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Case Report

Nubbin Sign: Identify Graft Occlusion on Coronary Computed Tomography

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Abstract

Coronary angiography is the gold standard to identify graft occlusions after coronary artery bypass graft surgery. However, it is an invasive test and puts patient at additional risks when compared to a non-invasive technique such as computed tomography (CT). In this case report we discuss an important radiological sign on CT that indicates graft occlusion, however has not been extensively described in literature.

Keywords: *SVG Occlusion; Coronary CT; Nubbin Sign*

Introduction

Vein grafts are commonly utilized conduits for coronary artery bypass graft surgery. Despite advances in surgical techniques, vein grafts remain highly susceptible to occlusion in both early and late post-operative time periods having a failure rate of up to 10% in one year and 50% at 10 years. Thrombus formation, neointimal hyperplasia and accelerated atherosclerosis are few mechanisms that underlie graft occlusion. Coronary angiography is the gold standard to recognize graft failure, however it is an invasive test and may not be preferred by some patients. An alternative is computed tomography (CT) which can show graft patency with acceptable reliability and is increasingly being used for this purpose. In this report, we present a case of an uncommon but easily identifiable radiological sign on multidetector CT that can indicate graft failure.

Case Report

An 81-year-old male had three vessel coronary artery bypass graft (CABG) done in 2004 with following grafts placed: left internal mammary artery graft (LIMA) to left anterior descending artery (LAD), saphenous venous graft (SVG) to posterolateral branch (PLB) and SVG to right coronary artery (RCA). Patient presented with few months history of dyspnea on exertion and fatigue. Coronary CT angiogram was done to assess coronary artery anatomy. On CT scan, LIMA and SVG to PLB were noted to be patent. An out pouching of contrast was visualized on anterior portion of aorta (Figure 1, white arrow) that implied complete occlusion of one SVG. Patient subsequently underwent left heart catheterization, which confirmed that SVG to RCA was indeed occluded. However, only medical management and close follow up was decided by team consensus.

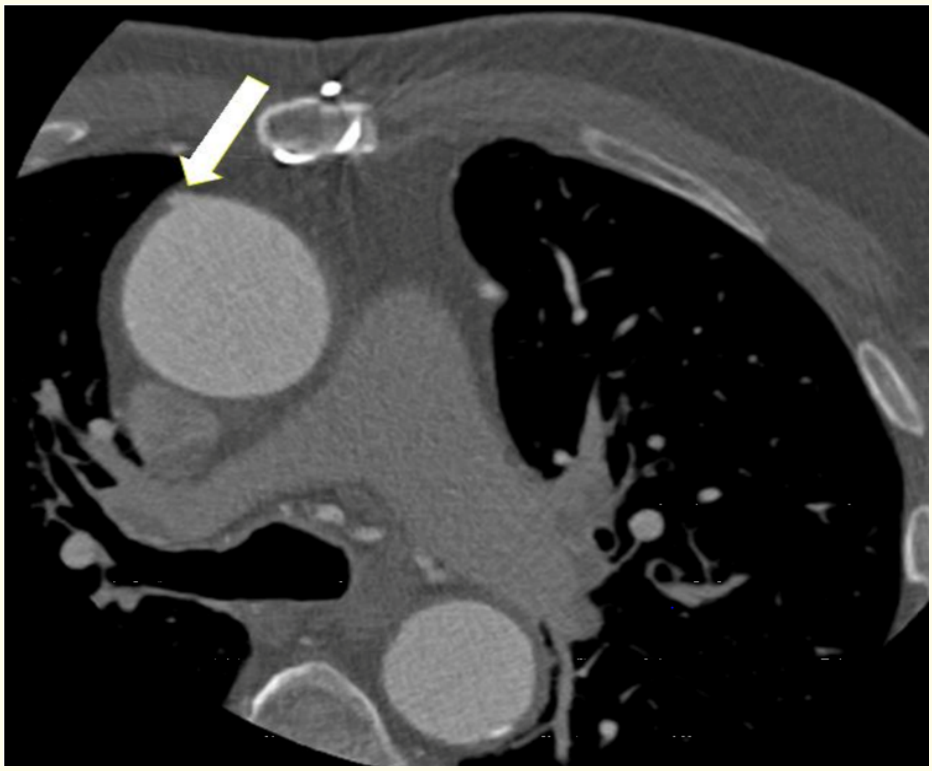

Figure 1: *Outpouching of contrast as shown by white arrow suggests SVG occlusion.*

Discussion

Vein grafts have high occlusion rates, 5% of grafts fail at 1 month, 10% at 1 year and 50% at 10 years. Graft failure process can be categorized temporally in early (0 - 30 days), short term (30 days to 1 years) and long term (> 1 year) phases [1]. Early graft failure is characterized by thrombus formation which is mainly ascribed to procedural factors such as endothelial injury, graft handling, graft kinking, anastomosis failure and smaller target vessel diameter [1]. After one month, graft occlusion is due to high shear stress causing neointimal hyperplasia. This process is caused by intimal damage, platelet aggregation, growth factor release and smooth muscle cell proliferation. Long term failure is attributed to atherosclerotic process. Plaques in vein grafts are more friable, have thinner fibrous caps, lesser calcification and are more prone to rupture and thrombus formation. These particular characteristics of venous plaques make SVG interventions technically difficult due to distal embolization and no flow phenomenon [2]. Tobacco use, hypertension, dyslipidemia, and small target vessel diameter are some of the factors that have been strongly associated with vein graft occlusion [3]. Diagnosing SVG occlusions in a timely manner is crucial to decide further management strategy.

SVG has its one end attached to the proximal part of ascending aorta and the other end to the target vessel distal to the point of occlusion. It is the completely occluded SVG that is seen as a nubbin at its origin from aorta, rest of the graft is not visualized due to complete thrombosis or atresia. Outpouching of contrast at the level of aortic was first described as an indication of proximal SVG occlusion by Mueller., *et al.* in 2007, nevertheless has been rarely reported in literature since then [4,5]. It remains an important radiological finding to recognize SVG occlusions, its specificity and sensitivity are not defined.

Multidetector CT (MDCT) has emerged as a reliable and noninvasive technique to evaluate graft patency. MDCT angiogram is 97% sensitive and 97% specific to detect graft patency [6]. In our case, CT coronary reliably showed occluded proximal SVG that was proven to be accurate on coronary angiogram. Our case strengthens the importance of noninvasive CT technique to diagnose SVG vein graft occlusion in a timely manner.

Conclusion

Multidetector CT can identify graft occlusions post CABG without placing patients at an increased risk of an invasive procedure. Nubbin sign is an outpouching of contrast at anterior surface of aorta and indicates proximal SVG occlusion.

Conflicts of Interest

Dr. Keshavamurthy, Dr. Singh and Dr. Durugu report no conflict of interest in context of this case report. There were no funding sources to declare.

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