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Clinical study of peripheral vascular diseases and treatment modalities

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***Abstract*---**Peripheral vascular disease is circulation disorders that affect blood vessels outside of the heart and brain. It often neglected by patients but in later stage it causes serious problems. Smoking tobacco is the main culprit for PVD. So, this challenging subject is taken up for the present study in which we will be studying the clinical profile and management modalities for PVD in our hospital. This prospective study was conducted between September 2014 to September 2021on patients admitted to Smt. B. K. Shah Medical Institute and Research Centre, Dhiraj Hospital Piparia Vadodara. 50 patients having symptoms of peripheral vascular disease. This prospective study conducted at S.B.K.S.M.I.R&C. Dhiraj Hospital Piparia Vadodara, included 50 patients with acute pancreatitis, male and female (M: F =41:9),mean age is 35.5 years, smoking is the significant risk factor, medical therapy is more preferable in initial of disease while surgical treatment late phase. Peripheral vascular disease is mainly seen in elderly male specially seen in smokers and tobacco chewer ,claudication ,restpain,ulcer are the main symptoms , management is based upon claudication grading grade 1 and grade 2 can be manged conservatively while grade 3 and 4 required surgical management. Ilizarov, vascular bypass graft, embolectomy,

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amputation are surgical techniques which is decided upon level of blockage. Outcome of our surgical method is good compare to other similar studies. By early diagnosis and appropriate management one can save the limb.

***Keywords*---**peripheral vascular disease, rest pain, claudication, ilizarov, complication, outcome.

Introduction

Peripheral vascular disease (PVD) is the presence of systemic atherosclerosis in arteries distal to the arch of the aorta. As a result of the atherosclerotic process, patients with PVD develop narrowing of these arteries. The most common symptom of peripheral vascular disease is intermittent claudication. At other times, peripheral vascular disease leads to acute or critical limb ischemia. PVD also includes a subset of diseases classified as microvascular diseases resulting from episodic narrowing of the arteries Raynaud's phenomenon, erythromelalgia, TAO, atherosclerosis. PVD manifests as insufficient tissue perfusion initiated by existing atherosclerosis acutely compounded by either emboli or thrombi. Many people live daily with significant degrees of peripheral vascular disease; however, in settings such as acute limb ischemia, this latent disease can suddenly become life threatening and require emergency intervention to minimize morbidity and mortality [1].

Peripheral vascular disease (PVD), also known as arteriosclerosis obliterans, is primarily the result of atherosclerosis. The atheroma consists of a core of cholesterol joined to proteins with a fibrous intravascular covering. The atherosclerotic process may gradually progress to complete occlusion of medium and large arteries. The disease typically is segmental, with significant variation from patient to patient.

Vascular disease may manifest acutely when thrombi, emboli, or acute trauma compromises perfusion. Thromboses are often of an atheromatous nature and occur in the lower extremities more frequently than in the upper extremities. Multiple factors predispose patients for thrombosis. These factors include sepsis, hypotension, low cardiac output, aneurysms, aortic dissection, bypass grafts, and underlying atherosclerotic narrowing of the arterial lumen[2].

Emboli, the most common cause of sudden ischemia, usually are of cardiac origin (80%); they also can originate from proximal atheroma, tumor, or foreign objects. Emboli tend to lodge at artery bifurcations or in areas where vessels abruptly narrow. The femoral artery bifurcation is the most common site (43%), followed by the iliac arteries (18%), the aorta (15%), and the popliteal arteries (15%)[3,4].

The site of occlusion, presence of collateral circulation, and nature of the occlusion (thrombus or embolus) determine the severity of the acute manifestation. Emboli tend to carry higher morbidity because the extremity has not had time to develop collateral circulation. Whether caused by embolus or

thrombus, occlusion results in both proximal and distal thrombus formation due to flow stagnation.

The primary factor for developing peripheral vascular disease (PVD) is atherosclerosis. Other conditions that often coexist with PVD are coronary artery disease (CAD),The primary factor for developing peripheral vascular disease (PVD) is atherosclerosis.

Other conditions that often coexist with PVD are coronary artery disease (CAD), atrial fibrillation, cerebrovascular disease, and renal disease. PVD that coexists with CAD may indicate an increased burden of atheroma.[5] Studies have suggested that even asymptomatic peripheral arterial disease (PAD) is associated with increased CAD mortality.[6] Noninvasive tests for vascular disease—pulse wave velocity and ankle-brachial index—have been linked with the number of vessels obstructed with CAD.[7]

Risk factors for PVD include smoking, hyperlipidemia, diabetes mellitus, and hyper viscosity.

