A 71-year-old man presented with possible gastric outlet obstruction. Previously treated for ulcerative colitis, he had had a colectomy and had undergone Park’s procedure (construction of an ileal-anal pouch).

At presentation, the patient’s main complaint was a 4-day history of abdominal pain and vomiting. He was dehydrated, with associated metabolic alkalosis. He also had a history of acute-on-chronic renal failure, diabetes and hypertension.

On admission, plain abdominal radiographs (Figs 1 and 2) demonstrated signs of small-bowel obstruction, multiple radio-opaque stones (including one large one) in the region of the right hypochondrium, and intrabiliary gas. The patient therefore represented a classic case of Rigler’s triad, indicating ‘gallstone ileus’.

An ultrasound scan of the abdomen confirmed the pneumobilia and multiple small stones in the gallbladder. Also there was no intra- or extrahepatic bile duct dilation, and there were no signs of cholecystitis.

Initially treatment was conservative in nature, with resuscitation before surgery. Because of the patient’s poor renal function, no pre-operative computed tomography (CT) scan of the abdomen was done.

Intra-operatively, extensive small-bowel adhesions, a cholecysto-enteric fistula, an impacted gallstone just proximal to the ileal-anal pouch anastomosis, distal small-bowel obstruction with fistulas and a large stone in the gallbladder were found.

Surgical intervention consisted of small-bowel adhesiolysis, intra-operative ileoscopy, resection and primary anastomosis of the distal small bowel, stone extraction and cholecystectomy with ligation of the cystic duct and cystic artery. The abdomen was washed out and a pencil drain was left in the gallbladder bed. A Foley’s catheter was inserted into the ileal pouch-anal anastomosis and sutured to the anal skin. The patient was placed on an intravenous adrenaline infusion and was admitted to the intensive care unit postoperatively. Unfortunately he died 3 days later.

Discussion
The first case of gallstone ileus was reported by Bartholin (cited by Lassandro et al.1) in 1654. Since then it has remained a rare but significant complication of gallstone disease.2

The term ‘gallstone ileus’ refers to mechanical small-bowel obstruction as a result of acute or chronic cholecystitis.1,4 Subsequent inflammatory change in the gallbladder predisposes the gallstone to wear its way into the gastrointestinal tract, creating...
a fistulous connection to the adjacent bowel.\textsuperscript{3} Frequent sites for these cholecysto-enteric fistulas are the stomach, colon, jejunum and duodenum.\textsuperscript{3,4}

Generally these stones pass without difficulty. However, if they are large enough (typically more than 2.5 cm) and in a narrower portion of the bowel (such as the terminal ileum), the probability that they will cause mechanical obstruction increases.\textsuperscript{3} Other factors influencing the possibility of obstruction include the number of calculi, and segment motility.\textsuperscript{3}

Gallstone ileus by and large affects elderly women.\textsuperscript{1-9} In patients over 65 years of age it can be implicated in causing up to 25\% of non-strangulated small-bowel obstructions.\textsuperscript{2-5} Because of the age of the population involved, the morbidity and mortality associated with the disease is increased.\textsuperscript{3} An estimated 15 - 18\% mortality has been reported.\textsuperscript{5} (Our patient’s advanced age, as well as his co-morbidities, had a negative impact on his surgical management.\textsuperscript{1})

Twenty-five million Americans suffer from gallstones. A sedentary lifestyle, a poor diet and an inherited predilection, as well as obesity, diabetes and the use of oral contraception, increase the likelihood of gallstone development.\textsuperscript{6} According to Bortoff et al., 15 - 20\% of gallstones comprise enough calcium to be detectable on radiographs.\textsuperscript{6}

Rigler’s triad, documented in 1941, illustrates the classic radiographic features of gallstone ileus, namely: (i) partial or complete obstruction of the bowel; (ii) air within the biliary system; and (iii) a large ectopic gallstone that may change position on consecutive radiographs.\textsuperscript{2,3,7,8} However, the prevalence of all three of these features is as low as 17 - 35\%.\textsuperscript{3} Features of small-bowel obstruction alone are most common.\textsuperscript{2}

The role played by imaging in the diagnosis of gallstone ileus has been well documented.\textsuperscript{1} In 1954, Thomas Dorr (cited by Zaliekas and Munson)\textsuperscript{5} discussed the diagnosis of gallstone ileus by means of radiography. According to Dorr, radiological features were under-reported and under-appreciated. In his study and research Dorr found that this diagnosis was rarely made pre-operatively – in as few as 20 - 50\% of cases.

Ultrasound has proved to be far more sensitive than plain radiographs for the detection of gallstones and pneumobilia.\textsuperscript{2,4}

CT plays a significant role in identifying the primary pathology. The improved accuracy associated with CT facilitates planning of treatment, be it surgical or conservative in nature.\textsuperscript{7} CT also helps to determine the size, number and site of obstruction of the offending stone/s,\textsuperscript{6} as well as the site of the cholecysto-intestinal fistula.\textsuperscript{5}

**Conclusion**

Since all three of the features of Rigler’s triad were present on the patient’s initial abdominal radiographs, the primary imaging played an essential part in the diagnosis.

**Authorship.** All the authors contributed significantly to this case report. Alida Johanna Kuhnast, BA, HED, is thanked for her invaluable assistance with the editing.

### REFERENCES