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A Study on Assessment of Peripheral Arterial Disease in Diabetic and Nondiabetic Patients

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Abstract
Patients with PAD and DM had higher incidence of cardiovascular and cerebrovascular events-both fatal and non-fatal-than do non-diabetic PAD patients. According to the old World Health Organisation definitions, hypertension was defined as a systolic blood pressure of >160 mmHg and/or a diastolic blood pressure of >95 mmHg, or as long as the patient was receiving antihypertensive medication at the time. When a patient's blood creatinine level was greater than 140 µmol/l, macro albuminuria (>200 µg/min), microalbuminuria (20-200 µg/min), or both, nephropathy was diagnosed. Out of the 170 patients that were chosen, this study contained 146 whose case notes could be located. Their age was 64.83±11.2 years (mean±SD). With a length of 14.1±12.3 years, 68 patients (40%) had diabetes. Between patients with and without diabetes, there were no appreciable variations in the age and sex distribution, smoking history, incidence of intermittent claudication, or length of follow-up following angiography. Compared to those without diabetes, diabetic patients with peripheral artery disease had worse arterial disease and a worse prognosis.

INTRODUCTION

For men and women under 50, the prevalence of peripheral arterial disease is 2-6%, for those over 70, it rises to >7%[1,2]. Significant risk factors for peripheral arterial disease include hypertension, diabetes, smoking and hyperlipidemia[3]. Peripheral arterial disease patients have a poor prognosis and a shortened life expectancy because they frequently coexist with cerebrovascular illness and/or coronary artery disease[4,5]. Half of all deaths are caused by coronary heart disease, whereas nearly two thirds are caused by vascular diseases in general[6].Six It has also been shown that more than 40% of patients with peripheral arterial disease had renal artery stenosis[7]. In diabetic individuals with persistent foot ulceration, peripheral vascular dysfunction is a significant risk factor for lower-extremity amputation[8,9].

Comparing the severity and mortality of peripheral artery disease in patients with diabetes to those without the disease has not been extensively studied. While King[10] discovered a higher involvement of the profunda femoris in diabetes patients, Strandness[11] revealed that diabetic individuals had more infrapopliteal illness.

In patients with pre-existing diabetes, peripheral neuropathy, age, and length of diabetes are linked to an increased risk of PAD[12,13]. The prevalence of PAD in DM patients over 40 has been reported to be 20% using ABI to identify PAD[13]. In patients with DM who are older than 50, this frequency rises to 29%[14]. According to the United Kingdom Prospective Diabetes Study, every 1% increase in glycosylated haemoglobin was correlated with a 28% increase in the incidence of PAD, as well as higher rates of death, microvascular complications and major amputation. These findings suggest that the severity and duration of diabetes mellitus are significant predictors of both the incidence and the extent of PAD[15,16]. males who are actively smoking or have hypertension have a stronger link than other males. In addition to using hospital resources more frequently and spending more money, people with PAD who also have DM typically stay in the hospital longer than patients with PAD alone. As opposed to risk factors like smoking, which are linked to more proximal PAD in the aorto-ilio-femoral vasculature, diabetes mellitus is also related with more severe below-the-knee PAD (e.g., popliteal, anterior tibial, peroneal and posterior tibial arteries). More than half of patients with critical limb ischemia (CLI) also have diabetes mellitus (DM), making individuals with critical lower limb ischemia particularly susceptible to concurrent PAD and DM. Patients with PAD had a 30% overall mortality rate and a 20% cardiovascular event rate, including MI and stroke, over a 5-year period. Thirty percent of CLI patients require significant amputations and twenty percent of them die within six months. Patients with diabetes account for up to 60% of patients who present with acute MI and 25%-30% of patients having coronary artery revascularization[17]. Patients with PAD and DM had higher incidence of cardiovascular and cerebrovascular events-both fatal and non-fatal-than do non-diabetic PAD patients.

MATERIALS AND METHODS

The case notes were used to gather patient demographics, including age and sex, history of smoking, and conditions related to peripheral vascular disease, ischemic heart disease, hypertension, nephropathy, and hypercholesterolemia. A history of myocardial infarction or coronary revascularization surgery, alterations on electrocardiography, or clinical signs of angina were all used to diagnosis ischemic heart disease. According to the old World Health Organisation definitions, hypertension was defined as a systolic blood pressure of >160 mmHg and/or a diastolic blood pressure of >95 mmHg, or as long as the patient was receiving antihypertensive medication at the time. When a patient's blood creatinine level was greater than 140 µmol/l, macroalbuminuria (>200 µg/min), microalbuminuria (20-200 µg/min), or both, nephropathy was diagnosed. In order to determine which patients had undergone multiple revascularization procedures, lower-extremity amputations, vascular reconstruction, angioplasty, or stent placement, as well as which patients had passed away in the years after their angiographic procedure (up until 1999), case records were also reviewed. If the amputation was high level, it was done close to the midfoot and if it was low level, it was farther away.

Statistical Analysis: The differences in the mean values for age and cholesterol levels were evaluated using the two-sample t test. Any apparent discrepancies in proportions and arterial occlusion score were either confirmed or refuted using the one-tailed proportion test. The vascular disease scores of patients with and without diabetes were compared using the Mann-Whitney U test. When the P value was <0.05, statistical significance was acknowledged and the 95% confidence interval was computed appropriately.

