Diagnosis: Probable *Pseudoterranova decipiens* infestation.

The microbiology laboratory at Boston Medical Center (Boston, MA) identified the nematode as an anisakid, most likely *Pseudoterranova decipiens*, also known as the “seal worm” and the “cod worm.” *P. decipiens* is a species in the family Anisakidae, which also includes *Anisakis*, *Phoceanema*, *Terranova*, and *Contracoecus* species. Of these, only *P. decipiens* and *Anisakis simplex* have been reported to cause infection in humans in North America.

All anisakids lead a marine life cycle, with seals, dolphins, and whales serving as the definitive hosts. Anisakid eggs are shed in the feces of the definitive host; free-living larvae infect crustaceans, which are in turn ingested by fish and which are then concentrated up the food chain into larger and larger fish [1]. Only when an intermediate host is ingested by a definitive host does the larvae undergo its final maturation. Intermediate hosts include a number of whitefish, such as cod, herring, haddock, halibut, smelt, mackerel, and anchovies [2], but also Pacific salmon [3, 4] and squid. A recent report from The Netherlands found that anisakid larvae infested 88% of cod and herring [5]. In contrast, transmission of anisakiasis via bluefin and yellowfin tuna has not been reported.

Anisakid larvae typically infect the viscera of fish but may also come to infest muscle tissues. *P. decipiens* larvae frequently infest the fish muscles in vivo, particularly in smaller-sized intermediate host fish. (McClelland’s excellent and comprehensive review of seal worm infections [6] includes a photo of a transilluminated live flounder in which numerous larvae are clearly visible in its musculature.) In contrast, *Anisakis* larvae are usually restricted to the fish viscera in vivo, only infesting the muscles after the fish has been killed, particularly if the fish is not promptly gutted and cleaned after its death.

Humans are accidental and dead-end hosts in the anisakid life cycle, and infestation results from ingestion of raw or in-
adequately cooked fish that is itself infested with third- or fourth-stage anisakid larvae. Sushi, sashimi, and ceviche are the most commonly implicated vehicles [7]. Only a handful of cases have been reported in the United States, although the syndrome is, not surprisingly, relatively common in Japan. In humans, anisakid larvae are incapable of spreading beyond the gut to muscle tissues, as occurs in fish and squid. Instead, the worm burrows and creeps ineffectually into the upper gastrointestinal tract mucosa, either dying within a few days or weeks or exiting the host by crawling up the esophagus and being expectorated, as occurred with our patient (figure 1; see also video 1, available in the electronic edition of Clinical Infectious Diseases). In some cases, the worm induces eosinophilic gastroenteritis and/or eosinophilic granulomas, and the inflammation induced by its tunnelling can mimic the pain of gastric ulcers [8]. Humans are rarely infected with >1 larva at a time. When required, mechanical extraction via endoscope is curative [8]. In vitro and in animal models suggest that albendazole and ivermectin might also be helpful in human infections [9].

Anisakids are hardy creatures. To reduce the risk of raw fishborne anisakiasis, the US Food and Drug Administration recommends that all fish and shellfish intended for raw consumption be flash frozen to \(-35^\circ\text{C}\) for 15 h or stored frozen at \(-20^\circ\text{C}\) or lower for at least 7 days [10]. In the present case, the larva survived being frozen, fried, and soaked in stomach acid for 9 days, and it then lived an additional week—seemingly no worse for the wear—swimming in a jar of saline on C.J.G.’s desk, before finally succumbing to acute formalin immersion in the interests of science.

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