

# Reconstruction Image of Small Bowel Obstruction (SBO) Due To Japanese Rice Cake (Mochi)

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## Abstract

**Background:** Authors have continued clinical practice with reconstruction method of computed tomography (CT).

**Case presentation:** We have experienced 78-year-old male of acute abdomen complaining strong abdominal pain.

**Result:** Laboratory test showed WBC 14800 / $\mu$ L, and CT showed two high-density lesions in right middle and left upper abdomen, which has 143/214 Hounsfield unit, respectively. They suggest small bowel obstruction (SBO) by traditional Japanese rice cake (mochi). He was treated conservatively with infusion and relieved.

**Discussion:** Rice cake may cause various problems, such as ileus, gastric ulcer, perforation and suffocation. This report becomes hopefully a reference for future practice and research.

**Keywords:** Computed Tomography (CT); Reconstruction Method; Small Bowel Obstruction (SBO); Japanese Rice Cake (Mochi); Hounsfield Units (HU)

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## Introduction

The authors and collaborators have continued medical practice and research for long [1]. These area include non-communicable disease (NCD), type 2 diabetes (T2D), chronic kidney disease (CKD), and atherosclerotic cardiovascular disease (ASCVD) [2,3]. Furthermore, we have reported various radiological development including the reconstruction method of computed tomography (CT) and early stage detection of diseases [4,5,6].

For actual clinical practice, we have received lots of emergent patients with crucial medical problems. Among them, we have recently experienced an impressive case, who was transferred to our hospital. He was an elderly person with acute abdomen. Using CT scan and also reconstruction method, he was diagnosed as small bowel obstruction (SBO) by traditional Japanese rice cake (mochi). According to recent reports, SBO caused by rice cake has been found in Japan [7]. The reason is that mochi is a traditional and famous food in Japan and it can bring problems in gastro-intestinal (GI) tract, including stomach and intestine [8]. When mochi lesion is larger than 20 mm in size and may remain, it possibly causes the obstruction of GI tract [9].

Regarding the emergency status of rice cake ileus, several cases were reviewed [9]. All patients showed the lifestyle of swallowing without chewing. The episode was often found in January. For its reason, people always eat rice cake as Japanese way of life during

New years' 3 day and consecutive period. Recently, the globalization of Japanese food culture has been developed all over the world. Therefore, it is necessary to have a deeper understanding of the food culture of mochi in the future. The general clinical progress of this case and some discussion would be described in this article.

## Case Presentation

### Medical History

The patient is a 78-year-old male. As to past history, he has been pointed out to have light hypertension. He visited orthopedic clinic for slight cervical heavy sensation a few years ago, which was non-contributory. On the night of January 24, 2022, he felt mild nausea in his abdomen. When he woke up at 5 am next morning, he suddenly vomited and developed aches from the epigastric region to the abdomen. His vomiting persisted with food residue, and then he called an ambulance. He was transferred to our hospital for further evaluation and treatment.

### Physical Examination

His physical examination in the morning of Jan 25 revealed rather acute distress because of abdominal pain. On the first contact in the emergency room, his consciousness was alert and vitals were BP 146/72, P 49/min, respiration 18/min and SpO<sub>2</sub> 99%. Head, neck, lung and heart were unremarkable. His abdomen is slightly

extended and rather hard. He complained of abdominal pain at epigastrium to abdomen. He shows slight tenderness, but defense was not apparent. Neurological examination was intact.

### Laboratory Tests

Biochemical laboratory tests were conducted in Jan 25 2022. The results were as follows: WBC 14800 / $\mu$ L, RBC  $4.57 \times 10^6$  / $\mu$ L, Hb 15.0 g/dL, Ht 43.1%, Plt  $23.4 \times 10^4$  / $\mu$ L, TP 7.2 g/dL, Alb 4.1 g/dL, A/G ratio 1.3, T-Bil 0.8 mg/dL, AST 60 U/L, ALT 27 U/L, ALP 101 U/L (38-113), LDH 941 U/L (124-222), r-GT 44 U/L (-86), Cr 0.58 mg/dL, BUN 20 mg/dL, blood sugar 198 mg/dL, CRP 0.14 mg/dL.

