. It was placed in the normal saline solution and immediately sent to the parasitologist for identification.

Post-operative treatment consisted of 45 mg. of prednisolone daily, mydriatic, and steroid eyedrop. The patient was discharged 7 days after the admission with visual acuity of 1/60 and was followed up every week for a period of 5 weeks. Follow up examination showed progressive clearing of the anterior and posterior uveitis. The examination of the fundus at this time showed localized pigmentary retinal changes in the papillomacular area. The retinal lesion remained unchanged over the follow-up period and finally turned to be chorioretinal scar. The final vision was still 1/60 in his left eye.

Case 2

A 26-year-old Thai female was admitted to Srinagarind Hospital on June 19, 1984 with the complaint of painful blindness in her right eye for two weeks. About one month earlier, she was admitted to local provincial hospital with the signs and symptoms of eosinophilic meningitis, and the cerebrospinal fluid examination confirmed the diagnosis. Two weeks later, during the course in local hospital, she developed pain and blurred vision in her right eye. She was diagnosed by local doctor as acute glaucoma and treated with 2% pilocarpine eye drop QID and 1 gm. of acetazolamide daily without significant improvement. Finally she was referred to this hospital for further treatment. Complete history taking revealed the habit of consuming raw fish and Pila snails and also intermittent episodes of migratory swelling 13 years ago. Ocular examination revealed vision of only light perception in the right eye and 6/6 in the

left. Tonometry by schiotz method reported intraocular pressure of 32 mm.Hg in the right and 11 mm.Hg in the left. Slit lamp biomicroscopic findings of the right eye were as followed : moderated circumcorneal conjunctival injection, corneal edema, numerous cells and flares in the normal-depth anterior chamber.

A dead parasite was seen adhered to the anterior iris surface extended from 1 to 6 o'clock circumferentially. The fibrinous exudate was seen occluded the pupil. Other details of the posterior segment were obscured. Laboratory work up including complete blood count, urinalysis, and chest X-ray disclosed only eosinophilia (Eo = 25%). The emergency operation was done immediately and the worm was surgically removed in the same manner as in case 1, but it could not be removed intact due to some desquamation. The specimen was also sent to the same parasitologist for identification.

Postoperative treatment was 60 mg. of prednisolone daily, topical steroid and mydriatics. She was admitted in the hospital for 6 days and discharged with the final vision improved to be counting finger at 2 feet. Follow-up course was similar to case 1 but the posterior uveitis was persisted over the period of 8 weeks even though the worm was removed. Finally the uveitis resolved, but the pigmentary retinal lesion was still present. Fundus photograph of the right eye was done 6 weeks after removal of the worm (Fig 2). The best corrected vision in her right eye was 6/60, six months later.

IDENTIFICATION OF THE WORMS

The worms were preserved in 70 % alcohol for an hour and stored in 70 % alcohol to which 5 % glycerol was added. Measurements of the worms were made after clearing. They were mounted for identification by

