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Low-Intensity Rehabilitation as a Safe Bridge to Surgery in Multi-segmental Aortic Aneurysms

Hangi Kim, Kihun Hwang
Department of Physical Medicine and Rehabilitation, Dong Eui hospital, Busan, Korea

Introduction

Aortic aneurysms (AAs) carry high risks of rupture, especially in multi-segmental cases. While rehabilitation is vital for functional recovery, high-intensity exercise may trigger catastrophic events by increasing wall shear stress. Current guidelines lack specific protocols for "giant" (>6.0 cm) aneurysms with severe trunk instability. We report a patient with a 6.4 cm distal arch aneurysm, a 3.7 cm abdominal aneurysm, and "Poor" standing balance. This report discusses a safe rehabilitation strategy focusing on bed-based and assisted-standing exercises to minimize hemodynamic stress while preventing functional decline.

Case report

A 71-year-old male with a history of right cerebellar and lateral medullary infarction presented with recurrent pneumonia. Diagnostic imaging via chest CT in July 2025 identified an incidental aortic arch aneurysm (max. diameter 6.3 cm). At 3-month follow-up imaging demonstrated a dissecting aneurysm at the distal aortic arch and proximal descending thoracic aorta (max. 6.4 cm). Comprehensive Aorta-CT revealed an extensive aneurysmal change spanning the ascending to the thoracic descending aorta (max. 6.4 cm at the distal arch), accompanied by an abdominal aortic aneurysm (max. 3.7 cm).

Given the high risk of dissection progression or rupture, rehabilitation was carefully titrated to prevent deconditioning while ensuring cardiovascular safety. For two months, the patient underwent monitored rehabilitation with reduced frequency, focusing on hemodynamically stable, static, and passive exercises to minimize sympathetic activation. To mitigate the risk of hypoxia-driven hypertensive episodes during orthostatic stress (assisted standing), nasal O2 supplementation was administered. The patient completed two months of rehabilitation with stable vital signs and no adverse cardiovascular events. He was subsequently referred to a tertiary medical center for definitive surgical management.

Discussion

The aortic aneurysm in this patient met surgical indications, but a several-week delay was expected before transfer to a tertiary hospital. To prevent the inevitable functional decline associated with immobility, we initiated a tailored rehabilitation program focused on cardiovascular safety. High-impact maneuvers were substituted with assisted standing and passive mat exercises to prevent contractures while avoiding excessive strain on the aortic wall. Prophylactic nasal O2 was utilized to stabilize vitals and prevent hypoxia-driven blood pressure spikes. Throughout the two-month intervention, the patient remained hemodynamically stable and asymptomatic (denying chest pain), demonstrating that a carefully titrated, low-intensity rehabilitation program can safely bridge the gap to surgical management in high-risk vascular patients.

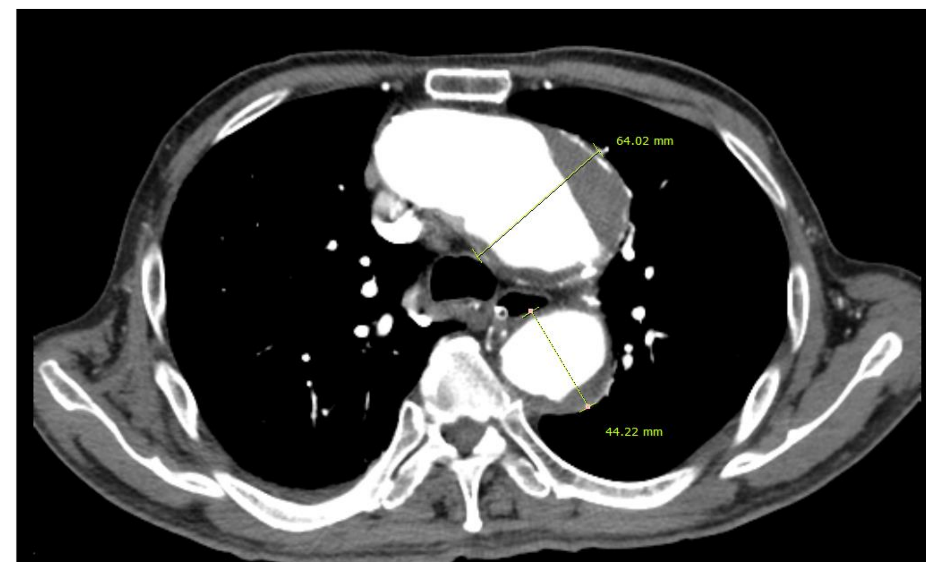

Figure 1. Axial CT. Aneurysmal dilation of both ascending (64.02 mm) and descending (44.22 mm) segments.

