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Terranova (Nematoda : Anisakidae) Infection in Man I. Clinical Features of Five Cases of *Terranova* Larva Infection

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Since van Thiel *et al.* (1960) and van Thiel (1962) reported several cases of larval anisakiasis in man, several hundreds cases of human anisakiasis causing eosinophilic granuloma have been reported in Japan by Asami *et al.* (1965), Yokogawa and Yoshimura (1965, 1967), and many others. However, no case of infection with *Terranova* larva in the gastrointestinal wall in man has been reported. Recently, the authors have experienced five cases of gastric disorder due to *Terranova* larva invasion during the period from March to October, 1971 among many patients who visited our clinic, Karasawa Hospital, Asahikawa, Hokkaido*. The present paper deals with the clinical features of the patients infected with *Terranova* larva in the stomach wall. The detailed morphological characteristics of the larvae obtained will be described elsewhere (Koyama *et al.*, 1972).

* The abstract of the present paper was read at the 41st Annual Meeting of the Japanese Society of Parasitology held in 1972 at Okayama (Suzuki *et al.*, 1972).

Report of cases

Here we report five cases which were encountered in the Karasawa Hospital. They are all summarized in Table 1.

Case 1 : A 17-year-old shop-assistant, male, presented himself to our clinic with a complaint of severe epigastric pain. The pain suddenly attacked him 8 hours after eating of raw fish (halibut) and became frequent, occuring every five minutes. On physical examination the patient looked pale. The abdomen was flat and soft, but there was marked tenderness in the epigastrium. A complete blood count and urinalysis were normal. Gastroscopy was immediately performed with the Olympus GTF-S, 7 hours after onset of the illness. A larval nematode was found partly penetrating into the stomach wall on the greater curvature of the angular region. Under the observation an *Anisakis*-like larva about 30 mm in length was removed from the stomach wall by means of gastroendoscopic biopsy technique and it was alive in saline. The patient's complaint disap-

Table 1 Five cases of *Terranova* larva infection in human stomach wall

Case No.	Sex	Age	Source of infection	Hours from the eating of raw fish to the onset*	Chief complaints	Period from the onset to the removal of the larva	Location of the foci
1	Male	17	Halibut (*Hippoglossus stenolepis*)	8	Severe epigastric pain	7 hours (Mar. 18, 1971)	Greater curvature of the angular region
2	Male	31	A kind of sea fish	4	Severe epigastric pain	14 hours (Apr. 13, 1971)	Greater curvature of mid portion of the corpus
3	Female	45	A kind of sea fish	10	Severe epigastric pain	5 days (Apr. 22, 1971)	Greater curvature of lower portion of the corpus
4	Male	27	Halibut (*H. stenolepis*) and tuna (*Thunnus thynnus orientalis*)	5	Severe epigastric pain and hematemesis	6 hours (June 5, 1971)	Greater curvature of lower portion of the corpus
5	Male	26	Cod (*Gadus morrhua macrocephalus*)	2	Severe epigastric pain	5 days (Oct. 26, 1971)	Greater curvature of mid portion of the corpus

* Onset of epigastric pain

peared in a few hours after removing it. Morphologically the larva was identified as *Terranova* sp. larva (Type A).

Case 2: A 31-year-old office worker, male, complained of spasmodic severe epigastric pain which had attacked him every five minutes, 4 hours after having eaten raw fish. On physical examination the patient showed shock symptoms. The abdominal wall relaxed and soft. Routine determinations of red and white blood count, hemoglobin and urinalysis yielded normal results. On immediate GTF-S examination a larval nematode was observed penetrating into the stomach wall on the greater curvature of the corpus. A living larva about 35 mm in length was picked out from the stomach wall by biopsy technique. Morphologically the larva was identified as *Terranova* sp. larva (Type A).

Case 3: A 45-year-old housewife complained of severe epigastric pain characterized by attacks at intervals of approximately 5 minutes, 10 hours after eating raw fish. GTF-S examination revealed the penetration of a larval nematode into the stomach wall. One *Anisakis*-like larva about 35 mm in length was removed by biopsy technique under the observation. The worm was identified as *Terranova* sp. larva (Type A).

Case 4: A 27-year-old civil engineer, male, complained of severe epigastric pain, which had suddenly attacked him five hours after having eaten raw fish (halibut and tuna) and hematemesis. The pain lasted for several hours till consultation at intervals of approximately 3 to 4 minutes. On physical examination, the patient showed shock symptoms suggesting acute abdomen. A marked tenderness was recognized by the palpation on the epigastric region. The leukocyte count was 9,800 with normal differential cell count. Results of clinicopathological analysis of urine, blood and serum were normal. On GTF-S examination a larval nematode was observed partly penetrating into the stomach wall on the greater curvature of the corpus, with its free posterior portion in the stomach lumen (Fig. 1). The local mucosa was slightly elevated from the surrounding mucosa. Hemorrhagic erosion and ulcerative lesion were also seen on the mid and lower portions of the corpus. A living larval nematode

about 35 mm in length was picked out from the stomach wall by means of gastroendoscopic biopsy technique (using the Olympus JF-B) (Fig. 2). The epigastric pain disappeared soon after removing the worm from the stomach wall. After the detailed morphological examination, the larva was identified as *Terranova* sp. larva (Type A).

