Int Surg 2013;**98:**254–258
DOI: 10.9738/INTSURG-D-12-00003

Case Report

A Case of Intestinal Obstruction Caused by Prominent Kyphosis Resulting in Compression of the Intestine by the Costal Arch

Satoshi Yoneyama, Takehito Kato, Tetsuya Yumoto, Masami Ohwada, Toru Terashima, Masanori Koizumi, Hamaichi Ueki

Department of Surgery, National Hospital Organization Mito Medical Center, Ibaraki, Japan

An 85-year-old woman with no history of abdominal surgery complained of abdominal pain and vomiting and was referred to us with a diagnosis of intestinal obstruction a few days later. Upon admission to our facility, she presented with marked abdominal swelling and prominent kyphosis. Because of the kyphosis, most of the dilated bowel was compressing her thoracic cavity. No obvious strangulation or free air was observed via abdominal computed tomography imaging. We attempted decompression using a nasogastric tube, but the symptoms persisted. Surgery was performed 2 days after admission. The origin of the obstruction was a compression of the ileocecal region by the costal arch. The bowel was discolored, and thus surgically excised. There were no major postsurgical complications other than a mild wound infection. Until now, there have been no reports of advanced kyphosis inducing ileus, but there are concerns of an increase in similar cases as society continues to age.

Key words: Kyphosis – Hunchback – Intestinal obstruction

Most cases of spinal kyphosis are caused by age-related changes, and as the condition progresses, patients develop symptoms such as nerve compression and reflux. There are many classifications and causes of intestinal obstruction, although the most common cause of small intestinal obstruction is adhesions. In the present study, we report on a case of intestinal obstruction caused by prominent kyphosis and resulting in compression of the ileocecum by the right costal arch.

Case Report

An 85-year-old woman was diagnosed with osteoporosis in her 60s and had no history of abdominal

Reprint requests: Satoshi Yoneyama, MD, Department of Surgery, National Hospital Organization Mito Medical Center, 280, Sakuranosato, Ibaraki-machi, Higashiibaraki-gun, Ibaraki 311-3117, Japan.
Tel.: +81 29 240 7711; E-mail: yoneyama.surgery@gmail.com

Fig. 1 Abdominal findings. The patient's intestine was dilated and located in the thoracic cavity because of prominent kyphosis.

surgery. She visited her local practitioner complaining chiefly of abdominal pain and vomiting and was diagnosed with an intestinal obstruction. A few days later, she presented to our facility, and her physical characteristics upon admission were: height, 128 cm; weight, 28 kg; blood pressure, 139/79 mmHg; temperature, 37.4°C; and pulse, 110 beats per minute. We confirmed prominent kyphosis, and the patient's abdomen was swollen and mildly tender. However, no symptoms of peritoneal irritation, such as rebound tenderness or muscular defense, were observed. Because of kyphosis, part of the patient's abdominal wall was compressing her thoracic cavity (Fig. 1).

A blood test upon arrival showed nearly no signs of inflammatory reaction (white blood cell count, 8200 per microliter; C-reactive protein level, 0.81 mg/dL). A diagnosis of dehydration was also confirmed (blood urea nitrogen level, 56.2 mg/dL; creatinine level, 0.45 mg/dL).

An abdominal X-ray showed marked dilation of the small intestine (Fig. 2), which was confirmed via abdominal contrast computed tomography (CT; Fig. 3). Because of prominent kyphosis, a section of dilated small intestine was observed in the patient's thoracic cavity. No free air or ascites was observed. A three-dimensional reconstructed image of the abdominal CT indicated possible ileocecal compression by the costal arch.

