

Mini Review

Uncommon Manifestations of Common Vascular Disease in the Elderly

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Abstract

Vascular disease may manifest atypically in elderly patients due to presence of comorbid conditions, age related physiologic changes and frailty. Here we outline some of these uncommon clinical presentations of common vascular disease and discuss how management must change to effectively diagnose and treat these conditions specifically in an elderly population.

Keywords: Acute aortic syndrome; Acute limb ischemia; Extracranial vascular disease; Mesenteric ischemia; Peripheral artery disease; Venous disease

Introduction

Vascular disease is a disease inherently of the elderly, confounded by multiple comorbidities. Age related physiologic changes combined with frailty renders management strategies in the elderly a unique problem. Disease states are further complicated by factors like sedentary lifestyle, subclinical depression, polypharmacy and age-related cognitive changes. Generally speaking, the symptoms of vascular disease are straightforward and easy to diagnose. Symptoms are classic, often visibly unmistakable, and aren't mimicked by other disease processes; however, elderly patients (65 and above) with vascular disease may present with misleading symptoms. This may lead to delay in diagnosis and treatment, and in some situations, may threaten life and limb. In the ensuing sections, the most common vascular conditions will be described along with their atypical manifestations in an elderly patient population.

Peripheral Artery Disease (PAD)

Incidence of chronic occlusive disease of lower extremity arteries, commonly referred to as PAD, increases with age. PAD affects 10%

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of individuals over 65 and 25% of the population above 80 [1]. Since the atherosclerotic occlusive process most commonly involves the infrarenal aorta and arteries of the lower extremities, the classic presentation of patients with PAD is intermittent claudication - this refers to pain or discomfort in the calf muscles when patients walk. When disease progresses, patients may present with disabling claudication, ulceration or gangrene, classified as Chronic Limb Threatening Ischemia (CLTI).

The prevalence of chronic coexisting illnesses like diabetes, chronic kidney disease, COPD, coronary artery disease, and osteoarthritis may affect the patients presenting symptoms. Elderly patients who have PAD may be rendered sedentary due to the convergence of several comorbid conditions and may not walk enough to develop claudication symptoms. Specifically due to the prevalence of diabetes or peripheral neuropathy, many patients may not complain of rest pain which in other patients would be the warning sign of serious vascular disease. In addition, elderly patients who do present with intermittent claudication may commonly mistake their pain for that of osteoarthritis. Physicians also may mistake intermittent claudication pain for that of osteoarthritis in these patients. Given these changes in presentation, it is not uncommon for elderly patients to present initially with CLTI. The first time an elderly patient presents with any symptoms may be with a non healing ulcer or gangrene.

The current management strategy for patients presenting with intermittent claudication from PAD is medical - namely lifestyle modifications, pharmacologic agents, reduction or elimination of risk factors such as smoking, HTN, DM, and exercise therapy in the form of regimented or supervised therapy with regular follow up visits to monitor disease state and efficacy of treatment. This clearly cannot be the strategy with elderly patients who present with CLTI. The treatment in these cases has to be aimed at restoration of circulation to prevent loss of limb - surgical or interventional in nature.

Acute limb ischemia

Etiologies of acute arterial occlusions are embolic, thrombotic, or traumatic. Acute embolic occlusion may be from a cardiac source or a more proximal arterial source like an ulcerating plaque or aneurysm. Cardiac arrhythmia, specifically atrial fibrillation, myocardial infarction, and valvular heart disease are the main causes of cardioembolic events. Peripheral arterial aneurysms and occasionally aortic aneurysms are the other causes of distal emboli.

Low flow state induced limb ischemia may mimic acute limb ischemia initially in clinical presentation. Elderly and frail patients may present with symptoms and signs of ALI, for example a sudden onset of "cold leg". "Cold leg" is usually indicative of an acute embolism or acute thrombosis; however, these symptoms may be due instead to significant reduction in peripheral perfusion due to cardiac or systemic factors, otherwise known as low flow state. Cardiac factors include CHF, sudden onset bradyarrhythmia, pacemaker malfunction, and general cardiovascular collapse post massive MI. Systemic factors are severe sudden dehydration (such as secondary to diuretic use),

volume depletion (diarrhea), or severe sepsis. It is important to identify the low flow state induced limb ischemia as management of low flow state significantly differs from that of embolic or thrombotic events. This patient must not be rushed to the OR for embolectomy or thrombectomy, rather, the low flow state must be corrected while starting anticoagulation to prevent thrombosis of vessels in the distal vascular beds.

Aortic dissection

Aortic dissection is another, lesser thought of cause of acute limb ischemia. When there is no cardiac history in a patient presenting with symptoms of ALI, aortic dissection must be ruled out as an etiology of disease. Aortic dissection is the most common acute aortic condition.