Case 5: A 26-year-old carpenter, male, visited our clinic with a five-days history of severe epigastric pain, occurring 2 hours after eating of raw fish (cod). On physical examination there was epigastric tenderness. The leukocyte count was 8,300 with 48% neutrophils, 38% lymphocytes, 4% monocytes and 10% eosinophils. The gastric juice contained 54 C.U. of free HCl and 77 C.U. of total acid. The occult blood reaction of gastric juice was strongly positive. On GTF-S examination the larval penetration into stomach wall was seen and a living *Anisakis*-like larva was picked out which was identified as *Terranova* sp. larva (Type A).

Discussion

Kitayama *et al.* (1967) found a case of parasitic granuloma of the stomach in a stray dog, and reported that the causative agents were *Terranova* sp. and *Contracaecum* sp. larvae. Shiraki *et al.* (1968) described that *Terranova* sp. larvae penetrated into the stomach wall of experimentally infected rabbits. Moreover, Kikuchi *et al.* (1970) observed experimentally that *Terranova* sp. larva penetrated into the stomach wall of rabbits and dogs. These facts suggest a possibility that *Terranova* sp. larva might penetrate into the human gastrointestinal wall, and this study proved the possibility for the first time. We have studied gastroendoscopically on 36 cases of larval nematode infection in the stomach wall in Karasawa Hospital, Asahikawa, Hokkaido during the period from October, 1969 to April, 1972. Among 36 larvae obtained, one from each patient, five larvae were identified as *Terranova* sp. (Type A) on the basis of morphological characteristics.

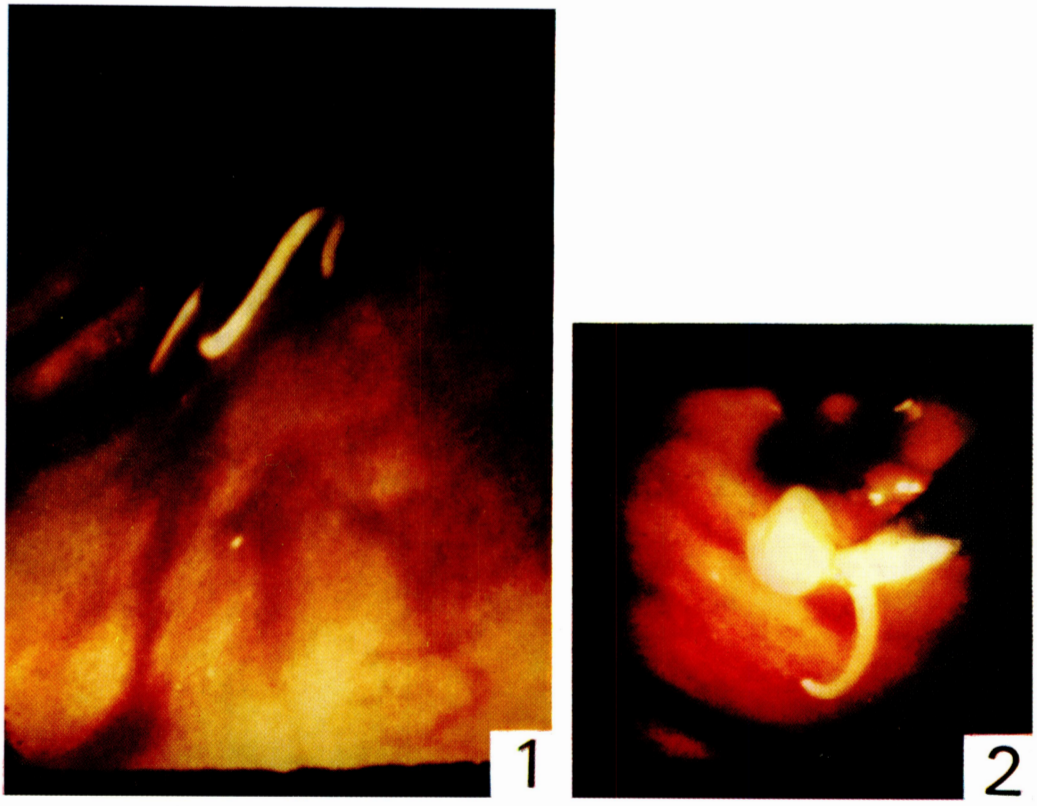
The symptoms shown by five patients were very similar to those of anisakiasis (Namiki et al., 1970). Therefore, the routine clinical diagnoses of these cases, prior to the parasitological examination, were all "the acute gastric anisakiasis". The changes of the mucosae in which the *Terranova* larva was found were almost the same as those of the cases due to *Anisakis* larva. It was found that the results of laboratory examinations on five cases were generally normal, except for a white cell count of 9,800 in Case 4 and hyperchlorhydria and 10% eosinophils in Case 5.

