

MDCTA OF LOWER EXTREMITIES ARTERIES STENO-OCCLUSION IN VARIOUS AGE GROUPS AND BOTH GENDERS: STUDY INCLUDED 38 PATIENTS PRESENTED WITH CLINICAL MANIFESTATIONS

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ABSTRACT

The purpose of our study was to evaluate the role of Multi Detector Row Computed Tomography Angiography (MDCTA) in evaluating the Peripheral Arterial Disease (PAD) affecting the lower limb for Libyan patients presented with clinical manifestations. Thirty-eight patients referred in the period from December 2017 to March 2018 for Computed Tomography Angiography (CTA) of lower limb vessels to evaluate and diagnose the diseases of peripheral lower extremities arteries. For evaluation of the lower extremities arterial diseases 128-Row MDCT (Toshiba Aquilion, Japan) was used. After preparation of the patients, we used intravenous line for non-ionic iodinated contrast injection and the patients were scanned from renal level to the toes who took 20-30 seconds for scanning. Three-dimensional (3-D) visualization was essential. Thirty-eight patients with clinical manifestations referred for CTA of lower limbs arteries were with atherosclerotic steno-occlusive disease. 28 patients had claudication, 34 patients had rest pain with ischemia, 38 patients had Diabetes Mellitus (DM) and only two patients were with trauma. The scanning of the lower extremities' arteries showed singular or multiple atherosclerotic stenosis or occlusion. The largest group among the referred patients with clinical manifestations was diabetic mellitus group and the smallest one was trauma group. MDCTA is preferred tool for evaluation of lower extremities arteries of patients with clinical manifestation. The arterial steno-occlusion increased by increasing age and more among males than females. Highly detected lower extremities' arteries of atherosclerotic steno-occlusive disease were in patients with clinical manifestations (claudication, rest pain with ischemia, diabetes mellitus and trauma).

KEY WORDS: MDCTA, Patients, Age, Gender, Clinical manifestations, Lower extremities arteries, Steno-occlusion.

INTRODUCTION

The common femoral artery is the arterial supply of the lower limb arising from the external iliac artery. It begins at inguinal ligament level and gives profunda femoris and continues as superficial femoral artery. Its continuation is the popliteal artery at level of adductor canal which dividing into anterior tibial artery and posterior tibioperoneal trunk. The anterior tibial artery passes to reach the anterior leg and continues to the foot dorsum as dorsalis pedis artery. The tibioperoneal artery is divided into posterior tibial artery and peroneal artery. The posterior tibial artery divided into medial and lateral planter arteries⁽¹⁾.

Aortic and lower limb arterial disease is a common disease and refers to disease of blood vessels supplying the extremities reflecting increasing prevalence of atherosclerosis. The (PAD) leading to obstruction of the peripheral artery may associated with symptoms and signs indicating ischemia. Most of patients with symptoms of claudication have lower extremity disease. The atherosclerotic obstructions of distal aorta and lower extremity arteries are the most common conditions of peripheral arterial obstructive diseases^(2,3,4,5).

Digital Subtraction Angiography (DSA) is an invasive, cost and has some morbidity and it provides a 2-dimensions (2-D) map of the vessels which may be not accurate for evaluate the degree of vascular stenosis and tortuosity. DSA is more used for therapeutic interventions rather than diagnostic studies^(2,6).

CTA and Magnetic Resonance Angiography (MRA) provide a high resolution, 3-dimensions (3-D) and it

is a robust, non-invasive procedure for evaluation and diagnosis of peripheral arterial disease as well as decrease morbidity and imaging cost^(6,7,8). Radiation exposure of DSA is 3.9 times greater than with CT angiography⁽⁸⁾.

MRA generally used for young patients and for patients with contrast allergy or renal insufficiency. MRA does not acceptable for assessment of PAD for patients with pacemaker or other implants, as well as it is not effective for uncooperative patients⁽⁹⁾.

Developments of multi-detector computed tomography angiography MDCTA made accurate assessment of the peripheral arteries and increased use to depict the peripheral vessels runoff. Multi-Planer Reformations (MPRs) were required in patients with extensive calcification providing accurate steno-occlusive assessment^(10,11,12).

Calcification is widely involving the arterial walls and patients with a history of diabetes mellitus, cardiac disease or elderly patients are likely to have extensive calcification⁽¹³⁾.

MDCTA is superior to DSA visualization of arterial territories. It has major advantages compared to DSA in the detection of eccentric lesions (Figures 1,2) of PAD with use of cross sectional multi-planer reformatted CTA^(14,15,16).



