A surprise behind the dark

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Standard ultrasound has a poor accuracy in the detection of carotid plaque surface irregularities and ulcers, which are features of vulnerable lesions. Sonographic contrast agents can improve vessel wall lumen definition, thus potentially overcoming this limitation. Recent studies also suggest that contrast ultrasound can be used to study intraplaque neovascularization, a potential marker of high-risk lesions.

This case represents a striking example of the added value of contrast ultrasound to improve diagnostic accuracy of vascular studies, particularly in the detection of plaque surface irregularities and plaque neovascularization.

KEYWORDS
Contrast ultrasound;
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Carotid artery;
Imaging

A 83-year-old man was referred for a standard carotid ultrasound examination because of a right carotid murmur. He had a history of hypercholesterolemia, prior smoking, arterial hypertension, and permanent atrial fibrillation; he had no previous neurological symptoms and was treated with enalapril and warfarin.

B-mode ultrasound (Figure 1A) showed the presence of a large plaque of the right carotid bulb, which was echolucent in the near wall and slightly echogenic in the far wall. Because of plaque echolucency luminal borders were poorly defined. By colour Doppler (Figure 1B), the narrowest point with high flow turbulence was detectable. Pulsed-wave Doppler interrogation was consistent with a >70% stenosis (peak systolic velocity >230 cm/s, end-diastolic velocity >100 cm/s).

As the morphology of the lesion remained poorly defined, a bolus of an ultrasound contrast agent (Optison) was injected by a peripheral vein to improve image quality. Contrast-enhanced images (Figure 1C) showed clearly the presence of a large ulcer within the near wall plaque; moreover, a linear flow of microbubbles could be observed in the proximal plaque shoulder (see Supplementary data online, Movie S1; Figure 1D), consistent with plaque neovascularization.

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This case represents a striking example of the added value of contrast ultrasound to improve diagnostic accuracy of vascular studies, particularly in the detection of plaque surface irregularities1 and plaque neovascularization.2,3

Supplementary data
Supplementary data are available at European Journal of Echocardiography online.

References

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Figure 1. (A) B-mode image showing the presence of an atherosclerotic plaque of the right internal carotid artery plaque that was characterized predominantly echolucent (class II type) in near wall and predominantly echogenic (Class III type) at far wall. (B) Colour Doppler imaging showing colour turbulences at narrowest stenosis level. (C) Contrast-enhanced images showing the presence of a significant ulcer in the context of the near wall plaque. (D) Contrast-enhanced images showing the presence linear flow (arrows) of microbubbles in the caudal near wall plaque shoulder consistent with intraplaque neovascularization.