Bowel anisakiasis is rare, and the incidence and clinical features of this condition remain unclear. Using the Japanese Diagnosis Procedure Combination (DPC) in-patient database, we identified 201 cases of bowel anisakiasis between the months of July and December during 2007 and 2008. More than 70% were males. The average age was 54.5 years. Overall, 102 (50.7%) cases had ileus, 16 (8.0%) had perforation or peritonitis, and 4 (2.0%) had intestinal bleeding. Allergic responses, including urticaria, were found in seven (3.5%) patients. Fourteen (7.0%) cases underwent open surgery. Three (1.5%) underwent colonoscopic removal of Anisakis larvae. The average length of stay in the hospital was 9.6 days. The annual incidence of bowel anisakiasis is estimated to be about 3.0 per 1 million people per year. It is important to continue collecting all available data to monitor the trends of this distressing condition.

Human anisakiasis is caused by infection with the third-stage larvae of *Anisakis* sp. or *Pseudoterranova decipiens*, common nematode parasites of marine mammals. The condition occurs after consumption of infected salt-water fish or cephalopod mollusk species, including mackerel, squid, sardine, horse mackerel, salmon, and bonito.

This serious zoonotic disease, which was first described by Van Thiël and others in 1960, has increased throughout the world in the last few decades. The prevalence of anisakiasis is clearly related to traditions of consuming raw, lightly cooked, or marinated seafood, such as Japanese sushi and sashimi, Dutch salted or smoked herring, Scandinavian gravlax, Hawaiian lomi-lomi, and Latin American ceviche.

The development of diagnostic and therapeutic techniques with gastroendoscopy coincides with the increase in the number of reported cases. Clinical features of gastric anisakiasis have been described, and endoscopic diagnostic procedures and treatments are well-established. Reportedly, most cases of anisakiasis occur in the stomach, whereas bowel anisakiasis is rare. Although there are several case reports describing clinical details in a small number of patients, statistics in clinical features of bowel anisakiasis are scarce.

We have conducted a secondary analysis of the administrative-claims database to examine the occurrence and clinical features of bowel anisakiasis using the Japanese Diagnosis Procedure Combination (DPC) in-patient database, which represents approximately 45% of in-patient admissions to acute care hospitals in Japan. Data were compiled between July and December each year by the DPC Research Group funded by the Ministry of Health, Labour, and Welfare, Japan. The database includes data on patients’ age and sex, diagnoses, co-morbidities at admission, complications after admission [data were recorded with the International Classification of Diseases, Tenth Revision (ICD-10) codes and text data in the Japanese language], procedures, length of stay, and discharge status. Because gastric anisakiasis can be endoscopically treated in emergency units or outpatient clinics, the DPC in-patient database lacks most of gastric cases. However, the database is usable to examine bowel anisakiasis, because most patients with bowel anisakiasis are considered to require hospitalization.

In the first step, we selected patients with the diagnosis of anisakiasis (ICD code, T810). The ICD code does not differentiate the anatomical locations of anisakis; therefore, in the second step, they were identified using the Japanese text.

We identified 201 cases with a diagnosis of bowel anisakiasis from 106 hospitals between July 1 and December 31 in both 2007 and 2008; additionally, we identified 223 gastric cases and 6 cases that were not clarified as either gastric or bowel in the same period.

The average (± standard deviation) age in the bowel anisakiasis group (54.5 ± 13.9 years) was higher than that in the gastric anisakiasis group (49.2 ± 15.8 years; P < 0.01). The rate of male sex was higher in the bowel anisakiasis group (73% versus 61%; P < 0.01). Seasonal trends were similar; 135 (67.2%) of 201 bowel anisakiasis and 135 (60.5%) of 223 gastric anisakiasis occurred between September and November.

Of 201 cases with bowel anisakiasis, 102 (50.7%) cases had ileus, 16 (8.0%) had perforation or peritonitis, and 4 (2.0%) had intestinal bleeding. Only one case was diagnosed as intussusception. Allergic responses including urticaria were seen in seven (3.5%) patients. Of 223 gastric cases requiring hospitalization, 22 (9.4%) had gastric bleeding, 4 (1.7%) had perforation or peritonitis, and 4 (1.7%) had allergic responses.

Table 1 shows the rates of complications induced by bowel anisakiasis in each sex and age group. The rate of abdominal complication seemed to be relatively low in younger patients aged ≤ 39 years, but the Fisher’s exact test showed no significant difference (P = 0.075). The rate of allergic responses was significantly higher in younger patients aged ≤ 39 years (P = 0.011).

Of 201 bowel cases, 14 (7.0%) cases underwent open surgery, and 3 (1.5%) underwent colonoscopic removal of Anisakis larvae. The averages of length of stay were 9.6 days [95% confidence interval (CI) = 8.3–10.9 days] and 13.2 days [95% CI = 9.7–16.7 days] in non-surgical and surgical cases, respectively, and the Mann–Whitney test showed a significant difference (P = 0.003).

A Japanese report published in 1991 showed that only 567 (4.5%) of 12,586 cases of anisakiasis were bowel-type. We identified 201 cases of bowel anisakiasis between July and December in 2007 and 2008. The DPC data include about 45% of all the acute-care hospitalization in Japan. A previous Japanese survey reported that, of 2,491 cases of anisakiasis...
Allergic responses are not specific to anisakiasis. According to the literature review of 79 cases of surgically treated bowel anisakiasis in Japan, most of the surgical cases occurred between January and December. Using these data, we have estimated the annual incidence of bowel anisakiasis to be approximately 380 per million people, but no anaphylaxis was seen. In our study, allergic responses were seen in seven (3.5%) cases, but no anaphylaxis was seen. Several limitations should be acknowledged. Studies using the administrative-claim database may be limited by incomplete reporting that could lead to overestimation or underestimation of the disease and its complications. Some cases of bowel anisakiasis with mild symptoms may have been treated conservatively in outpatient clinics, and our failure to capture such cases may have resulted in an underestimation of the incidence. The monthly prevalence data were insufficient, because data between January and June were not available from the DPC database.

Despite these limitations, the database is useful to examine the trends of occurrence and clinical features of bowel anisakiasis. It is important to continue collecting all available data to monitor the trends of this distressing condition.

Table 1

<table>
<thead>
<tr>
<th>Sex</th>
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<th>n</th>
<th>%</th>
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<td>52.7</td>
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<td>5.5</td>
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(P = 0.325) (P = 0.292)

<table>
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<tr>
<th>Age (years)</th>
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<th>%</th>
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<th>%</th>
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<td>39.4</td>
<td>4</td>
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<td>87</td>
<td>60.8</td>
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<td>13</td>
<td>52.0</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

(P = 0.075) (P = 0.011)

References