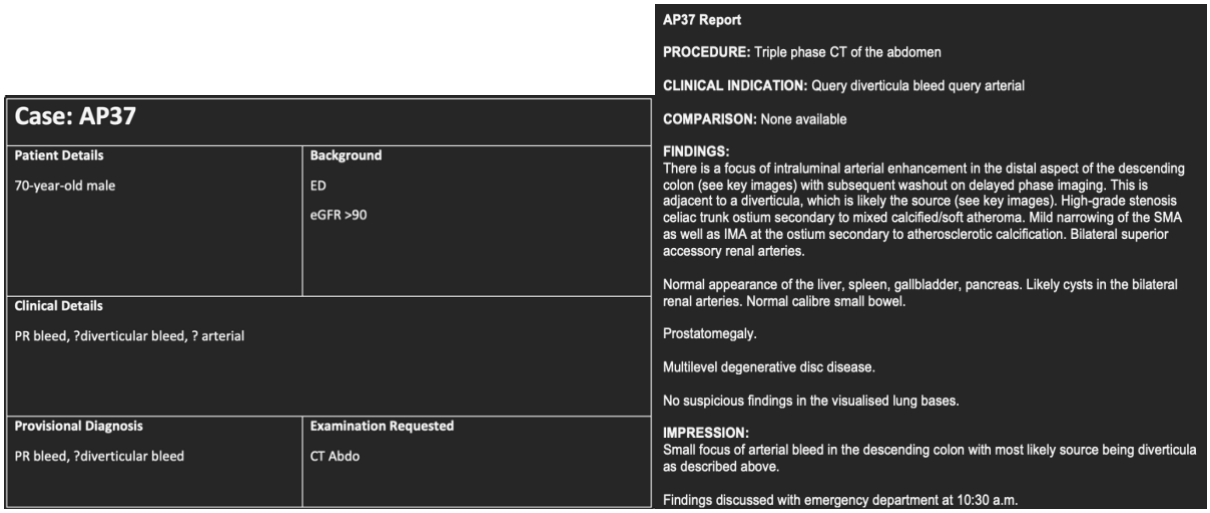

**Case: AP37**

| Patient Details | Background |
|---|---|
| 70-year-old male | ED<br>eGFR >90 |
| **Clinical Details** | |
| PR bleed, ?diverticular bleed, ? arterial | |
| **Provisional Diagnosis** | **Examination Requested** |
| PR bleed, ?diverticular bleed | CT Abdo |

**AP37 Report**

**PROCEDURE:** Triple phase CT of the abdomen

**CLINICAL INDICATION:** Query diverticula bleed query arterial

**COMPARISON:** None available

**FINDINGS:**
There is a focus of intraluminal arterial enhancement in the distal aspect of the descending colon (see key images) with subsequent washout on delayed phase imaging. This is adjacent to a diverticula, which is likely the source (see key images). High-grade stenosis celiac trunk ostium secondary to mixed calcified/soft atheroma. Mild narrowing of the SMA as well as IMA at the ostium secondary to atherosclerotic calcification. Bilateral superior accessory renal arteries.

Normal appearance of the liver, spleen, gallbladder, pancreas. Likely cysts in the bilateral renal arteries. Normal calibre small bowel.

Prostatomegaly.

Multilevel degenerative disc disease.

No suspicious findings in the visualised lung bases.

**IMPRESSION:**
Small focus of arterial bleed in the descending colon with most likely source being diverticula as described above.

Findings discussed with emergency department at 10:30 a.m.

**Methods for the image acquisition based on the request form.**

A 70-year-old male patient is admitted to ED as he is experiencing rectal bleeding (PR). The doctor wants to rule out serious internal pathology that may have caused the PR such as a diverticular or arterial bleed. A CT Abdomen scan has been requested. As the patient has a high eGFR rate, they have minimal likelihood of adverse risks from the contrast dye. A triple phase CT was undertaken to visualize the arterial, portal venous and delayed phase (Wortman et al. 2017). This monitoring of contrast flow through the various phases allows enhancement of any abnormal bleeding or vasculature that may be causing the PR bleed. A non-contrast phase is first captured to compare with the contrast enhanced imaging. Then arterial phase and portal venous phase which highlight the arteries and veins; respectfully. The arterial phase is scanned around 30 seconds after contrast injection and the portal venous after 70 seconds. Bolus tracking should have ideally been used to ensure enough enhancement before commencing the scans with the contrast volume being calculated proportional to patient weight. Lastly, a delayed phase taken 3-5 minutes after the IV contrast administration is also incorporated to assess any washout or further enhancement of structures that may indicate underlying pathology. A kVp between 100-120 should have been used and the mAs modulated as a function of patient density whilst keeping the image noise constant. MPR reconstructions should generally utilise a smooth algorithm and VR images may be included to visualise 3D vasculature. Lung bases should also be observed using a lung algorithm to rule out perforation.