Aortic Aneurysms

Aneurysms are generally a disease of the elderly population with incidence of 5% in patients over 65 years of age and 12.5% in men over 75 years of age [1]. It should be noted that aneurysms are asymptomatic generally until rupture. The most common symptom of a leaking/ ruptured aneurysm is back pain. Because of the prevalence of degenerative lumbosacral spinal disease in a significant number of elderly patients, back pain may be initially ignored as patients already have chronic back pain. Most commonly an elderly patient will present with back pain for a few days that wasn't initially considered ominous before the patient collapses. The noted initial manifestation in elderly patients therefore may be delirium or disorientation secondary to blood loss from a leaking aneurysm. These symptoms become very misleading to the diagnosing physician and hinder quick and effective intervention for the condition. Presence of back pain radiating to the groin may be mistaken for ureteral calculus and mistreated with hydration and analgesics. Male patients may even present with testicular pain as the initial manifestation of a leaking aneurysm. This pain is referred given the retroperitoneal origin of these structures. A patient who presents with testicular pain with no further genitourinary findings should therefore receive an abdominal ultrasound to rule out abdominal aortic aneurysm.

Acute aortic syndromes

Acute aortic syndromes have been recognized only recently. They are comprised of four different entities: acute aortic dissection, symptomatic aortic aneurysm, Intramural Hematoma (IMH), Penetrating Aortic Ulcer (PAU). Each of these entities will present with the same common symptom - searing, severe, and persistent back or chest pain. Therefore, these diagnoses cannot be made without imaging modalities such as CT scan. Aortic dissection is defined by a tear in the intimal layer of the vessel with blood flowing between the intima and the media creating a false lumen. IMH does not involve a tear in the intima, rather, IMH is caused by rupture of the vasa vasorum resulting in bleeding between the layers of the vessel. PAU occurs in cases of severe atherosclerosis of the aorta where rupture of plaque causes localized out pouching of the aortic vessel wall with potential for rupture.

In elderly patients, the first signs of acute aortic syndromes may be hypotension or neurological manifestations, or syncope, rather than the pathognomonic searing chest pain. Acute aortic syndrome must therefore be considered on the differential diagnosis for these patients [1].

Acute aortic dissection manifests most commonly in the elderly as syncope, heart failure, and stroke rather than chest pain [1]. With

mortality of 2% per hour if undiagnosed and untreated, even greater so in octogenarians [2]. Ascending aortic dissections are best managed with open surgery. Descending aortic dissections on the other hand are best managed medically with the goal of keeping blood pressure controlled and reducing force of contraction. Aggressive treatment may be necessary in cases refractory to medical management. Endovascular approach has now become the preferred treatment.

Extracranial vascular disease

Carotid atherosclerotic disease is responsible for as many as 20% of all ischemic strokes [3]. Evaluation and investigations of bruits in the neck should be part of standard of care for elderly patients. If significant carotid disease is discovered, treatment options are medical - antiplatelet medications, antihypertensives, and statins - or surgical with Carotid Endarterectomy (CEA) or stenting. In elderly patients, another condition that isn't often recognized is subclavian steal syndrome. Significant stenosis or occlusion at the origin of the subclavian artery results in reversal of flow in the ipsilateral vertebral artery. This may cause decreased perfusion of the posterior part of the brain. Symptoms include ataxia, diplopia, and sudden falls without loss of consciousness ("drop attacks"). When elderly patients present with frequent history of falls, this diagnosis should be ruled out. Given the prevalence of falls in the elderly population, this condition is frequently missed. A simple test with blood pressure taken in both upper extremities reveals the diagnosis. A difference of greater than 20-25 mmHg systolic pressure between upper extremities is diagnostic. Most of these patients can be treated effectively with minimally invasive techniques of angioplasty and stenting of the subclavian artery.

Mesenteric ischemia

Chronic mesenteric ischemia

The hallmark of chronic mesenteric ischemia is the clinical triad of postprandial abdominal pain (also known as abdominal angina), weight loss and steatorrhea. Generally, two of the three mesenteric arteries have to be diseased to produce symptoms; however, isolated stenosis or occlusion of one of the mesenteric arteries can produce symptoms in a small subset of patients - particularly elderly patients who may have severe preexisting atherosclerotic disease with poor collateral development. This is called "territorial mesenteric ischemia" [4]. It is not uncommon for physicians to begin workup for malignancy when elderly patients present with severe weight loss. Some patients with severe mesenteric vascular disease may refrain from eating altogether. This phenomena is referred to as "fear of food syndrome". This condition may be mistaken as sequelae of depression or dementia in the elderly. With the advent of duplex ultrasonography and CTA, it has become easy to diagnose mesenteric vascular disease with noninvasive techniques. Angioplasty/stenting of mesenteric arteries has become the first therapeutic option for patients with chronic mesenteric ischemia [5].

Acute mesenteric ischemia

Acute mesenteric ischemia on the other hand, presents a serious surgical emergency. If not diagnosed and treated promptly, mortality can be as high as 60-80% [6]. Elderly patients with coexisting atrial fibrillation, valvular heart disease, or recent MI can suffer embolic occlusion of the SMA. Thrombosis occurs in severely diseased atherosclerotic arteries. Another infrequent condition in the geriatric

population is the entity of Nonocclusive Mesenteric Ischemia (NOMI). This can happen in elderly patients who suffer from low flow state hemodynamics. This low flow state may be induced by cardiac failure, severe bradyarrhythmias, pacemaker malfunction, or severe systemic conditions like volume depletion from dehydration and diuretics, just as in ALI. Recently, we have observed low flow state induced limb ischemia and acute mesenteric ischemia in patients who present with cardiogenic shock who require high doses of vasopressors and mechanical circulatory assist devices such as an Intraaortic Balloon Pump (IABP), Extracorporeal Membrane Oxygenation (ECMO), or a Ventricular Assist Device (VAD). A high index of suspicion combined with careful attention to laboratory findings such as metabolic acidosis may point to the correct diagnosis expeditiously in these patients.

