

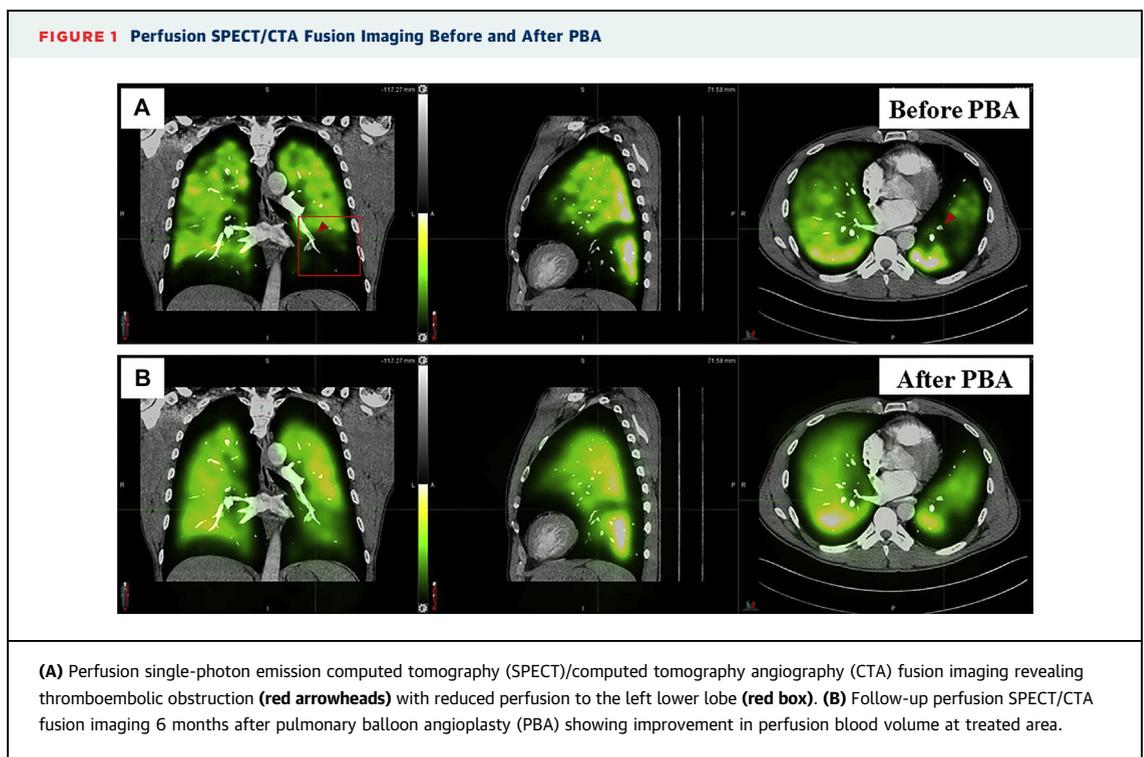


Integrated Use of Perfusion SPECT/CTA Fusion Imaging and Pulmonary Balloon Angioplasty for Chronic Pulmonary Thromboembolism

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Pulmonary balloon angioplasty (PBA) is an evolving therapy for inoperable chronic pulmonary thromboembolism (1). Because the criteria of operability remain subjective based on surgical experience, high-quality imaging integrated with the clinical picture is crucial to making individualized treatment decisions.

