بسم الله الرحيم

^{محاضرات} التكرار يعلم الشطار

Repetition is the Secret of Learning

Wait a minute , before ordering the Endovascular Suite !!

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Atherosclerotic Arterial Disease may present with either;

- Functional Ischemia (Intermittent Claudication), or
- Critical Ischemia, now termed Chronic Threatening Limb Ischemia (CTLI)

Which may present by

- Rest Pain,
- Tissue Loss (ulcer &/or gangrene)
- or both

The Classic Picture of Atherosclerotic PAD

In addition to items in history taking as : age , DM , Smoking , Cardiac , etc

Radiological Signs of Atherosclerosis

- 1) Vessel wall calcification,
- 2) Multivessel involvement,
- 3) A mixture of focal and diffuse lesions ,
- 4) Ostial and
- 5) Proximal vessel involvement

Extensive Calcification in Plain X-Ray





The Classic CTA Picture of Atherosclerotic PAD



The Classic CTA Picture of Atherosclerotic PAD



The Classic Angiographic Picture of Atherosclerosis 1- Bilateral

2- Diseased arteries

3- Stenosis &/or occlusion

4- N0t limited to areas of bifurcation

Axial Cuts are also so important !!!



But Atherosclerotic PAD is not the only cause of Foot Ischemia !!!!

Although it is true atherosclerosis is the most common cause !!!!

Critical foot ischemia may be the admitting presentation of diseases other than atherosclerosis In Egypt , other causes of Critical Foot Ischemia that should be considered:

- 1) Neglected Embolism
 - (still prevalent in Egypt !!!!)
- 2) Arterio-arterial embolism from e.g. Popliteal Aneurysm
- 3) Thrombo-angitis Obliterans
 - (Burger's Disease)
- 4) Other types of Arteritis
- **5) Other pathologies**

Case 1



Multislice CT angiography of the abdominal aorta and both lower limbs arteries revealed:

- Timed multi slice belical CT acquisition with automatic high flow IV non ionic contrast medium infusion to obtain axial sections in arteriographic phase.
- The obtained sections were processed to obtain anglographic images.

Reported history prior vascular surgical intervention for reported Buerger's disease.

I- Abdominal aorta and its branches:

- · Normal appearance of the abdominal aorta with no evidence of stenotic or occlusive lesions.
- · Normal appearance of both renal and mesenteric arteries.
- · Normal appearance of both common, both external and internal illac arteries.

II- Right lower limb arterial axis:

· Patent common and deep formed advices with no stenotic or accusive lesions.

Patent proximal superficial femoral artery with abrupt interruption of its lumen at a mid-thigh level. Multiple conscrew collaterals are seen at the distal part of the thigh.

- · Pant hair-line upacification of the popiteal arterula collateral versels, with focal interminition of its mid/distal aspect, at the level of the knee joint. Refilling of the distal popliteal artery via corkscrew collaterals.
- · Markedly attenuated tibio-peroneal trunk.
- · Non opacification of the anterior and posterior tibial arteries.
- · Non opacification of proximal third of peroneal artery with collateral filling of its mid and distal thirds.

MG & MEMBER OF ALFA MEDICAL GROUP







This case is actually embolic occlusion !!!

So, Embolism (acute or neglected) is The First Conflicting Cause In CTA, the Key Diagnostic Findings of Arterial Embolism are :

- Normal Proximal Arteries
- Occlusion at bifurcation or stenotic area (as add. Hiatus)
- Distal arteries not apparent in acute phase (No collaterals – spasm – distal thrombosis)

But Again , the most important is High Index of suspicion





In acute embolism phase the runoff usually not visualized due to distal thrombosis After sometime , if neglected , or in old age -due to collateralsthe runoff may appear

Again both atherosclerosis & embolism are different !!!



The Classic Angiographic Picture of Atherosclerosis 1- Bilateral

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Atherosclerotic Occlusion vs. Embolism



Occlusion not at bifurcation multiple stenoses / Diseased arteries



Normal Arteries

Occlusion at bifurcation

Distal thrombosis



It is unilateral / at bifurcation / healthy otherwise arteries





Abrupt occlusion at Rt CIA bifurcation + Normal other arteries

But this not Atherosclerotic !