Other etiologies for developing PVD may include phlebitis, injury or surgery, and autoimmune disease, including vasculitides, arthritis, or coagulopathy. PVD rarely exhibits an acute onset; it instead manifests a more chronic progression of symptoms. Patients with acute emboli causing limb ischemia may have new or chronic atrial fibrillation, valvular disease, or recent MI, whereas a history of claudication, rest pain, or ulceration suggests thrombosis of existing PVD. Radiation-induced PAD is becoming more common, perhaps due to the efficacy of current antineoplastic treatment and increased survival.[8]

In this study types of treatment modalities for peripheral vascular disease compared with each other medical management by giving patient Anticoagulant medication),Anticoagulant medication, beta blockers. In surgical management embolectomy, artificial grafting, ilizarov surgery (lateral decortication), amputation done

Aim and Objectives

- To study investigations needed to confirm peripheral vascular diseases
- To study etiological factors of peripheral vascular diseases
- To analyses various types of peripheral vascular diseases
- To study various modalities of treatment for peripheral vascular disease
- To study the outcome and various treatment modalities.

Material and Method of Study

This is a random and prospective study of peripheral vascular diseases and its treatment modalities. This study is carried on patients admitted at Dhiraj general hospital between time periods of September 2014 to September 2021. In this study 50 case of peripheral vascular disease and their different treatment modalities. Approval of Sumandeep Vidyapeeth Ethical committee was taken. All

patients undergone through all investigation for PVD available at Dhiraj general hospital and managed accordingly that.

Inclusion Criteria

The study will include all adults who diagnose of Peripheral vascular diseases of lower limb regardless of risk factor status.
The patients who gives consent for study.

Exclusion Criteria

Patients with severe co morbidity.
Patients who are not giving consent.

Method of Data Collection

This is a randomized prospective study of cases of peripheral vascular diseases and treatment modalities. Direct interview with patient, patient informant and obtaining a detailed history. Thorough clinical examination was done and appropriate investigation of the patients were done.

Result

Table 1: Sex Distribution:

PATIENT	NO. OF PATIENT (N=50)	PERCENTAGE (%)
MALE	43	86%
FEMALE	7	14%

Table 2: Age Incidence:

AGE GROUP	MALE(n=43)		FEMALE (n= 7)		TOTAL (n=50)	
	No.	%	No.	%	No.	%
≤30	1	2.3%	1	14.28%	2	4%
31-40	4	9.3%	0	0	4	8%
41-50	21	48.8%	1	14.28%	22	44%
51-60	9	20.9%	0	0	9	18%
61-70	6	13.9%	3	42.85%	9	18%
71-80	2	4.6%	2	28.57%	4	8%

Table 3: Risk Factors

Risk factor	No. of patients	Percentage (%)
Alcoholic	30	60%
Smoking	45	90%
Tobacco	46	92%
Diabetes	12	24%
Hypertension	10	20%
Heart diseases	12	24%

Table 4: Clinical Features:

CLINICAL FEATURE	NO. OF PATIENT	PERCENTAGE (%)
CLAUDICATION	50	100 %
REST PAIN	30	60%
ULCER	12	24%
GANGRENE	6	12%

Table 5: Claudication Grade

Claudication grade	No. of patients	Percentage (%)
I	06	12%
II	10	20%
III	28	56%
IV	06	12%

Table 6: Pulsation

ARTERY	Absent in	Percentage (%)
Dorsalis pedis	40	80%
Anterior tibial	38	78%
Posterior tibial	35	70%
Popliteal	20	40%
Femoral	6	12%

Table 7: Doppler Study

ARTERY	TRI PHASIC	BI PHASIC	MONOPHASIC	ABSENT FLOW
DORSALIS PEDIS	0%	10%	40%	50%
ANTERIOR TIBIAL	0%	12%	40%	48%
POSTERIOR TIBIAL	80%	2%	50%	40%
POPLITIAL	40%	10%	40%	10%
FEMORAL	80%	8%	12%	12%

Table 8: surgical management

ilizarov	Vascular bypass				embolectomy	amputation
	IF	FF	FP	BIF		
11	3	6	3	1	4	6

Table 9: rest pain outcome:

Rest pain	No. of patient	ilizarov	Bypass graft	embolectomy	amputation	medical
disappear	37	10	10	3	6	8
occasional	07	1	3	1	0	2
Not reduced	06	0	0	0	0	6
total	50	11	13	04	6	16

Post operatively 37 patients completely disappear rest pain while 7 patients have still having complain of occasional intermittent rest pain, 6 patients had no effect of treatment all of them are treated with medical management.

Claudicating distance

Out of 50 patients claudication distance increased in 40 while 10 patients increased claudication distance. Among those 10 patients were treated medically.

