



ORIGINAL RESEARCH PAPER

Radio-Diagnosis

SPECTRUM OF IMAGING FINDINGS IN LOWER LIMB CT ANGIOGRAPHY IN PATIENTS OF LOWER LIMB ARTERIAL DISEASE

KEY WORDS: Computed Tomography Angiography, arterial disease, occlusion.

Dr. Nilesh H Chaudhari

Professor & Head Of Department, Department Of Radiodiagnosis, Dr. Vasantrya Pawar Medical College Hospital & RC.

Dr. Gaurav Deshpande*

JR III Radiodiagnosis, Department Of Radiodiagnosis, Dr.vasantrya Pawar Medical College Hospital & RC. *Corresponding Author

Dr. Pranita Jadhav

JR II Radiodiagnosis, Department Of Radiodiagnosis, Dr.vasantrya Pawar Medical College Hospital & RC.

ABSTRACT

Disorders of the arterial system can cause complications ranging from minor disabilities to loss of the limb. Conventional digital subtraction angiography (DSA) is considered as the gold-standard technique for evaluation of the arterial system. Alternative imaging modalities include Duplex ultrasonography (DUS), computed tomography angiography (CTA) and magnetic resonance angiography (MRA). CT angiography allows larger body volumes to be scanned within a short time period at high resolution to provide a good delineation of arterial flow. The aim of this study is to illustrate the spectrum of abnormalities in patients presenting with clinical suspicion of peripheral arterial disease. Total 50 patients suspected of lower limb arterial disease were studied. The most common age group of patients was the 5th decade. 80% patients had history of hypertension and 76% were known diabetics. Most common lesion was complete occlusion. Anterior & Posterior Tibial Arteries were most commonly involved.

INTRODUCTION

Disorder of the arterial system can cause complications ranging from minor disabilities to loss of the limb. Conventional digital subtraction angiography (DSA) is considered as the gold-standard technique for evaluation of the arterial system. Alternative imaging modalities include Duplex ultrasonography (DUS), computed tomography angiography (CTA) and magnetic resonance angiography (MRA). DUS has been used as the initial imaging modality however, it is operator dependent, time consuming and is less accurate in assessing distal vasculature and collaterals. CT angiography allows larger body volumes to be scanned within a short time period at high resolution to provide a good delineation of arterial flow. This has enabled CTA to become a fast, accurate, safe and non-invasive modality in lower extremity arterial imaging. CTA provides a detailed overview of the lower limb vasculature (1). It helps to rule-out or confirm the etiology as well as verify the degree and an exact location of the stenosis (2). CT angiography is a reliable non-invasive imaging method for the comprehensive and multi parameter evaluation of patients with PAOD (3). CTA utilizes intravenously administered contrast to visualize the vascular system during the arterial phase of enhancement while also providing additional information regarding osseous and soft-tissue pathologies and their relationship to blood vessels.

Aim/Objective:

- To illustrate the spectrum of abnormalities in patients presenting with clinical suspicion of peripheral arterial disease.
- To identify the most common sites of involvement in lower limb vascular pathologies.

MATERIALS AND METHODS

Study Design: Descriptive cross-sectional study
Source of Data: Patients visiting the department of Radiodiagnosis at a tertiary healthcare centre.
Participant Size: 50

Inclusion Criteria

Patients of any age group & of either gender who presented with signs/ symptoms of lower limb arterial disease.

Exclusion Criteria

- Patients with deranged renal function test.
- Patients with a history of allergic reaction to iodinated contrast media.

Apparatus and Materials

- Study was explained to the patient & written informed consent was taken for contrast administration.
- Renal function test was performed.
- Appropriate gauge IV cannula was inserted into a superficial vein of the upper limb.
- Intravenous non-ionic, low osmolar contrast agent (e.g. Iomeprol/ Iohexol) injection at a flow rate of 3.5 – 4.0 ml/sec.
- Multi-detector row CT angiography was performed on Siemens 'Somatom Perspective' 128 slice CT scanner.
- Post scan processing was done using multi planar reconstruction, curved planar reconstruction, maximum intensity projection (MIP), volume rendered imaging.
- Data was collected and compiled using Microsoft Excel. Statistical analysis was done using descriptive statistics.

