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Original Research Paper

Radio-Diagnosis

ROLE OF MDCT IN PERIPHERAL ARTERIAL DISEASE OF LOWER EXTREMITIES : SEGMENTAL EVALUATION AND ASSOCIATION WITH RISK FACTORS AND CLINICAL SYMPTOMS

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ABSTRACT

Introduction: Peripheral arterial disease causes narrowing or luminal occlusion of the the peripheral arteries, leading to problems that might range from moderate impairments to limb amputation. In the setting of acute care, computed tomographic angiography (CTA) provides precise methods for identifying and classifying the severity of vascular disease.This study was done to evaluate the arterial segments affected by peripheral vascular disease and the frequency of segments involved and to assess the association of risk factors and clinical findings with the radiological presentation. **Material and methods:**A total of 42 patients with peripheral vascular disease were included in our study. After taking an informed consent a brief history was taken regarding symptomatology, risk factors and duration of disease. Patients were studied by using Computed tomographic angiography to interpret lower limb arterial system. **Results:** In this study17.6 % of total arterial segments had significant (>75%), and almost 40 % of all the arterial segments had complete occlusion. Almost 95.2% segments showed presence of collateral channels. Out of the patients who had significant stenosis, 22 (55%) patients had history of smoking, 12(30%) patients had diabetes mellitus and 7(17.5%) patients had history of hypertension. 26 (65%) patients had of blackish discoloration, out of which 16 (61.5%) patients had wet gangrene and 10(38.4%) patients had dry gangrene. **Conclusion:** MDCT is a non invasive modality for Lower Limb Arterial Disease Evaluation with good agreement between clinical and CT angiography findings .

KEYWORDS :

INTRODUCTION

Peripheral arterial disease causes narrowing or luminal occlusion of the the peripheral arteries.Most commonly caused by atherosclerosis, less common causes include thromboembolism, trauma, entrapment syndromes and vasculitis including vasospastic disorders and Buerger'sdisease[1].

In the setting of acute care, computed tomographic angiography (CTA) provides precise methods for identifying and classifying the severity of vascular disease.[2,3]

Computed tomography angiography is increasingly being used in evaluation of vascular disease because of the rapid technical developments, shorter durations of acquisition, higher spatial resolution, thinner sections, and volumetric depiction of the entire vascular system within a limited period along with reduced amount of contrast medium. [4]

AIMS AND OBJECTIVES-

The aim of this study is to evaluate the arterial segments affected by peripheral vascular disease and the frequency of segments involved and to study the association of risk factors and clinical findings with the radiological presentation.

Materials and methods

The main source of data was patients presenting to SRMSIMS, Bareilly during the time period of six months with suspected peripheral vascular disease on clinical examination including claudication, rest pain and tissue loss. After taking an informed written consent, a brief history was taken from each patient regarding symptomatology, risk factors and duration of disease. A focused clinical examination with the aid of the referring physician was undertaken as regards to severity and extent of involvement of the disease. Total 42 patients were included in our study. Patients with history of trauma, altered renal function tests and history of contrast allergy were excluded in our study.

CT Peripheral Angiography: Patients underwent MDCTA on Siemens Somatom Flash Definition Dual Source 128 slice CT scanner. Plain CT Acquisition data is taken from the level of infrarenal aorta till the toes. Arterial phase was taken when the ROI reaches threshold of 100HU in descending infrarenal aorta following contrast injection. Venous phase was taken at an interval of 60-65 sec from the time of contrast injection. 3D reconstruction with thin planar (1mm) MPR was performed in coronal and sagittal planes. The images were viewed on a workstation capable of viewing source axial images and 3D imaging software tools.

Data analysis- The lower limb arterial system was divided into anatomical regions [Aorto-iliac region, Femoral, popliteal region & Tibial (anterior and posterior tibial arteries) and peroneal regions] .The artery stenosis grade was classified as significant and insignificant stenosis and complete occlusion.

RESULTS-

A total of 42 patients were included in our study. 20 patients belonged to the age group of 40-60years, 20-39 years age group included 7 patients and more than 60 years age group included 14 patients. Out of 42 patients, 34 patients were male and 8 patients were female.

Out of the patients who had significant stenosis, 22 (55%) patients had history of smoking, 12(30%) patients had diabetes mellitus and 7(17.5%) patients had history of hypertension. 26 (65%) patients had of blackish discoloration, out of which 16 (61.5%) patients had wet gangrene and 10(38.4%) patients had dry gangrene. 36(90%) patients complained of pain or claudication.

Total iliac arterial segments were 252 out of which 72 (28.6%) segments were involved. Out of the involved segments complete occlusion was noted in 32 segments (44.4%) and significant stenosis was seen in 39 segments (54.4%).

Total femoral arterial segments were 252 out of which 76(30.1%) segments were involved. Out of the involved segments complete occlusion was noted in 25 (32.8 %) segments and significant stenosis was seen in 42 (55.2%) segments.

Total popliteal arterial segments evaluated were 84, out of which 34 were involved. Complete occlusion was noted in 13 (38.2%) segments and significant stenosis was seen in 19(55.8%) segments.

Total tibioperoneal arterial segments were 252, out of which 135 segments were involved.Complete occlusion was noted in 57 (42.2%) segments and significant stenosis was seen in 72 (53.3%) segments.

DISCUSSION-

A total of 42 patients were included in our study. 20-39 years age group included 7 patients, 20 patients belonged to the age group of 40-60years, and more than 60 years age group included 14 patients. This is in agreement with study done by Parikh et al, in which majority of patients were in age range of 33–75years.[5]

Out of 42 patients, 34 patients were male and 8 patients were female.This is in agreement with study done by Hasa et al, in which 135 patients (85%) were males and 25 patients were females (15%) .[6]

Diabetes and hypertension were the most common risk factors in the study group. Diabetes is one of the strongest predictors for PAD as noted by Athyros et al [7], hypertension is positively associated with PAD as per Selvin and Erlinger[8] as shown in the National Health and Nutrition Survey (NHANES) data . We found that Smoking is common in patients of PAD. This is in accordance to study by Benegal D S et al who found 50% of smokers in study population, out of which 65.5% showed hemodynamically significant stenosis in comparison with non smoking population in whom 24.2% showed significant stenosis with P value <0.001 showing significant correlation between smoking and stenosis. [9].

Claudication was present in 36 patients and gangrenous changes were seen in 26 patients.The most characteristic symptom of PAD is claudication and blackish discoloration of limbs. [10]Most common segments to be involved were tibioperoneal arterial segments with variable extent of occlusion or stenosis. Similar findings were noted in the study was conducted by Ozkan et al [11] in which, aortoiliac disease was noted in 51%, femoropopliteal disease in 65% of the patients.

In our study multiple segments (3 or more) were involved in 66.6 % patients, two segments were involved in 19 % and single segment was involved in 15 % patients. Ozkan et al [11] studied examination of segmental distribution of atherosclerosis in 626 patients with peripheral arterial disease involving a single segment in 36% of the patients, two segments in 42% of the patients, and more than three segments in 33% of the patients, concluding that PAD was a multi segmental disease in most of the cases of the study group.

According to literature as cited by Prasad, Boppana et al [12]overall sensitivity in detecting 50 - 99% stenosis is 100% and specificity is 99.8%.

CONCLUSION-

MDCT is a non invasive modality for Lower Limb Arterial Disease Evaluation with good agreement between clinical and CT angiography findings .

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