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Image of Interest

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Pseudokidney and Donut Signs in Colon Cancer

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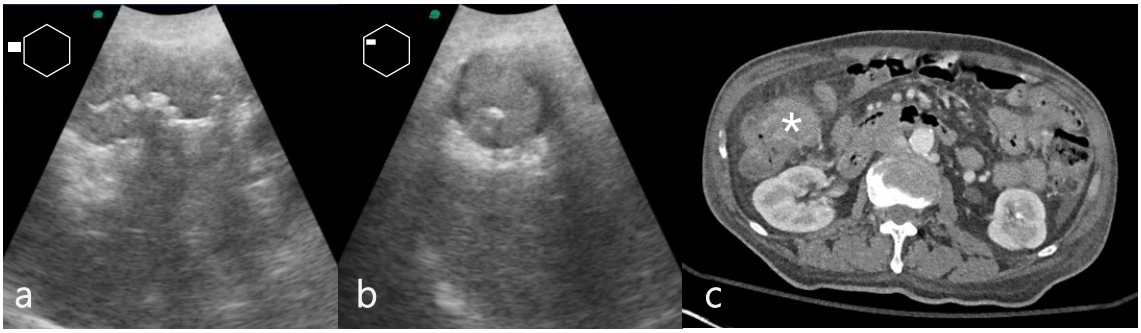

A 73-year-old man was admitted with sudden lower limb weakness and was diagnosed with an acute ischaemic stroke. He also reported an unintentional weight loss of 20 kg over a few months, associated with altered bowel habits and anorexia. Clinical examination revealed fullness in the right flank. Blood investigations showed severe iron deficiency anaemia (haemoglobin 6.0 g/dL; normal range 14.5–17.0 g/dL). A bedside abdominal point-of-care ultrasound (POCUS), performed using a curvilinear probe over the right flank, demonstrated the findings shown in **Figures 1a** and **1b**. The serum carcinoembryonic antigen (CEA) level was elevated at 27.7 ng/mL (normal <5.0 ng/mL). A colonoscopy was not performed as patient was not well and family declined any further intervention. Contrast-enhanced computed tomography (CT) of the abdomen (**Figure 1c**) confirmed the abnormalities identified on POCUS and localised the lesion to the ascending colon (*****). A diagnosis of ascending colon cancer was made, and the patient was referred to the palliative care service.

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In this patient, abdominal POCUS performed from the right flank in the longitudinal plane demonstrated a reniform mass affecting the ascending colon, consistent with the **pseudokidney sign** (**Figure 2a**).[1,2] This sonographic sign is seen when marked bowel wall thickening appears as a heterogeneous hypoechoic outer layer surrounding a central serpiginous echogenic component (**Figure 2b**).[1] The resulting appearance resembles that of a kidney (**Figure 2c**). On the transverse (short-axis) view, a **donut sign** was observed (**Figure 2d**), characterised by concentric thickened hypoechoic rings with a central echogenic focus.[1,2] An irregular hypoechoic rim surrounding the thickened bowel wall was also present, corresponding to peritumoural oedema. Both signs can only be appreciated with circumferential tumours.

The sonographic features arise from tumour infiltration originating in the mucosal layer of the bowel wall. Tumour growth results in progressive thickening of the mucosa and disruption of the normal bowel wall architecture, which is typically visualised on ultrasound as five distinct layers. As the tumour, arising from the second hypoechoic layer (mucosa), progresses, it disrupts the adjacent layers, including the third hyperechoic submucosa and subsequently the fourth hypoechoic muscularis propria. With further tumour extension, the fifth hyperechoic layer (serosa) becomes involved, often manifesting as an irregular outer tumour margin.

In the present case, the irregular outer margin seen in **Figure 2c** suggests serosal involvement, consistent with pT3 disease. As the tumour enlarges, progressive narrowing of the bowel lumen occurs, while residual compressed intraluminal contents and surrounding fatty tissue contribute to the characteristic central echogenic appearance.

These sonographic signs are not specific to colorectal cancer but are most commonly encountered in this condition, reflecting the high prevalence of colorectal malignancy. Similar appearances may also be seen in other bowel pathologies, including intestinal lymphoma, severe inflammatory bowel disease, particularly Crohn's disease, and intestinal intussusception.[3] In intussusception, the donut sign more typically manifests as a target sign, characterised by multiple concentric bowel wall layers. Nevertheless, the presence of either the pseudokidney sign or the donut sign should prompt consideration of significant underlying bowel pathology, including gastrointestinal malignancy.

