CASE REPORT

Pre-existing oral contrast from lanthanum carbonate: a confounding factor in CT mesenteric angiography

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ABSTRACT. A 69-year-old male was referred from the renal unit to radiology for investigation of bleeding per rectum. A CT mesenteric angiogram was performed. However, it was noted on the pre-contrast images that the large bowel contained positive oral contrast media. The procedure was abandoned as it would have been difficult to see extravasation of intravenous contrast from a bleeding point in the large bowel. The initial belief was that either the patient had been given oral contrast by ward staff on the assumption that it would be needed, or had had a recent radiological study requiring contrast, which was still present. Neither was the case; it emerged that the patient was taking Fosrenol (Shire Pharmaceuticals, Wayne, PA), a lanthanum carbonate medication used in the treatment of hyperphosphataemia. Lanthanum is densely radio-opaque and appears as positive bowel contrast on CT and plain radiography studies. When considering radiological studies specifically requiring the absence of oral contrast, it is important to be aware of the patient's drug history to avoid non-diagnostic scans with the associated radiation exposure.

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CT mesenteric angiography is an established technique for the localisation of intestinal bleeding. The standard protocol specifically precludes the use of oral contrast agents in order to allow for the visualisation of intraluminal contrast in the bowel from active bleeding. We present a case of a 69-year-old male who developed bleeding per rectum while in the renal unit and undergoing treatment for chronic renal failure. A CT mesenteric angiogram was requested to locate the source of the bleeding. However, initial pre-contrast images showed that the colon contained what was thought to be oral contrast media, which prompted the scan to be terminated prior to the administration of intravenous contrast. The patient and ward staff all denied that contrast had been given. It was later discovered that the patient was taking regular lanthanum carbonate (Fosrenol; Shire Pharmaceuticals, Wayne, PA) for the treatment of hyperphosphataemia, which can act as a positive oral contrast. We report the details of the case and discuss the radiological properties of lanthanum.

Case report

A 69-year-old male with longstanding end-stage renal failure of unknown aetiology was admitted to hospital with a lower respiratory tract infection. The patient had

previously been on haemodialysis and had undergone two renal transplants, one having been removed and one still *in situ* but not functioning. Automated peritoneal dialysis had been established as renal replacement therapy since the failure of the second transplant 3 years earlier.

During the patient's time in hospital, fresh bleeding per rectum developed. This was investigated with an inpatient flexible sigmoidoscopy, which was normal. The bleeding subsequently stopped. A second large bleed reduced the patient's haemoglobin level to 6.1 g dl⁻¹ and prompted a blood transfusion. After discussion with the radiology department, an urgent CT mesenteric angiogram was arranged.

The normal protocol for CT mesenteric angiography was followed, which included no oral contrast prior to the scan. The pre-contrast images showed apparent radio-opaque contrast throughout the large bowel (Figure 1). Sigmoid diverticular disease was noted, as was an incidental 7 cm right common iliac artery aneurysm. The radiographers alerted the radiologist, who decided to terminate the scan prior to the administration of contrast. They believed that the patient must have had oral contrast in the last couple of days, perhaps given, as occasionally happens, by the ward staff and clinical team prior to discussion with the radiology department.

On returning to the ward, both the patient and the ward staff denied administering contrast and there was no recent imaging requiring oral contrast to explain its presence. However, a review of his drug chart showed that for 2.5 years the patient had been taking lanthanum

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Figure 1. Axial CT demonstrating radiodensity within the bowel secondary to lanthanum carbonate.

carbonate as a phosphate binder. The patient had previously been taking calcium carbonate and aluminium hydroxide. Fortunately, the bleeding settled with no further treatment. The right common iliac aneurysm was subsequently treated electively with a stent graft.

Discussion

Lanthanum carbonate is a phosphate binder used in the treatment of hyperphosphataemia, predominantly in patients with renal failure. It is a chewable tablet that dissolves in gastric acid to yield ionic lanthanum, which then binds dietary phosphate, preventing absorption in the small bowel. Lanthanum (^{57}La) is a silvery white metallic element belonging to the lanthanide group of the periodic table, which includes gadolinium (^{64}Gd). The congregation of large amounts of this metallic element in the bowel leads to marked attenuation of X-rays and therefore appears radiodense on CT and plain film (Figures 1 and 2) [1], similar to barium (^{56}Ba). Lanthanum carbonate hydrate tablets have been shown to produce extremely high CT numbers of 8450 ± 450 HU [2].

In this case, the patient was bleeding from the bowel and a CT angiogram could not be performed owing to the increased density within the bowel lumen. Only a careful history and review of patient medications revealed the source of the contrast. Incidentally, a lumbar spine radiograph had been taken in a different hospital on a previous occasion (Figure 2), showing density within the bowel, the cause of which was unclear at the time. In similar situations, $^{99\text{m}}\text{Tc}$ -labelled red cell scintigraphy could be considered as an alternative investigation, although the patient stabilised without further intervention or investigation and therefore it was not felt appropriate in this case.

Figure 2. A plain film of the lumbar spine also clearly shows lanthanum within the bowel (courtesy of Dr Hywel Thomas, Consultant Radiologist, Musgrove Park Hospital, Taunton, UK).

While the appearance of lanthanum in the bowel has been reported widely in nephrology journals [3, 4], the authors could only find two papers in the radiology literature that mention it [2, 5]. It is important to note that taken properly, *i.e.* chewed before swallowing, the appearance may resemble the presence of oral contrast medium as seen in our patient, while if the tablets are swallowed whole or partially chewed, they may produce small, very dense opacities with significant beam-hardening artefact.

Conclusion

When requesting and performing radiological examinations that specifically require the absence of bowel contrast, the patient's medication should be taken into consideration to avoid subdiagnostic scans and subsequently unnecessary radiation exposure. This will be of particular importance in centres with busy renal units.

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