



FACTORS FAVORING PREFERENCE OF ARTERIOGRAPHY OVER CT ANGIOGRAPHY FOR PERIPHERAL ARTERIAL DISEASE EVALUATION

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ABSTRACT Despite many advances in the quality and availability of less invasive arterial imaging modalities, arteriography remains the “gold standard.” This is a Prospective study which analyzes the factors favoring the preference of DSA over CTA in patients with peripheral vascular disease. Those patients with peripheral vascular disease undergoing DSA, who were initially planned for CTA and could not undergo CTA for various reasons were included. This study consists of 38 patients with most of them were males 29 (76%). In our study common factor for referral over CTA was renal dysfunction patients 18 out of 38 (47%), as contrast required in standard CTA for lower limb runoff is around 100ml and in our DSA average volume required is only 30ml because of target lesion arteriography with magnification. Next common factor was presence of heavy calcifications in tibial vessel walls which hampers the evaluation of the CTA who were 37% of our study patients (14). Other factors were severe congestive Cardiac Failure, Previous Bone Plating/Nailing in leg bones and limb Contracture. With increasing incidences of diabetic patients with their associated diabetic nephropathy and heavy calcificated arteries, makes these patients more preferred for DSA than CTA due to its low contrast dose requirements and images free of calcification artefacts.

KEYWORDS : Arteriography, CT Angiography, Peripheral Arterial Disease

Introduction:

Despite many advances in the quality and availability of less invasive arterial imaging modalities, arteriography remains the “gold standard.” Alternative modalities, such as computed tomographic angiography (CTA) are being used with increasing frequency because of improved image quality and minimal risk[1–6]. However, arteriography remains an indispensable tool for the vascular surgeon. With increased incidence of peripheral arterial diseases in diabetic patients who has higher renal dysfunction and high calcification load in peripheral arteries, makes arteriography more preferred method of evaluation (as contrast requirement as small and arterial calcification not affects the study results). Also, with possibility of simultaneously going for diagnostic and intervention procedures in same settings, reduces time needed for intervention and improves limb salvage rates. Here arteriography is synonymously used with DSA (Digital Subtraction Angiography).

Materials and methods:

This is a Prospective study which analyzes the factors favoring the preference of DSA over CTA in patients with peripheral vascular disease. Those patients with peripheral vascular disease undergoing DSA, who were initially planned for CTA and could not undergo CTA for various reasons or those who had CTA with inconclusive diagnosis during past two years (2021-2022) were included. Those patients with contrast allergy, repeat angiogram, young children and pregnant women are excluded from the study. There were totally 38 patients included in the study. Reasons for referral for DSA instead of CTA, its successful completion along with contrast dose, duration of study and its diagnostic preferences were studied with respect to standard CTA.

Results and Discussion:

Decision making in extremity peripheral artery disease represents one of the most challenging and nuanced algorithms in vascular surgery. Optimal management is highly individualized, tailored to patient-specific goals, factoring in clinical presentation, anatomic pattern of disease, functional status, perioperative risk, and long-term survival. Hence accurate diagnosis by angiogram is one of key factors. With rapid increase of diabetic population and their frequent association with peripheral vascular diseases, makes these patients more preferred for DSA due to coexisting nephropathy and vessel calcification.

This study consists of 38 patients with most of them were males 29 (76%). Age groups range from 20 to 88 years with mean 57 years. Most of our patients were older age group (with diabetes and renal dysfunctions more common in elderly) with more than 50 years constituting 85% (32). Diabetes and renal dysfunction (serum creatinine > 1.5) were more frequent risk factors constituting 68% and 47% respectively. Location of PVD common in lower limb of about 68%. Several of these features were shown clearly in table-1.

TABLE-1: CHARACTERISTICS OF PATIENTS WHO UNDERWENT DSA

S.No	Features	Number (out of 38)	Percentage (%)
1	Gender: A) Male	29	76%
	B) Female	9	24%
2.	Age groups: Range	20 to 88 years, mean – 57 years	
	less than 50 years	6	15%
	50 – 60 years	10	26%
	61- 70 years	14	36%
	more than 70 years	8	23%
3	Comorbidities : A)	18	47%
	Renal Dysfunction		
	B) Diabetes mellitus	26	68%
	c) Smoking	11	28%
	d) Hypertension	11	28%
	e) Heart disease	4	10%
4	Disease Location: a)	26	68%
	Lower Limb Pvd		
	a) Upper Limb Pvd	12	32%

In our study common factor for referral over CTA was renal dysfunction patients 18 out of 38 (47%), as contrast required in standard CTA for lower limb runoff is around 100ml and in our DSA average volume required is only 30ml because of target lesion arteriography with magnification. Next common factor was presence of heavy calcifications in tibial vessel walls which hampers the evaluation of the CTA who were 37% of our study patients (14).

