



Transient Small Bowel Angio-oedema Secondary to Intravenous Iodinated Contrast Medium

Amjada A. Kalam¹ Praveen Kesav Ramaswamy¹

¹ Department of Radiodiagnosis, Sree Gokulam Medical College And Research Foundation, Thiruvananthapuram, Kerala, India

J Gastrointestinal Abdominal Radiol ISGAR 2022;5:213–216.

Address for correspondence Praveen Kesav Ramaswamy, MD, EDiR, DICR, Department of Radiodiagnosis, Sree Gokulam Medical College And Research Foundation, Thiruvananthapuram 695011, Kerala, India (e-mail: rpraveenkesav@gmail.com).

Abstract

We report the clinical profile and computed tomography (CT) findings of a rare case of transient angio-edema of the small bowel following intravenous administration of non-ionic iodinated contrast material in a 36-year-old woman. The pre-contrast CT showed normal small bowel and large bowel wall thickness. Findings included long segment, circumferential bowel wall thickening involving the duodenum, jejunum, and almost the entire ileum on CT scan obtained following the intravenous contrast material injection. The large bowel wall appeared normal in post contrast images also. There was no mesenteric fat stranding, ascites or significant lymphadenopathy. This entity, like most contrast-induced adverse reactions, has a favorable clinical outcome with aggressive clinical monitoring and supportive measures.

Keywords

- anaphylaxis
- contrast allergy
- small bowel angio-edema

Introduction

Acute allergic reaction following the use of iodinated contrast material is well known and varies from simple itching to severe anaphylactic shock. Urticaria is the most commonly observed contrast-induced adverse reaction. Gastrointestinal manifestations are rare, with transient angio-edema of the bowel being reported in only a few case reports. Our case report illustrates the imaging findings of transient angio-edema of the bowel on computed tomography (CT) examination.

Case Report

A 36-year-old normotensive woman under evaluation for acid peptic disease and recurrent abdominal pain without any change in bowel habits was referred for a contrast-enhanced CT abdomen. The patient had a positive history of allergy to gluten. The bowel was prepared with 1.5 L of 50% mannitol, given orally, as a neutral contrast agent before

acquisition of CT. Plain CT of the abdomen and pelvis was performed on a 128-slice CT scanner (GE), followed by post contrast images after intravenous injection of non-ionic iodinated contrast material (300 mg/mL, Ultravist) at an injection rate of 4 mL/sec via an automated pressure injector. Multiphase CT scans of the abdomen and pelvis were obtained in the arterial, portal, and venous phases by bolus tracking technique with trigger threshold of 100 HU in the descending thoracic aorta.

Following the acquisition of images of the venous phase, the patient complained of light headedness, nausea, vomiting, and palpitations. The patient was found to be hypotensive with a blood pressure of 90/50 mmHg. The patient was managed with Trendelenburg positioning, intravenous crystalloids, antiemetics, proton pump inhibitors, and steroids (hydrocortisone). The patient's vitals stabilized within 15 minutes with supportive management and the blood pressure stabilized at 110/70 mm Hg and a delayed CT scan was taken at 20 minutes post contrast injection.

published online
August 15, 2022

DOI <https://doi.org/10.1055/s-0042-1749676>.
ISSN 2581-9933.

© 2022. Indian Society of Gastrointestinal and Abdominal Radiology. All rights reserved.

