Original Research Article

To Study the Spectrum of Clinical Features, Prevalence, Risk Factors, Type of Management and Clinical Outcome in Relation to the Type of Management in Patients with Peripheral Arterial Disease

Surabhi Matta[1], Madhu Lata Rana[2]

[1]Post Graduate Student, General Surgery, SGRRIM AND HS, Dehradun, India
[2]Professor, General Surgery, SGRRIM AND HS, Dehradun, India

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Abstract

Background: Peripheral artery stenosis or blockage is frequently one of the manifestations of systemic atherosclerosis. The most frequent causes of Peripheral arterial disease (PAD) are atherosclerosis and/or thromboembolic disease. The patient may display a variety of clinical manifestations and symptoms, which can be categorized into the following groups: loss of sensation, changes in colour, temperature, pulsations of the arteries, movement, ulceration, gangrene. Digital subtraction angiography (DSA) still yields the sharpest images, even though CT angiography and magnetic resonance (MR) angiography are more recent techniques that are gaining favor. Risk Factors. Cigarette smoking, Diabetes Mellitus (DM), High blood pressure and abnormal lipid levels, Insufficiency of the kidneys and raised inflamatory markers. Imaging, Duplex Ultrasound, Angiography Done Through a Catheter, Non-operative management, Operative Procedures Surgical revascularization plays a predominant role in the management of patients who have vascular disease; however, the modern treatment paradigms have evolved significantly with an increased emphasis on catheter-based percutaneous interventions over the past two decades. **Aims and Objective:** To study the spectrum of clinical features, prevalence, risk factors, type of management and clinical outcome in relation to the type of management in patients with peripheral arterial disease. **Conclusion:** Prevalence of total peripheral arterial disease patient as compared to patients presenting with either unilateral or bilateral lower limb pain is 24.5%. It can be seen that 82% population is male and the rest is female. 57% of the population that was analyzed in this research project had diabetes mellitus. The population had 33% people who were known hypertensives who were suffering from peripheral arterial disease. Tobacco is another risk factor that goes hand in hand with smoking, where males are mostly known to be smokers.

Keywords: Peripheral arterial disease, Digital subtraction angiography (DSA), CT angiography and magnetic resonance (MR) angiography , Cigarette smoking

Introduction

Peripheral artery stenosis or blockage is frequently one of the manifestations of systemic atherosclerosis. It causes the muscles in the lower extremities to receive insufficient oxygen, which results in a dull discomfort, cramping, or numbness in the calf, buttock, hip, thigh, or arch of the foot. The most frequent causes of Peripheral arterial disease (PAD) are atherosclerosis and/or thromboembolic disease [1]. The size of the blocked arterial and whether the stenosis or occlusion develops quickly (acutely) in a previously healthy artery or gradually (chronically), with the artery gradually narrowing over time, determining how severe the symptoms are [2].

If an artery continues to narrow, collateral circulation could develop. This circulation provides a different course for blood to travel, which may lessen symptoms up until a serious stenosis or occlusion has occurred. The intermittent claudication, defined as a crippling pain in the muscles that is consistently brought on by walking but not by taking the rest (unlike nerve compression from a lumbar intervertebral disc prolapse or osteoarthritis of the spine or spinal stenosis, which are typically relieved only when resting in the sitting position for greater than 5 minutes) [3].

Anaerobic respiration can happen even when the patient is at rest, and it frequently affects the foot and/or calf. The claudication distance reduces as the condition worsens, and the leg's perfusion may be seriously compromised. The patient may display a variety of clinical manifestations and symptoms, which can be categorized into the following groups: loss of sensation, changes in colour, temperature, pulsations of the arteries, movement, ulceration, gangrene. It is standard procedure to look for any indications of an aortic aneurysm or a renal artery bruit in the abdomen as well as the femoral, popliteal, posterior tibial, and dorsalis pedis arteries, both of which may be present in individuals with lower limb occlusive disease. Embolic occlusion of the arterial circulation is a medical emergency that requires immediate attention [3]. Permanent ischemia that lasts longer than six hours usually necessitates amputation of limbs [4].

