Medical treatment

Infection prevention –Pitfall of a raw food culture

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Introduction

What do you associate with the word "infection" ? Leaving aside the technical aspect, we often hear or read news about infections on TV, newspapers and the Internet. For example, highly pathogenic bird flu broke out on April 13 in Kumamoto. It didn' t spread to people and the prefecture declared the end of bird flu epidemic on May 8. Every year, flu and norovirus outbreaks occur in winter and food poisoning epidemic caused by O-157 or other bacteria breaks out in summer. We live with risk of those familiar infections throughout the year. Besides that, major social problems like bird flu epidemic sometimes occur. The theme of this paper is prevention of infections. Infections are an extremely wide-ranging problem. But, due to space limitations, the paper cannot cover the whole range and it focuses on food poisoning.

In April and May 2011, food poisoning occurred at a chain of grilled meat restaurants in Toyama, Ishikawa, Fukui prefectures and Yokohama city. The poisoning was caused by Enterohemorrhagic Escherichia coli in Yukhoe, Korean style steak tartare. The number of patients reached 181. Among them, 34 patients developed hemolytic-uremic syndrome, a serious complication. Five of the cases led to encephalopathy and they died of it. In 1998, the Director-General of the Environmental Health Bureau, the Ministry of Health, Labour and Welfare (MHLW), issued a notice on a food hygiene standard to ensure safety of meat to be eaten raw. According to the standard, those restaurants should have trimmed their beef for Yukhoe before processing or cooking and disinfected the cooking utensils, such as cutting boards and knives. But, they did not. Later, a survey on the awareness of and compliance with the standard was conducted. The survey showed that non-compliant entities amounted to 48%. Of those entities, restaurants

accounted for 52% and meat suppliers for 36%. Responding to the poor compliance, the MHLW established a standard with penal clauses on meat to be eaten raw and put it into effect on October 1, 2011. On July 1, 2012, the ministry prohibited restaurants (grilled meat restaurants) from serving beef liver sashimi, slices of raw beef liver. Possibly in response to the prohibition, more people had beef liver sashimi and that led to a rise in the number of food poisoning cases from raw liver. Those cases were caused not by Enterohemorrhagic E. coli but by Campylobacter.

The series of food poisoning incidents revealed the problem of non-compliance with hygiene standards by meat manufacturers, meat suppliers and restaurants. The incidents also revealed another problem; a taste for raw food, such as raw meat and offal.

In some areas of Japan, people have traditionally had horse and chicken sashimi. Today, as many people have come to eat grilled meat and offal, it is becoming more and more common to eat various types of meat and offal raw, which include livestock meats like beef and pork and meats of wild animals like deer and boar. And, the number of food poisoning cases from those meats including offal is increasing. Many of those cases are caused by Enterohemorrhagic E. coli in beef Yukhoe and liver sashimi and by Campylobacter in chicken sashimi, chicken tataki (seared sashimi) and beef liver sashimi.

I will talk about Enterohemorrhagic E. coli and Campylobacter, mentioned above as typical pathogens of food poisoning from raw food diet, and norovirus. I discuss norovirus because food poisoning by norovirus is different in some aspects from Enterohemorrhagic E. coli and Campylobacter cases.

● Typical pathogens of food poisoning

(1) Enterohemorrhagic Escherichia coli

Most types of Escherichia coli that live in the human colon and form intestinal flora are harmless. But, O-157 and O-111 living in the intestines of cows are dangerous and produce verotoxin. These types of E. coli are highly resistant to acid and they survive in gastric acid. They are considered to infect humans with only a low coliform count of 50. Those bacteria can cause serious damage to human health. Food that carries those bacteria includes beef (especially mince), milk (especially non-sterilized milk) and beef liver. Food poisoning is developed 4 to 8 days on average after ingestion. The patients will suffer from stomachache and

bloody stool. When the condition worsens, hemolytic-uremic syndrome occurs and it can result in a secondary disease, such as kidney dysfunction and neurological disorder, or death. As mentioned above, during the mass food poisoning in April and May 2011 at grilled meat restaurants, some people were infected with O-111 and others with O-157. Among them, 34 people developed hemolytic-uremic syndrome and five of them died of encephalopathy.

Generally, children under 10 account for 40% of those infected with Enterohemorrhagic E. coli. Small children and elderly people have a predisposition to hemolytic-uremic syndrome. The major causes are underdone meat, raw food diet and secondary infection during cooking. To prevent infections with Enterohemorrhagic E. coli, it is important to avoid eating raw meat and cook meat well (more than one minute at 75°C). It is important to make sure that children, elderly people or those with their immunity lowered due to pre-existing medical conditions do not eat raw or underdone meat.