This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

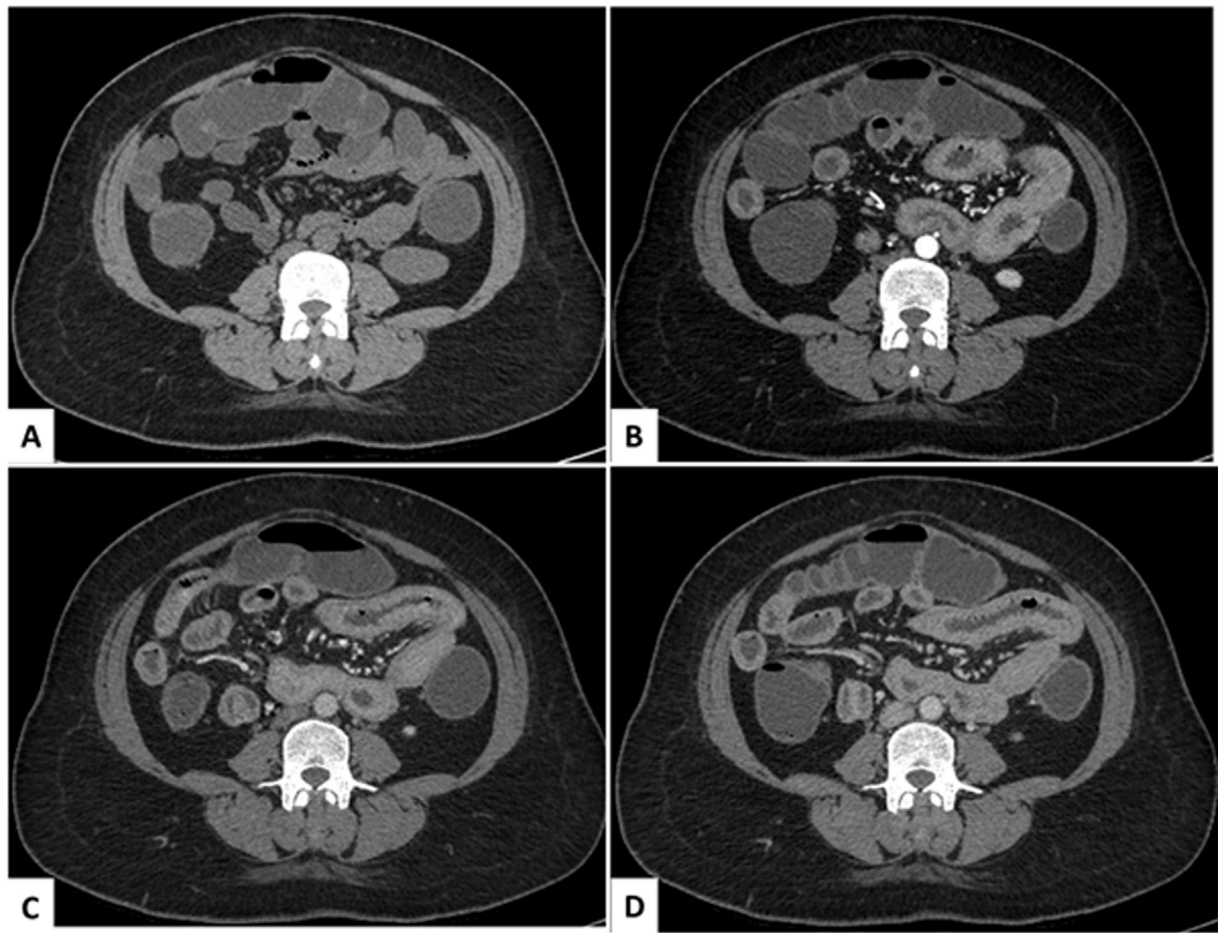


Fig. 1 Axial sections at the same level during multiphase contrast study of the abdomen in the pre-contrast (A), arterial (B), portal (C), and venous phases (D). The pre-contrast images show normal small and large bowel wall thickness with the development of isolated small bowel trans-mural edema with stratification in all post contrast images.

The patient was monitored in the intensive care unit overnight and she recovered without any further episodes of hypotension. There was no evidence of urticaria, itching, dyspnea, chest tightness, abdominal pain, diarrhea, or constipation. Routine blood investigations sent were unremarkable.

The post contrast phase CT images revealed diffuse circumferential small bowel transmural wall thickening and stratification involving almost the entire length of the small bowel except the terminal 15 cm of the ileum. There were no skip lesions. Pre-contrast images showed normal thickness of the entire small bowel wall (► **Figs. 1** and **2**). Stomach and large bowel appeared normal in both pre and post contrast images. No mesenteric fat stranding, free fluid, or significant lymph nodes were noted. The superior mesenteric artery and vein showed no luminal filling defects. An imaging diagnosis of transient angio-edema of the small bowel was made. The 20-minute delayed scan showed mild reduction in the small bowel mural edema as compared with the venous phase images and also appearance of mild peri-enteric and mesenteric fat stranding (► **Fig. 3**).

The patient was not on any angiotensin-converting enzyme inhibitors or NSAIDs and there was no previous history of similar episodes. No family history to suggest hereditary angio-edema was present.

She was observed in-hospital for 48 hours to look for any further episodes of hypotension or delayed allergic reactions. Sonographic evaluation of the small bowel wall was done prior to discharge, which showed complete resolution of the small bowel wall edema, consistent with our diagnosis. No additional findings were noted.