Distally, pulses cannot be seen, however, the femoral pulse may still be noticeable and even pressing. This is because, despite the absence of blood flow, distal obstruction forces the artery to forcibly expand with each pressure wave. A portable Doppler ultrasonography probe is very helpful in the assessment of occlusive artery disease. [5] Duplex scanning is a different type of scanning that creates an image of the vessels being examined using B-mode ultrasound. The femoral artery is typically involved in digital subtraction percutaneous angiography (DSA), in which a radio-opaque dye is introduced into the arterial tree using a percutaneous catheter method. Digital subtraction angiography (DSA) still yields the sharpest images, even though CT angiography and magnetic resonance (MR) angiography are more recent techniques that are gaining favor [6]. Acute limb ischemia (ALI) and lower extremity amputation are two serious PAD-related disorders that affect the limbs and are a direct result. Even though there is a great deal of overlap between the two categories, the etiology of PAD and the other diseases brought on by atherosclerosis are not the same. This shows that individualized PAD diagnostic and

*Correspondence
Dr. Surabhi Matta
Post Graduate Student, General Surgery, SGRRIM AND HS, Dehradun, India

treatment plans are necessary. The words peripheral vascular disease and peripheral artery (or arterial) disease have been used interchangeably and without a precise definition throughout the course of medical history [5]. It is believed that it is crucial to adopt precise vocabulary and definitions in the era of precision medicine. For the purposes of this scientific statement, "lower extremity PAD" refers to peripheral arterial disease (PAD). To be more precise, it is being referred to an obstruction brought on by atherosclerosis that reaches the pedal arteries from the aortoiliac segments [7].

The classic signs of intermittent claudication, which include exertional calf pain that disappears within 10 minutes of resting, are only experienced by 10% to 30% of patients. The remaining individuals either experience unusual leg symptoms (40%–50%) or no exertional leg symptoms at all (20%–50%). Typical symptoms are present in only 10% to 30% of individuals with intermittent claudication [8]. Atypical leg symptoms can include pain or discomfort that starts at rest, or that prevents the patient from walking, and that which does not consistently go away with rest [9]. The hallmark of PAD is a buildup of plaque in the arteries that results in blood vessel narrowing. After coronary heart disease and stroke, which are the two main causes of atherosclerotic morbidity, PAD is the third most common cause [10].

Critical limb ischemia, also known as chronic limb-threatening ischemia [11], is a severe form of peripheral arterial disease that is typically described as PAD in the presence of rest pain, lesions that do not heal, or tissue loss.The factors that put a patient at risk for PAD are comparable to those that put the patient at risk for atherosclerotic disease in other vascular beds, albeit with some differences in the risks that each component poses.Cigarette smoking is powerful indicator of the presence of PAD and the course of the disease; additionally, it forecasts the failure of bypass graft and endovascular intervention procedures [12, 13, 14]. It is estimated that smoking can increase the risk of peripheral arterial disease in the lower extremities by a factor of two to six, and it can increase the risk of intermittent claudication by a factor of three to ten [15, 16]. Eighty percent of people diagnosed with PAD have a history of smoking [17,18]. Smoking cigarettes is a higher risk factor for peripheral arterial disease (PAD) than it is for coronary artery disease (CAD), with smokers having a 2 to 3 times greater possibility of acquiring PAD than CAD [19]. In addition to this, it is an independent predictor of the probability of requiring unplanned urgent revascularization of the lower extremities in the aftermath of first successful treatment [20]. In patients who have overt diabetic mellitus, the risk of prevalent PAD increases by a factor of two to fourfold, while the risk increases by a factor of two when there is impaired glucose tolerance [21]. Uncontrolled elevated blood pressure is linked to a more severe form of peripheral arterial disease (PAD) [22] . There is a correlation between prevalent PAD and having total cholesterol and LDL cholesterol levels that are elevated, low HDL cholesterol levels, and high triglyceride levels [23]. When total cholesterol levels rise by 10 mg/dl, there is a five to ten percent increase in the likelihood of having PAD [24]. Patients who have chronic kidney disease (creatinine clearance 60 ml/min) and end-stage renal disease have a higher prevalence of intermittent claudication and a low ankle-brachial index (ABI), as compared to patients who have normal renal function [25].