### Results of Radiological Tests

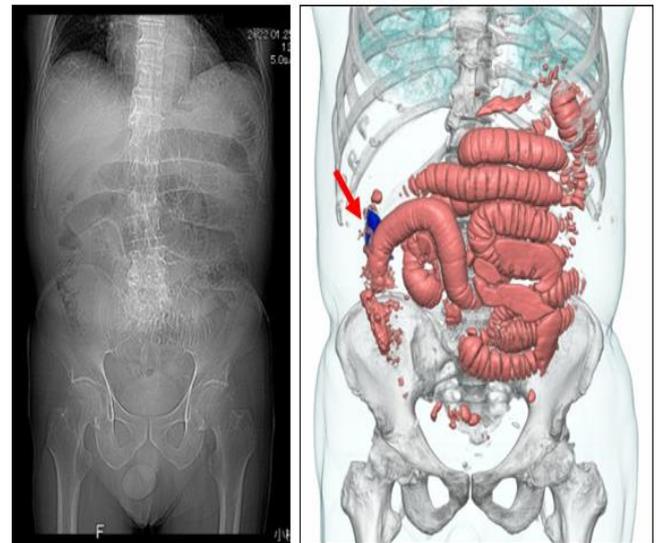
As to radiological tests, abdominal CT test was conducted. As a result, there were two high density lesions in right middle quadrant and left upper quadrant regions (Figure 1a,b). For their density of CT scan view, right lesion showed 143 Hounsfield unit (HU) and left lesion showed 214 HU. These images are compatible with the presence of traditional Japanese rice cake (mochi) in the intestine.



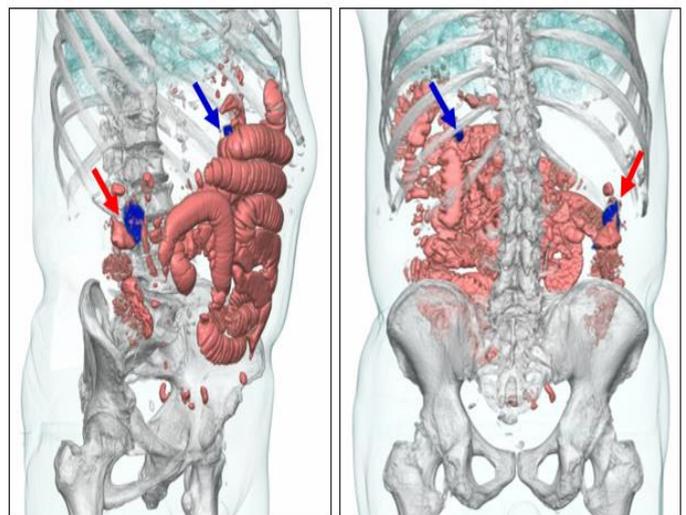
**Figure 1:** Abdominal CT showing two high-density lesions. 1a: SBO by rice cake in the right middle abdomen (red arrow); 1b: SBO by rice cake in the left upper abdomen (blue arrow).

This case was examined by abdominal X-ray examination in supine position (Figure 2a). The result showed enlarged intestine image which is consistency with probable sub-ileus or ileus of small intestine, suggesting SBO. However, it did not detect the presence of rice cake.

Using detailed computerized image data, reconstruction imaging method was conducted. Reconstructed data of coronal view of abdomen is shown (Figure 2b). It reveals clear image of enlarged intestine with gas. Furthermore, it indicates the coincidence of image between Figure 2a and 2b. Figure 2b can point out the correct place where rice cake exists in the right middle abdomen. The reconstruction technology can detect precisely two lesions of rice cake in bilateral abdomen from back side of view (Figure 3a,b).



**Figure 2:** Ileus findings for SBO by rice cake on abdominal X-P and CT reconstruction. 2a: Abdominal X-P can show much gas without the lesion of rice cake; 2b: CT construction shows the image of rice cake (red arrow).