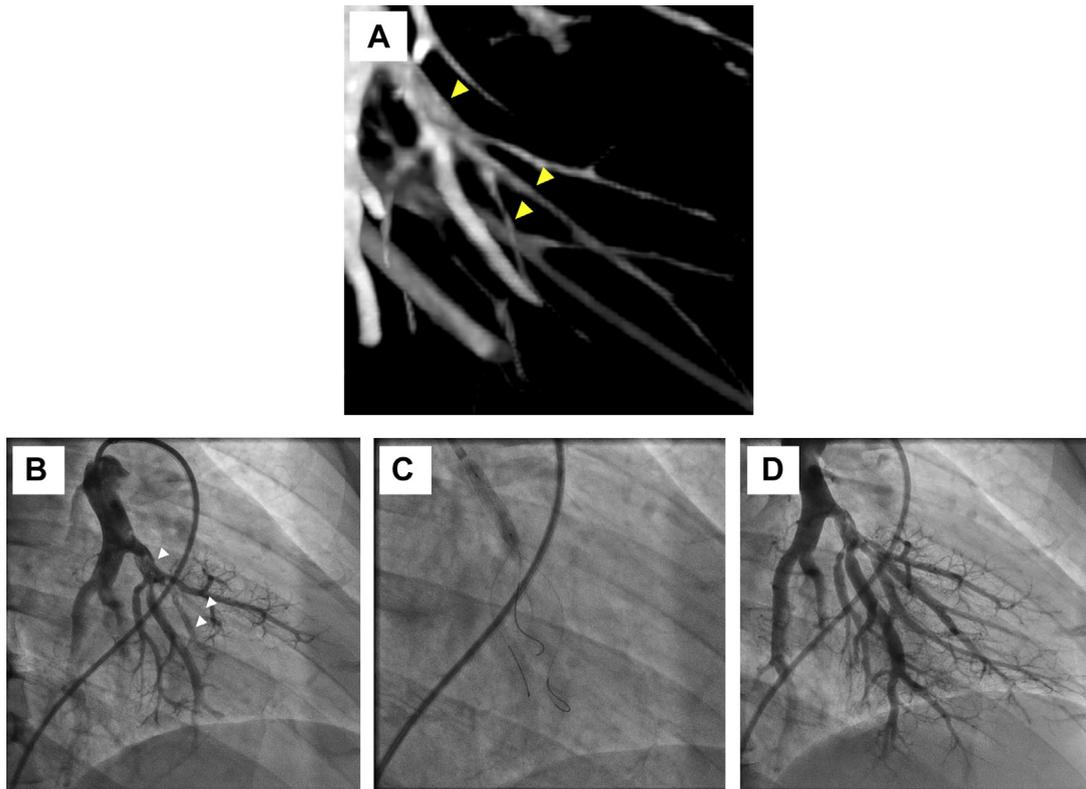
A 33-year-old man with a prior history of pulmonary emboli presented with a complaint of reduced extreme performance, despite Vo_2 max of 52 ml/kg/min and normal right ventricular function on stress echo. Perfusion single-photon emission computed tomography (SPECT) was fused to a diagnostic computed tomography angiography (CTA).



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FIGURE 2 CTA-Guided Selective Pulmonary Angiography Before and After PBA



(A) The maximum intensity projection of CTA revealing intraluminal thrombus and pulmonary artery structure extending to the periphery (yellow arrowheads). (B) Selective pulmonary angiography before PBA showing a large organized thrombus along with subtotal occlusions of 3 branches as indicated by the CTA (white arrowheads) (Online Video 1). (C) Performance of PBA with a 2.5-mm balloon, followed by 4.0-mm balloons. (D) Final result after PBA treatment (Online Video 2). Abbreviations as in Figure 1.

Intriguingly, perfusion SPECT/CTA fusion imaging detected significantly reduced perfusion to the left lower lobe in the distribution of a pulmonary artery with intraluminal organized thrombus (Figure 1A). Despite continued appropriate anticoagulant therapy, he continued to feel frustrated at not being able to train up to his previous high level.

Surgical treatment was considered for symptomatic chronic pulmonary thromboembolism, but the overall clinical picture and limited burden of disease did not appear appropriate for open surgical endarterectomy. Therefore, PBA was offered. Although hemodynamic parameters at rest were normal, CTA-guided selective angiography confirmed organized thrombus along with subtotal occlusions of 3 significantly sized branches in the left lower lobe (Figures 2A and 2B, Online Video 1). These lesions were sequentially dilated with up to a 4.0-mm balloon (Figure 2C). Pulmonary blood flow by angiography was

dramatically improved after PBA procedure (Figure 2D, Online Video 2). He was able to resume high-level exercise without the previous symptoms. Follow-up perfusion SPECT/CTA fusion imaging 6 months after PBA procedure showed persistent improvement in perfusion blood volume in the treated segments (Figure 1B).

This case demonstrates the value of using high-quality imaging to direct optimal therapy. Integrated use of perfusion SPECT/CTA fusion imaging and PBA could be a complementary and alternative therapeutic option for patients with chronic pulmonary thromboembolism, even in less extensive disease.

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APPENDIX For supplemental videos and their legends, please see the online version of this article.