Clinical Profile

Ankle-to-brachial index (ABI), also known as the ratio of ankle-to-brachial systolic blood pressure, is the first-line noninvasive diagnostic tool for peripheral arterial disease. PAD is defined as an ABI less than 0. 90 [32]. The diagnostic performance of ABI to diagnose PAD is reasonably strong, with sensitivity and specificity, respectively, ranging from 61% to 73% and 83% to 96%. This is based on imaging modalities serving as the gold standard [25]. According to the findings of several studies, women typically have ABIs that are lower than those of men, maybe because women are shorter than men [12,13].

Waveform analysis provides us with the ability to detect occlusive disease in diabetic persons despite their calcified arteries and to evaluate which patients are at a high risk of developing cardiovascular disease (CVD) and limb events [26]. The segmental perfusion pressure and the transcutaneous oxygen pressure are two additional physiological tests that can be performed in addition to the ABI and TBI. The former enables us to localise the pressure drop downstream of significant stenosis, whereas the latter evaluates tissue oxygenation. Not only is the latter useful for quantifying the consequence of malperfusion, but it can also be used to identify viable tissue after revascularization, and it can be used as a contrario for delimitation of the amputation line in severe cases [27]. **Imaging.** In individuals diagnosed with PAD, noninvasive imaging has experienced substantial progress over the past decade because of technical advancements, allowing for a more precise assessment of the anatomical makeup and degree of arterial stenosis [28]. The capacity to monitor distal arteries with calcification, a lower contrast dose, and greater spatial resolution are some of these advantages. The choice of imaging modalities to utilize in the diagnosis of PAD need to be chosen by several characteristics, including as the patients' symptoms (for example, claudication as opposed to CLI), renal function, and ABIs. Computed tomographic angiography (CTA) and magnetic resonance angiography (MRA) are both accepted as viable imaging procedures that can be applied for the purpose of identifying whether a patient suffering from PAD should undergo revascularization. [29]. When compared with angiography, multidetector CTA has a sensitivity and specificity of greater than 90 percent for the detection of PAD [23].

Duplex Ultrasound

The sensitivity and specificity of the test are both governed by a number of separate parameters, such as the presence of calcium in the artery wall, the location or depth of the vessel, and the occurrence of many occlusions at diverse locations. [30].

Angiography Done Through a Catheter

Although it is still considered the gold standard for detecting PAD, catheter-based angiography is now only performed on patients who are having endovascular revascularization [1]. CTA and MRA imaging can be fused to the angiography, which has the potential to reduce the use of contrast as well as radiation. New techniques are available that aid to reduce the consumption of iodinated contrast, and these approaches can assist reduce the amount of contrast that is employed [31]. In addition, standard contrast-based angiography is occasionally complemented or replaced by CO2 angiography in certain medical institutions In many patients suffering from claudication, a sustained improvement in claudication distance and a reduction in cardiovascular risk can be achieved through cessation of smoking. Diseases connected with vascular difficulties, such as hypertension and diabetes, may need the use of medicine. Even when the lipid profile is normal, a statin should be taken because these drugs have the capacity to modify atherosclerotic plaques and protect against cardiac mortality regardless of the patient's baseline serum lipid levels. In addition to that, an antiplatelet agent is required [32]. Surgical revascularization plays a predominant role in the management of patients who have vascular disease; however, the modern treatment paradigms have evolved significantly with an increased emphasis on catheter-based percutaneous interventions over the past two decades. The increasing significance of this type of minimally invasive vascular intervention can be attributed to a number of different factors. These factors include the rapid advancements in imaging technology, the decreased risk of morbidity and mortality associated with endovascular interventions, and the accelerated recovery time that follows percutaneous therapy in comparison to conventional operations.