Summary

The present report is concerned with the first record of five cases of gastric disorder accompanying severe epigastric pains caused by *Terranova* sp. larva. The clinical features investigated gastroendoscopically were as follows; (1) The patients complained of severe epigastric pain after having eaten raw sea fish. (2) The pain appeared within 2–10 hours after eating of raw fish and it was characterized by an attack at intervals of approximately 3 to 5 minutes. (3) Endoscopical observations revealed that in all cases the larval nematodes were penetrating into the stomach wall, leaving its posterior portion in the lumen. The mucosa, in which the larva was located, slightly elevated from the surrounding mucosa. (4) In four cases, the lesion was situated on the greater curvature of the corpus and in one case, on the greater curva ture of the angular region. (5) All larvae were still alive when removed from the stomach wall. (6) Patients' complaints disappeared soon after removing the larvae from the stomach wall.

References

1) Asami, K., Watanuki, T., Sakai, H., Imano, H. & Okamoto, R. (1965): Two cases of stomach granuloma caused by *Anisakis*-like larval nematodes in Japan. Am. J. Trop. Med. & Hyg., 14, 119–123.
2) Kikuchi, S., Kosugi, K., Hirabayashi, H. & Hayashi, S. (1970): On the pathogenesis of *Terranova* larvae from codfish against dogs and rabbits. Jap. J. Parasit., 19, 340 (Japanese text).



Explanation of Figures

Figs. 1 & 2 Gastrofiberscopic photographs in Case 4.

Fig. 1 A larva is penetrating into the stomach wall, leaving its posterior portion in the stomach lumen. The mucosa, in which the larva is invading, is slightly elevated.

Fig. 2 The same larva that is shown in Fig. 1, is being picked up by means of biopsy technique.

3) Kitayama, H., Ohbayashi, M., Satoh, H. & Kitamura, Y. (1967): Studies on parasitic granuloma in the dog. Jap. J. Parasit., 16, 28-35 (Japanese text).
4) Koyama, T., Kumada, M., Suzuki, H., Ohnuma, H., Karasawa, Y., Ohbayashi, M. & Yokogawa, M. (1972): *Terranova* (Nematoda: Anisakidae) infection in man. II. Morphological features of *Terranova* sp. larva found in human stomach wall. Jap. J. Parasit., 21, 258-262.
5) Namiki, M., Morooka, T., Kawauchi, H., Ueda, N., Sekiya, T., Nakagawa, K., Huruta, T., Ohguro, T. & Kamata, H. (1970): Diagnosis of "acute gastric anisakiasis." Stomach and Intestine, 5, 1437-1441 (Japanese text).
6) Shiraki, T. & Otsuru, M. (1968): On the Anisakinae larvae found in marine fishes of northern Japan. Jap. J. Parasit., 17, 642 (Japanese text).
7) Suzuki, H., Ohnuma, H., Karasawa, Y., Ohbayashi, M., Koyama, T., Kumada, M. & Yokogawa, M. (1972): *Terranova*-like larva picked out from the wall of human stomach with endoscopy. Jap. J. Parasit., 21, Suppl., 61 (Japanese text).
8) van Thiel, P. H., Kuipers, F. C. & Roskam, R. Th. (1960): A nematode parasitic to herring, causing acute abdominal syndromes in man. Trop. Geogr. Med., 2, 97-113.
9) van Thiel, P. H. (1962): Anisakiasis., Parasit., 52, Proc. 16-17.
10) Yokogawa, M. & Yoshimura, H. (1965): *Anisakis*-like larvae causing eosinophilic granulomata in the stomach of man. Am. J. Trop. Med. & Hyg., 14, 770-773.
11) Yokogawa, M. & Yoshimura, H. (1967): Clinicopathologic studies on larval anisakiasis in Japan. Am. J. Trop. Med. & Hyg., 16, 723-728.

Terranova 人体感染について
I. *Terranova* 幼虫感染5症例の臨床所見

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1971年度中に，急性の胃痛を訴えて北海道旭川市唐沢病院に来院した患者に施行した早期胃内視鏡検査により，見出されたアニサキス様線虫寄生例36例中に5例の *Terranova* sp. 幼線虫寄生例を経験した．本幼虫による人体感染例はこれが初めてのことと考えられるので，その臨床所見について概要をのべる．(1) 患者はいづれも海産魚類の生食の後，2～10時間内に心窩部の激痛を訴えた．(2) その痛みは約3分から5分間隔で頻発した．(3) 幼線虫穿入部位は，胃体部大彎(4例)，胃角部大彎(1例)といづれも大彎であつた．(4) 内視鏡的に，幼線虫穿入局所はいづれもやや隆起していた．(5) 摘出虫体はいづれも生きていた．(6) 虫体摘出後，患者の苦痛はまもなく消褪した．