Short communication

Human gnathostomosis in Spain: first report in humans

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Gnathostomosis has been known since 1836, when the parasite was discovered in the stomach of a tiger in London Zoo. Today it is considered an important food-borne parasitic zoonosis, endemic mainly in Asian countries where some people prefer to eat raw fish, amphibians or reptiles.

In its mammal definitive host the adults are located in the stomach wall, even in granulomes. The eggs leave the definitive host with the faeces and develop further in an aquatic environment. Larva 1, mobile, is ingested by a copepod, in which it evolves to immature larva 3. The larvae become infectious for mammals in a second intermediary non-specific host, which ingest the copepod. These may be a number of crustaceans, cold-blooded vertebrates, birds or mammals. The infective larva can pass from one host to another within different food chains of the biotope in question. Maturation to the adult stages takes place only in the definitive specific hosts (canids and felids in G. spinigerum). It is a slow process of some 6.5 months in duration. This is due to a migration followed by the infectious larval stage, which involves: perforation of the gastric wall, entry into the liver, migration to muscles and connective tissues, and, again, perforation of the gastric wall from the outside in order to reach its final destination. This internal migration often leads to ectopic locations, especially in uncommon hosts, such as humans, where Gnathostoma larvae are not able to reach sexual maturity. The most dangerous locations are the brain and spinal cord, while others include the eye, lung, pleura, urinary tract and intestine (Oriel and Ash, 1994). In some patients with eosinophilic myeloencephalitis, G. spinigerum has been found in the eyes, suggesting a possible migration via the optic nerve. External gnathostomosis usually comes from the therapeutic application of reptile or amphibian flesh or the manipulation of raw meat.

Most human cases, both external (cutaneous migration) and internal (visceral migration), have been diagnosed in Thailand and Japan, or in...
persons who have travelled in Asiatic countries. The pathology derives from mechanical damage to the tissues, together with the immune response against the parasite.

The signs and symptoms of external gnathostomosis suggest sparganosis, cutaneous paragonimosis, cutaneous larva migrans or myasis. Therefore, specific diagnosis is reached only with surgical extraction and examination of the worm. In cerebral cases the prognosis is bad, and in endemic areas a differential diagnosis is necessary with angiostrongylosis, paragonimosis, neuroschistosomosis and cysticercosis (Jaroonvesama, 1988).

The epidemiology of gnathostomosis has not been sufficiently investigated. On the basis of the life cycle, the infection may be contracted by ingesting meat of any of the hosts that harbour the third-phase infectious larva; i.e. fish, amphibians, reptiles, birds and mammals. In Thailand, most of the human cases result from the consumption of duck and chicken flesh. Women are more often affected, due to the manipulation of the raw meat of these animals (Rusnak and Lucey, 1993).

In Spain, the only species of the genus found is *G. hispidum*, which was found in 1954 in the province of Granada (Muñoz-Canizares, 1954) with a pig as the definitive host. This species is considered as relatively common in pigs and wild boars in Europe, Asia and Australia (Anderson, 1992), and has been described as a human parasite in China and Japan occasionally, having a clinical profile similar to that of *G. spinigerum*. It has been demonstrated that pigs can become infected with *G. hispidum* by directly ingesting copepods (Dissamarn et al., 1966).

Two human cases of gnathostomosis were diagnosed in Granada, Spain in 1998. The first clinical case was a woman, 76 years of age, living in a rural environment in the foothills of the Sierra Nevada mountains. She was hospitalized for acute epigastric pain and vomiting. She had no history of international travel. The ecography and radiology suggested an intestinal obstruction due to a tumor near the ileocaecal valve. A right haemicolectomy was performed. A fragment of intestine 25 cm long was removed, the caecal portion of which presented a zone of irregular edges and reddish coloration. In the serosa, an erythematose nodule 1 cm in diameter was found.

The second case was also a female, 43 years old, also living in a rural environment near Granada without a history of international travel. She was hospitalized for severe pain in the right iliac fossa with a remarkable abdominal muscular resistance. Diagnosis was an acute appendicitis. During intervention, a tumor was located in the caecum wall. Terminal ileum and caecum were resected. The caecum wall showed non-specific inflammation with a well delineated area of brownish coloration, some 5 cm in diameter. No other clinical or epidemiological data from both patients were available.

Both histological samples were processed according to habitual methodology. The Masson trichrome stain was used. It was surprising to find this parasite, unusual in our country, and cited only one time in a pig.

Figs. 1 and 2 show two selected images of *Gnathostoma* sections from these two, respectively.

Microscopically the third stage larvae of *G. spinigerum*, *G. hispidum* and *G. doloresi* could be distinguished in transverse section through the intestinal regions (Akahane et al., 1986; Sohn and Lee, 1996). Intestinal walls of *Gnathostoma* spp. are comprised of more or less cuboidal cells of a single columnar epithelium. These cells have 3–7 nuclei in *G. spinigerum*, whereas only one large nucleus is found in the central region of each epithelium cell in *G. hispidum*. The large nucleus noted in each epithelial intestinal cell, linked to a cuticule thinner than that of *G. spinigerum*, suggest that both cases were due to *G. hispidum*.

Due to the absence of epidemiological data it is impossible to elucidate the route of infection and to establish appropriate prophylactic measures.

This report points out the necessity of considering gnathostomosis in the differential diagnosis of acute abdominal conditions, even in countries without documented human cases. In North America, the first recorded case of gnathostomosis in humans was in Mexico in 1970, and the numbers of gnathostomosis patients in Mexico
Fig. 1. Longitudinal section through anterior portion of the worm. The cephalic region is retracted. Note the serrate ends of spines (tri-and bifurcate) typical of *Gnathostoma* spp, the club-shaped esophagus, intestinal epithelium and the coelomyarian musculature. Scale bar: 50 μm.

Fig. 2. Section through the body at the level of the intestine. Note the structure of intestinal epithelium, the coelomyarian musculature and lateral chords with numerous nuclei. Minute spines are visible in the cuticle. Scale bar: 50 μm.
seems to increase dramatically with time (Ogata et al., 1998). The two human cases described in this article will call attention to this zoonosis, which is underdiagnosed in Spain and probably in other European countries where *G. hispidium* is present in pigs and wild boars.

**References**