Endovascular intervention gives improved clinical results and plays an even larger part in the treatment of vascular illnesses as device development and image-guided technology continues to be developed. Endovascular intervention has been shown to be effective in treating vascular diseases. Patients who are suffering considerable symptoms and for whom angioplasty has either been unsuccessful or is not an option often are the ones who are considered for surgical operations. Catheter-based therapies include procedures such as stent

grafting and percutaneous transluminal angioplasty, both of which are abbreviated as PTA. Embolectomy, thrombolysis, extraanatomical grafting, laparoscopic grafting, and direct anatomic surgical reconstruction are some of the other surgeries that have the potential to be performed. Direct anatomic surgical reconstruction may also entail an endarterectomy.

Aims and Objective

To study the spectrum of clinical features, prevalence , risk factors , type of management and clinical outcome in relation to the type of management in patients with peripheral arterial disease.

Methodology

All patients presenting to Shri Mahant Indiresh Hospital, Dehradun and admitted in hospital with clinically/radiologically diagnosed as peripheral arterial disease will be taken up for the purpose of study, with the exceptions mentioned above.

Detailed history of all patients shall be taken, with spectrum of clinical features and their correlation with peripheral arterial disease.

History and presentation of symptoms, similar complaints in the past, and complications related to any surgery in past, if any, shall be recorded. Patients will be subjected to detailed physical examinations specially to rule out associated complications and to formulate management strategy.

Data collected shall be tabulated and subjected to detailed analysis, using standard statistical procedures.

Results and Observations

This is a prospective study conducted in the Department of Surgery, SGRRIMS and associated Shri Mahant Indiresh Hospital, Dehradun between 1st January 2021 to 31st December 2021.

All the patients of 18 years and above who presented with unilateral or bilateral lower limb pain were included in this study. the demographic information was recorded on the data collection form. Complete history was taken and the management and outcome of the peripheral arterial disease was recorded and followed up during the hospital stay of the patient.

Total 119 cases have been gathered for analyzing the given data. Following are the frequency tables and its interpretations.

Prevalence

Table 1: In the table given below we can see that in the given data, 82% of population is male and rest 18% population is female.

	Frequency	Percent
Female	21	18
Male	98	82
Total	119	100

Table 2: Age wise distribution

	Frequency	Percent
21-40	6	5
41-60	55	46
61-80	56	47
Above 80	2	2

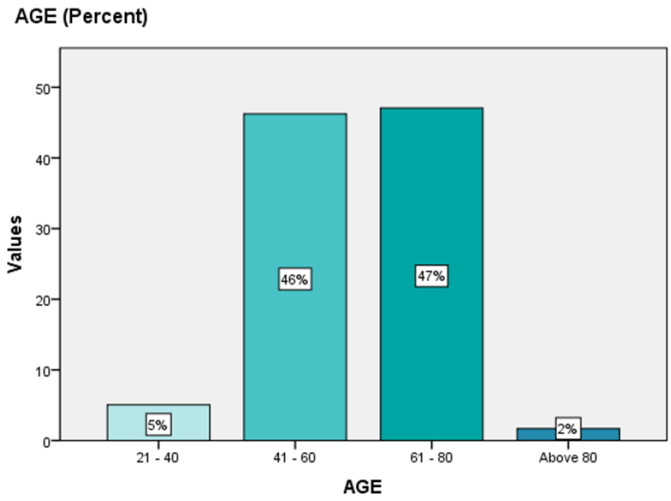


Table 3: In the table given below, we can see that 43% of the patients are diabetic and 57% of the patients are free from diabetes.