Discussion

The spectrum of allergic reaction varies from simple manifestation such as itching to life-threatening complications such as an anaphylactic shock. According to the American College of Radiology, adverse contrast reactions are classified as mild (self-limiting), moderate (not immediately life-threatening but requiring treatment), and severe (life-threatening).¹ Cutaneous manifestations are well known and constitute 76% of all contrast-induced reactions. Angio-edema with swelling of the skin and/or mucous membranes is a very rare adverse reaction (0.01%).² Transient angio-edema of the bowel is even rarer, with 12 case reports so far in the literature.³ The pathophysiology of transient angio-edema of the small bowel is attributed to the non-allergic, contrast-induced hypersensitivity reaction.¹

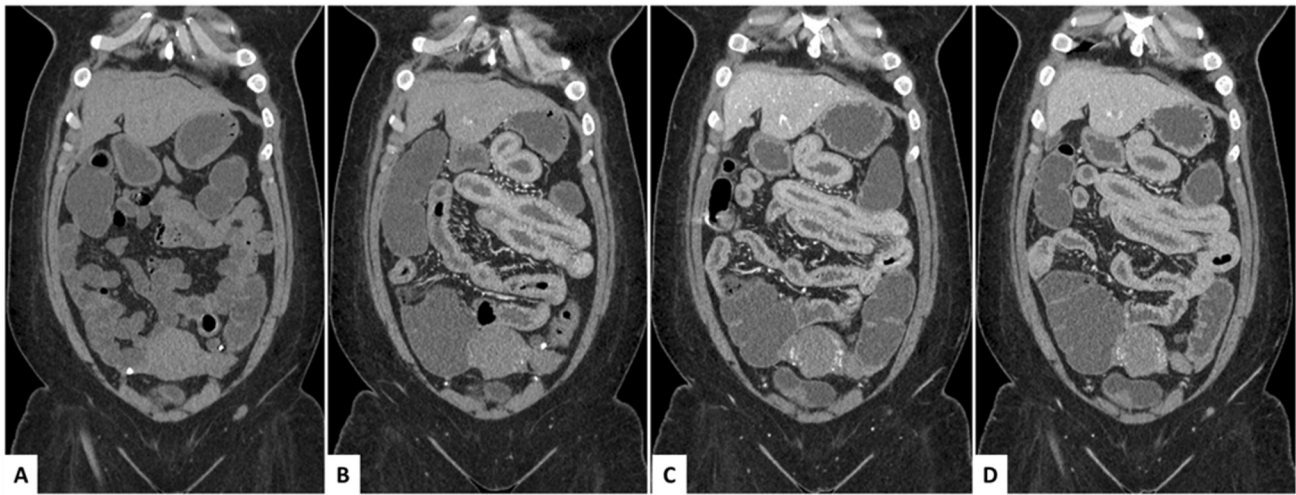


Fig. 2 Coronal sections at the same level during multiphase contrast study of the abdomen in the pre-contrast (A), arterial (B), portal (C), and venous phases (D). The pre-contrast images show normal gastric, small and large bowel wall thickness with the development of isolated small bowel transmurial edema with stratification in all post contrast images.

Angio-edema of small bowel is caused by hereditary and acquired causes such as C1-esterase inhibitor deficiency, angiotensin-converting enzyme inhibitor drugs in susceptible individuals and a few food products. De-regulation of the complement and kallikrein-kinin systems due to either a deficiency or a dysfunction of the C1-esterase inhibitor is the proposed mechanism in most of these cases.⁴

Characteristic findings of transient angio-edema of small bowel on CT includes diffuse circumferential long segment, small bowel transmurial thickening with mural stratification predominantly in the duodenum and jejunum with relative sparing of the terminal ileum. No peri-enteric fat stranding, mesenteric edema, free fluid, or vascular abnormality has been observed with contrast medium-associated bowel angio-edema.⁵ The predominant involvement of the duodenum, jejunum and proximal ileum is attributed to the rich

vascular supply, ample mucous folds, and loose connective tissue in these segments of bowel loops.³ The various differentials to be considered based on radiographic features include shock bowel, ischemia, inflammatory bowel disease, nephrotic syndrome, and vasculitis.^{6,7}

Skip areas of bowel wall thickening, hyperaemic vasa recta, fistulae, and sinuses are more in favor of inflammatory bowel disease such as Crohn's disease.⁸ Heterogeneously enhancing asymmetrical bowel wall thickening, skip lesions, omental thickening, mesenteric and peritoneal inflammation with necrotic lymphadenopathy are more in favor of enteric tuberculosis.⁹ Occluding thrombus may be apparent in case of ischemic bowel disease. Radiation enteritis is limited to the radiation field and represented by the clustered bowel loops.⁸ Other less common causes of sub-mucosal intestinal edema include hypo-proteinemia, congestive heart failure, portal hypertension, and lymphatic obstruction. All imaging differentials can be easily differentiated by looking for the temporal evolution of bowel wall edema, which is absent in the non-contrast images along with clinical manifestation of allergic response to contrast like, hypotension, and abdominal pain/cramps. This differentiation is further aided by the rapid resolution of symptoms with supportive measures and temporal resolution of the bowel wall edema/thickening on follow-up imaging.