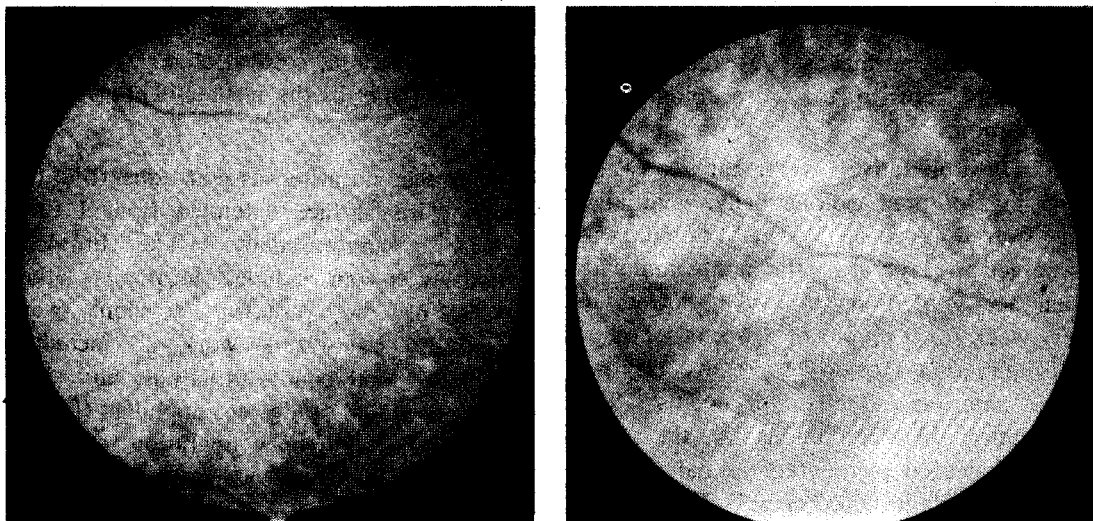


Fig. 2 Fundus photograph of the right eye (in case 2) revealed the pigmentary retinal degeneration. Noted clumps of pigment in the posterior pole.

placing the worms in the medium PVA lactophenol, and covered with cover slides.

Drawing of their morphology was made by camera lucida and photomicrographs were taken after clearing and mounting.

The worm No. 1 (case 1)

The worm is 14.5 mm. in length and 0.25 mm. in width, and show smooth cuticle with faint transverse striae of the external surface. The head is smooth and round. The mouth possesses two teeth. The oesophagus is 0.20 mm. long. The intestine is wide, thin-walled tube. The spicules are

conspicuous, striated rod, unequal, 1.25 mm. and 1.29 mm. in length respectively.

The caudal bursa is well developed. The arrangement of the bursal rays is as followed : ventral ray branches at a point two-thirds of its length into a small ventro-ventral and a large latero-ventral ray. Lateral rays arise from a common trunk. The antero-lateral ray is thicker than the others, and projects like a finger. The postero-lateral ray is shorter than the medio-lateral ray. Externo-dorsal ray is simple and arises between lateral and dorsal rays. Dorsal ray emerges as a short trunk. (Fig. 3, 4).