Surgery was considered to be extremely risky because of the patient's age; thus, conservative treatment was conducted on admission. The patient was made to fast and was given rehydration fluid, and a nasogastric tube was inserted. However, the patient's condition did not improve; therefore,

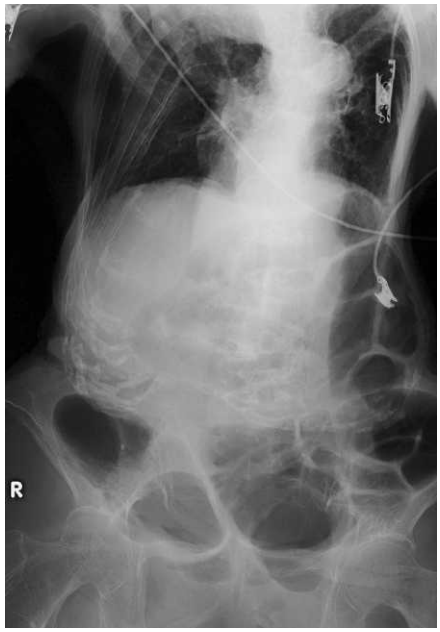

Fig. 2 A plain abdominal X-ray.

laparotomy was performed 2 days after admission via a lower abdominal midline incision. As suspected, the ileocecal region was being compressed by the right costal arch, which had deviated because of kyphosis. Discoloration, thought to be due to ischemia, was observed in the same; therefore, the ileocecal region was surgically excised. Suction decompression of the intestinal contents was also performed.

Ischemic changes and thinning were found in the resected ileocecal region specimen. No neoplastic or ulcerative pathology, or stenotic changes were observed. A pathologic examination showed thinning of the colonic wall, disappearance of the muscle layer, and chronic ischemia. In addition, mucosal necrosis was observed in the same region, which was thought to be due to acute ischemia. Four days after surgery, the patient began oral ingestion. There were no major complications other than a mild wound infection.

Discussion

Intestinal obstruction is a condition in which the passage of intestinal content is impeded because of a number of possible reasons.[1] In Japan, it is common to use the terms *ileus* and *intestinal obstruction* interchangeably.[2] Patients mainly present with clinical symptoms, such as abdominal pain, vomiting, cessation of gas and fecal passage, and abdominal

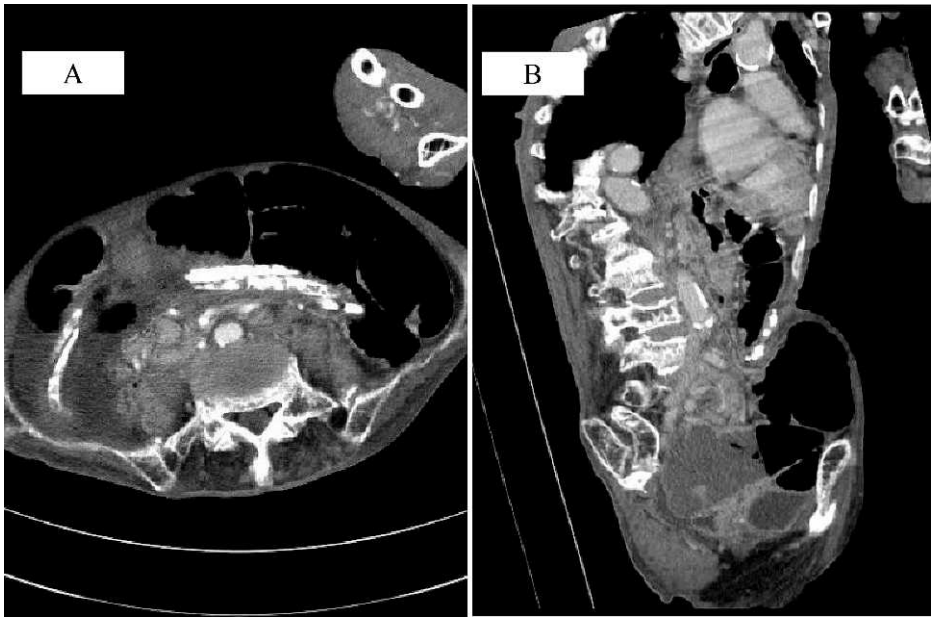

Fig. 3 An abdominal contrast CT image. (A) Horizontal section. (B) Sagittal section.

swelling.[3] Intestinal obstruction is divided into 2 major categories: mechanical and functional. However, there are a number of other categories depending on the etiology, site of origin, and history of abdominal surgery.[2] Previous reports indicated that the main cause of small intestinal obstruction is intestinal adhesions, whereas colonic cancer is the main cause of colonic obstruction.[4] The main indications of surgery for intestinal obstruction are severe abdominal pain, dehydration, circulatory

