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LETTER TO THE EDITOR

Non-occlusive mesenteric ischaemia: CT findings, clinical outcomes and assessment of the diameter of the superior mesenteric artery: Don't forget the reperfusion process!

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(The Editors do not hold themselves responsible for opinions expressed by correspondents)

To the Editor,

We have read with great interest and appreciate the paper by Pérez-García et al entitled "Non-occlusive mesenteric ischaemia: CT findings, clinical outcomes and assessment of the diameter of the superior mesenteric artery".¹

The authors reviewed clinical outcomes and CT findings of non-occlusive mesenteric ischaemia (NOMI) in a very large case population (106 patients); 74 patients had signs of vascular narrowing of the superior mesenteric artery (SMA) branches and in the 55 cases with a previous CT scan there were statistically significant differences regarding the SMA diameter with a mean reduction of the artery calibre and standard deviation of 1.93 ± 1.1 mm between the NOMI and non-NOMI scans ($p < 0.001$).

No doubt that the narrowing of the SMA is a well-known sign of NOMI, as already reported by other authors (even if the comparison was with CT scans of a control case population and not with a previous CT scan of the same patient), however you have to remember that NOMI is a dynamic condition because of the high rate of spontaneous reperfusion process, which is an attempt (effective or not) of the re-establishment of normal mesenteric blood supply after the ischaemic event.²⁻⁴ All this means that CT findings in NOMI, including the calibre of the SMA, can change over time depending essentially on the presence or absence of a reperfusion process and furthermore on the duration and severity of bowel ischaemia, the lapse of time passed from the ischaemic event and the efficiency of collateral vessels.^{3,4}

Actually, the presence of a reperfusion process could explain the fact that only 74 out of 106 NOMI patients (70%) in this study showed signs of vascular narrowing of the SMA branches as well as the high percentage of patients with thickening of the bowel wall, accounting for 82 out of 106 ones. Although the latter CT feature (bowel wall thickening) is still considered the most common CT finding in acute mesenteric ischaemia, some recent articles in the literature, including experimental studies, have clearly demonstrated that the thickening of the bowel wall is definitively a characteristic feature in occlusive venous ischaemia, because of the venous congestion (since in the early phase of this type of ischaemia), whereas it could be found in occlusive arterial ischaemia or in NOMI if only a reperfusion process is present; this never happens in absence of reperfusion.⁵⁻⁷ Indeed, in the advanced phase of these two types of ischaemia (arterial occlusive type and NOMI), when reperfusion does not take place, the bowel walls remain thin because there is no blood flow inside them.⁵⁻⁷ The figure 6 of the article by Pérez-García et al is an explanatory CT example of an NOMI with an ineffective reperfusion process, since the coexistence of features of advanced ischaemia of the small bowel, where the reperfusion process does not take place (paper thin wall, absence of mural enhancement and pneumatosis) and the signs of reperfusion of the colon (wall thickening with hyper-enhancement of the mucosa and hypo-attenuation of the submucosa), an intestinal tract which is very often involved in NOMI.^{8,9}

Other CT features suggestive of a reperfusion process are mesenteric fat stranding and high attenuation of the bowel wall on unenhanced CT images.¹⁰

In our cohort of NOMI patients, Fisher's exact test showed a strong connection between the presence of reperfusion and mesenteric fat stranding ($p = 0.026$), bowel wall thickening ($p = 3.2 \times 10^{-5}$) and high attenuation of the bowel wall on unenhanced CT images ($p = 2.8 \times 10^{-4}$).³ Referring to the latter CT feature, we strongly recommend the use of triphasic CT protocol (unenhanced, late arterial and portal phase CT acquisition) when there is a clinical suspicion of acute intestinal ischaemia because this is a better way to differentiate haemorrhagic necrosis (in

case of ineffective reperfusion process) from an effective reperfusion process with intramural haemorrhage. Indeed a precise diagnosis of these two conditions (intramural haemorrhage due to reperfusion process or haemorrhagic necrosis) can be done by comparing the unenhanced with post-contrast CT scans: an increase in Hounsfield unit values in post-contrast CT scans, when compared to unenhanced ones, occurs only in the case of reperfusion, whereas in an haemorrhagic necrosis the hyperattenuation of the bowel wall on unenhanced CT does not change its Hounsfield unit values in post-contrast scans, meaning the absence of contrast enhancement of the bowel wall and revealing a transmural bowel necrosis, the most important CT finding to better manage the condition of the patient.^{3,4,7}

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