(2) Campylobacter

Generally, bacterial food poisoning epidemic breaks out in summer and the incidence decreases in winter. The incidence of food poisoning by Campylobacter is high in May and June, it slightly falls in July and August, and it increases again in September and October. Campylobacter is a normal inhabitant of the intestines of cows, pigs and chickens. An infection occurs when the bacterial count has increased to 500 to 800. The incubation period is two to five days, which is relatively long. Campylobacter is vulnerable to dryness and rapidly dies under normal atmospheric conditions. Those characteristics make it difficult to locate the source of infection when food poisoning by Campylobacter has occurred. Epidemiologically, the food poisoning is considered to result from eating of raw or underdone chicken or beef liver or a secondary infection during a cooking process.

When an infection develops, the person may suffer from a fever, fatigue, headache, nausea, stomachache, diarrhea and bloody stool. No fatal case has been reported except for some people suffering from immunodeficiency. Patients will make steady recoveries. However, one out of 2000 or so cases develops Guillain-Barré syndrome, a serious complication. About one to three weeks after infection with Campylobacter, the patient will develop acute peripheral neuropathy, mainly weakness of limbs. When the symptoms worsen, the patient may come to have difficulty in walking or other sequelae. Fatal cases from respiratory muscle paralysis have been reported. It is important to avoid eating raw food to prevent

infections with Campylobacter just as Enterohemorrhagic E. coli.

(3) Norovirus

Stool and vomit of an infected person contain a large amount of norovirus. Norovirus remains infectious for weeks to months in the environment. Some noroviruses in sewage reaching a sewage plant may survive the treatment to be carried to rivers and then to the sea where they are concentrated in oysters and other bivalves. If a person eats raw or underdone shellfish infected with norovirus, the person will be infected with norovirus. Norovirus is easily passed from person to person by directly taking in dry virus or indirectly taking it in via an object an infected patient has touched. Recent epidemiological research shows that food poisoning by norovirus is caused more by transmission of infection from person to person than by eating of raw shellfish, which used to be more common. In December 2006, mass food poisoning occurred at a hotel in Tokyo. The areas were cleaned only with a detergent after the vomit of patients was removed and the ventilation was not adequate. Experts concluded that those factors caused dry virus to float in the interior space and resulted in the spread of a food poisoning epidemic

Norovirus is resistant to gastric acid and low-level chlorine contained in tap water, as well as to heat at around 60°C. To prevent infections with norovirus, food must be cooked at 85°C or more for at least one minute. When removing vomit or stool, the persons must wear gloves, mask and gown so that they won't touch it. After the vomit is removed, the area must be disinfected using sodium hypochlorite. The persons must wash their hands with soap and running water. Disinfection with alcohol is thought to be ineffective against norovirus because norovirus does not have a lipid envelope around the protein shell. Other viruses immune to alcohol include rotavirus and Clostridium difficile.

● Food poisoning and raw food culture

Behind the high incidence of food poisoning caused by Enterohemorrhagic E. coli and Campylobacter, there seems to be Japanese people's taste for raw food or Japan's food culture.

In 2010, Food Safety Commission, Cabinet Office, conducted a survey on eating of beef and beef offal at grilled meat restaurants. To the question "How often do you eat raw beef?," 23.7% of the respondents answered "almost every time," 34.1%

said "sometimes," and 42.2% "never." About 60% had raw meat. A survey on the awareness of a risk in eating raw meat was conducted in 2011 and 2012 and the results were compared. The comparison has revealed an interesting result. The percentage of respondents who "understood well that there was a big risk including development of a serious disease" increased from 69.3% to 90.7%. That of those who "knew the risk was especially high for children and elderly people" soared from 23.2% to 72.7%. This result is considered to indicate that people' s attitudes have changed as they have heard about many food poisoning cases. The other side of the coin is that many people still eat raw meat even though they are well aware of the risk of developing a serious disease and the high risk for children and elderly people. Isn' t that surprising?

Postscript

Even if standards on beef to be eaten raw are established, that doesn' t ensure safety 100%. It is required to be fully aware of the fact and educate people to avoid eating raw beef or beef liver as much as possible. Especially, children, elderly people and those with lowered immunity as well as people around them should be careful that they will not eat raw or underdone meat or offal.

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