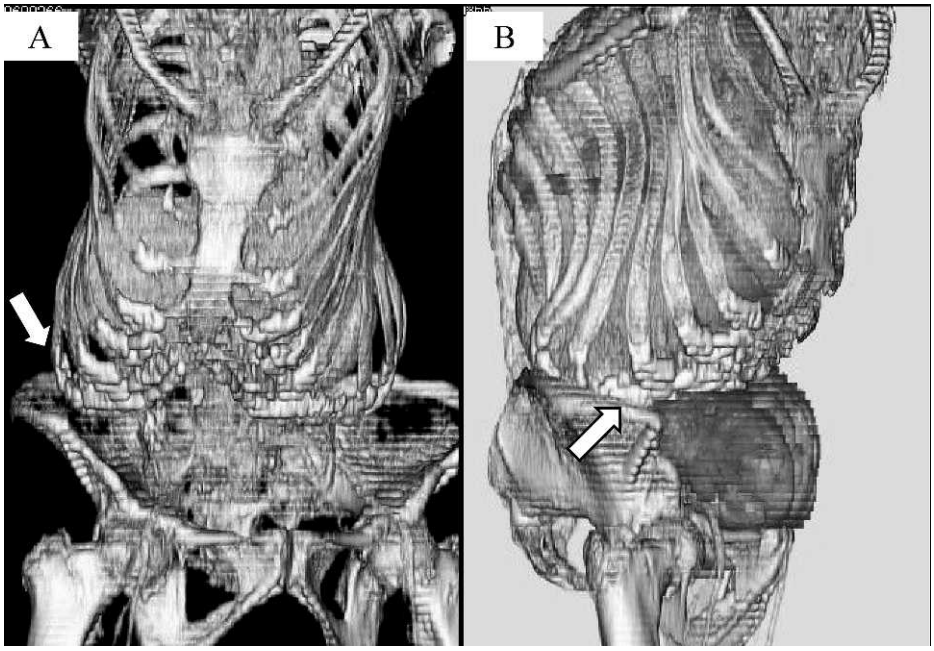

Fig. 4 A three-dimensional reconstructed image of the abdominal CT. (A) Anterior image. (B) Lateral image. The arrow indicates intestinal compression by the costal arch.

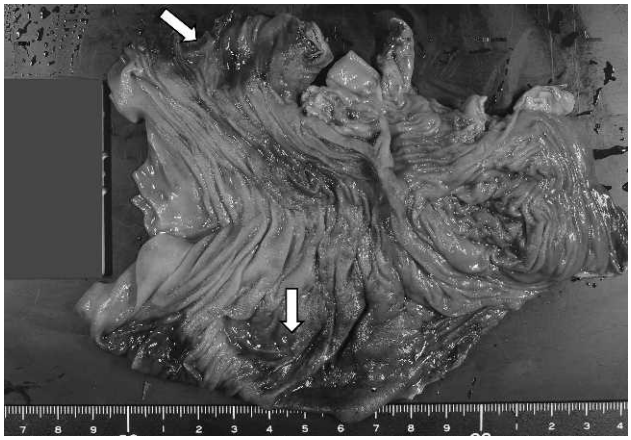

Fig. 5 A resected specimen. The arrows indicate regions of ischemic changes.

abnormalities of the digestive tract, and failure of conservative treatment to alleviate symptoms.[5,6]

Kyphosis is a condition in which the posterior convex curvature of the spinal column is abnormally increased in the sagittal plane.[7,8] Although kyphosis often accompanies spinal caries, cases of degenerative age-related lumbar kyphosis and kyphotic changes due to osteoporotic spinal compression fractures have also been observed.[9] Orthopedic surgery is performed to alleviate pain or neurologic symptoms, although the number of patients of advanced age requiring surgery and management of complications have increased.[10] Abdominal symptoms occurring with kyphosis include gastroesophageal reflux disease accompanied by gastric exclusion or hiatal hernia, as well as abdominal pain due to intercostal nerve stimulation.[11,12]

In the present case, ileocecal compression by the right costal arch was observed during surgery and from the resected specimen findings. We speculated that the ischemia was caused by ileocecal compression by the right costal arch due to kyphosis. The patient presented with symptoms of intestinal obstruction in addition to constipation and dehydration. The cause of the missing muscle layer of the ileocecal region was not evident, but it could have been due to chronic compression.