Ultrasound has demonstrated good diagnostic accu-

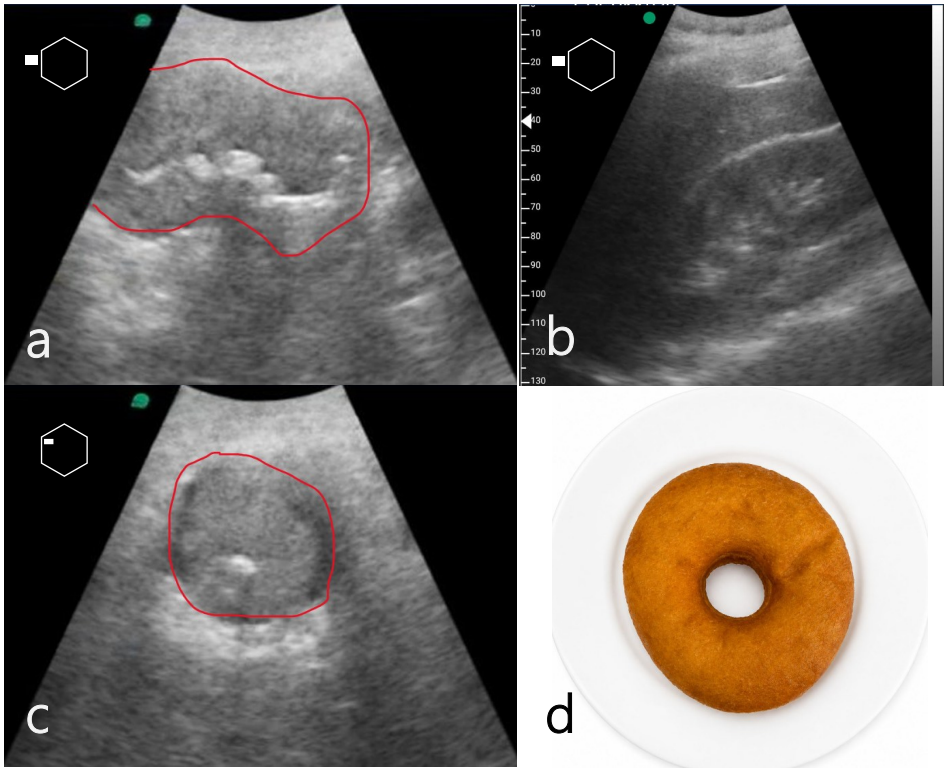

Fig. 2: a) Sonographic image of the tumour in long axis showing the 'pseudokidney sign' resembling a kidney with hypoechoic periphery of the cortex and hyper echogenic centre of the medulla, and b) sonographic image of the right kidney, c) Sonographic of the tumour in short axis showing the 'donut sign' resembling a donut (d) (Courtesy of Dr Suprianto).

racy for the detection of colorectal lesions, with reported high sensitivity and specificity.[4,5,7] However, in the absence of bowel preparation or contrast-enhanced techniques such as colonic water insufflation, the detection of bowel lesions can be challenging, particularly for small polyps and early-stage cancers. Positive ultrasound findings generally indicate that the lesion has extended beyond the bowel wall layers into the subserosa or pericolic tissues, corresponding to at least pT3 disease.[4-7] Consequently, small, non-circumferential tumours may be easily overlooked. Furthermore, ultrasound is an operator-dependent modality, with diagnostic performance closely related to the examiner's experience and awareness of relevant sonographic signs.

Colorectal cancer remains a major global health burden and is a significant cause of morbidity and mortality. The disease is often diagnosed at an advanced stage, largely because of the lack of specific symptoms in its early phases. In experienced hands, POCUS serves as a valuable bedside tool that may facilitate the early detection of significant colorectal pathology and expedite further diagnostic investigations. Patients with findings suggestive of colorectal malignancy should be referred promptly for definitive evaluation.

In resource-limited healthcare settings, POCUS may complement existing screening strategies, such as faecal occult blood testing (FOBT), and assist clinicians in determining the need for further colorectal assessment. Its real-time capability, accessibility, non-invasive nature, and lack of ionising radiation make it particularly attractive for use in primary care and other resource-constrained environments.[8] Early detection through POCUS may facilitate timely referral, reduce diagnostic delays, and ultimately improve patient outcomes.

Abbreviations

POCUS	Point of care ultrasound
CEA	Carcinoembryonic antigen
CT	Computed tomography
FOBT	Feacal occult blood test

Declarations

The authors declare that they have no conflicts of interest and no financial disclosures relevant to this case report.

Patient Consent

Patient consent has been obtained.

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None

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