**Figure 3:** The images of abdomen made by reconstruction method; 3a: Rice cakes in right (red) and left (blue) by oblique view; 3b: Rice cakes in right (red) and left (blue) by reverse view

## Clinical Progress

He was hospitalized and immediately started for treatment. He was inserted a gastric tube, given continuous drip infusion and received conservative therapy. His nausea and abdominal pain were relieved for several hours, and his symptoms disappeared at night of Jan 25. He was provided 1500cc div a day and removed the Gastric tube after 48 hours. During 3<sup>th</sup>-6<sup>th</sup> day, he was stable with no symptoms at all, and abdominal CT was checked on 7<sup>th</sup> day (Jan 31). As a result, ileus situation has disappeared, and no remarkable findings were observed. Consequently, he could start normal regular meal and was discharged.

## Ethical Considerations

Current case study was basically performed according to the Declaration of Helsinki in the light of ethical aspect. Further, adequate comment has been found with Ethical Guidelines for Research for Humans. The clinical condition was associated with the concept of Good Clinical Practice (GCP). The Authors and et al. have established the ethical committee in our hospital. It includes adequate professional staffs. They are the president of the hospital, surgeon, physician, head nurse, pharmacist, radiology staff and legal specialty. We have fully discussed concerning this issue for the agreements of the protocol. The informed consent of written agreement document was taken from the patient.

## Discussion

For acute abdomen, some cases show SBO due to mochi, that is rice cake (mochi) made of sticky rice [11]. Such situation is found when mochi is swallowed without chewing. Mochi becomes hard when it is cold, and can't dissolve easily. The ingredient of mochi consists of amylopectin, and it does not dissolve even in the hot water. Furthermore, when it develops to kneading process, it would be not easily digestible [12]. Radiologically, mochi is not usually visualized on X-ray examination [10]. On the other hand, mochi seems to be characteristic image for CT for high-density structures [13,14].

Various case reports were found on rice cake SBO [12,15]. An elderly female suffered from ileus because of intake of rice cake who has previously laparoscopic operation [16]. She was treated by fasting and intravenous infusion, and was recovered in a day. From a recent report, 66-year-old female developed abdominal pain and nausea [7]. She had eaten some rice cakes without chewing the day before. CT scan showed lesion in the stomach on the day, and similar lesion in the ileum with obstruction for ileus. She was treated by fasting and intravenous saline, with recovery within 2 days.

The review of SBO by mochi was reported as follows [10]. Their symptoms included colic pain (100%), nausea (86%), positive tenderness (100%) and abdominal defense (29%). The standard treatment included fasting, drip infusion, naso-gastric tube and long tube insertion. Furthermore, Hounsfield units (HU) value of

rice cake were investigated. For SBO due to rice cake, 9 cases and 67 previous case was reviewed [17]. The mean value showed 160 Hounsfield units. Conservative treatment was found in 56 cases (73.7%). If the length of mochi is more than 4cm, higher risk of intestinal perforation may be suggested. An elderly female showed high-density intraluminal lesion associated with 145 HU in jejunum [16]. Another report found that the high-density lesion showed 120-206 HU [13]. On the other hand, this case showed 143 and 214 HU.

For medical problem in upper GI tract, rice cake may require endoscopic removal. When hot and toasted rice cake is swallowed, thermal injury may be found [13]. Medical staffs have to be aware of this possibility. One of the treatment methods is to use an endoscope and double-balloon enteroscopy to crush the impacted food into small pieces and remove them [18].

Furthermore, rice cakes may cause some problems, such as ileus, gastric ulcer, perforation and suffocation [19]. It is major cause of choking accidents. Epidemiological out-of-hospital cardiac arrests (OHCAs) was studied especially due to rice cake [20]. Totally, 46911 OHCAs were analyzed, in which 3294 (7.0%) was by suffocation. Among them, 314 (9.5%) was from rice cake, and 77/314 (24.5%) was found during New Years' 3 days.

In summary, a case of SBO by rice cake associated with discussion and perspective was revealed here. Such situation may cause various accidents and complications. Medical staffs have to know the possible progress. This report will hopefully contribute daily clinical practice.

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