RESULTS AND DISCUSSIONS

170 patients selected, 146 patients whose case notes could be traced were included in this study. Their age (mean ±SD) was 64.83±11.2 years. A total of 68 patients (40%) had diabetes, with a duration of 14.1±12.3 years. There were no significant differences in age and sex distribution, smoking history, incidence of intermittent claudication and the duration of follow-up after an-giography between diabetic and non-diabetic patients. However, although diabetic

Table 1: Demographics, smoking history, follow-up duration, and indications for arteriog- raphy in diabetic and nondiabetic patients

n	Diabetic patients	Nondiabetic patients	p-value
Age (years)	64.83±11.2	66.30±12.10	0.46
Men (%)	38 (55.8)	55 (32.3)	0.44
Smokers* (%)	51 (75.0)	68 (40.0)	0.28
Duration of follow-up (years)	4.47±1.25	4.52±1.23	0.87
Indicationsfor arteriography			
Intermittent claudication	53 (36.3)	66 (97.0)	0.26
Rest pain	4 (2.7)	11 (16.1)	0.05
Foot ulcer	27 (18.4)	9 (13.2)	<0.0001
Foot gangrene	9 (6.1)	4 (5.8)	0.01
Number of amputations	26 (17.8)	11 (16.1)	<0.0001
High level	20 (13.6)	11 (16.1)	
Low level	7 (4.7)	0	

Table 2: Levels of revascularization performed in diabetic and nondiabetic patients

	Diabetic patients	Nondiabetic patients	p-value
N	37 (54.4)	52 (76.4)	0.92
Iliofemoral region	10 (14.7)	15 (22.0)	0.99
Femoropopliteal region	29 (42.6)	38 (55.8)	0.53
Peroneal tibial region	0 (0)	7 (10.2)	0.09

patients had more foot ulcers and gangrene than nondiabetic patients, rest pain was less common in diabetic pa-tients. This is summarized in Table 1.

Table 2 shows the number of patients who underwent a revascularization pro-cedure as well as the level at which the procedure was performed. Between the diabetic and nondiabetic groups, there was no difference in the proportion of pa-tients that underwent some form of revas- cularization procedure (61.2 vs. 62.4%, P = 0.8). There was also no difference in the levels of revascularization performed between the two groups. Additionally, there was no difference in the proportion of patients who underwent more than one revascularization procedure in the period following the angiographic procedure (21.8 vs. 22.7%, P = 0.8).

Patients with coexisting diabetes and PAD have different outcomes depending on how various factors interact, including immunologic factors, neuropathy, infection, and patient comorbidities[17]. A higher incidence of PAD and a risk of unfavourable outcomes, such as the requirement for lower extremity bypass surgery, amputation, or death, have been linked to inadequate glycemic management. Additionally linked to poorer results after vascular surgery or endovascular intervention is poor glycemic management[18].

Therefore, in order to give effective long-term treatments for DM, it is crucial to develop medications that can influence the complex pathophysiologic pathways of the disease. Lifestyle modifications like losing weight, increasing physical activity and consuming less fat and cholesterol all lower the chance of developing diabetes from glucose intolerance and improve cardiovascular risk factors[19]. Quitting smoking is also essential and has been linked to better results from endovascular and surgical procedures. In addition to minimising unpleasant events during revascularization, this secondary risk factor reduction can significantly lower the prevalence and severity of PAD in diabetic individuals.

Revascularization is a crucial therapeutic option for the management of symptomatic PAD in diabetic patients and it can be achieved through surgery or endovascular methods. Some studies have demonstrated that endovascular procedures are associated with worse results in diabetics, particularly as distal flow declines, because of the higher frequency of below-the-knee illness in individuals with DM[19]. For this reason, endovascular treatments were originally thought to be more suitable for patients with localised illness above the knee. Additionally, it was observed that diabetic patients fared better after undergoing surgery to revascularize their veins, particularly when their tibial illness was treated with an autologous saphenous vein bypass[19]. Nonetheless, it appears from recent research that diabetes patients with sufficient distal runoff have patency rates that are similar to those of non-diabetics[4].

Another complication in these patients that is linked to a higher risk of calluses death is diabetic foot ulcers[17]. Both endovascular and open surgical techniques produced comparable results in terms of limb salvage rates in PAD patients whose course is worsened by diabetic foot ulcers[20]. It is noteworthy, therefore, that individuals with diabetic foot ulcers who also have concurrent PAD have higher odds of wound healing failure and amputation necessity. The relationship between effective revascularization and ulcer healing is complicated, and various investigations have demonstrated that the two are not necessarily associated[17].

CONCLUSION

Diabetes mellitus is also associated with a higher mortality risk and a lower quality of life. Diabetes causes atherosclerosis through a variety of multifactorial mechanisms, such as inflammatory

processes, disruptions of different cell types inside the arterial wall, stimulation of coagulation, and suppression of fibrinolysis. These variables heighten the vasculature's vulnerability to atherosclerosis and the instability that renders plaque vulnerable to rupture and thrombosis. To enhance the clinical outcomes in this patient population, it is crucial that several specialists work together and adopt a multidisciplinary approach, including cardiologists, internal medicine doctors, and vascular surgeons.

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