2. Create appropriate image reconstructions in the CT planes which best demonstrate the disease process under consideration and include relevant images.

| Series Number | Series Description | Modality |
|---|---|---|
| 1,012 | C- AX 1.5mm Range Nia 32527942 | CT |
| 1,022 | C- COR 1.5mm Range Nia 32527942 | CT |
| 1,029 | C- SAG 1.5mm Range Nia 32527942 | CT |
| 1,038 | C+ AX 1mm Range Nia 32527942 | CT |
| 1,021 | C+ COR 1mm Range Nia 32527942 | CT |
| 1,029 | C+ SAG 1mm Range Nia 32527942 | CT |
| 1,012 | Delayed 1.5mm Range Nia 32527942 AX | CT |
| 1,019 | Delayed COR 1.5mm Range Nia 32527942 | CT |
| 1,028 | Delayed SAG 1.5mm Range Nia 32527942 | CT |

Figure 1. Axial MPR slice from the ‘Abdo CTA’.

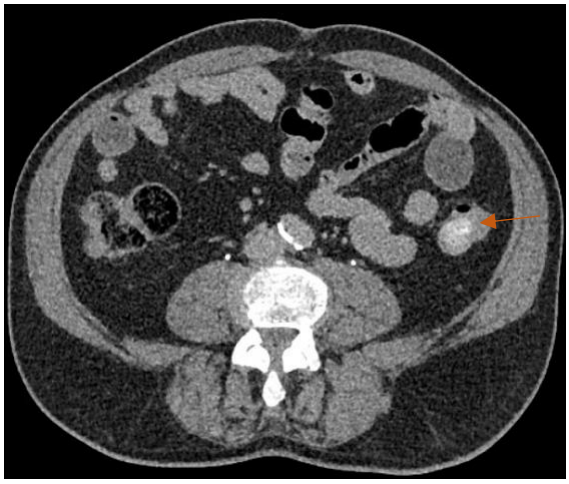

Figure 2. Axial MPR slice from the ‘Abdo Delayed’.

In Figure 1, the orange arrow points to the intraluminal arterial enhancement in the distal aspect of the descending colon. This white oval (bleed) appears near a black oval (diverticula) alluding that this might be the cause for the patient’s symptoms. Figure 2 shows blood remaining in the colon during the delayed phase most likely from the blood we saw in Figure 1. However, the intensity of the bleed has decreased and there appears to be ‘washout’. This patient has severe diverticulitis throughout their large bowel.

**Typical CT appearances of the disease process under investigation**

The contrast dye will help enhance the visualisation of blood which will appear white on the CT images making it easier to sight any abnormal bleeding. In this case we are looking at diverticula on the colon which are usually accompanied by thickening of part of the bowel wall. They are small 2-3mm air-filled sacs protruding from the colon wall and are therefore highly attenuating and appear black on CT imaging (Minordi et al. 2020). Diverticula may contain small arteries within them that can sometimes bleed into the colon and cause painless rectal bleeds (Pemberton, 2024). This contrast blood will appear hyperdense (white) and near the hypodense (dark) diverticula as shown in Figure 2.

**Importance of CT imaging in the disease process under investigation.**

Although colonoscopy is a gold standard effective method of assessing PR bleeds with potential for therapeutic intervention, that procedure is invasive and unless paired with endoscopy is limited to pathology within the large colon (Raman et al. 2013). Radionuclide scintigraphy and catheter angiography are also widely used imaging modalities but have significant limitations (Raman et al. 2013). On the other hand, CT is readily available, has a fast acquisition time and can localize anatomy with precision. According to Amin and Antunes (2023), 40% of the time lower GI bleeding is caused by diverticular disease which is often diagnosed using CT imaging. Diagnosis and treatment of this condition is extremely crucial because recuring bleeds are more likely to result in morbidity and mortality (Wu et al. 2010). CT angiography helps to visualise both the arteries and veins in the abdomen and pelvis as well as highlight the source of the bleed. Using IV contrast is a non-invasive way to assess anatomy without the need for invasive angiography or colonoscopy techniques. The use of interventional imaging should be undertaken with more caution in elderly patients as they have a higher risk of cardiovascular and gastrointestinal complications (Lin, 2014).

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