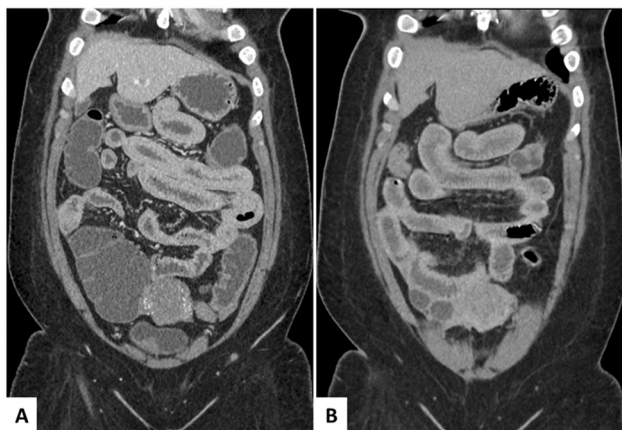


Fig. 3 Coronal sections at the same level during venous (A) and 20 minutes delayed (B) phases of multiphase contrast study of the abdomen showing isolated small bowel transmurial edema with stratification in the venous phase (A). The 20-minute delayed post contrast image (B) show mild reduction in the mural stratification and small bowel wall edema with appearance of mild peri-enteric and mesenteric fat stranding.

Conclusion

Angio-edema of the small bowel following intravenous iodinated contrast material administration is rare and also under-reported. Typical imaging findings such as rapid evolution of bowel wall thickening following the administration of iodinated contrast material, not associated with inflammatory changes and its resolution on follow-up imaging is helpful in distinguishing this entity from other pathological conditions. Treatment is symptomatic, with most episodes being self-limiting. Utmost care should be taken in such patients if they undergo contrast studies in future.

Conflict of Interest

None declared.

References

- 1 Kulkarni KN, Hegde RG, Balani A, Joshi AR. Transient angioedema of small bowel secondary to intravenous iodinated contrast medium. *Indian J Radiol Imaging* 2014;24(03):303–305
- 2 Mortelé KJ, Oliva MR, Ondategui S, Ros PR, Silverman SG. Universal use of non-ionic iodinated contrast medium for CT: evaluation of safety in a large urban teaching hospital. *Am J Roentgenol* 2005; 184(01):31–34
- 3 Hu X-H, Gong X-Y, Hu P. Transient small bowel angioedema due to intravenous iodinated contrast media. *World J Gastroenterol* 2012;18(09):999–1002
- 4 De Backer AI, De Schepper AM, Vandevenne JE, Schoeters P, Michielsens P, Stevens WJ. CT of angioedema of the small bowel. *Am J Roentgenol* 2001;176(03):649–652
- 5 Seo N, Chung YE, Lim JS, Song MK, Kim M-J, Kim KW. Bowel angioedema associated with iodinated contrast media: incidence and predisposing factors. *Invest Radiol* 2017;52(09): 514–521
- 6 Israili ZH, Hall WDCough and angioneurotic edema associated with angiotensin-converting enzyme inhibitor therapy. A review of the literature and pathophysiology. *Annals of Internal Medicine* 1992;117(03):234–242
- 7 Ciaccia D, Brazer SR, Baker ME. Acquired C1 esterase inhibitor deficiency causing intestinal angioedema: CT appearance. *Am J Roentgenol* 1993;161(06):1215–1216
- 8 Macari M, Megibow AJ, Balthazar EJ. A pattern approach to the abnormal small bowel: observations at MDCT and CT enterography. *Am J Roentgenol* 2007;188(05):1344–1355
- 9 Sinha R, Rajesh A, Rawat S, Rajiah P, Ramachandran I. Infections and infestations of the gastrointestinal tract. Part 1: bacterial, viral and fungal infections. *Clin Radiol* 2012;67(05): 484–494