Table 10: healing of ulcer:

	Healed	Not healed
Ilizarov	8	0
Amputation	2	0
Medical	0	2

Discussion

Peripheral vascular disease (PVD) is a slow and progressive circulation disorder caused by narrowing, blockage, or spasms in a blood vessel. Peripheral vascular disease also called peripheral arterial disease is under diagnosed, poorly understood, and much more common than former thoughts. Various treatment modalities both medical and surgical tried.

There was a male preponderance with 86% of the total patients being males. Patients in the 4th and 5th decade (median age: 51.7 years) were commonly affected. Smoking and tobacco are the main risk factors in peripheral vascular disease, found in 92% of the patients. The most common presentation was pain at lower limb with claudication, rest pain, blackening of skin, and gangrene in late presentation. Most commonly diagnosis based on history and clinical examination. Arterial Doppler and CT-angio are diagnostic tool. Pain and claudication symptoms depends upon level of blockage. Initial management in grade I and II is medical management with cilostazol and pentoxyphylline with antiplatelet and life style modification. Surgery is management of choice in patients having claudication grade III and IV. Ilizarov surgery have excellent results when there is no popliteal blockage or proximal to it. In our study complication rate is very less, there is only 1 case of wound infection. Out come and patient satisfaction is excellent with surgical method in our study. The mean hospital stay was 24.7 days. There is no mortality in our study.

There is a male predominance in our study with males accounting for 86% of patients with an M: F: 43:7 which is comparable to the Vibhu Garg et al [9] and study conducted in subharti medical college in the year of 2016 and Ashok Pithva et al [10] . The reason for male preponderance in our other Indian study is due higher rate of tobacco chewing and smoking in male in India. (3,5) . Female patients were also noted to be older at presentation, which may reflect the positive effect of estrogen on the cardiovascular system until the menopause. The peak incidence was in the 4th and 5th decade of life - the most productive age group. The median age group in our study is 51.74 years compared to 46.25 years in Vibhu Garg[9] is and 44.45 years in Ashok et al [10]. Both male and female have

same almost same incidence of age. Elderly patients are more prone to associated risk factors like diabetes, hypertension, hypercholesterolemia, obesity are more found in such patients. Elderly patients are more predisposed to have coronary artery disease and other cardiac complication. Smoking and tobacco chewing is the main risk factor in our study which is respectively 92% and 90% of total number of patients. Injurious effects of smoking on the development of PAD are those which result in abnormal vasodilator responses of arteries this causes decrease peripheral oxygen supply which causes tissue hypoxia and pain starts. Someone who has ever smoked is more than four times as likely as a non-smoker to develop PVD and current smokers are more than 11 times more likely than non-smokers to suffer from peripheral vascular disease. [11] In our study 60%patients were alcoholic while in both other study it is 24% and 5%. The exact mechanism how it act in peripheral vascular disease is not known but it can induce other risk factors like diabetes, hyperchlolestremia. In our study 24% and Vibhu Garg et al [9] study; 56% patients were diabetic. In diabetic patients symptoms might mimic with diabetic neuropathy, diabetic foot, these patients have more chances to develop wound infections. There is evidently a clear association between PVD and hypertension although its relative risk may not be as high as for smoking or diabetes mellitus.

Pain relive by taking rest because substance P and metabolites wash away after taking rest and patient continue to walk. Majority of patients in our study come under grade 3 in which patients having rest pain typically while sleeping with hyperesthesia this is due to obstruction of vessel and slightly relieve by holding leg this is may be because of suppression of transmission of pain which is comparable to Ashok et al in which 70% of patients came under grade 3. Grading is very important because treatment depends on the base of claudication grade if patients come under grade 1 medical management should be given. Grade 2 and 3 different surgical methods are beneficial while in Grade 4 generally all patients end up with an amputation. Patients clinically presenting with grade 4 required amputation. Level of amputation decided on presence of pulsation. Usually when gangrenous changes up to ankle and popliteal pulsation are present patient need below knee amputation. Above knee amputation is required when popliteal pulsation are absent. All peripheral pulsation examined in supine position, with well exposure. Dorsalis pedis artery pulse - on dorsal surface of the foot, running lateral to the tendon of the first toe, it is first artery to be affected it absent in 80% patients in our study.