There are other reports of intestinal obstruction due to extrinsic compression in addition to the present case.[13] There is also the possibility that, when using virtual endoscopes, compression abnormalities due to the ribs can be mistaken for lesions on imaging.[14] We conducted a PubMed search using the key words "kyphosis" and "intestinal obstruction" to identify similar cases of intestinal obstruction owing to ileocecal compression from the costal arch caused by advanced spinal kyphosis, but we found none. We believe that in the future there will be an increase in similar cases owing to aging populations; therefore, appropriate precautions are necessary.

In the present case, conservative treatment did not alleviate the patient's symptoms; therefore, we removed her ileocecal region to resolve the intestinal obstruction and restore normal digestion. Considering the patient's physical capabilities and daily activities, cosmetic surgery was not performed for kyphosis. It is possible that intestinal compression by the costal arch may reappear; therefore, careful follow-up will be necessary.

Conclusion

In the present study, we reported on a case of an intestinal obstruction thought to be caused by ileocecal compression by the right costal arch owing to prominent kyphosis. In the future, we believe that there will be an increase in the number of similar cases owing to the aging of society.

References

1. Wilson MS, Ellis H, Menzies D, Moran BJ, Parker MC, Thompson JN. A review of the management of small bowel obstruction. *Ann R Coll Surg Engl* 1999;**81**(5):320–328
2. Shikata J, Ohtaki K, Amino K, Takeda Y. Nationwide investigations of intestinal obstruction in Japan. *Jpn J Surg* 1990;**20**(6):660–664
3. Zadeh BJ, Davis JM, Canizaro PC. Small bowel obstruction in the elderly. *Am Surg* 1985;**51**(8):470–473
4. Masahiko O, Hideaki T, Kiyonori F, Noritake T, Yukichi M. Nationwide investigation of 21,899 cases of intestinal obstruction. *J Abdom Emerg Med* 2000;**20**(5):629–636
5. Jackson PG, Raiji MT. Evaluation and management of intestinal obstruction. *Am Fam Physician* 2011;**83**(2):159–165
6. Stewardson RH, Bombeck CT, Nyhus LM. Critical operative management of small bowel obstruction. *Ann Surg* 1978; **187**(2):189–193
7. Le Huec JC, Aunoble S, Philippe L, Nicolas P. Pelvic parameters: origin and significance. *Eur Spine J* 2011;**20**(suppl 5):564–571
8. Roussouly P, Pinheiro-Franco JL. Sagittal parameters of the spine: biomechanical approach. *Eur Spine J* 2011;**20**(suppl 5): 578–585
9. Goldstein LA, Waugh TR. Classification and terminology of scoliosis. *Clin Orthop Relat Res* 1973;(93):10–22
10. Munting E. Surgical treatment of post-traumatic kyphosis in the thoracolumbar spine: indications and technical aspects. *Eur Spine J* 2010;**19**(suppl 1):S69–S73

11. Fujimoto K. Review article: prevalence and epidemiology of gastro-oesophageal reflux disease in Japan. *Aliment Pharmacol Ther* 2004;**20**(suppl 8):5–8
12. Simpson C, Greenough WB. Abdominal pain in an elderly osteoporotic patient: ribs on pelvis syndrome. *J Am Geriatr Soc* 2004;**52**(6):1039
13. Radosa MP, Diebolder H, Camara O, Winzer H, Mothes A, Runnebaum IB. Small-bowel obstruction caused by duodenal compression of a paraaortic lymphocele. *Onkologie* 2011;**34**(7): 391–393
14. Choi EK, Park SH, Ha HK. External compression by a rib that caused a pseudolesion at virtual colonoscopy. *Gastrointest Endosc* 2006;**64**(6):1009–1010; discussion 1010