Normal Arteries elsewhere + Occlusion at the Lt CFA bifurcation



Occlusion at Rt Popliteal Bifurcation + Normal other arteries

Multiple sites of embolic occlusion



Popliteal artery embolism



Multiple sites of embolic occlusion

Multiple

Emboli





Embolism on top of atherosclerosis



So why this confusion occurs ???

1) As before atherosclerotic occlusive disease is the most common arterial occlusive disease

2) Duplex US operators <u>always describe</u> <u>atherosclerotic arterial wall in their reports</u>, although in many cases, atherosclerosis is not the culprit pathology.

How to Suspect Embolism?

- AF
- Or even Sinus rhythm >>>> why?
 Embolism might be caused by detachment of an already formed thrombus during the phase of passage from AF to sinus rhythm, as the heart restored its contractile function.
- The contralateral pedal Pulse felt in most cases
- High index of suspicion is needed !!!!!





In general

Absence of AF is not against the diagnosis of Cardioarterial embolism !!!

• So , before you order the endovascular suite wait a minute'

• You may order CTA or MRA

 This is especially true if you depend solely on DUS findings with the inexperienced operator always describing atherosclerotic occlusion !!!
In these cases CTA Or MRA is more helpful

Young Patient

Not diabetic

Not hyperlipedemic

Even Not Smoker

So, why to jump to the diagnosis of atherosclerotic disease ??

Impacted embolus at the Popliteal Bifurcation



Role of Axial Cuts

Analysis of one patient CTA

Axial Cuts are so important in cases difficult to diagnose, as this case



Axial cuts at aortic bifurcation & CIAs





Axial cuts at CIA-EIA levels





Axial cuts at EIA-CFA levels





Axial cuts at CFA – SFA levels







Impacted embolus P3 + thrombosed tibials













But in fact !!! embolism may not be cardio -arterial, **Do not forget** the arterio-arterial embolism !!!! Source : Saccular aneurysm of abdominal aorta



Arterio -Arterial Embolism

Source : saccular aneurysm descending thoracic aorta







Pseudoaneurysm from Femoral puncture



Source : Post-traumatic Saccular Aneurysm Rt SFA /Pop with distal showers



The Second Conflicting Cause Is Popliteal Aneurysm

Popliteal Aneurysm may be the cause of foot ischemia

Popliteal Aneurysm with distal showers (arterio-arterial embolism)



Embolism vs. Thrombosed Popliteal Aneurysm

History Taking Examination :

Clues to diagnosis

- mass in the ipsilateral popliteal fossa -
- mass in the contralateral popliteal fossa
- contralateral popliteal pulse felt easily than usual

DUS & Axial Cuts in CTA

DUS can easily detect Popliteal Aneurysm



CTA is the main diagnostic tool





Remember : Easily Palpable Popliteal Artery Pulsation on the other side , why?

CTA is the main diagnostic tool







The dilated genicular artery prevent distal thrombosis !!!!!

Role of Axial Cuts





Axial Cuts can differentiate between Popliteal Embolism & Aneurysm





DUS can also differentiate !!





Patient presented with patch of gangrene tip of left big toe

?? A good candidate for tibial angioplasty ?? But wait



Tibial Disease

But , wait a minute !!!

He is not diabetic He is of moderate age !! Male patient Smoker !!!

Angiography All proximal arteries above both knees are good No calcification !! No Calcification !! No Calcification !! Middle Age Male Patient Non- diabetic But heavy Smoker

Presented with foot claudication Patch of gangrene Lt big toe







The Third Conflicting Cause is Thrombo-angitis Obliterans Burger's Disease

THROMBOANGIITIS OBLITERANS (TAO) BUERGER'S DISEASE has important features that are distinguishable from other forms of Vasculitis,

• Highly inflammatory thrombus,

Relative sparing of the blood vessel wall

(Preservation of the internal elastic lamina),

- Normal levels of acute phase reactants such as sedimentation rate and CRP and
- <u>Absent immune-activation markers</u>, such as ANA, RF and complement levels).