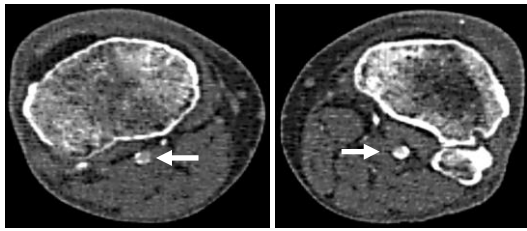
(Figure 1) 80 yrs patient with eccentric lesion at the right iliac artery (white arrow).

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(Figure 2) 80yrs patient with eccentric lesions at both posterior tibial arteries (white arrows).

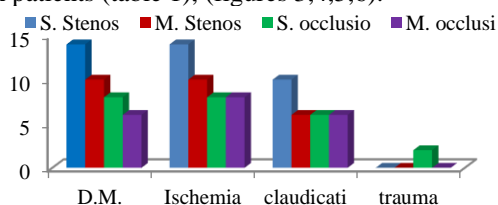
MATERIALS AND METHODS

Between December 2017 and March 2018, the clinicians in Zliten Teaching Hospital referred 38 patients (31 men, 7 women; mean age 61 years; age range 30-81 years) with suspicion of lower limb vascular disease for CTA of the lower extremities arteries inflow and runoff with complaint of claudication, rest pain, trauma, soft tissue ulceration and ischemia. Underwent multi-detector computed tomography angiography scanner (128 row MDCTA Toshiba Aquilion, Tokyo-Japan) for the referred patients. Pump injector of automated contrast monitoring power was the accessory tool to complete examinations. After patients' preparation performed injection of 140 ml contrast material via inserted canula at a rate of 4.5 ml/sec.

RESULTS

The patients referred to our department with clinical manifestations for doppler ultrasound study of the lower limbs arteries. The studied cases with clinical manifestations were 38 patients (mean age 61 years; 81% males and 19% females). Regarding to clinical manifestations of the study groups;

- Thirty-eight (100%) patients with diabetes mellitus; Doppler ultrasound study showed 24 (63%) patients with atherosclerotic stenosis (14 single and 10 multilevel stenosis) and 14 (37%) patients with complete occlusion (8 single, 6 multilevel occlusion) and Thirty-four (94%) patients presented with rest pain and ischemia; ultrasound study showed 18 (47%) patients with atherosclerotic stenosis (10 single, 8 multilevel stenosis) and 16 (42%) patients with complete occlusion (8 single, and 8 multilevel occlusion).
- Twenty-eight (74%) patients presented with claudication; ultrasound study showed 12 (32%) patients with atherosclerotic stenosis (6 single and 6 multilevel stenosis) and 16 (42%) patients with complete occlusion (10 single, and 6 multilevel occlusion).
- Two (5%) patients were presented with trauma; ultrasound study showed single complete occlusion in both patients (table 1), (figures 3,4,5,6).



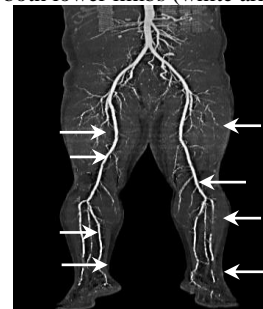
(Figure 3) Shows relation of manifestations with MDCTA results of the single and multiple steno-occlusive lesions of the lower limbs peripheral arteries.



(Figure 4) MDCTA for 30 yrs. patient with history of gunshot; The scanning showed complete cut and occlusion of superficial femoral artery of left lower limb (white arrows), stitching in skin was noted (red arrows).

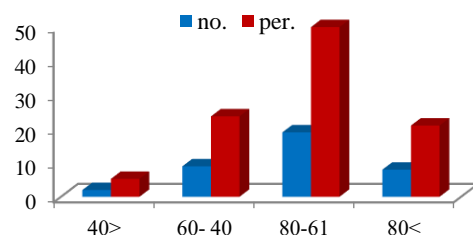


(Figure 5) MDCTA for 75 years old patient. Patient showing extensive atherosclerosis associated with multiple, complete and partial occlusion of anterior tibial, posterior tibial and peroneal arteries as well as multiple stenosis at lower level of superficial femoral arteries for both lower limbs (white arrows).



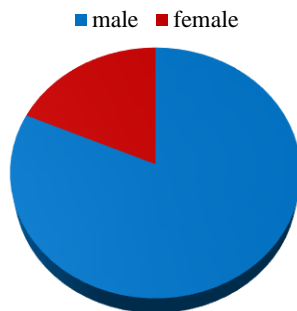
(Figure 6) MDCTA for 62 years old patient with typical multiple atherosclerotic complete occlusion and stenosis in peroneal, anterior and posterior tibial arteries of both lower limbs (white arrows).