Venous disease

Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE) are common vascular conditions. It is well known that when patients present with unprovoked DVT/PE, a genetic hypercoagulability should be suspected. However when an elderly patient presents with unprovoked DVT or PE it is important to rule out occult malignancy. We have seen several elderly patients where an initial presentation of unprovoked DVT led to the diagnosis of renal cancer. Other conditions that may result in thrombophilic phenomena are pancreatic and lung cancer. Therefore, imaging such as CT chest and abdomen should be part of diagnostic investigation for these patients to rule out occult malignancy as the underlying cause of unprovoked DVT/PE.

Dialysis access

As the percentage of the aging population increases in the western world, so has number of patients requiring dialysis for end stage renal disease. The general philosophy for these patients has been to create

an AV fistula as the first line of permanent management for dialysis patients. This is not practical or realistic in very elderly patients because of lack of suitable veins and lack of time for fistula maturation as the need for dialysis in these patients is often urgent. Therefore, AV graft placement is often needed. High output heart failure is a rare complication of longstanding AV fistula or graft. Normally, the flow through the access must be 2L/min or more to result in this condition. Elderly patients with preexisting cardiac disease, pulmonary hypertension, and ventricular dysfunction however, may go into heart failure at lower flow rates than their younger counterparts. When an elderly patient with ESRD presents with heart failure that doesn't respond to conventional treatment, their AV access should be studied in detail. It is possible nowadays by duplex scanning to measure the flow rate. Treatment in such scenarios would be ligation or revision of the dialysis access.

Summary

As the world population ages, the elderly will be the fastest growing subset of the population. The prevalence of vascular disease in the elderly makes it imperative that primary care physicians be cognizant of atypical clinical presentations unique to this population. It is important to note that this population has a high incidence of coexisting illness such as heart disease, COPD, hypertension, diabetes, CKD and debilitating osteoarthritis. Polypharmacy, frailty, and age related cognitive impairment may further impede prompt and accurate diagnoses [7]. To tackle the challenges of this complex patient population, it is necessary to take a multidisciplinary approach. While most physicians can easily diagnose vascular disease, it is important to recognize the rare and unusual symptoms and etiologies noted here (Table 1) to deliver the optimal standard of care to this subset of the population.

Condition	Signs and Symptoms Typical	Signs and Symptoms Atypical	Additional Comments
Peripheral Artery Disease	Intermittent claudication Rest pain	CLTI*	Sedentary lifestyle due to coexisting conditions such as CHF, COPD, and arthritis. Diabetic neuropathy may mask rest pain.
Acute Limb Ischemia (ALI) ¹	6P's** of ALI		Etiology due to low flow state should be considered in elderly patients
Ruptured Aortic Aneurysm	Back pain Hypotension	Testicular/perineal pain Ecchymosis of perineum Disorientation Dementia	This is referred pain Discoloration of perineum due to tracking of blood along fascial planes in retroperitoneum.
Acute aortic syndromes	Searing back/chest pain	Hypotension Syncope Heart failure Stroke, neurologic symptoms	Existing vascular disease and decreased cerebrovascular reserved
Extracranial Vascular disease Subclavian steal syndrome	Diplopia, ataxia, perioral numbness, drop attacks		Drop attacks in elderly pts mistaken for normal sequelae of senescence. Difference in SBP in both arms will point to correct diagnosis
Mesenteric Ischemia	Postprandial abdominal pain, weight loss, steatorrhea	Fear of food syndrome	Fear of food syndrome in elderly mistaken for psychiatric disorder
Non-Occlusive Mesenteric Ischemia (NOMI)	Acute abdominal pain out of proportion.	Persistent metabolic acidosis and lack of response to volume replacement.	NOMI occurs in setting of low flow state (most commonly patients on mechanical circulation assistance devices such as ECMO, LVAD, and IABP)
Thromboembolic Venous Disease (DVT/PE) ¹	Swelling of lower extremities.		Occult malignancy must be ruled as a cause in elderly patients with unprovoked DVT
Complications of dialysis Access	Steal syndrome	Persistent/recurrent heart failure refractory to standard treatment	High output heart failure occurs in elderly patients, more likely to have preexisting heart or lung disease at lower threshold of flow.

Table 1: Uncommon manifestations of common vascular disease in the elderly.

*CLTI- Chronic limb threatening ischemia, presenting with nonhealing ulcers or gangrene

**6P's - Pain, pallor, pulselessness, paresthesia, paralysis, poikilothermia

¹These conditions differ in etiology rather than signs and symptoms in the elderly population

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Declaration of Conflicting Interests

The authors declare that there are no conflicts of interests.

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