The characteristic angiographic findings of TAO
Involvement of small and medium-sized arteries

(digital arteries of fingers and toes, palmar, plantar, tibial, peroneal, radials and rula arcarteries). disease,

- In more than one limb
- Predominantly the lower limbs
- More severe disease distally.
- Segmental occlusive lesions (diseased arterial segments intervening normal arteries .



- Sparing of the larger inflow vessels.
- Normal proximal arteries free of atherosclerosis, aneurysms or other sources of emboli.

• The occlusion is tapering or abrupt arterial occlusions.

 Collateralization around areas of occlusion described as corkscrew collaterals, spider leg or tree root appearance (not pathognomonic).









What may occur if you tried endovascular recanalization **!!!!!**











Popliteo-tibial bypass with Saphenous vein



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Popliteo-PTA bypass

The Fourth Conflicting Cause : Vasculitis or Arteritis

What Type of Vasculitis or Arteritis can cause lower limb occlusion & Foot Ischemia??

Vasculitis may be
A) Large Vessel Vasculitis
B) Medium Vessel Vasculitis
C) Small Vessel Vasculitis or ANCAassociated vasculitides (AAVS)

But If Vasculitis or Arteritis produces LL ischemia, it is properly large vessel Vasculitis

If large vessel Vasculitis, it may be: **1.Giant Cell Arteritis (GCA)** or Temporal Arteritis 2. Takayasu's Arteritis Disease (TA)

Giant Cell Arteritis (GCA), or Temporal Arteritis affects the temporal arteries and has no relations with lower limb ischemia



Temporal Arteritis

Takayasu's Arteritis Pulseless Disease

- usually involves *aortic arch and its branches*.
- affects the more proximal elastic arteries with destruction of medial elastic fibers.
- It has certain criteria

Three majors	Ten minors	
 Left mid- subclavian artery lesion. Right mid- subclavian artery lesion. Characteristic signs and symptoms > 1 month's duration. 	 Elevated erythrocyte sedimentation rate (ESR). Carotodynia. Hypertension. Aortic regurgitation/ annulo-aortic ectasia. Pulmonary artery disease. 	 Left mid-common carotid artery lesion. Distal brachiocephalic trunk lesion. Descending aortic lesion. Abdominal aortic lesion. Coronary artery lesion.

A) Large Vessel Vasculitis



But, it may be the rare type of Takayasu's causing Mid Aortic **Syndrome** and Lower Limb affection !!!



So ,Why this case is a Vasculitis ??????



You may think that it is one of the rare type of Takayasu's that affect the mid -aorta.

 But , There is No Mid-aortic syndrome!
 No stenosis or occlusion of proximal arteries

IN addition The other arteries are normal



Other Conflicting Causes

Thrombosed Aneurysm of PSA with distal Showers



compartment Upper thigh Mid thigh Both arteries the same course in the poster compartment

Popliteal Artery Entrapment







Adventitial Cystic Disease





- A middle-aged man who had intermittent lingering leg pain and an isolated popliteal artery stenosis, but again, no other calcium or atherosclerotic disease on CT angiography

VASCULOPATHIES SECONDARY TO CONNECTIVE TISSUE DIDEASES

Behçet's Disease (BD) or Silk Road Disease

Clinical Manifestations: -

- Ocular lesions
- Oral aphthae
- Recurrent mucocutaneous lesions
- Genital ulcers
- Cutaneous involvement
- Positive Pathergy test:



VASOSPASTIC DISORDERS

A) Raynaud's SyndromeB) AcrocyanosisC) Livedo Reticularis

In Conclusion

- Although atherosclerotic PAD is the most common cause of foot ischemia , other causes in Egypt are still not uncommon.
- So, when there is a discrepancy between the patient's symptoms and diagnostic imaging, and when there is lack of the known <u>atherosclerosis-related</u> <u>radiological findings</u>, the possibility of an alternate diagnosis should be entertained.
- So , Before ordering the endovascular suite , please consider the other causes of foot ischemia , use CTA or MRA with axial cuts
- and keep a high index of suspicion

BASICS OF VASCULAR AND ENDOVASCULAR SURGERY

Fourth Edition



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A Non- Profit Edition