The patients with steno-occlusive disease were divided into age groups. The age groups of patients were among 30 to 81 years. 19 (50%) patients with the disease were in age group 61-80 years, followed by 9 (14%) patients were in age group 41-60 years, 8 (21%) patients were in age group > 80 years and 2 (5.3%) patients were in age group < 40 years. The disease increased by increasing age (figure 7).



(Figure 7) Number and percentage of patients with lower limb peripheral arteries steno-occlusive lesion in age groups.

Out of thirty-eight patients were 31(81%) males and 7(19%) were females with lower limbs peripheral arteries steno-occlusive lesion. In this study showed the disease was highly affected males compared to females with ratio of 4.5:1 (figure 8).



(Figure 8) male to female ratio was 4.5:1.

DISCUSSION

Lower extremities' peripheral vascular disease diagnosis usually undergoes with many radiological tools include ultrasonography (USG), digital subtraction angiography (DSA), MR angiography and MDCT angiography. MDCTA demonstrated features including size and extent of the vascular lesions and it could detect all the lesions in aorto-iliac segment very well as gas interfere the detection of cases on USG. DSA is invasive tool and has some morbidity whereas MDCTA was superior to DSA in visualization of peripheral territories^(6,14). MDCTA was the modality of quick examination compared to MRA and DSA. MRA for patients with pacemaker or definite other implants is contra-indicated and can't be used in uncooperative patients. MDCTA of peripheral vascular disease was the preferred imaging modalities to characterize all types of the detected vascular lesions including steno-occlusive disease. It was increasingly used for minimally invasive imaging of vascular territories^(9,13) in patients who presented with clinical data (claudication, D.M., ischemia, trauma and all complaints related to arterial disease).

MDCTA underwent for all referred patients to evaluate PAD of lower limbs who presented with D.M, claudication, rest pain with ischemia and trauma and showed accurate imaging of the lower extremities' arteries.

The study showed steno-occlusive disease of the lower extremities in the examined patients was with mean age of 61 years and increased by increasing age-groups, nearly equal to the compared international study that showed the lower limbs arterial occlusion was secondary to atherosclerotic stenosis began after the age of 50 years⁽²⁾, (figure 7).

Our study showed the lower limbs peripheral arterial steno-occlusive disease affects males more than females. This result was not different significantly compared with the other studies⁽¹⁷⁾, (figure 8).

MDCTA examination in the study showed all cases with atherosclerosis as well as most of these cases were arterial stenosis (single level stenosis or multi-

level stenosis) or complete arterial occlusion (single complete occlusion or multilevel complete occlusion) similar to the other international studies showing the atherosclerosis was the most form of the peripheral arterial disease⁽⁴⁾, (figure 3).

MDCTA for evaluation of lower extremities arteries in our study all the examined (thirty-eight) patients presented with long-standing diabetes mellitus accompanied with or without other clinical manifestations such as claudication, rest pain with ischemia and trauma were highly associated with lower limbs arterial steno-occlusive disease. One amputated thigh of a patient with diabetes mellitus. The other presented patients were with different stages of ischemia (table 1).

(Table 1) Shows the correlation of clinical manifestation of the presented patients with various levels of steno-occlusive lesions.

	One level complete occlusion	Multilevel complete occlusion	One level stenosis	Multilevel stenosis	Total
Claudication	10	6	6	6	28
D.M.	8	6	14	10	38
Ischemia	8	8	10	8	34
Trauma	2				2

The other international studies showed participants who had PAD and diabetes mellitus was associated with great severity and diffuse peripheral arterial disease relative to non-diabetics and with greater risk of mortality and impaired quality life. The claudication in diabetic patient was twice of non-diabetic patients and PAD was more aggressive in patients with D.M. than in non-diabetic patients^(4,18,19,20).

Two patients presented with trauma. Two of those patients came with gunshot at his left thigh. MDCTA showed cutting popliteal artery. Emergency operative procedure performed for patient in the hospital before scanning.

CONCLUSION

Peripheral vascular disease and atherosclerosis diagnosis became easy with MDCTA. This diagnostic technique was simple and non-invasive to evaluate the vascular study and now it is one of the methods of choice for diagnosis of vascular disease. The atherosclerotic steno-occlusive lesion increased by increasing age and appeared more in males than females. MDCTA was highly effective in diagnosis of PAD that mostly accompanied with diabetes mellitus with or without other clinical manifestations.

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