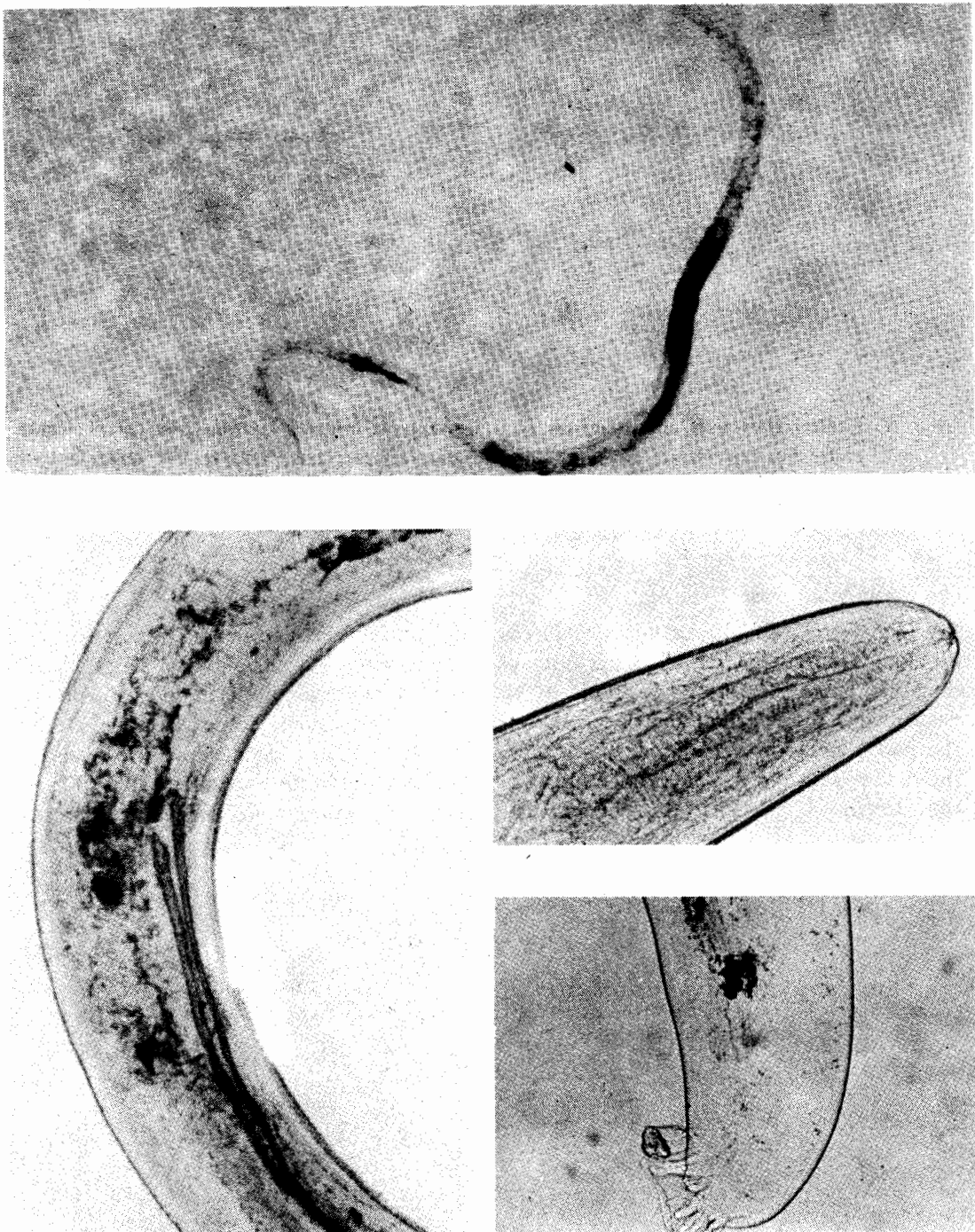


Fig. 3 Photomicrographs of male *Angiostrongylus cantonensis* in case 1. (a) entire worm. (b) anterior end, showing esophagus and teeth (x50). (c) posterior end, showing a pair of spicule (x50). (d) posterior end, showing bursa and arrangement of bursal rays (x50).

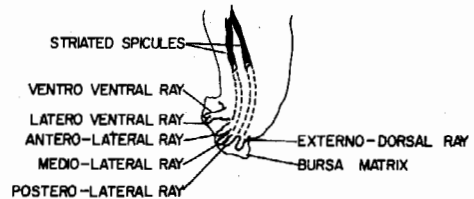
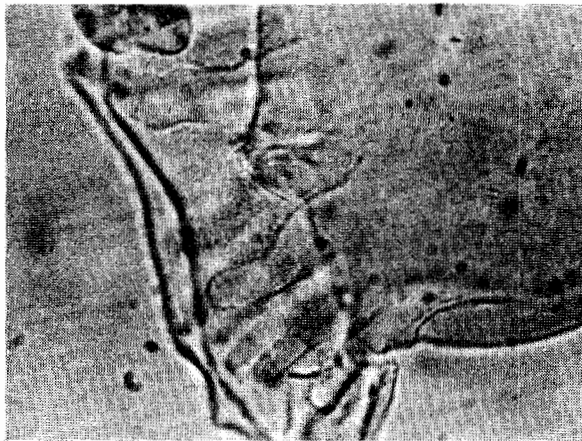


Fig. 4 Photomicrograph and diagram of male *Angiostrongylus cantonensis*. (a) posterior end, showing bursal rays (x200) (b) diagram demonstrated the arrangement of the bursal rays.

The worm No. 2 (case 2)

The worm was broken into two pieces after the operation of the eye. Its internal structure and real size are difficult to measure due to distortion and degeneration. The body, with transverse striae, is slender. The head is round. The caudal bursa is well developed. The arrangement of the bursal rays is as followed : ventral ray

originates from a common trunk, the small ventro-ventral ray and the large latero-ventral ray separate at a point about the distal one-third of the common trunk. The lateral rays are slender, and the postero-lateral ray is shorter than the medio-lateral ray. The spicules are unequal, striated rod. (Fig. 5)