In our study all patients under went for lower limb arterial Doppler study. All patients under claudication grade 1 and 2 shows bi phasic or monophasic flow in more distal arteries like dorsalis pedis and anterior tibial artery. While triphasic flow in femoral and popliteal vessels. Patients having claudication grade 3 and 4 shows absence of flow in more distal arteries while femoral and political shows monophasic flow. Typical findings in arterial narrowing are: A) increase peak systolic velocity. B) marked spectral broadening C) monophasic wave forms seen in our patients. The overall accuracy of Doppler in peripheral arterial disease is 98% [12]. It is more economic and no complication compare to CT angiography. Because of its noninvasiveness and affordability it more preferable over ct angiography. CT angiography of lower limb is gold standard for peripheral arterial disease it is as accurate as digtal subtraction angiography[12]. In our study only

10 patients under gone for lower limb CT angiography these because of patient's affordability issue and availability of facilities. CT angiography more use full in suspect case of femoral artery blockage or popliteal artery blockage. In the Infrapopliteal region, exact lesion assessment remains problematic due to small vessel diameters. CT angiography much costlier compare to Doppler study and chance of dye induced anaphylactic reactions and radiation exposure are there. In postoperative period it is the best tool to visualize patency of graft or formation of collaterals after ilizarov surgery.

In our study total 34 patients were treated surgically while 16 patients managed medically. In our study 16 patients treated medically having grade I, II cludication,with rest pain only 2 patients having ulcer after one month of treatment 8 patients have completely resolved the symptoms while other 8 patients still having occasional or regular complain of pain and claudication. There is no improvement in ulcer after medical management in our study. In Vibhu Garg [9] study all patients were treated medically with cilostazol and pentoxyphylline 80 patients out of 100 improved their pain. By comparing all this clinical study with present study it seems that exclusive medical management only beneficial in initial stage of disease.

Surgical methods used for PVD are

1. ILIZAROV: It is a distraction of vertically splited tibia. Bigger vessels remain as such. It is the neohistogenesis which cure rest pain and increase cludication distance and small ulcer healing of its own thus it prevents increse in gangrene make line of demarcation very clear. In this study 11 patients underwent for ilizarov, in all these patient femoral and poplitaial pulsation are well present. Blockage present only below poplital level thease patient having blockage below poplitial level. In Ashok Pitva et al [11] patients some patients having femoral and pollitial artery blockadge. Results of lizarov surgery in our study are excellent almost all patients relived from the cludiacation and rest pain and non healing ulcer compare to othere study. In our study only one ptient has not reduced rest pain while in ashok garg et al 2 patintes not relieved rest pain this is might because they polpliteal artery blockage. When there is blockage of popliteal or femoral artery present ilizarov is not advisable because the neovascularisation formation is very poor in proximal blocakge. The main drawback is prolonged hosital stay and patient has to wear ilizarov ring for 6 weeks which is quit discomfortfull. Patinet has to stay at hospital minimum for 3 weeks for latreal direction it is done 0.25mm every four hourly.

2. BYPASS SURGERY: Peripheral artery bypass is surgery to reroute the blood supply around a blocked artery. A graft is used to replace or bypass the blocked part of the artery. Total 13 patients underwent for bypass surgery all of them having blockage above popliteal artery. Post-operatively patients were put on antiplatelet drugs orally and followed up at the end of 1, 6,12,18,24 months. Patency was present in all patients at the end of 2 years follow-up which as compared to El-Sayed et al [13] in which 82% patient had patency which may be due to more number of patients(n=93) patients in El-Sayed study as compared to 13 in our study.

3. Embolectomy was done in only 4 patients compared to 246 patients in Stile et al study [14] patients in Rochester et al study which may be due to patient presenting late at our institute after development of gangrene which requires amputation. Comparing the outcome of embolectomy 1 patient had to undergo re-embolectomy for recurrent block. All patients limb were salvaged in our study following embolectomy compared to other study but patients in our study were low to compare with other studies.

4.AMPUTATION: Amputation should be the last choice of management in peripheral vascular disease one should try best to save the limb. Total 6 patients undergone for below knee amputation in our study all these patients have had clear line of demarcation, complete blackening, no pulsation present below popliteal artery. There were no wound infection or increase in gangrenous part during postoperative period our study. All patients in postoperative period anti platelet drug started comparing to our results of amputation with Ashok Pitva et al [10] there were total 4 (n=20) underwent for amputation 2 of them are in postoperative period after ilizarov surgery develops gangrenous changes.

Conclusion

Peripheral vascular disease is mainly seen in elderly male specially seen in smokers and tobacco chewer ,claudication ,restpain,ulcer are the main symptoms, management is based upon claudication grading grade 1 and grade 2 can be manged conservatively while grade 3 and 4 required surgical management. Ilizarov, vascular bypass graft, embolectomy, amputation are surgical techniques which is decided upon level of blockage. Outcome of our surgical method is good compare to other similar studies. By early diagnosis and appropriate management one can save the limb.

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