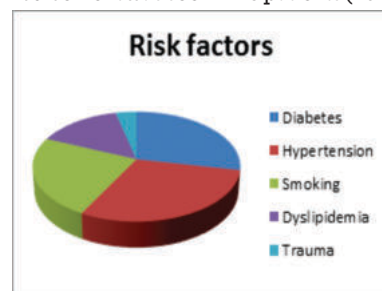
RESULTS

In this study, 50 patients suspected of lower limb arterial disease were studied.

AGE (YEARS)	NO. OF PATIENTS	PERCENTAGE (%)
10 - 20	2	4
21 - 30	0	0
31 - 40	9	18
41 - 50	5	10
51 - 60	18	36
61 - 70	9	18
71 - 80	7	14

Out of these patients, 42 patients (84%) were males and 8 patients (16%) were females.

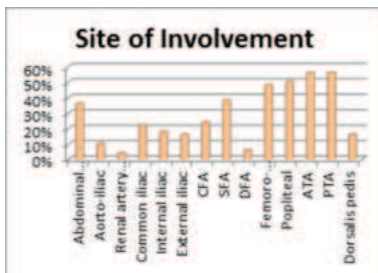
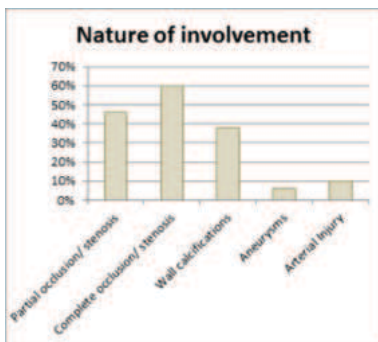
Bilateral involvement was seen in 27 patients (54%) and unilateral involvement was seen in 23 patients (46%).



The risk factors identified in our study were: diabetes (38 patients), hypertension (40 patients), smoking (32 patients), dyslipidaemias (20 patients) and trauma (5 patients).



Rest pain and intermittent claudication were the most common chief complaints with which patients presented to the OPD.



DISCUSSION

The most common age group of patients was the 5th decade with 36% (18 patients) presenting between 51 – 60 years. A marked male predominance was noted with 84% male population and 16% female population. Thus the M: F ratio was 5.25.

80% patients had history of hypertension and 76% were known diabetics. Documented evidence of dyslipidaemia was present in 40% patients. 64% patients gave history of cigarette smoking for more than 10 years.

Regarding the clinical presentation of PAOD, Creager et al reported that, the most common symptom of PAOD is intermittent claudication (3). In our study, lower limb pain at rest was the most common symptom (45 patients). Only 3% patients came with gangrenous extremity.

Complete occlusion was the most commonly encountered nature of lesion, in 30 patients (60%) and partial occlusion was present in 23 patients (46%). Pseudo-aneurysm as a post-traumatic complication was seen in 3 patients (6%) and arterial injury in 5 patients (10%).

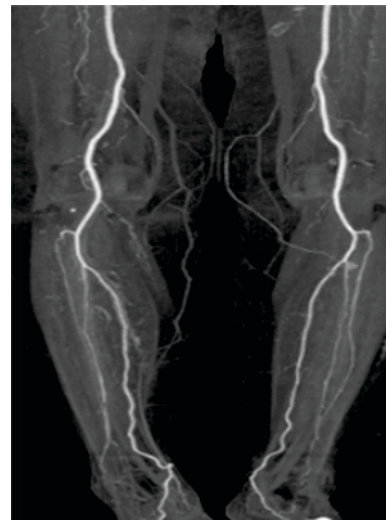
Most common site of involvement along the lower limb arterial system, in our study, was Anterior/ Posterior Tibial Artery (56%) followed closely by popliteal artery (50%).

Renal artery was involved in only 2 patients (4%).

CASE - 1

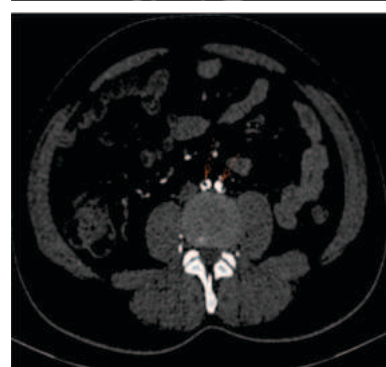


Normal CT angiogram of the abdominal aorta



Normal CT angiogram of bilateral lower limb arterial system.