FIGURE- 1: TIBIAL ARTERIES WITH A) HEAVY CALCIFICATIONS AND B) WITH BONE PLATING NOT CLEARLY SEEN IN CTA IMAGE



Hingorani et al. compared CTA with contrast arteriography in patients with chronic lower extremity ischemia requiring revascularization. Accuracy of CTA were poor in femoropopliteal and tibial segments compared with contrast arteriography[8]. Also with volume and rate of contrast injection can be adjusted to minimum in patients with severe congestive cardiac failure, DSA was preferred in 4 of our cases. Also in patients with previous plating/nailing for both bone fracture legs, tibial

arteries visualization were very poor in CTA then DSA and hence preferred in our 3 (8%) cases. With peripheral vascular disease patients developing knee contractures due to ischemic pain, patients positioning is very difficult with associated motion artefacts in CTA. In these patients DSA provided better imaging by target vessel catheterization and contrast injection for 8% of our cases.

FIGURE- 2: TIBIAL ARTERIES WITH HEAVY CALCIFICATIONS CLEARLY SEEN IN DSA IMAGES WITHOUT CALCIFICATION

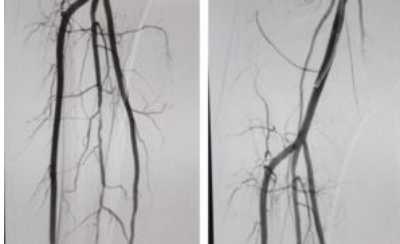


TABLE-2: FACTORS FAVOURING DSA OVER CTA

	Factors	number	Percentage
1)	Renal Dyfunction	18	47%
2)	Arterial Calcification	14	37%
3)	Severe Congestive Cardiac Failure	4	10%
4)	With Previous Bone Plating/Nailing	3	8%
5)	Limb Contracture	3	8%

Thus in our study renal dysfunction, arterial heavy calcification, severe congestive Cardiac Failure, Previous Bone Plating/Nailing in leg bones and limb Contracture were factors favouring for DSA over CTA, with predominant factors being renal dysfunction and arterial heavy calcification which constituted 47% and 37% of our study patients respectively.

Conclusion:

With increasing incidences of diabetic patients with their associated diabetic nephropathy and heavy calcificated nephrites, makes these patients more preferred for DSA than CTA due to its low contrast dose requirements and images free of calcification artefacts.

REFERENCE:

1. Rutherford's VASCULAR SURGERY AND ENDOVASCULAR THERAPY, 10th edition
2. Mell M, et al. Clinical utility of time-resolved imaging of contrast kinetics (TRICKS) magnetic resonance angiography for infrageniculate arterial occlusive disease. *J Vasc Surg.* 2007;45:543-548.
3. Schlager O, et al. Duplex sonography versus angiography for assessment of femoropopliteal arterial disease in a "real-world" setting. *J Endovasc Ther.* 2007;14:452-459.
4. Gjonmaess E, et al. Gadolinium-enhanced magnetic resonance angiography, colour duplex and digital subtraction angiography of the lower limb arteries from the aorta to the tibio-peroneal trunk in patients with intermittent claudication. *Eur J Endovasc Surg.* 2006;31:53-58.
5. U-King-Im JM, et al. Contrast-enhanced MR angiography for carotid disease. *Neurology.* 2004;62:1282-1290.
6. Nederkoom PJ, et al. Duplex ultrasound and magnetic resonance angiography compared with digital subtraction angiography in carotid artery stenosis. *Stroke.* 2003;34:1324-1332.
7. Randoux B, et al. Carotid artery stenosis: prospective comparison of CT, three-dimensional gadolinium-enhanced MR, and conventional angiography. *Radiology.* 2001;220:179-185.
8. Hingorani A, et al. Comparison of computed tomography angiography to contrast arteriography for patients undergoing evaluation for lower extremity revascularization. *Vasc Endovascular Surg.* 2007;42:115-119