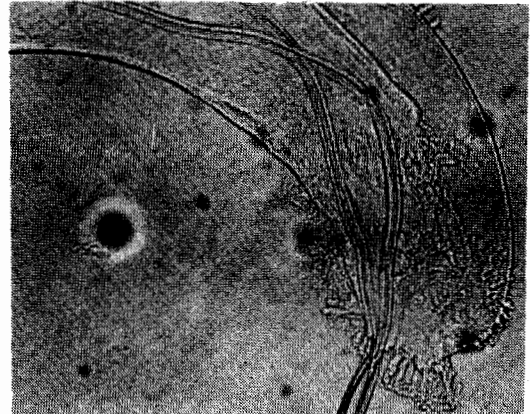
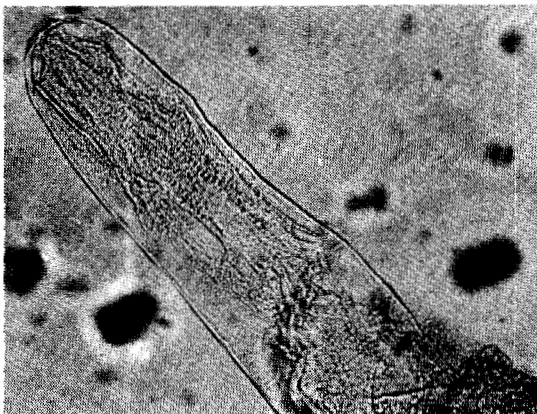


Fig. 5 Photomicrograph of male *Angiostrongylus cantonensis* in case 2. (a) anterior end, showing esophagus (x50). (b) posterior end, showing the length of spicules, the bursa fractured and arrangement of bursal ray (x50).

Both worms were identified as a young adult (fifth-stage larva) male *Angiostrongylus cantonensis*, based on the description of Mackerras & Sanders (1955), and Manoon Bhaibulaya (1975).⁽⁹⁻¹¹⁾

DISCUSSION

Angiostrongylus cantonensis is a metastrongylid lung worm of the rat, demonstrated to be etiologic agent of epidemic eosinophilic meningitis in Honolulu, the South Pacific, Taiwan, Vietnam and Thailand.^(1, 7, 8, 12, 13) Adult worm lives in the pulmonary vessels of the rat. Larval stages develop in slug and land snails which serve as an intermediated hosts. When rats eat these hosts, third-stage larvae enter their circulation, migrate to the meninges, and develop into fourth and fifth-stage larvae in the brain. This takes about a period of one month. Young adults then enter the circulation again, migrate to the pulmonary arteries and attain maturity there.⁽¹¹⁻¹³⁾

Man becomes accidental host by eating such intermediate hosts as Pilla snails, slugs, freshwater prawns, some fish and other paratenic hosts.^(12, 13) The route of worm's migration in man is still unknown but may be similar to that in the rat. It is believed that after reaching the fifth-stage, larvae migrate along the surface of the brain, traverse the optic nerve travelling between the nerve and sheath until they reach the eye.^(7, 8, 14)

Worm migration in the eye causes some changes in the ocular structure. When it migrates in subretinal route, it produces severe chorioretinal reaction, which is followed by hypo and hyperpigmentation changes in the retina. Finally this retinal lesion may turn to be irreversible pigmented scar which distribution corresponded well to the track of the parasite.

The worm may make its way through the optic nerve, migrate into the vitreous, or further into the anterior chamber, produce severe uveitis (as in both cases,) which may be caused by inflammatory reaction to the worm itself or its toxin and enzymes. Whether it is caused by the worm or its products should be further studied by biochemical evaluation of the vitreous tapping. However, this uveitis is reversible change, responsive to topical and systemic corticosteroid (as in both cases), but it takes about 4-8 weeks to be completely resolved.

In addition, unilateral optic disc swelling and optic atrophy were noted in about 12 % of patients with eosinophilic meningitis caused by *A. cantonensis*.^(7, 14) This was thought to be the reaction of the worm migration through the optic nerve. Lid swelling was also found in 1 % of these patients and this may be the reaction of periorbital migration of the worm.^(7, 14) All of these changes are not present in our two cases.

In conclusion, there are some ocular changes caused by *A. cantonensis*, involving different ocular structures such as optic nerve head, retina, vitreous and lid. All of these changes are not pathognomonic features of ocular angiostrongyliasis, since they may be present in any other ocular diseases. The clinical importance is to keep in mind that they may be caused by this worm. Actually, we have seen so many cases of pigmented chorioretinal scar or severe uveitis in general practice. Majorities of these cases are of unknown etiology. Probably the worm may be responsible for these ocular changes and intraocular angiostrongyliasis should be included in the differential diagnosis. And with the aid of immunodiagnostic method, the diagnosis will be reached, even the parasite is not demonstrated.⁽¹⁵⁻¹⁷⁾

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