CASE - 2



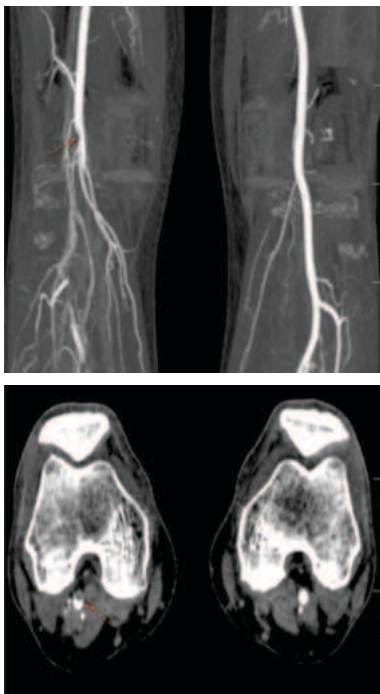
Extensive atheromatous soft and calcified plaques noted in the infrarenal & distal part of abdominal aorta involving aortic bifurcation & bilateral common iliac arteries causing luminal irregularity with narrowing.

CASE-3



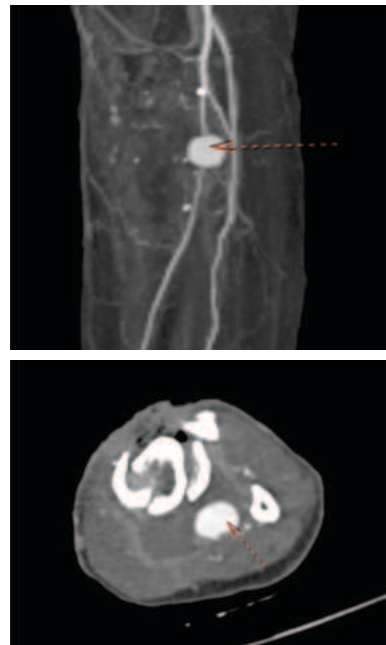
Absent contrast opacification noted from bifurcation of common femoral artery, in proximal 2/3rd of superficial femoral artery and in profunda femoris artery --- represents complete thrombotic occlusion.

CASE-4



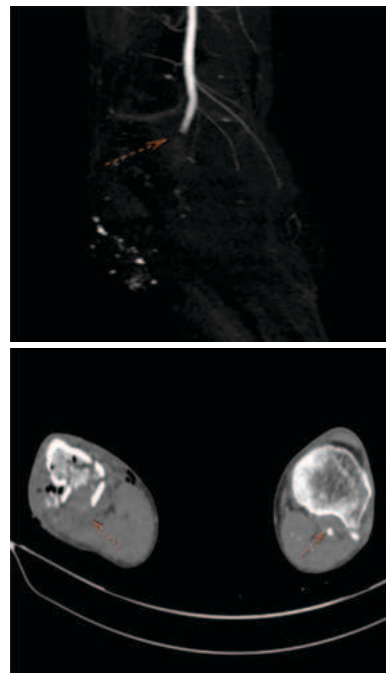
Hypodense filling defect partially occluding the lumen is noted in the right popliteal artery s/o eccentric partial occlusion (approx.50%).

CASE-5



Comminuted displaced fracture noted in upper end of tibia involving upper shaft and meta-diaphyseal region. Pseudo aneurysm of size approx. 1.2 x 1.3 cm arising from upper 1/3rd of left posterior tibial artery (PTA).

CASE-6



Displaced comminuted fracture of upper ends of right tibia & fibula with displaced fracture fragments indenting over distal part of right popliteal artery s/o Arterial injury with absent contrast opacification distally. Left popliteal artery is well-opacified and shows normal course & calibre.

CONCLUSION

CTA is efficient and accurate in the evaluation of lower extremity arterial diseases. It can detect the primary disease with respect to number of sites involved, number of lesions and the nature of involvement. MDCT angiography showed more vascular segments than DSA, particularly within calf vessels (4). In post-trauma cases, signs of vascular injury can be readily detected, and information regarding bony and

soft-tissue injuries can also be obtained. In suspected PAOD patients, ultrasound is best screening tool, however in patients requiring surgical intervention, CTA is preferred for thorough evaluation of entire lower limb arterial tree.

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