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Legs bend: why dynamic angiography is important

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Klein and colleagues (1) have their patients bend knees during angiography and confirm suspicions that leg arteries bend too. But their meticulous three dimensional image reconstruction and analysis is critically important in understanding the consequences of mechanical treatment for femoropopliteal artery disease.

One remarkable finding by Klein and colleagues is that the popliteal artery in these patients shortens (along its centerline) up to 25% during knee bending. Other groups have described similar conformational changes in the iliofemoral (2) and femoropopliteal (3) arteries during hip and knee flexion respectively. Flexion points can be surprisingly far from the joint itself, so positioning stents centimeters “above” the joint does not necessarily spare the stent from bending and compression. Moreover, conventional straight-leg angiography and conventional anatomic landmarks do not anticipate the stress imparted on stents and stent-tissue junctions during daily activities including walking (4) and squatting (5). Arterial geometry changes during motion should be put into context of varying demand and flow conditions of the skeletal muscles and vascular tree. Perhaps more comprehensive analysis of exercise and rest structure and flow using magnetic resonance imaging (6) or ultrasound might provide insight into femoropopliteal atherosclerosis genesis and evolution, early and late healing after percutaneous intervention, and impact on exercise.

The geometric findings of this study remind us that contemporary stenting of the femoropopliteal artery, especially around and below the adductor hiatus, remains an unproven (7) and even unfavorable long-term option. Despite two decades of innovation, femoropopliteal artery obstruction remains a rich target for developing novel biological and mechanical treatments. As Klein and colleagues’ work suggests, interventionists should not consider these arterial segments only during a static straight-leg condition, but also during the extensive bending, shortening, twisting, and multifocal kinking that occurs off the interventional table. Dynamic angiography might help.

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