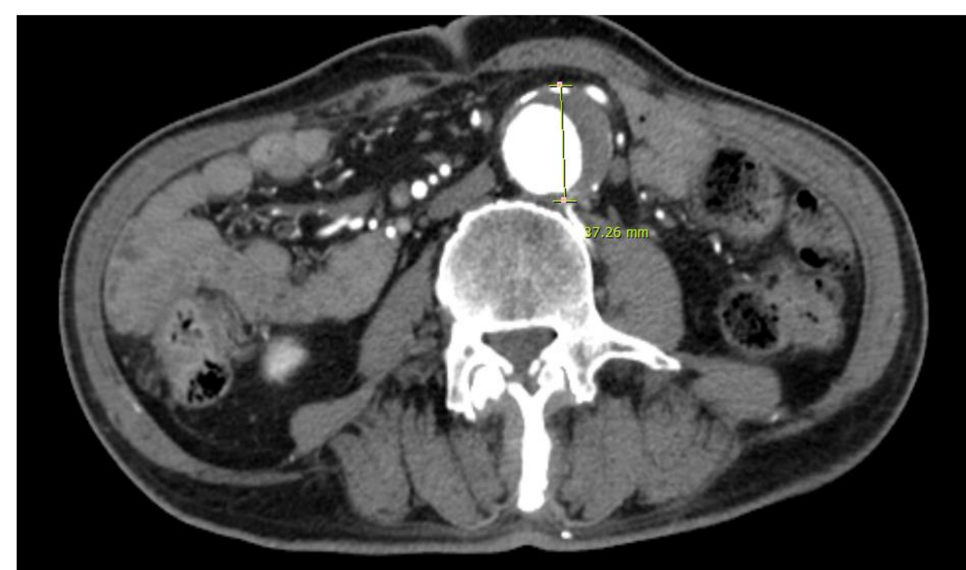

Figure 2. Axial abdominal CT. Aortic dissection into the abdominal aorta (37.26 mm diameter).

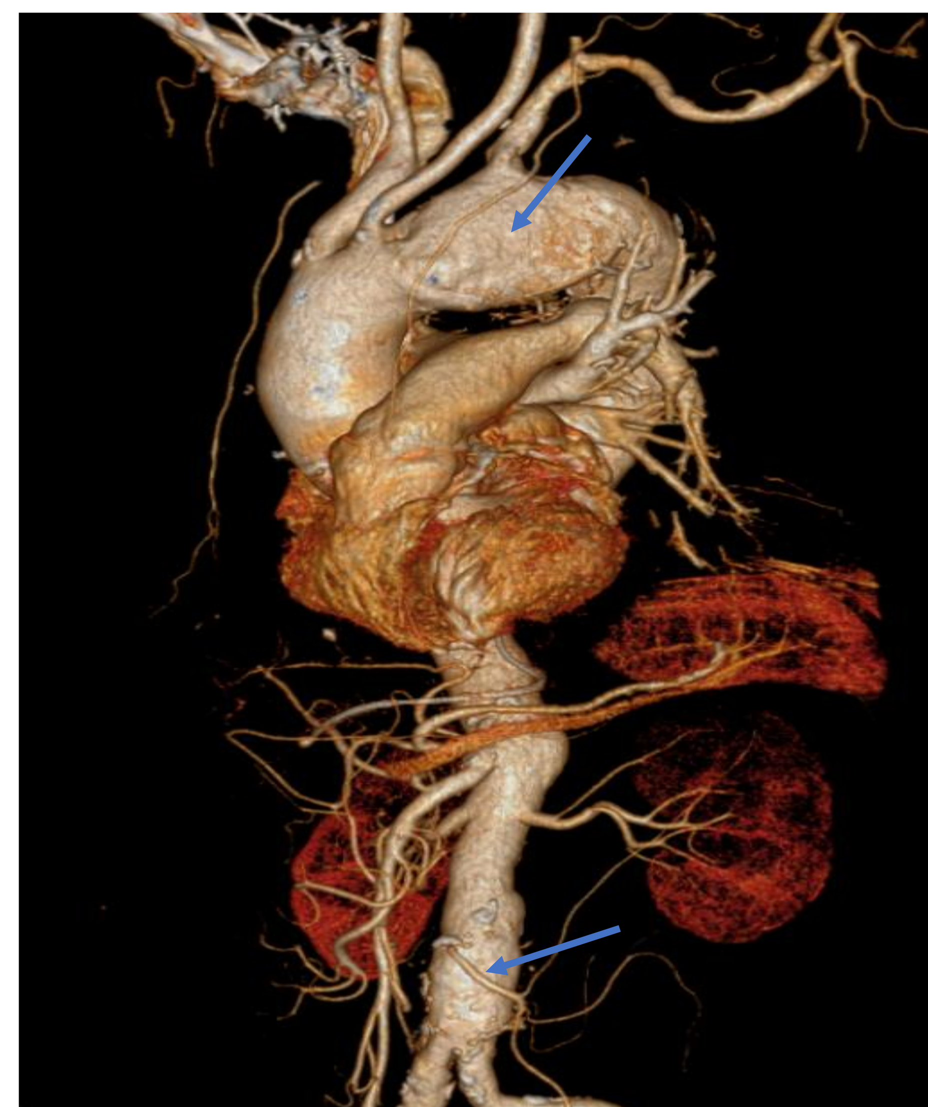

Figure 3. 3D volume-rendered CT angiogram. The dissection and aneurysmal changes extend from the ascending aorta through the descending thoracic segment to the abdominal aorta.