Diabetes Mellitus

	Frequency	Percentage
Absent	51	43
Present	68	57
Total	119	100

Table 4: Smoking

	Frequency	Percent
Absent	66	55
Present	53	45
Total	119	100

Table 5: In the table given below, we can see that in 89% of population , left upper limb is not involved but in 11 % of the population left upper limb is involved.

Left UL

	Frequency	Percent
Absent	106	89
Present	13	11
Total	119	100

Table 6: In the table given below, we can see that in 56% of population left lower is not-involved and in 44% of the population, left lower limb is involved.

Left UL

	Frequency	Percent
Absent	67	56
Present	52	44
Total	119	100

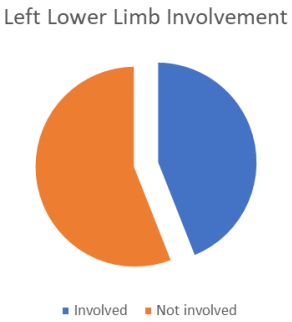
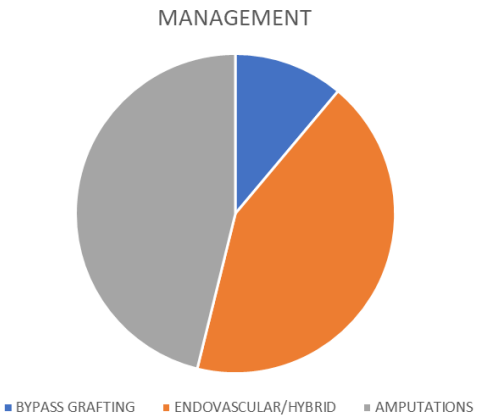


Table 8: In the table given below, we can see the results of Management given by the respondents.

Management	
Bypass Grafting	13
Endovascular/hybrid	50
Amputations	54



Discussion

In the table regarding gender, 82% of population is male and rest 18% population is female. In the research study conducted by He et al. (2012) [33], their data included 78% of males and 22% as females. This research findings of gender is very similar to our findings. In the table given below we can see that in the given data, most of the respondents are of age between 41-80. Zemaitis et al. (2022) [34] conducted a study where 70% of the population is male and 30% is female, out of which most of the respondent's age lie between 41-60 and their findings are much similar to this study.

In the table given regarding diabetes, we can see that 43% of the patients are diabetic and 57% of the patients are free from diabetes. In the study conducted by Eraso et al. (2014) [35], 55% of population is non-diabetic and 45% of the population is diabetic. In the given data, we can see that in 67% of population is non-hypertensive and in 33% of population is hypertensive. In the study conducted by Kasenda et al. (2022) [36], 55% of population is non-hypertensive and 45% of the population is hypertensive.

In the data mentioned, we can see that in 55% of population, smoking is absent whereas 45% of the population smokes one or another form of cigarettes/bidi/etc. In the study conducted by Tseng (2003) [37], 55% of population smoking is absent and 45% of the population are smokers.

In the data collected in this study, we can see that kidneys of only 7% population are involved. Either the involved population suffered from a chronic kidney disease, alongside diabetes, or an individually standing long term renal issues. In the given data collected, we can see that in 3% of population improved flow of 2D Echo is seen. In the given data that was collected, we can see the results of Management given by the respondents. 50 patients were managed by endovascular/hybrid means in view of vessel narrowing and stenting. Catheter directed thrombolysis was performed in most patients. 13 patients underwent by pass grafting through CTVS Department and recovered well.

Conclusion

Prevalence of total peripheral arterial disease patient as compared to patients presenting with either unilateral or bilateral lower limb pain is 24.5% . It can be seen that 82% population is male and the rest is female. 57% of the population that was analyzed in this research project had diabetes mellitus. The population had 33% people who were known hypertensives who were suffering from peripheral arterial disease.Tobacco is another risk factor that goes hand in hand with smoking, where males are mostly known to be smokers.

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