Gnathostomiasis
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Etiology
Gnathostomiasis is a food-borne parasite zoonosis caused by a round worm in the genus *Gnathostoma* e.g. *G.spinigerum*, *G.hispidum*. It can cause both cutaneous and visceral symptoms in humans.

Life cycle
The adult worms live in the gastric wall of tigers, dogs, and cats that are definitive hosts. The female worms pass eggs in the hosts’ feces. In water, eggs become first-stage larvae. After being ingested by cyclops that are the first intermediate hosts, they develop into second-stage larvae. When the second intermediate hosts (fish, birds, frogs, and snakes) ingest cyclops, the second stage larvae will develop into third-stage larvae which are infective stage for humans and other definitive hosts. If dogs or cats, the definitive host, eat them, third-stage larvae will develop into adult worms in the stomach wall. Humans are accidental hosts and the larvae will never develop into adult worms.

Life cycle of *Gnathostoma spinigerum*. Adapted from:
URL: http://www.dpd.cdc.gov/dpdx/HTML/gnathostomiasis.htm
Transmission
Humans become infected by eating undercooked fish, poultry, or other raw flesh containing infective larvae.

Endemic areas
The endemic areas of gnathostomiasis are Asian countries especially Southeast Asia including Thailand, Vietnam, and Myanmar. It can be found in China, Japan, Mexico, and Australia. Now it becomes a traveler disease found in the travelers from Asia.

Symptoms
Gnathostomiasis can be divided into two groups;
1. Visceral gnathostomiasis
After ingestion of larvae, patients may have systemic symptoms such as low grade fever, malaise, anorexia, nausea, vomiting, and epigastric pain during the larvae migrate through gastric or intestinal wall. Other symptoms may occur due to migration of larvae such as;
- Lung – pneumonitis, pleuritis
- Eye – blindness, corneal ulcer
- Urinary bladder – hematuria
- Central nervous system – radiculomyelopathy, hemiparesis, myeloencephalitis, eosinophilic meningitis, subarachnoid hemorrhage

2. Cutaneous gnathostomiasis
Larvae may migrate through skin especially trunk, arms, legs, and face causing intermittent or recurrent migratory swelling accompanying with erythema, itching, irritating sensation or pain of affected area that persist about 1-2 weeks. Spontaneous recovery without any treatment is the rule. However, recurrent or migratory swelling usually occurs in cases who receive no treatment. Sometimes there will be creeping eruption or micronodules along the way of the migrating larvae.

Diagnosis
Clinical diagnosis can be done in patients having history of eating raw or partially cooked flesh in endemic areas and presenting with typical clinical syndrome. Complete blood count in these patients may reveal eosinophilia with or without leukocytosis. Gnathostoma antibody detection by using serologic test such as ELISA (using antigen from crude or purified third stage larvae of G.spinigirum) or Immunoblot test may be helpful for diagnosis.

Definite diagnosis of gnathostomiasis requires identification of the larvae from the lesions. Skin biopsies provide supportive information for diagnosis and treatment but frequently miss the larvae in the lesions.

Treatment
Albendazole has been used for treatment of gnathostomiasis with the dosage of 400 mg twice daily for 21 days yield a cure rate of more than 90%. A single dose of Ivermectin (0.2 mg/kg) has also been used with a cure rate of 76-95 %. However, it should be avoid in children younger than 5 years old.

Prevention
Avoidance of eating raw or uncooked flesh, especially in endemic regions.